

Document of  
The World Bank

Report No: 21780-BR

PROJECT APPRAISAL DOCUMENT  
ON A  
PROPOSED LOAN  
IN THE AMOUNT OF US\$209 MILLION  
TO THE STATE OF SÃO PAULO  
GUARANTEED BY THE FEDERATIVE REPUBLIC OF BRAZIL  
FOR THE  
SÃO PAULO METRO LINE 4 PROJECT  
December 6, 2001

**Finance, Private Sector and Infrastructure Department  
Brazil Country Management Unit  
Latin America and the Caribbean Region**

## CURRENCY EQUIVALENTS

(Exchange Rate Effective (December 2000 - April 2001))

Currency Unit = Brazilian Real (R\$)

R\$1 = US\$0.51-0.43

US\$1 = R\$ 1.95-2.30

## FISCAL YEAR

January 1 -- December 31

## ABBREVIATIONS AND ACRONYMS

ABTN	- Brazilian Association of Technical Standards ( <i>Associação Brasileira de Normas Técnicas</i> )	LUCI	- Land Use Change Indicator
ATC	- Automatic Train Control	KV	- Kilovolt
		METRO	- São Paulo Metro Company ( <i>Companhia do Metropolitano de São Paulo</i> )
BNDES	- National Economic and Social Development Bank ( <i>Banco Nacional de Desenvolvimento Econômico e Social</i> )	MR	- Metropolitan Region
BOT	- Build-Operate-Transfer ( <i>Construir-Operar-Transferir</i> )	MT	- Ministry of Transport
CBTU	- Brazilian Urban Train Company ( <i>Companhia Brasileira de Trens Urbanos</i> )	NATM	- New Austrian Tunnelling Method
CETESB	- Environmental Technology Company ( <i>Companhia de Tecnologia de Saneamento Ambiental</i> )	NOx	- Nitrogen Oxide
CIF	- Cost, Insurance, Freight	PCU	- Project Coordination Unit
CMSP	- São Paulo Metro Company ( <i>Companhia do Metro de São Paulo</i> )	PITU	- Integrated Urban Transport Project ( <i>Projeto Integrado de Transporte Urbano</i> )
CMTC	- Municipal Bus Company ( <i>Companhia Municipal de Transporte Coletivo</i> )	PM10	- Particulate Matter less than 10 microns in diameter
CO	- Carbon Monoxide	PMIC	- Project Management and Implementation Consultant
COFIEIX	- External Financing Commission ( <i>Comissão de Financiamento Externo</i> )	PMOC	- Project Management Oversight Consultant
CPTM	- São Paulo Metropolitan Company ( <i>Companhia Paulista de Trens Metropolitanos</i> )	PMU	- Project Management Unit
CTC	- Centralized Traffic Control	pphd	- Persons per hour per direction
DERSA	- São Paulo State Roads Directorate ( <i>Direção de Estradas de Rodagem do Estado de São Paulo</i> )	ppm	- Parts per million
EBTU	- Brazilian Urban Transport Company ( <i>Empresa Brasileira de Transportes Urbanos</i> )	PROCONVE	- Program for the Control of Vehicle Emissions
EMTU	- Metropolitan Bus Company ( <i>Empresa Metropolitana de Transporte Urbano</i> )	RTCC	- Regional Transport Coordination Commission
EMU	- Electric Multiple Unit	SEAIN	- State Secretariat for Foreign Affairs
FEPASA	- São Paulo State Railways ( <i>Ferrovias Paulistas S.A.</i> )	SMA	- Secretariat for the Environment ( <i>Secretaria do Meio Ambiente</i> )
GEIPOT	- National Transport Planning Agency ( <i>Empresa Brasileira de Planejamento dos Transportes</i> )	SOx	- Sulfur Oxide
GSP	- Government of the State of São Paulo	SPM	- São Paulo Municipality
HC	- Hydrocarbons	SPMR	- São Paulo Metropolitan Region
IBGE	- Brazilian Institute of Geography and Statistics ( <i>Instituto Brasileiro de Geografia e Estatística</i> )	SSP	- State of São Paulo
ICB	- International Competitive Bidding	STM	- São Paulo Municipal Secretariat for Transport ( <i>Secretaria de Transportes da Prefeitura do Município de São Paulo</i> )
ICMS	- Circulation Tax on Goods and Services ( <i>Imposto de Circulação sobre Mercadorias e Serviços</i> )	STMSP	- São Paulo Secretariat for Metropolitan Transport ( <i>Secretaria de Transportes Metropolitanos</i> )
IERR	- Internal Economic Rate of Return	TBM	- Tunnel Boring Machine
I/M	- Inspection and Maintenance System	TRENSURB	- Porto Alegre Metropolitan Rail Mass Transit ( <i>Trens Urbanos de Porto Alegre</i> )
LRT	- Light Rail Transport	VOC	- Volatile Organic Compound

Vice President:	David de Ferranti
Country Manager/Director:	Vinod Thomas
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**BRAZIL**  
**SÃO PAULO METRO LINE 4 PROJECT**

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BRAZIL  
São Paulo Metro Line 4 Project

## Project Appraisal Document

Latin America and Caribbean Region  
LCSFT

<b>Date:</b> December 3, 2001 <b>Country Manager/Director:</b> Vinod Thomas <b>Project ID:</b> P051696 <b>Lending Instrument:</b> Specific Investment Loan (SIL)	<b>Team Leader:</b> Jorge M. Rebelo <b>Sector Manager/Director:</b> Danny Leipziger <b>Sector(s):</b> DV - Privatization, TU - Urban Transport <b>Theme(s):</b> Private Sector; Transport; Urban <b>Poverty Targeted Intervention:</b> N
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### Program Financing Data

Loan     Credit     Grant     Guarantee     Other:

#### For Loans/Credits/Others:

**Amount (US\$m):** US\$209

**Proposed Terms (IBRD):** Variable Spread & Rate Single Currency Loan (VSCL)

**Grace period (years):** 5

**Years to maturity:** 15

**Commitment fee:** 0.75%

**Front end fee on Bank loan:** 1.00%

Financing Plan (US\$m):	Source	Local	Foreign	Total
BORROWER		332.90	209.00	541.90
IBRD		0.00	209.00	209.00
FOREIGN PRIVATE COMMERCIAL SOURCES (UNIDENTIFIED)		111.00	72.00	183.00
<b>Total:</b>		443.90	490.00	933.90

**Borrower:** STATE OF SÃO PAULO

**Responsible agency:** SECRETARY OF METROPOLITAN TRANSPORT/SÃO PAULO METRO COMPANY

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### Estimated disbursements ( Bank FY/US\$m):

FY	2002	2003	2004	2005	2006	2007		
<b>Annual</b>	3.00	83.10	66.00	47.70	7.20	2.00		
<b>Cumulative</b>	3.00	86.10	152.10	199.80	207.00	209.00		

**Project implementation period:** FY 2002-2007

**Expected effectiveness date:** 12/30/2001    **Expected closing date:** 06/30/2007

## **A. Project Development Objective**

### **1. Project development objective:** (see Annex 1)

The objectives of the project are: (a) to improve the quality and long-term sustainability of urban transport in the São Paulo Metropolitan Region (SPMR) by interconnecting the existing subway, commuter rail and bus networks through the construction of METRO's Line 4; (b) to improve the accessibility of the low-income population of the areas served by Line 4 to employment centers and health and education facilities; and (c) to seek private sector participation in the development of Line 4.

The first objective will be achieved by financing the construction of Line 4 of the São Paulo METRO which links the Vila Sonia suburb with the Luz station and will have at the end of the proposed project, 12.9 km of double underground track, 5 stations, one yard, one workshop and 13 trainsets. When fully built, i.e., after the proposed project, Line 4 will have in total 14 stations and 23 trainsets. The proposed project would be undertaken under a turnkey contract with private sector participation (concession or other arrangement), in which 80% of the project will be financed by the public sector and the remainder by the private sector. The second objective will be achieved by promoting modal and fare integration between buses, subway and rail, in such a way as to minimize the overall generalized cost of travel (tariff, travel time, reliability and safety) to the low income users of the system, particularly those from Embu and Taboão da Serra. The third objective will be met through either a concession agreement or other private sector participation (PSP) arrangement to obtain at least 20% of the cost of the project.

The Line 4 Project is a priority undertaking within the Integrated Urban Transportation Plan (PITU) for the SPMR. The Project will (i) serve as a "bridge" between METRO's Line 5 and Companhia Paulista de Trens Metropolitanos (CPTM) West commuter line to the METRO network, (ii) interconnect with all three existing METRO lines to provide a grid flexibility to the METRO network which does not exist with the present radial configuration, and (iii) interconnect two CPTM commuter rail lines. At the end of the project, the whole metrorail network will be interconnected thereby facilitating access to most of the sectors of the SPMR.

### **2. Key performance indicators:** (see Annex 1)

The key performance indicators measure the modal integration objective by estimating the % of stations where bus/rail integration is provided, the public transport improvement related objective by measuring the increase in the rail share in urban transport motorized trips, and the accessibility of low-income user related objective by measuring the generalized cost of travel (travel time plus fare plus reliability).

## **B. Strategic Context**

### **1. Sector-related Country Assistance Strategy (CAS) goal supported by the project:** (see Annex 1)

**Document number:** 20160-BR **Date of latest CAS discussion:** March 30, 2000

The current Bank's assistance strategy to Brazil was approved by the Board on March 30, 2000 (Document nbr. R2000-25(IFC/R2000-34). A progress report (22116-BR) was presented to the Board on May 24, 2001 (Document nbr. R2001-0057(IFC/R2001-0069). The five pillars that support the overall poverty reduction strategy of the CAS are: (a) targeted interventions to reduce poverty, among others through the provision of urban services to the poor, (b) sustainable fiscal adjustment, among others through reform of public enterprises, (c) renewed growth, among others through private sector participation in infrastructure provision, (d) improved government effectiveness, and (e) effective environmental management. The proposed project constitutes an important part of the program to meet the CAS objectives, in particular in

terms of targeted provision of services to the poor, fiscal adjustment and growth.

The project will have the following impacts:

(a) *Direct poverty effects.* Although nearly all Line 4 users have incomes above the food poverty line usually used to calculate poverty in Brazil, fifty percent of the users are from a low income family and earns less than US\$4/day with about twenty two percent earning less than US\$2/day. The access to health, education and employment benefits of the new line will be significant for the following poor communities in the São Paulo Metropolitan Region: Taboão da Serra, Embu, Cotia, Embu Guaçu, Itapeperica da Serra, Jujutiba, São Lourenço and Vargem Grande Paulista among others (see Annex 11).

(b) *Direct Fiscal Effects.* The Bank's support for the turnkey contract with PSP of this greenfield construction project in Brazil should generate significant fiscal savings over the equivalent public-sector-only project of about US\$200 million over the next 6 years. There will be no operating subsidies since this is a positive concession.

(c) *Dynamic Fiscal Effects/Governance and Institutions.* The loan is part of a dynamic process of support to institutional improvements by the state government of São Paulo, during which the state has transformed itself administratively and achieved fiscal balance. In pushing forward this process, and bringing best practice to São Paulo State in the areas of PSP/infrastructure construction/regulation, the project has political and institutional benefits both at the level of São Paulo, and, owing to the State's fiscal significance at the federal level, outside it.

(d) *Economic Growth.* Traffic congestion is becoming a serious impediment to the economic performance of the Brazilian economy's largest single component: It is estimated that in the São Paulo Metropolitan Region 316 million passenger hours/year are wasted for bus and auto trips, and total length of congested roads tripled between 1992 and 1996 from 39 to 122 km. By connecting the existing rail and metro networks, the Line 4 project will increase accessibility to all areas of the SPMR and consequently to the job market particularly for the low-income segment of the population.

(e) *Environment.* The project has significant environmental benefits by reducing the number of buses and the length of bus trips in the area of influence of Line 4 and consequently the auto and bus emissions in that corridor.

Through its involvement the Bank has already helped accelerate the private sector participation process in METRO and will stimulate a thorough review and improvements of sub-sector policies - particularly financial and modal integration - at the state and municipal levels. This project also contributes to the attainment of state creditworthiness and fiscal improvement because the new line will not have an operating subsidy. The proposed project is also a follow-up to the efforts started with the CBTU São Paulo Metropolitan Transport Decentralization Project and the Barra Funda-Roosevelt Project which aimed respectively at decentralizing the federally-owned CBTU to the State to allow for more effective modal and tariff integration and to link the two existing commuter railways of the region. The proposed project is also anchored on the following ESW:

a) Urban Transportation: Issues and Options, which laid the foundations for the CBTU decentralization program;

b) Essentials for Sustainable Urban Transport in Brazil's Large Metropolitan Areas. This ESW was widely discussed within the Bank and with our Brazilian counterparts. They have adopted b) as their urban transport strategy; and

c) the discussions of the Bank's Urban Transport Strategy, in which it was concluded that the Bank could be involved in the financing of subways when the high levels of demand so require, the environmental benefits are significant, alternative modes are incapable of satisfying the demand and the fares will be sufficient to cover working costs defined as out-of-pocket costs plus depreciation and cost of capital of equipment and the impact on State finances is adequately funded and sustainable.

## **2. Main sector issues and Government strategy:**

**Background.** The São Paulo Metropolitan Region (SPMR), with 8050 sq. km, has 16.8 million inhabitants spread irregularly over 39 individual municipalities which are dominated by the São Paulo Municipality (SPM) with 8.5 million inhabitants. The SPMR generates roughly 20% of the GNP and is considered the most important economic region of the country. Each day, 31.4 million person trips take place in the SPMR of which 10.8 million are walking trips, 10.1 are private auto trips and 10.4 are public transport. Fifty percent of the motorized trips are by private automobile while of the remaining 50% by public transport 76% are by bus (mostly private operators), 2% by vans, 16% by METRO and 6% by train. Of the 12 million trips by public modes, about one third use more than one vehicle, requiring some sort of modal transfer: 78% of all METRO trips, 61% of all train trips and 16% of all bus trips require one or more transfers to be completed. This level of urban transport activity, dominated by the road-based motorized modes has significant impacts on the SPMR's environment. Despite an existing 270 km rail network, the lack of integration between the METRO and the suburban trains discourages more rail trips, in favor of buses and the automobile creating heavy congestion during peak hours thereby significantly increasing home-to-work trip time. The urban poor are the main users of public transport and bear the brunt of these problems: (i) shortage of capacity at peak hours resulting in overcrowded (>8 pass/m<sup>2</sup>) often inhuman conditions, (ii) long work journeys (2.5 hours/day) from the Metropolitan periphery to the urban centers, with often more than two modal transfers; and (c) paying over a fifth of their income towards fares. The proposed Line 4 will link the METRO and suburban rail (CPTM) network integrating the whole rail-based system with a huge network of intermunicipal feeder buses.

**Institutional Framework:** There are two main bodies responsible for overseeing the Metropolitan and urban transport sector in the SPMR: (a) the *Secretaria de Transportes Metropolitanos do Estado de São Paulo* (STMSP) created in 1991; and (b) the *Secretaria de Transportes da Prefeitura do Município de São Paulo* (STM). STMSP is responsible for urban transport in the metropolitan region outside the jurisdiction of São Paulo Municipality and oversees the São Paulo METRO, the suburban railway (CPTM) and the metropolitan bus company (EMTU). Therefore, the whole rail-based network of the SPMR is under the STMSP along with the intermunicipal buses i.e. buses that operate in more than one municipality. The STM is responsible for all the buses that operate in the São Paulo Municipality. At present there is no regulatory agency in the SPMR either at the municipality or State level. Present interaction between the STMSP and STM is facilitated by the RTCC (Câmaras Temáticas) but a more formal coordination would be desirable.

A number of key issues must be addressed in order to improve the supply of urban transport services and to guarantee their orderly development and sustainability in the long term for the SPMR. They are: (a) institutional issues; (b) cost recovery and financial management issues; (c) environmental issues; and (d) transport planning issues.

**Institutional Issues.** The most critical institutional issues are: (a) the fine-tuning of relations between state and municipal governments and a clear definition of their respective roles in the financing, planning and operation of urban transport services in accordance with the 1988 Constitution; (b) the appropriate modification of regulations, including the elimination of regulatory barriers which might prevent free entry

and/or competition in the market for provision of public transport services, particularly in the bus industry; and (c) the need for a regulatory agency for metropolitan transport in view of the existing and upcoming concessions of Line 4, CPTM and state busway services. To deal with a) Government's strategy was to create a regional coordination entity (Câmara Temática de Transportes) empowered by the SPMR for planning, coordinating and setting priorities for new investments and modal integration. This entity meets frequently and is primarily a forum for discussion of metropolitan transport policies and projects which has successfully discussed integration between municipal and state projects and the specifications for the future SPMR's smart card. Although the Câmara Temática has served the purpose of a forum for discussion of main issues it is not deliberative. The proposed project will require a formal coordination agreement between the State and the São Paulo Municipality to ensure that physical and tariff integration agreements are formal and cannot be changed without joint consent. To deal with b) the State is committed to reform the bus industry route contracts through competitive bidding just as it did with the São Mateus-Jabaquara busway concession, as soon as the present permissions to operate expire; and finally to deal with c) the State's Assembly is discussing a Regulatory Agency draft law to set a regulatory entity for transport. While it awaits legislative approval, the State should create an interim commission which will act as a regulatory agency to oversee the Line 4 concession.

**Cost Recovery and Financial Management Issues.** The need to address cost recovery from a more commercially oriented standpoint by: (a) setting tariffs which, when added to subsidies, cover at least the long-run variable costs (defined as out-of-pocket costs plus depreciation of equipment and cost of capital) of the service provided; (b) controlling fare evasion; (c) appropriate peak and off-peak pricing; (d) improving the financial management of the systems through wide-ranging cost cutting measures, staff rationalization policies, and employing more financial managers to run the mass transit systems; and (e) revamping the funding mechanisms in order to guarantee adequate financing for the implementation of new mass transit systems and the sustainability of the existing systems. Since the initial preparation of this project in 1993-94, to help achieve these goals, the São Paulo State Government (GSP) has embarked on an aggressive campaign to promote private sector participation in the urban transport sector. METRO has adjusted its fares to reflect increases in costs, outsourced a number of services to reduce operating costs, reduced staff and decided to seek private sector participation in the construction of this line. However, despite these efforts, METRO can still have cost-efficiency gains, if it manages to operate the new line without increasing its staff. That METRO maintains a working ratio of less than one is a conditionality of this project.

**Environmental Issues.** Air pollution, noise, traffic congestion, and road accidents are major environmental issues to be addressed in the SPMR. The reduction of the environmental impacts of urban congestion and noise pollution in the urban area could be done through: (a) the allocation of responsibilities across government levels for the enforcement of the law and definition of tougher standards; (b) the use of cleaner and quieter systems; (c) where appropriate, the use of non-motorized transport; (d) improved traffic management and control; and (e) the strengthening of traffic safety education and the enforcement of traffic regulations. As part of a long-term strategy, the Government is reviewing the potential role of market-based incentives to address pollution as well as the implementation—to the extent possible—of the polluter-pay principle to minimize the fiscal burden implied by *de facto* government subsidies to polluters. The financing of the noise and emissions laboratory (under Ln. 4312-Br), as well as the PHRD grant (TF25255) which financed air-quality related studies to measure the impact of vehicle emissions on health, contribute to these objectives. Construction of Line 4 will definitely reduce the number of bus-kms in the same corridor and consequently will reduce vehicle emissions. The impact on auto emissions will be reduced because the number of auto users which will switch to METRO is smaller for cultural reasons. METRO and commuter rail are unfortunately still seen as transportation for the lower income classes, especially at peak-hour. The

State Environmental Agency (CETESB) has, however, introduced legislation, by which only vehicles with tags ending in an odd number can circulate in some days of the week and those with tags ending in an even number will circulate during the other days, in some months of the year, to reduce the environmental impacts. This has reduced the number of vehicles per day by an estimated 600,000 in those months of the year in which this rotation is in force. The São Paulo Municipality Traffic Agency (CET) has introduced the same system on a daily basis for the peak-periods to ease traffic congestion. This measure has also had positive impacts on the environment which are now being quantified.

**Transport Planning Issues.** The need to strengthen SPMR's transportation planning, traffic data base, traffic management, and economic and financial evaluation of new investments was emphasized during the preparation of the project and is being successfully addressed by the SPMR since 1994. STMSP is equipped with a battery of sketch planning, demand and supply models which will test different land use, air quality, and urban transport scenarios. Furthermore, an integrated land use, urban transport, and air-quality strategy (PITU) has been carefully crafted using a participatory approach and resulted in a blueprint for the development of the SPMR's public transport system until year 2020.

**São Paulo State Government Strategy:** The SSP urban transport strategy for the SPMR is anchored in 4 pillars: a) to establish with the municipalities, operators and users a regional transport coordination commission (RTCC), which has already occurred; b) to develop and update on a periodic basis, an integrated land use, urban transport and air quality strategy; c) to introduce financing mechanisms which will guarantee the long-term sustainability of the urban transport systems; and d) to promote progressive private sector participation in the investment and operations management of those systems. SSP has shown a remarkable progress towards the above objectives. First, there is an RTCC functioning as a forum for discussion of metropolitan policies for prices and subsidies as well as for discussion of common issues such as multimodal tickets and major investment projects. Second, SSP has refined an integrated land use, urban transport and air quality strategy using sketch planning techniques (PITU). This strategy has been used for decision-makers and stakeholders to discuss proposed projects. SSP has explored several financing mechanisms for the urban transport sector. Last, conscious of the scarcity of resources it faces, SSP has sought a progressive participation of the private sector in the operation of its systems: the São Mateus-Jabaquara trolleybusway was successfully concessioned out to the private sector for 20 years, the initial studies for the concession of the suburban rail system (CPTM) were completed under the Bank-financed Ln.3457-BR and the transactional structure report for the actual concession process is being prepared, several activities of the METRO were outsourced to the private sector and they are either reducing costs or generating non-operating revenues. The construction of Line 4 under a public-private partnership will be a pioneer project because it starts a trend towards investment of the private sector in the construction of new infrastructure and equipment. SSP's strategy is therefore to integrate the existing systems, to offer an acceptable level of service to the user and to eliminate operating subsidies.

### **3. Sector issues to be addressed by the project and strategic choices:**

#### **Institutional Issues.**

- The Regional Transport Coordination Commission (RTCC) must ensure that integrated modal fares are introduced both with municipal and intermunicipal buses, and with the METRO and suburban rail system through the introduction of a multimodal type of ticket using smart card technology.
- A consultation mechanism between the State and the municipalities of the SPMR, especially the municipality of São Paulo will be put into effect to ensure modal and tariff integration and joint urban operations ("operações urbanas")
- A Regulatory Agency or Transitional Regulatory Entity independent of the State Secretariat for Metropolitan Transport must be established by the State not later than one year after signing.

**Cost Recovery and Financial Management Issues.** One of the objectives of the proposed project is maintain or improve the working ratio of METRO by making sure that its fixed costs are spread over a greater number of passengers to be transported by the new Line 4 and by not hiring additional staff. If METRO achieves this goal it will rank amongst the most efficient in the world.

### C. Project Description Summary

**1. Project components** (see Annex 2 for a detailed description and Annex 3 for a detailed cost breakdown):

Component	Sector	Indicative Costs (US\$M)	% of Total	Bank-financing (US\$M)	% of Bank-financing
Part A is an Infrastructure and Equipment Investment Component to build Line 4 under a turnkey contract with PSP (concession or other arrangement) including the transfer stations between the METRO, commuter rail, buses, autos, and non-motorized transport.	Urban Transport	898.81	96.2	201.91	96.6
Part B is a Technical Assistance Component to: (i) finance the Project management and supervision consultants; (ii) undertake a cost-efficiency study of the São Paulo METRO; and (iii) support for follow-up project finance studies.	Urban Transport	33.00	3.5	5.00	2.4
<b>Total Project Costs</b>		931.81	99.8	206.91	99.0
Front-end fee		2.09	0.2	2.09	1.0
<b>Total Financing Required</b>		933.90	100.0	209.00	100.0

### 2. Key policy and institutional reforms supported by the project:

The main reform supported by the project is the pioneering of a public-private partnership in the construction of a subway line under a turnkey with PSP scheme. In the past, São Paulo METRO always relied on State funds for the construction of its lines. The State budgetary constraints in the last ten years prevented the METRO network to grow faster as it was desirable in a city with the population density of São Paulo. This project is not only jump-starting a public-private partnership but also creating the enabling environment to attract private sector investment for future projects in urban transport. The other key policy reform supported by the project addresses the issue of cost-recovery by the São Paulo METRO and stresses the importance of covering working costs with operating revenues. During project preparation METRO has already progressed considerably in this area.

### **3. Benefits and target population:**

Beneficiaries are the residents of the São Paulo Metropolitan Region, particularly low-income households (earning up to four minimum salaries) who are major users of public transport. Line 4 catchment area is not limited to the neighborhoods directly served by its stations. Its “missing link” role between the suburban railway and the METRO network makes it attractive to a huge number of transit users. The number of poor living in Line 4 catchment basin amounts to 3.15 million persons (and 1.28 million jobs), i.e. 79 % of the overall poor population in the SPMR. This line will be significantly used by users from the poor municipalities located at the periphery and connected to the Metropolitan Area center by suburban railway lines serving overwhelmingly low-income people, or by bus feeder lines. Even though Line 4 is located in the southwestern quadrant of the SPMR, trip origins are far from being restricted to this area: as an example, 20 % of the trips on Line 4 are originated in the peripheral districts of the eastern part of the SPMR (which are amongst the poorest areas in the SPMR), thanks to the good connection between the rail network and Line 4. Line 4 will not only increase the number of jobs accessible from the periphery but also improve the travel conditions of public transport users. The main beneficiaries of the new line will be the populations of Embu ,Taboão da Serra, Cotia, Embu Guaçu, Itapecerica da Serra, Juquitiba, São Lourenço and Vargem Grande Paulista among others whose accessibility to the CBD and other areas of employment , health and education facilities will be highly enhanced.

The Government of the State of São Paulo will also benefit from the turnkey with concession to the private sector because it will not pay any operating subsidies and yet will expand its METRO system thereby diverting from road-based modes a substantial number of commuters. The reduction of bus-kilometers and less congestion in the area of influence of the line will have positive air quality impacts which are quantified in the economic evaluation.

### **4. Institutional and implementation arrangements:**

The overall coordination of the proposed project rests with the São Paulo Secretariat for Metropolitan Transport (STMSP) which will establish a Project Coordination Unit (PCU) for the São Paulo METRO Line 4 project which will be supported by its own Project Management Oversight consultant group. The São Paulo METRO Company (CMSP) will be the implementing agency responsible for the supervision of the project.

## **D. Project Rationale**

### **1. Project alternatives considered and reasons for rejection:**

The following technical alternatives were compared at identification: (a) do-nothing; (b) introduce 2 parallel reserved bus lanes; (c) build a metrorail line with underground and elevated portions; and (d) build the metrorail link as proposed, i.e., totally underground. The underground metrorail link was selected as the preferred alternative because of lower costs (minimum land expropriation requirements and resettlement), elimination of the number of modal transfers required, congestion relief, and shorter implementation schedule.

**2. Major related projects financed by the Bank and/or other development agencies (completed, ongoing and planned).**

Sector Issue	Project	Latest Supervision (PSR) Ratings (Bank-financed projects only)	
		Implementation Progress (IP)	Development Objective (DO)
<b>Bank-financed</b>			
Decentralization of rails services from federal to state government with system rehabilitation	São Paulo Metropolitan Transport Decentralization (Ln. 3457-BR)	S	S
Decentralization of rail services from federal to state government with system rehabilitation	Rio de Janeiro Metropolitan Transport Decentralization (Ln. 3633-BR)	S	S
Decentralization of rail services from federal to state government with system extension	Recife Metropolitan Transport Decentralization (Ln. 3915-BR)	S	S
Decentralization of rail services from federal government with system extension	Belo Horizonte Metropolitan Transport Decentralization (Ln. 3916-BR)	S	S
Increase private sector participation in the decentralized metropolitan rail agency, Flumitrens	Rio de Janeiro Mass Transit Project (Ln. 4291-BR)	S	S
Increase private sector participation in the decentralized metropolitan rail agency, CPTM	São Paulo Integrated Transport Project (Ln. 4312-BR)	S	S
Decentralization of rail services from federal to state government with BOT type construction of new metrorail line	Salvador Urban Transport Project (Ln. 4494-BR)	S	S
<b>Other development agencies</b>			
IDB (Ongoing)	Metro's Line 5		

IP/DO Ratings: HS (Highly Satisfactory), S (Satisfactory), U (Unsatisfactory), HU (Highly Unsatisfactory)

*Bank Strategy.* Since 1992, the Bank has supported the rehabilitation and decentralization of CBTU subdivisions to the State governments in São Paulo (Ln. 3457-BR) and Rio de Janeiro (Ln. 3633-BR). Loan 3457-BR closed on March 31, 1998, having met its main objectives of (i) supporting the transfer of CBTU-SP to the State of São Paulo to enhance its management and operations; (ii) introducing institutional, organizational, and financial policy reforms to ensure its long-term financial sustainability, including improved multimodal integration, and expanded capacity; and (iii) contributing to poverty alleviation and environmental improvement. Loan 3633-BR, which had similar objectives, closed at the end of 2000. In June 1995, the Board approved two more loans (Lns. 3915-BR and 3916-BR) for US\$102.0 million and US\$99.0 million to finance the decentralization of the urban rail systems in Recife and Belo Horizonte, respectively. These loans were declared effective in April 1996 and are progressing satisfactorily. Follow-up loans in São Paulo (4312-BR) and Rio de Janeiro (4291-BR), which became effective recently, have attempted to introduce private sector participation in the decentralized commuter rail systems—CPTM and Flumitrens, respectively. Flumitrens has been concessioned out to the private sector in 1998. One line of CPTM is scheduled to be concessioned out in 2002/3. Even more recently, in

1999 the Bank financed a BOT type project in Salvador, Bahia with an operating concession for 25 years to the private sector. This project is also progressing satisfactorily.

### **3. Lessons learned and reflected in the project design:**

To build upon the experience of previous urban transport and urban projects around the world, an ex-post analysis of Project Completion Reports and Performance Audit Reports (PCR/PAR) was undertaken. This review recognized the trends and changes in project design after the PCRs/PARs were completed. The main lessons identified and incorporated in the design of the proposed project are:

*Institutional Strengthening.* The organizations dealing with urban transport at the federal, state and municipal levels should be reorganized and strengthened. Studies included in the institutional component must be carefully monitored and translated into action plans, which the Borrower must implement. The proposed project jump-started the creation of the RTCC and completion of critical studies.

*Lack of timely counterpart funding* has greatly influenced the pace of project implementation and in some cases has led to cancellation of components. An effort must be made to ensure that the adequate provisions of counterpart funds are included in the annual budgets of federal and state enterprises. The State of São Paulo has included the project in their CY02 and CY03 budgets.

*Slow implementation* has been a frequently occurring theme. The reasons have included a lack of familiarity with Bank procedures, overoptimistic scheduling at appraisal, lack of final engineering designs at appraisal, changes in political commitment, and lack of counterpart funds. These problems would be mitigated in the proposed project by such measures as: (i) strengthening capacity of operating agencies for financial management and application of Bank procedures; (ii) requiring the submission of final engineering design for the first year of project works prior to negotiations; and (iii) providing with technical assistance as needed.

### **4. Indications of borrower commitment and ownership:**

The Government of the State of São Paulo has, through the creation of a Secretariat for Metropolitan Transport, indicated the importance they attach to the provision and maintenance of an efficient metropolitan and suburban rail system. The Government has also shown its commitment to the development of the rail system and to the proposed project by quickly taking over the federally-owned and operated ex-CBTU São Paulo subdivision and by integrating it with the metropolitan lines of the state-owned FEPASA system, thereby creating the CPTM. To fully integrate both systems from a physical standpoint, the Government realized that it needs the link between the Barra Funda and Roosevelt stations (which is being financed under Ln. 4312-BR), and it has shown its commitment to this project by already having signed a contract for rolling stock to be used in that link. Furthermore, the Governor and the Secretary of Transport have shown their ownership and commitment to the project by, even during the worse financial straits, providing the subsidies required to cover the operating deficit of METRO and improve the system. The proposed project which was on hold since 1994, was considered a priority by the State administration as soon as the Federal Government authorized the resumption of borrowing from the Bank. The decision of the State to seek a solution for Line 4 which relied on a public-private partnership was emphasized by its decision to hire IFC corporate services to put together the BOT and concession. This shows a remarkable shift in the State philosophy and confirms the irreversible trend towards more substantial private sector participation in the sector.

## 5. Value added of Bank support in this project:

The proposed project consolidates and deepens the policy reforms initiated under the São Paulo Metropolitan Transport Decentralization Project (Ln. 3457-BR) and the Barra Funda-Roosevelt project (Ln.4312-BR), which assisted respectively in the decentralization of the federally-owned CBTU to the State to allow for more effective modal and tariff integration, and in connecting the two suburban rail systems. The main value-added by the Bank in this project is its role as promoter of a wider private sector participation in the investments and operation of urban rail systems, a catalyst for physical and tariff integration in the SPMR and as an honest broker to provide more credibility and ensure accountability in the preparation and bidding process of Line 4.

## E. Summary Project Analysis (Detailed assessments are in the project file, see Annex 8)

### 1. Economic (see Annex 4):

- Cost benefit NPV=US\$554 million; ERR = 17.7 % (see Annex 4)
- Cost effectiveness
- Other (specify)

### 2. Financial (see Annex 4 and Annex 5):

NPV=US\$ 16.518 million; FRR = 20.6 % (see Annex 4)

This would be the financial rate of return for the private sector concessionaire in case his participation in the investment is US\$183 million or about 20% of the capital cost of phase 1 of the project assuming he will pay a concession fee with a NPV of US\$5 million at the social tariff imposed by the State. The FRR of the investment if it was done in its entirety by the State with the present social tariff would be 4.2%.

### Fiscal Impact:

The fiscal impact of the project on the States Finances was analyzed by the CMU. As described in Annex 12, São Paulo state has an annual budget of about US\$20 billion. Over the last four years, São Paulo state has achieved a remarkable fiscal turnaround. Having rescheduled over R\$50 billion in outstanding debt to the federal government on favorable terms and significantly reduced spending on active personnel, the state ran an overall surplus in 2000 (excluding capitalized interest) and will be capable of doing so over the project implementation period. The direct impact of project counterpart funding and debt service on the state's finances will be modest. The state's counterpart contribution to capital costs will amount to only eight percent of its total capital spending during the construction period. Interest on the project loan will not exceed 0.1% of net current revenues at any time during the repayment period. No operating subsidies would be provided to the new line. Indirectly, the project may have a positive fiscal impact, when compared with the fiscal impact of a do-nothing situation, where traffic congestion and environmental impacts would be very detrimental and where alternative investments such as new roadways and bridges would be required.

### 3. Technical:

Compared with other alternatives such as reserved or exclusive busways, this is a sound project from a technical standpoint because by adding only 12.9 km of subway line, it will allow the SPMR to have a METRO and rail system fully connected with 340 km of rail-based system serving a wide geographical area. The construction methods proposed are well known and the technology required is widely available. The preparation of a BOT in this type of project has forced METRO and STMSP to re-energize their

transport planning, economic evaluation and financial engineering capabilities. Furthermore, METRO is equipped to implement this project and has the capability to provide a quality service on the overall network. The Bank project team and IFC staff reviewed several options to structure this project including a) a single Build-Operate-Transfer type bid with all infrastructure, equipment and operating concession included; b) two bids: a turnkey bid for the infrastructure and fixed installation systems; and a second bid for the operating concession with provision of rolling stock and other systems by the private sector; c) an Installment model which would consist on a turnkey project financed by a public-private partnership but operated by METRO, with conditionalities on METRO's working ratio; and d) a traditional procurement with several bids for each main component and support from export credit agencies. After a long discussion of the advantages and disadvantages of each alternative and analyzing the market conditions, alternative b) was considered the most cost-effective and viable to secure the highest private sector participation in the project without jeopardizing its main objective.

#### **4. Institutional:**

##### 4.1 Executing agencies:

The implementing agency is METRO under the general coordination of the STMSp. METRO will sign the turnkey and concession contracts and the contracts with the consultants for Part B of the Project. METRO will conduct the bidding process with the help of financial advisors and consultants. METRO will be responsible for the actual supervision of the project also with the help of consultants.

##### 4.2 Project management:

STMSp will establish and maintain a Project Coordination Unit (PCU) headed by a Project Coordinator, to assist in the general coordination of the project from the State standpoint. The Project Coordinator would report directly to STMSp Secretary and participate in the negotiations of the loan. Project Management Oversight (PMO) consultants financed under Part B of the project would act as full time advisers to the Project Coordinator to provide the technical support and cross-country experience required for managing the project.

METRO will have a Project Management Unit. This Project Management Unit (METRO/PMU) will report directly to METRO's President, and will be responsible for the preparation of bidding documents for the contracts, supervision of compliance with the contracts and for authorizing payments to the contractors. The PMU will call on the existing environmental, expropriation/resettlement and social monitoring division of METRO to ensure that the action plan approved in the environmental assessment report is implemented and the impacts of the project are properly monitored.

##### 4.3 Procurement issues:

The procurement preparation, evaluation, management and monitoring will be undertaken by METRO. METRO has some experience in Bank procurement guidelines and SBDs. The Regional Procurement Advisor undertook a procurement capacity assessment of METRO and concluded that this agency is procurement proficient.

#### 4.4 Financial management issues:

Both the State and METRO have experience with Bank loans and will be able to handle all aspects related to the financial management of the project including accounting, disbursement and auditing functions. Metro will be the agency responsible for loan disbursements. A Bank financial management specialist evaluated METRO's accounting, disbursement, procurement and auditing procedures and considered it capable and experienced to undertake those functions. METRO will carry out a time bound action plan to the Bank to integrate the existing systems so that it can produce PMRs not later than one year after effectiveness of the Loan Agreement.

#### **5. Environmental:** Environmental Category: A (Full Assessment)

5.1 Summarize the steps undertaken for environmental assessment and EMP preparation (including consultation and disclosure) and the significant issues and their treatment emerging from this analysis.

The project is expected to have a net beneficial impact on the environment. The new subway link will help relieve congestion in major transport corridors and central areas, resulting in lower emission of pollutants per vehicle-kilometer. Junction improvements and pedestrian overpasses will improve safety and quality of life. Nonetheless, construction of the line will cause some minor and localized negative environmental and social impacts.

The proposed underground routing of Line 4 and use of tunneling (with minimal "cut-and-cover") as the method of construction of the line and stations will minimize environmental impacts during construction. Such impacts are expected to consist essentially of limited expropriation of land for stations, and noise, vibration, dust, traffic disruption and limited disruption to underground utilities and services. Additional negative impacts during construction will occur due to haulage and final disposal of excavated materials from the construction sites. (The problems of excavated material are likely to be less severe than if "cut-and-cover" methods were to be used.) Measures to mitigate such impacts are specified in the EA's detailed action plan and in the bidding documents for works. A prior version of the EA prepared in 1994 for the Vila Sonia-Paulista segment was cleared by the Bank and approved by the State licensing agency (*Secretaria do Meio Ambiente* - SMA). The revised EA for Vila Sônia-Paulista and the Paulista-Luz segments were submitted to the Bank on October 20, 2000. They comprise a package of mitigating actions, as well as public information, monitoring and evaluation programs.

Land and/or property expropriation are limited to the areas close to the Vila Sônia subway yard and to some stations. A social assessment has been recently conducted for the full extension of the line. Affected properties (274 units in all) will be expropriated. Residential units (77) and commercial establishments (197) will be compensated for lost assets and assisted in relocating, through grants and services to be provided by the Company. In the 77 residential units about 227 persons will be affected of which 194 in the Paulista-Vila Sônia link and 33 in the Paulista-Luz link. The construction of replacement housing will not be undertaken, as it is envisaged that families and commercial establishments will be able to relocate within the surrounding area in existing housing stock and commercial units if they so desire. Valuation criteria and expropriation procedures are clearly defined for such cases. The expropriation decrees for the Vila Sonia-Paulista-Luz segments have been signed by the State Governor on November 8, 2001. A Relocation Plan, comprising guidelines and specific detailed relocation options, compensation packages and support services, as well as institutional arrangements, timetables and budgets for implementation of the plan, was cleared by the Bank and approved by the Metro's Board of Directors in 1994 for the Vila Sonia-Paulista segment. It was updated and was resubmitted to the Board of Directors on March 30, 2001. A monitoring and evaluation program has also been designed and will be undertaken by the Company.

The Final Environmental Assessment Report and the detailed Resettlement Plan (prepared according to Bank guidelines) was approved by the Board of Directors of the METRO and submitted to the State licensing authority. As requested by the Bank, the Borrower has updated the Resettlement Plan and submitted evidence that the Installation License has been requested. Evidence that the Environmental Assessment has been approved and that the appropriate license has been issued by the SMA should be provided to the Bank as a condition of effectiveness.

5.2 What are the main features of the EMP and are they adequate?

An environmental management action plan has been proposed as part of the EA. An implementation manual with all the measures required to mitigate impacts during construction was prepared and will be part of the bidding documents. The Project Implementation Unit will have an environmental specialist and will be supported by METRO's resettlement team.

5.3 For Category A and B projects, timeline and status of EA:

Date of receipt of final draft: March, 2001

5.4 How have stakeholders been consulted at the stage of (a) environmental screening and (b) draft EA report on the environmental impacts and proposed environment management plan? Describe mechanisms of consultation that were used and which groups were consulted?

Stakeholders were consulted during preparation in public meetings previously announced and scheduled with minutes recorded for each meeting; through conferences to different trade associations and neighborhood committees. The EA was discussed in official public audience and the comments were judged by the State Environmental Agency.

5.5 What mechanisms have been established to monitor and evaluate the impact of the project on the environment? Do the indicators reflect the objectives and results of the EMP?

Yes. An environmental specialist will be part of the core team and will assess the impacts due to noise, vibration and dust during and after the construction. The impact on buses and modal share will also be measured. See monitoring indicators in Annex 1.

## **6. Social:**

6.1 Summarize key social issues relevant to the project objectives, and specify the project's social development outcomes.

Line 4 will not only increase the number of jobs accessible from the periphery but also improve the travel conditions of public transport users. As mentioned above, the main beneficiaries of the new line will be the populations of Embu, Taboão da Serra, Cotia, Embu Guaçu, Itapeverica da Serra, Jujuitiba, São Lourenço e Vargem Grande Paulista whose accessibility to the Central Business District (CBD) and other areas of employment, health and education facilities will be highly enhanced. At least 50% of Metro users are low income and live in the suburbs of the greater SPMR. Improving suburban and metrorail services in general increases the accessibility of this low-income segment of the population to employment centers. Transport Users Associations have often stressed to Bank missions and to the RTCC the importance of having an efficient and above all reliable metrorail system. They have also stressed the need for more integration with other modes. The project was presented several times to the public initially under the label of the Projeto SIM (*Sistema Integrado Metropolitano*) in the previous government and in the present government under the name of PITU (*Projeto Integrado de Transporte Urbano*). Requests from some small towns served by the system were taken into account as well as requests from users associations which wanted the CPTM and Metro systems connected. Suggestions received after the public presentations of the system were also incorporated. There is a consensus that this project furthers the main goal of the beneficiaries: integration

with other modes and between rail lines and the subway system, lower generalized costs (shorter trip times, greater reliability) at an affordable fare. No negative social impacts are expected from the proposed project. A full review of the social impact of the proposed project and future extensions of the mass transit system was undertaken in the context of the PITU program and is available in the Project Files.

## 6.2 Participatory Approach: How are key stakeholders participating in the project?

### a. Primary beneficiaries and other affected groups:

The primary beneficiaries of the project are the low-income users of the Vila Sônia and Taboão da Serra areas who will be able to reduce substantially their travel time commute downtown using a bus-metro combination and integrated fare. The Associação Nacional de Transportes Públicos (ANTP) which represents users and operators was involved in the preparation of the SIM and PITU programs. The association is very supportive of the project.

### b. Other key stakeholders:

Other key stakeholders are the municipalities of São Paulo and others of the SPMR which are served by the line. In general there is a consensus that the Line 4 project is overdue and will represent a major gain for the users of the system in terms of travel time, reliability and quality of life.

## 6.3 How does the project involve consultations or collaboration with NGOs or other civil society organizations?

The Metro project was discussed and explained to a considerable number of trade associations and community groups either interested in the project or directly/indirectly affected by it. A display on the Line 4 project was open to the public in one of METRO stations.

## 6.4 What institutional arrangements have been provided to ensure the project achieves its social development outcomes?

The project management team at METRO will include specialized personnel which will monitor the impact of the project on the social development objectives set at appraisal.

## 6.5 How will the project monitor performance in terms of social development outcomes?

A METRO Team will monitor the families and businesses displaced by the project and ensure that they have been properly relocated. Property prices before and after construction will be recorded. The evolution of tariffs and satisfaction of the users with the level-of-service provided will be monitored every 2 years by an independent survey organization.

## 7. Safeguard Policies:

7.1 Do any of the following safeguard policies apply to the project?

Policy	Applicability
Environmental Assessment (OP 4.01, BP 4.01, GP 4.01)	<input checked="" type="radio"/> Yes <input type="radio"/> No
Natural Habitats (OP 4.04, BP 4.04, GP 4.04)	<input type="radio"/> Yes <input checked="" type="radio"/> No
Forestry (OP 4.36, GP 4.36)	<input type="radio"/> Yes <input checked="" type="radio"/> No
Pest Management (OP 4.09)	<input type="radio"/> Yes <input checked="" type="radio"/> No
Cultural Property (OPN 11.03)	<input type="radio"/> Yes <input checked="" type="radio"/> No
Indigenous Peoples (OD 4.20)	<input type="radio"/> Yes <input checked="" type="radio"/> No
Involuntary Resettlement (OD 4.30)	<input checked="" type="radio"/> Yes <input type="radio"/> No
Safety of Dams (OP 4.37, BP 4.37)	<input type="radio"/> Yes <input checked="" type="radio"/> No
Projects in International Waters (OP 7.50, BP 7.50, GP 7.50)	<input type="radio"/> Yes <input checked="" type="radio"/> No
Projects in Disputed Areas (OP 7.60, BP 7.60, GP 7.60)*	<input type="radio"/> Yes <input checked="" type="radio"/> No

7.2 Describe provisions made by the project to ensure compliance with applicable safeguard policies.

A full Environmental Action Plan and a Relocation Plan were prepared in accordance with Bank policies.

## F. Sustainability and Risks

### 1. Sustainability:

One of the main objectives of the proposed project is to establish long-term financial mechanisms and an institutional framework which will ensure not only project sustainability, but also the financial sustainability of the São Paulo urban transport system. The RTCC is already in operation. The study for the concession of CPTM is underway and preliminary results suggest that the concession is expected to substantially reduce operating and capital subsidies to the system and, in a very short period, produce “royalties” which will be paid to the government for the concession of the system. A draft law defining financing mechanisms for the urban transport sector, based on studies financed under Ln.3457-BR, will be submitted to the São Paulo Legislature. In this project, the State continues its strategy towards sustainability of the urban transport sector by granting a concession which will not require operating subsidies. Furthermore, there is a conditionality requiring that METRO improves its working ratio, i.e., the ratio between working costs and operating revenues.

**2. Critical Risks** (reflecting the failure of critical assumptions found in the fourth column of Annex 1):

<b>Risk</b>	<b>Risk Rating</b>	<b>Risk Mitigation Measure</b>
<b>From Outputs to Objective</b> Project cost and time overruns.	N	Use of well-known technology, available from many sources. Detailed Project Engineering estimates at appraisal.
Delays in the procurement process	N	Delays will be minimized by starting at pre-appraisal the pre-qualification by using standard bidding documents and requiring the borrower to produce the major tender documents by negotiations.
<b>From Components to Outputs</b> Unsustainability of the RTTC	N	Bank conditionality to ensure that RTCC is maintained.
Resettlement delays	M	Start the implementation of the Resettlement action plan right after appraisal.
Demand Forecast overestimated	N	Several Independent demand forecast studies will be available.
Proliferation of Illegal Transport (vans, topics)	M	Assurances of enforcement by State, Municipalities. Inclusion of clauses in concession contract assuring enforcement and penalties in case Government fails to enforce the law.
Poor Modal and Fare integration	N	The consultation mechanism with the Municipality of São Paulo is a dated covenant and the continuation of the RTCC will facilitate modal and tariff integration. The concession contract will emphasize this aspect.
Delay in approving Bus Feeder Routes to rail stations	M	The consultation mechanism between the Municipality and the State is a dated covenant. State will indicate in the concession contract when and how is going to concession out feeder routes as per plan agreed with the Bank.
Repeated failure to concession out the operations of the system	M	Alternative PSP options would be studied and agreed between the Bank and the State to obtain 20% of the project cost financing.
Failure to obtain private sector financing or higher construction costs due to unexpected soil conditions	N	The State has agreed to finance the gap.
Tariff too high for low-income users after PSP	M	State must approve tariffs and will examine burden on low-income users. If need be and request for tariff increases by concessionaire is

Untimely availability of counterpart funds	M	justified, State will put in place mechanisms targeted to the poor to subsidize their travel.
Limited Private Sector Interest in the Concession	M	The State Government has agreed to include the necessary counterpart funds in CY 02 and 03. The proposed package will be designed in a way as to attract the attention of the private sector by providing most of the infrastructure and equipment required for operations. This will make the concession very attractive for the private sector given the high ridership forecast.
<b>Overall Risk Rating</b>	M	

Risk Rating - H (High Risk), S (Substantial Risk), M (Modest Risk), N(Negligible or Low Risk)

### 3. Possible Controversial Aspects:

In view of the BOT type model selected by the Borrower, in case there will be repeated failures in the concession bid, the Borrower will review with the Bank alternative options to undertake the project which meet the basic objectives of the project, particularly the private sector participation in the investment and operation.

The integration of the privately-operated Line 4 with an existing state-operated subway network will require reliable revenue-sharing mechanisms which must have been agreed prior to the concession of the system. Tariff integration with municipal buses will require agreements between the State and those municipalities and this might be difficult in some cases. The project has been described to the METRO Union who sees it as the only way to continue to expand the network. There is support for the Line 4 project by all São Paulo political parties.

## G. Main Loan Conditions

### 1. Effectiveness Condition

- a) The duly registration of the Loan by the Central Bank of Brazil;
- b) The PCU and METRO/PMU have been established and their respective coordinators have been appointed;
- c) Evidence that population relocation is being carried out in accordance with the Resettlement Plan approved by the Bank and Brazilian authorities;
- d) Evidence that the Environmental Assessment and the corresponding Environmental Action Plan have been approved and that the appropriate license has been issued by the State licensing authority should be provided to the Bank.

**2. Other** [classify according to covenant types used in the Legal Agreements.]

During Negotiations, the following aspects were confirmed:

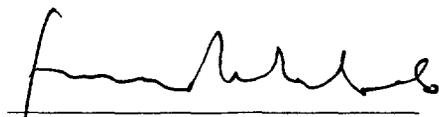
- a) that the Project Coordination Unit (PCU) and the METRO PMU would be structured and adequately staffed and otherwise supported in the implementation of its responsibility under the project;
- b) that procurement would be carried out in accordance with Bank guidelines, including: (i) the use of standard bidding documents for the procurement of the turnkey contract under ICB procedures; (ii) use of Bank's guidelines for the selection of consultants;
- c) that a Special Account in a commercial bank would be opened and maintained;
- d) that São Paulo METRO's financial statements, the Special Account and Statements of Expenditures (SOEs) or Project Management Reports (PMRs):
  - (i) would be audited by independent auditors acceptable to the Bank; and
  - (ii) audits would be submitted to the Bank by June 30 of each year;
- e) that:
  - (i) a Project Management Information System to track project expenditures, disbursements and procurement following LACI procedures will be installed in SP METRO not later than one year after effectiveness; and
  - (ii) pre-agreed operational and financial performance targets would be used to measure progress of the Project, and annual progress reports should be sent to the Bank;
- f) **Regulatory Agency:** The State will establish an autonomous entity/commission in charge of regulating concessions of metropolitan transport services under its jurisdiction not later than one year after loan signing.
- g) A Mid-Term Review to take place in July 2003, to review agreed institutional, operational and financial performance indicators, and compliance with covenants. Based on this evaluation, the State will propose a revised action plan and any corrective measures necessary to ensure that the project meets its objectives.
- h) **User Survey:** A survey will be undertaken every year during the first five years after the beginning of operations of Line 4 to gauge the satisfaction of the users with the service provided particularly in terms of level-of-service, modal integration and affordability. Surveys will be undertaken beforehand after the completion of Line 4 to measure its effect on real estate prices and on the construction of new housing and establishment of new businesses.
- i) **Retroactive financing** of up to US\$500,000 will be available for payments made to consultants within 12 months before the date of signing of the Loan Agreement.

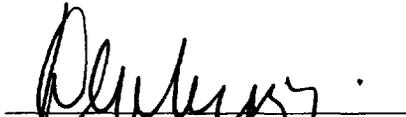
## H. Readiness for Implementation

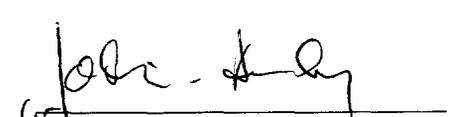
- 1. a) The engineering design documents for the first year's activities are complete and ready for the start of project implementation.
- 1. b) Not applicable.
- 2. The procurement documents for the first year's activities are complete and ready for the start of project implementation.
- 3. The Project Implementation Plan has been appraised and found to be realistic and of satisfactory quality.
- 4. The following items are lacking and are discussed under loan conditions (Section G):

**I. Compliance with Bank Policies**

- 1. This project complies with all applicable Bank policies.
- 2. The following exceptions to Bank policies are recommended for approval. The project complies with all other applicable Bank policies.

  
\_\_\_\_\_  
Jorge M. Rebelo  
Team Leader

  
\_\_\_\_\_  
Danny Leipziger  
Sector Manager/Director

  
\_\_\_\_\_  
Vinod Thomas  
Country Manager/Director

**Annex 1: Project Design Summary**  
**BRAZIL: São Paulo Metro Line 4 Project**

*More information on Logframes*

<b>Hierarchy of Objectives</b>	<b>Key Performance Indicators</b>	<b>Data Collection Strategy</b>	<b>Critical Assumptions</b>
<p><b>Sector-related CAS Goal:</b></p> <p>The proposed project is in line with the five main pillars of the CAS, namely: (a) targeted interventions to reduce poverty, among others through the provision of urban services to the poor; (b) sustainable fiscal adjustment, among others through reform of public enterprises; (c) renewed growth, among others through private sector participation in infrastructure provision; (d) improved government effectiveness; and (e) effective environmental management.</p>	<p><b>Sector Indicators:</b></p> <p>That the construction of Line 4 with partial financing from the private sector will be successful, therefore starting a new trend in rail-based mass transit systems in Brazil.</p> <p>That the working ratio of the METRO system improves to a level which will increase the operating surplus of METRO, thereby reducing overall contributions of the State to METRO.</p> <p>That the low-income classes accessibility to work improves and their generalized cost of travel decreases.</p> <p>That the loan disbursement occurs as scheduled and there is no lack of counterpart funds.</p>	<p><b>Sector/ country reports:</b></p> <p>Supervision missions and country assistance review.</p>	<p><b>(from Goal to Bank Mission)</b></p> <p>Expect that Government of Brazil will continue its efforts of public sector reform through ongoing technical assistance.</p> <p>Expect that the State Government will continue to strengthen the enabling environment for private sector operators in the urban transport and railway sectors.</p>

Hierarchy of Objectives	Key Performance Indicators	Data Collection Strategy	Critical Assumptions
<p><b>Project Development Objective:</b></p> <p>The main objective of the project is to improve the quality and long-term sustainability of urban transport in the SPMR by interconnecting the existing subway, commuter rail and bus networks through the construction of METRO's Line 4. Subsidiary objectives are: i) to improve the accessibility of the low-income population who are the main users of the METRO to employment centers and health and education facilities; and ii) to seek private sector participation in the development of Line 4.</p>	<p><b>Outcome / Impact Indicators:</b></p> <p>By the end of the project:</p> <p>90% of the stations of Line 4 integrated with buses;</p> <p>10-15% lower average generalized travel costs (travel times, fares and reliability) for users between Vila Sônia and Luz than without Line 4;</p> <p>Higher share (23%) of METRO in total urban transport motorized trips and reduced bus congestion in Line 4 corridor;</p> <p>METRO will not require an operating subsidy for its operation.</p>	<p><b>Project reports:</b></p> <p>See Annex 1a - table 1</p>	<p><b>(from Objective to Goal)</b></p> <p>System will not have operating subsidies otherwise will be a fiscal burden to the government;</p> <p>Proposed structural reforms, i.e., concession to the private sector or other PSP arrangements will take place.</p>

Hierarchy of Objectives	Key Performance Indicators	Data Collection Strategy	Critical Assumptions
<p><b>Output from each Component:</b></p> <p>An underground and independent line covering 12.9 kilometers and consisting of double track infrastructure, stations, workshops, systems and rolling stock;</p> <p>The integration of the above system with other private and public modes mainly the intermunicipal and municipal bus system;</p> <p>Improvement in the working ratio, i.e. the ratio between operating costs without depreciation and cost of capital and operating revenues of METRO.</p>	<p><b>Output Indicators:</b></p> <p>By the end of the project (2006):</p> <p>12.9 km of an underground subway, 5 stations and 13 trainsets delivered and in operation;</p> <p>Physical and fare integration of Line 4 with other modes in at least 50% of the stations of Line 4;</p> <p>Overall METRO's working ratio will be less than one.</p>	<p><b>Project reports:</b></p>	<p><b>(from Outputs to Objective)</b></p> <p>No lack of counterpart funds due to economic crisis;</p> <p>No delays in project implementation due to procurement problems.</p>

Hierarchy of Objectives	Key Performance Indicators	Data Collection Strategy	Critical Assumptions
<p><b>Project Components / Sub-components:</b></p> <p>Part A is an Infrastructure and Equipment Investment Component: (i) build Line 4 under a turnkey plus concession (or other PSP arrangement) contract including the transfer stations between the METRO, commuter rail, buses, autos, and non-motorized transport.</p> <p>Part B is a Technical Assistance Component to finance: i) the Project Management and project supervision consultants; (ii) a cost-efficiency study of the São Paulo METRO; and (iii) follow-up to the project finance studies.</p>	<p><b>Inputs: (budget for each component)</b></p> <p>By end of 2003: 1/4 of the infrastructure of Line 4 would be built;</p> <p>The contracts for rolling stock would have been signed;</p> <p>By end of 2004: 2/3 of the infrastructure of the rail system would be built;</p> <p>The financial management and cost recovery studies of METRO would have been completed.</p> <p>By end of 2006: The infrastructure of Line 4 would be completed;</p> <p>The rolling stock and systems would have been delivered and operational tests would start;</p> <p>The Financial management and cost recovery study would have been completed and its recommendations approved.</p> <p>By end of 2006: Line 4 will be operating for revenue service</p>	<p><b>Project reports:</b></p> <p>See Annex 1a Table 1</p>	<p><b>(from Components to Outputs)</b></p> <p>Private sector will be enticed by the Concession;</p> <p>Revenue-sharing mechanisms between METRO and Line 4 will be agreed;</p> <p>The RTCC will be an influential forum in transport coordination of the SMR.</p> <p>No project cost and time overruns;</p> <p>Environmental License is obtained on schedule;</p> <p>No resettlement Delays;</p> <p>Sustainability of the RTCC;</p> <p>No delays in the turnkey and operating concession procurement process;</p> <p>Timely availability of counterpart funds;</p> <p>Success to concession out the operations of the system.</p>

**Table 1A: Monitoring Indicators and Targets**

<b>By End of the Calendar year</b>	<b>2001 (base)</b>	<b>2002</b>	<b>2003</b>	<b>2004</b>	<b>2005</b>	<b>2006</b>
<b>Project Development Objectives</b>						
Percentage of Line 4 stations integrated with bus lines (integration related objective)	0	0	0	0	0	90
METRO share of urban transport motorized trips (%) (congestion related objective)	18	19	19	19	19	23
Generalized cost of travel (travel time plus fare plus reliability) between Vila Sonia and Luz (accessibility of low-income user related objective) in minutes*	89	89	89	89	89	51
METRO's working ratio	.98				>1	>1
<b>Project Outputs</b>						
<b>Physical Implementation</b>						
% of the Infrastructure completed	0	2	25	25	25	23
% of Stations completed	0	2	25	25	25	23
% of System works completed	0	0	0	28	44	28
% of Rolling Stock delivered	0	0	0	0	50	50
<b>Institutional Development</b>						
Financial Management and cost-recovery review of the METRO		Study completed	Recommendations Implemented			
Follow-up study on private sector participation		Study completed				

\* (fare + travel time x value of time + (probability of being late x minutes late x value of time)  
 fare is equivalent to 32 minutes is equal to R\$1 in 1998  
 travel time by bus in 1998 is 60 minutes and by metro (in 2006) is 20 minutes  
 value of time is R\$1.872/hour

## **Annex 2: Detailed Project Description**

### **BRAZIL: São Paulo Metro Line 4 Project**

#### **By Component:**

##### **Project Component 1 - US\$900.90 million** (total cost of component)

An Infrastructure and Equipment Investment Component (Part A) : to build the METRO's Line 4 between Vila Sônia and Luz, including the transfer stations between road and rail based systems. This is an underground rail rapid transit connection which will link CPTM's south line, METRO's Line 1 at Luz Station, METRO's Line 2 at Consolação Station and METRO's Line 3 at República Station. Line 4 of the METRO will be a 12.810 km, double track link between the Vila Sônia yard facility located south-west of the Pinheiros river and the Luz station. This component will comprise:

**a) Civil Works:** Line 4 is to be constructed entirely underground from its tail track north-east of Luz Station to the maintenance facility portal at Vila Sônia. Track will be standard gauge. The line sections will consist of: (i) 1478m of double track tunnel (one 8.43 m internal diameter tunnel) constructed using the "shield" method in soil between North of Luz station and the 24 de Maio works shaft; (ii) 150 m part in double track tunnel and part in single track ( two tunnels ) constructed by the New Austrian Tunnelling Method (NATM) in soil between 24 de Maio works shaft and Republica station; (iii) 136m of single track NATM tunnelling in soil and 68 m of double track tunnel constructed by cover-and-cut between República station and the Hilton works shaft; (iv) 1324 m of double track shield tunnelling in soil from the Hilton works shaft to Cel José Eusébio ventilation shaft; (v) 507 m of triple track NATM tunneling in soil between Cel José Eusébio ventilation shaft and Paulista station; (vi) 2335 m of double track shield tunnelling in soil between Paulista and Fradique Coutinho stations; and (vii) 5239 m of double track shield tunnel and 354 m of cover-and-cut tunnel both constructed in soil and rock from Fradique Coutinho station to the transition to the surface to access the Vila Sônia yard. At the end of the proposed project there will be 5 completed stations (Butantã, Pinheiros, Paulista, República and Luz) and 4 station shells (Faria Lima, Fradique Coutinho, Oscar Freire and Higienópolis). When phase 2 of Line 4 is completed there will be in addition 2 more passenger stations on the line, Morumbi and Três Poderes. When completed, at the end of phase 2 the project Line 4 will have 11 stations. The stations have off-street entrances and 132 m train platforms. At the end 6 stations would be constructed using NATM and the 5 remaining stations would be constructed using cover-and-cut.

**b) System-Wide Facilities** include the following components: (i) a high and medium-voltage (AC) electrical power system, including one primary substation of 138/88-22 KV, which will support a network of medium voltage, DC traction power substations with their respective rectifiers and transformers; (ii) a DC traction contact line system for distributing 1500 V power to the trains via a overhead conductor system in the tunnel section and via a conventional overhead catenary system in the parking and maintenance yard; (iii) a low voltage electrical system comprising switchboards, transformers, diesel generator group and no break for all electrical systems below 460 V including illumination and cable trays; (iv) a ventilation system in stations and tunnel; (v) elevators for physically disadvantaged and escalators for passengers; (vi) auxiliary systems such as pumps, fire detection, illumination, panels, etc.; (vii) a telecommunication system, data transmission, voice and video; (viii) a communications based train control system for signaling; (ix) on-board equipment for signaling; (x) a passenger and fare control system; (xi) a supervisory and control system for traffic, energy and auxiliary; (xii) all system facilities for the Vila Sônia maintenance and parking yard shall be provide including electrical power supply,

telecommunications, signaling and auxiliary systems.

c) **Rolling Stock** comprising a fleet of 16 trainsets to operate this line in phase 1 and additional 8 trainsets to complete 24 trainsets to operate this line in phase 2. As in the existing METRO system, these trains will operate under ATC. The maintenance facility at Vila Sônia will accommodate up to 25 trainsets. Maintenance shop facilities, including all equipment for maintaining the revenue and non-revenue vehicles, will be part of the yard complex.

**Project Component 2 - US\$33.00 million**

(total cost of component)

A Technical Assistance Component (Part B) to finance : (a) **the Project Management Oversight consultant** (PMOC) who will assist the Project Coordination Unit; and the supervision of the works and goods financed under the project ; b) a financial management and cost recovery study (including recommendations on tariff structure) designed to propose far reaching cost cutting measures and revenue maximization to improve METRO's working ratio by 2006; and c) a follow-up of the project finance studies.

**Summary of Concession Design  
Risks and Risk Mitigation**

1. The State of São Paulo decided that Line 4 must be operated by the private sector through a long-term concession at a tariff set by government. It also decided that this will be positive concessions, i.e., there will be no operating subsidies paid by the State to the concessionaire. It is, however, willing to finance most of the infrastructure and equipment components, leaving the remaining investment to be done by the private sector at a level which will still produce an acceptable return on equity to the concessionaire. In order to ensure that the tariff would not be a burden for the low-income users, the State decided at the outset that the fares in Line 4 will be the same as in the rest of the system and will be set by the State in the concession contract. Subsequent adjustments will take place according to a formula included in the concession contract.

2. Financial Advisors (IFC corporate services and Fundação Getúlio Vargas) were hired by the State to evaluate the options for the concession and prepare a preliminary background memorandum, a transaction report and an information memorandum for several options including: a) **a full Build-Operate-Transfer** in which the State would finance part of the investment and the other part would be financed by the private sector concessionaire. Line 4 would be operated by the concessionaire during a 25 year term; b) **an installment method** in which the State would finance the civil works and systems investment and the private sector would finance the rest of the systems and rolling stock. The private sector concessionaire would operate the line during 25 years but would be paid an installment, independent of the traffic demand, which would be paid by METRO on a monthly basis; c) **a traditional method** in which the State with or without the help of export credits would build and operate the Line. Subsequently, in view of the budgetary restrictions imposed by the significant changes in market conditions, **another BOT type option** was evaluated: the civil works and part of the system would be bid as a turnkey and built by the lowest evaluated price; the rest of the systems and the rolling stock would be financed by the private sector concessionaire who would operate the Line during 25 years. This investment would be partially financed by the State, who would define the investments to be made by the private sector and the maximum amount of

funds made available by the State for that investment as well as the minimum concession fee required. The bidder with the highest net present value of the concession fee and the difference between what it will require and the maximum amount of funds made available by the State would be the winner.

3. It has been decided that the best way to proceed with the procurement of the project is a BOT type project with a bid for the turnkey for the civil works and fixed installations followed by a bid for the concession and provision of rolling stock and remaining systems. This option will minimize the risks of construction of the infrastructure and provide sufficient time for the market to prepare the concession. The private sector is expected to finance approximately 20% of the cost of the Bank-financed project. The project procurement would consist in one single bid for civil works, systems, rolling stock and the concession to operate the system for 25 years at a tariff set by the State. The State will define the maximum investment per year over the project implementation period which will be able to finance and the minimum concession fee required. The bidders will bid on the amount of investment required and the concession fee. The bid for investment cannot exceed the value set by the State and the concession fee proposed by the bidders must exceed the minimum required. The bidder with the highest net present value of the concession fee and the difference between what it will request and the maximum investment made available by the State, would be the winner. A Project Management Oversight Consultant hired by the State will supervise the construction.

4. The Concession contract indicated above will also give the Line 4 concessionaire the right to operate intermunicipal buses in the areas between Vila Sônia and Embu and Taboão da Serra. This will ensure that the bus/metro integration will take place either by agreement with existing operators or with its own buses or by contract with legalized van service.

5. A detailed information memorandum will be annexed to the pre-qualification bid documents for the concession.

6. As mentioned above, the State's mandate is to provide a system affordable to the users, without State's operating subsidies. Therefore, the design of the concession had to take into account these two constraints and yet provide the necessary incentives and mitigation measures to create the enabling environment for the private sector to participate in the investment on rolling stock and systems and have a satisfactory return on its investment. User surveys indicated their willingness-to-pay for an integrated metro/bus fare at least 10% more than the fare they are presently paying for a metropolitan bus, because of Line 4 higher speed and reliability. At present, in São Paulo, the tariff charged by any metropolitan bus which parallels Line 4 is \$R 2.5 (a flat rate, i.e., it does not vary with distance or time of day). METRO's flat fare at present is \$R1.4 without discount but when bought in multiples of ten (the most common ticket) comes down to R\$1.2.

7. A detailed financial analysis is presented in the Transactional Structure Report which is available in the Project Files.

8. The specific risks identified in this concession design are :

Risk	Mitigation measure
Further Foreign Exchange Devaluation and Impact on Imported Equipment	A reserve account will be established by the State with the revenues obtained from the concession fee. The funds provided by the Banks will offset part of the burden caused by future devaluation
Compensation for government mandated discounts ("gratuidades") imposed by State/Municipality	State will enact legislation indicating that it will compensate for these discounts. This is already the practice in the State of São Paulo.
Bus feeder routes are not concessioned out as agreed	State will indicate in the concession contract when and how is going to concession out feeder routes as per plan included in the concession contract.
Sale of monthly passes/ special tickets	A system for selling these monthly passes and special tickets will be agreed and included in the concession contract
Delays in the completion of the civil works	Penalties to be paid to the State by turnkey contractor could be put in escrow to pay any concessionaire claims due to delays. Delays by the State in providing the funds agreed will also be subject to penalties in favor of the concessionaire
Revenue-Sharing since Line 4 is a bridge between several lines	Revenue-sharing mechanisms in which the portion paid in Line 4 is fully compensated will be clearly specified in the concession contract and will be introduced in the smart card

**Annex 3: Estimated Project Costs**  
**BRAZIL: São Paulo Metro Line 4 Project**

Project Cost By Component	Local US \$million	Foreign US \$million	Total US \$million
Infrastructure and Equipment Component (Part A)			0.00
Project Design	24.80	0.00	24.80
Expropriations	46.00	0.00	46.00
Civil Works	194.90	129.80	324.70
Permanent Way	7.80	44.20	52.00
Systems	39.10	117.40	156.50
Rolling Stock	39.40	114.80	154.20
Technical Assistance Component (Part B)		0.00	0.00
Administration/Supervision	15.20		15.20
Technical Assistance	8.90	8.90	17.80
<b>Total Baseline Cost</b>	<b>376.10</b>	<b>415.10</b>	<b>791.20</b>
<b>Physical Contingencies</b>	<b>31.30</b>	<b>32.51</b>	<b>63.81</b>
<b>Price Contingencies</b>	<b>36.50</b>	<b>40.30</b>	<b>76.80</b>
<b>Total Project Costs<sup>1</sup></b>	<b>443.90</b>	<b>487.91</b>	<b>931.81</b>
Front-end fee		2.09	2.09
<b>Total Financing Required</b>	<b>443.90</b>	<b>490.00</b>	<b>933.90</b>

<sup>1</sup> Identifiable taxes and duties are 125.6 (US\$m) and the total project cost, net of taxes, is 808.3 (US\$m). Therefore, the project cost sharing ratio is 25.86% of total project cost net of taxes.

**Annex 4: Cost Benefit Analysis Summary**  
**BRAZIL: São Paulo Metro Line 4 Project**

	Present Value of Flows @10%		Fiscal Impact	
	Economic Analysis	Financial Analysis	Taxes and Duties	Subsidies
<b>Benefits:(in mil US\$)</b>	<b>1,750</b>	<b>806</b>		
Travel Time Sav.	1,298			
Oper. Cost Sav.	296			
Other	156			
<b>Costs: (in mil us\$)</b>	<b>1,195</b>	<b>1,272</b>	<b>125.6</b>	
Investment	716			
Operating	479			
<b>Net Benefits</b>	<b>554</b>	<b>(466)</b>		
<b>IRR</b>	<b>17.7%</b>	<b>-4.2%</b>		

The results presented above for the economic analysis are conservative since they assume the most pessimistic scenario for operating costs; in addition the investment costs avoided due to the construction of Line 4 were not considered, again to be conservative. The results of the financial analysis presented compare the revenues at the social tariff against the financial costs (i.e., including taxes and duties).

**Summary of Benefits and Costs:**

**Cost-Benefit Analysis**

An incremental cost-benefit analysis of the proposed metrorail line was undertaken to evaluate the economic feasibility of the project. The methodology used consisted in comparing the situation with and without project and quantifying the benefits due to time savings for users of all modes, operating cost savings for all modes, road maintenance cost savings, accident savings, air pollution savings and the investment and operating costs. The demand for each mode was determined using a demand model which estimated the passenger-hours and passenger-kms saved by mode with the project. The main benefits considered were:

**Operating cost savings** (these are savings resulting from the lower costs of operating all modes with and without the project-. The demand model estimates the passenger-kms with and without the project and these are multiplied by the respective estimated operating costs);

**Travel time savings** - These are estimated by determining the passenger-hours saved, by type of trip (home-to-work, business or other) and multiplied by the value of time for each type of trip. Again the demand model estimates the passenger-hours with and without project per mode;

**Reduction of accidents**-These are estimated by multiplying the average cost per accident per 1000 passenger-kms with and without project. This reduction of accidents is normally a function of the number of bus-kms saved (minor);

**Reduction in road maintenance costs** due to the reduction of bus-kms with the project (minor);

**Reduction of air pollution costs** due to reduction in bus-kms with project (minor);

To be conservative the costs of avoided investments in the do-nothing situation were not considered.

The main costs considered were: a) The investment costs and b) the operating costs of Line 4. Note that this line is 100% underground except for the Vila Sónia yard.

The project will decrease the number of bus-kms traveled on the urban network through the construction of the metrorail based system and the re-routing of the buses to the main stations. The bus-kms saved per year are estimated by the demand model. The main beneficial impacts of the project under evaluation are reduced congestion (mainly due to less buses on the street), reduction in traffic-related accidents, reduced vehicular air pollution, reduced noise due to less buses on the street and economic savings from lower operating costs and reduction of travel time. The above are all quantifiable and were used in the economic analysis. There are, however, a great number of **non-quantifiable** benefits which cannot be captured in a standard cost-benefit analysis but are worth noting:

*Accessibility and creation of new opportunities:* 1. Promotes the interconnection between residential and employment areas and social equipment (hospitals, schools) facilities; 2. Strengthens existing sub-centers; 3. Creates new employment poles in the periphery; 4. It favors the development of new housing poles; 5. It will encourage new sub-centers of economic activity which otherwise would not be started.

*Land Use and Value:* 1. It increases land values due to lower generalized travel costs by public transport and by auto even without changes in the zoning law; 2. It increases the dynamics of the real estate market which is reflected by the occupation of empty lots and the renewal of older building in the area of influence of the metrorail.

*Employment Generation:* It will promote the creation of jobs with multiplier effects in several sectors of the economy.

A detailed economic evaluation report can be found in the Project File.

### **Traffic Demand Analysis**

Demand analysis was undertaken by two different specialized consultants based on the data provided by a comprehensive 1997 Origin –Destination Survey which collected data in 389 zones, interviewed close to 26,065 households and 97,760 people. Traffic demand levels were estimated by consultants through a demand simulation using separately the TRANPLAN and EMME/2 models, which tested several scenarios with different combinations of tariffs, travel time and reliability. Emme/2 uses the 4 step approach of the Urban Transport Planning System, namely Traffic Generation, Traffic Distribution, Modal Split and Traffic Assignment. Both models are the most commonly used traffic demand package in the U.S.A. After several iterations, the selected alternative consists of the metrorail line from Luz to Vila Sónia as the main trunk corridor. The alternative analysis then focussed on the optimization of the number of stations required from the start of operations and those that could be deferred. In 2006, the peak-hour traffic for Line 4 in the most heavily travelled direction was estimated to be 60,200 passengers per hour per direction (955,400/day) increasing to 71,000 pphpd in 2015 (1,018,000/day). Fixed guideway systems of the type proposed are worth considering when the peak-hour demand exceeds 15,000pphpd in the first year which is clearly the case.

A detailed demand analysis report can be found in the Project File.

**Main Assumptions:**

**Sensitivity analysis / Switching values of critical items:**

ITEMS				IRR (%)	NPV(1)	B / C
					i=10%	i=10%
<b>BASE CASE</b>		10%		17.7	555	1.46
	Discount Rate	12%		17.7	341	1.32
		15%		17.7	124	1.14
<b>BENEFITS</b>	Time Value	10%	Higher	19.2	685	1.57
		10%	Lower	16	425	1.36
		30%	Lower	12.5	165	1.14
		50%	Lower	8.4	-94	.92
	Operating Cost Savings	10%	Higher	18	587	1.49
		10%	Lower	17.3	523	1.44
		50%	Lower	15.7	395	1.33
		100%	Lower	13.5	235	1.20
<b>COSTS</b>	Construction Costs	50%	Higher	12	196	1.13
		100%	Higher	8.6	-161	.92
	Operating Costs of metro	100%	Higher	11.1	75.56	1.05
<b>SWITCHING VALUES</b>						
Reduction of Travel Times and Operating Costs Benefits		34%	Lower	10	0	1
Reduction of travel time		43%	Lower	10	0	1
Construction Costs		77.5%	Higher	10	0	1

Annex 11 evaluates the impact of the Line 4 project on poor households and indicates the main municipalities which will benefit from the project. Beneficiaries are the residents of the São Paulo Metropolitan Region (SPMR), particularly low-income households (earning up to three minimum salaries) who are major users of public transport. Residents of the Embu and Taboão da Serra areas, one of the poorest of the SMR, will be the main beneficiaries of the system which will cut their travel time in half (for trips between Vila Sônia and Luz) and increase travel reliability, comfort and safety. The reduction in travel time and the improvement in reliability when compared to a bus operation, are the main reasons why populations are willing to pay a higher tariff. The users of private autos will probably benefit from less bus congestion in the main streets at least while the space freed by the bus re-routing is not taken by more automobiles.

**Annex 5: Financial Summary**  
**BRAZIL: São Paulo Metro Line 4 Project**  
**SÃO PAULO METRO BALANCE SHEET 2001 - 2021**  
**PRESENT SYSTEM + NEW PROJECTS**  
 US\$ Million

	Base Year							
	2000	2,001	2005	2007	2008	2010	2015	2021
<b>ASSETS</b>								
Current Assets	88.1	157.0	273.3	318.8	318.8	307.1	295.5	295.5
Non-Currents Assets	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3
Permanent Assets	3,744.6	4,073.3	7,001.1	6,801.7	6,691.4	6,477.6	5,980.4	5,446.6
Net Fixed Assets	3,431.2	3,522.8	5,259.7	7,053.8	7,082.6	6,844.7	6,292.6	5,703.1
. Fixed Assets	4,123.3	4,288.8	6,354.9	8,383.0	8,534.6	8,534.6	8,534.6	8,534.6
. Less: Accum. Dep.	-692.1	-766.0	-1,095.2	-1,329.2	-1,452.0	-1,689.9	-2,242.0	-2,831.5
. Construction in Progress	167.5	402.8	1,613.4	-379.3	-530.9	-530.9	-530.9	-530.9
Net Deferred Charges	145.8	147.7	128.0	127.3	139.7	163.8	218.7	274.4
. Deferred Charges	220.5	237.7	309.8	345.9	363.9	400.0	490.2	598.4
. Less: Accum. Defer. B	-74.7	-90.0	-181.8	-218.6	-224.2	-236.2	-271.5	-324.0
<b>TOTAL ASSETS</b>	<b>3,837.0</b>	<b>4,234.6</b>	<b>7,278.7</b>	<b>7,124.8</b>	<b>7,014.5</b>	<b>6,789.0</b>	<b>6,280.2</b>	<b>5,746.4</b>
<b>LIABILITIES &amp; EQUITY</b>								
Current Liabilities	249.7	249.1	336.8	433.3	433.3	412.6	328.4	173.1
Domestic ST Loans	40.6	40.9	81.5	81.5	81.5	72.5		
Foreign ST Loans	0.1	0.1	58.8	155.3	155.3	155.3	155.3	
Account Payable	106.8	106.3	94.7	94.7	94.7	83.0	71.3	71.3
Other	102.2	101.8	101.8	101.8	101.8	101.8	101.8	101.8
Nons Current Liabilities	514.8	682.9	2,324.8	1,889.4	1,652.8	1,188.3	250.1	134.6
Domestic ST Loans	378.6	547.4	560.1	397.2	315.7	161.8		
Foreign ST Loans	0.8	0.7	1,630.1	1,357.6	1,202.3	891.8	115.5	-0.1
Other	135.4	134.8	134.6	134.6	134.8	134.7	134.6	134.7
Stockholders Equity	3,072.6	3,302.6	4,617.2	4,802.0	4,928.4	5,188.1	5,701.7	5,438.7
Capital	4,316.4	4,663.1	6,828.6	7,545.2	7,988.8	8,860.0	10,710.3	11,352.3
Accumulated Losses	-1,243.8	-1,360.5	-2,211.4	-2,743.2	-3,060.4	-3,671.9	-5,008.6	-5,913.6
<b>TOTAL LIABILITIES &amp; EQUITY</b>	<b>3,837.1</b>	<b>4,234.6</b>	<b>7,278.8</b>	<b>7,124.7</b>	<b>7,014.5</b>	<b>6,789.0</b>	<b>6,280.2</b>	<b>5,746.4</b>

DF/GOC/OEF-CEC

P/75/CEC/4ª linha - atualização appraisal/balanco projetado

**SÃO PAULO METRO INCOME STATEMENT 2001 - 2021**  
**PRESENT SYSTEM + NEW PROJECTS**  
 US\$Million

	2000	2001	2005	2007	2008	2010	2015	2021
<b>OPERATING STATISTICS</b>								
Passengers (Trips) - Million	486	474	680	740	741	742	758	763
Paying Passengers - Million	423	436	625	681	681	683	698	702
<b>OPERATING REVENUES</b>								
Paying Passengers - Mil	273.8	261.8	375.5	361.5	361.0	360.2	366.5	366.4
Subsidy for Non-Paying Passengers	31.0	38.2	54.7	59.6	59.7	59.8	61.1	61.4
GESP Reimbursement - Line 4				49.2	50.1	51.7	54.5	57.1
Total Operating Revenue	304.8	300.0	430.2	470.3	470.8	471.7	482.1	484.9
<b>NON-OPERATING INCOME</b>								
	10.2	13.5	14.1	14.2	14.2	14.2	14.6	14.7
<b>CONCESSION FEE</b>								
		-	-	10.2	16.8	17.3	18.2	19.0
Total Income	315.0	313.5	444.3	494.7	501.8	503.2	514.9	518.6
<b>OPERATING COSTS</b>								
Personnel	197.2	204.9	290.0	297.4	319.6	319.6	319.6	319.6
Materials	11.6	10.0	16.3	16.8	18.5	18.5	18.5	18.5
Other (incl. Energy Contracts)	54.0	79.7	115.2	118.1	126.7	126.7	126.7	126.7
Total Working Costs	262.8	294.6	421.5	432.3	464.8	464.8	464.8	464.8
Depreciation	69.0	76.7	96.8	124.7	122.8	117.7	105.8	93.1
Deferred Costs	17.9	15.6	27.8	5.3	5.6	6.2	7.7	9.6
Total Operating Costs	349.7	386.9	546.1	562.3	593.2	588.7	578.3	567.5
Financial Charges	56.9	48.3	187.4	154.5	158.9	147.4	110.1	-
Total Expenses	406.6	435.2	733.5	716.8	752.1	736.1	688.4	567.5
Net Operating Income	(44.9)	(86.9)	(115.9)	(92.0)	(122.4)	(117.0)	(96.2)	(82.6)
Net Income	(91.6)	(121.7)	(289.2)	(222.1)	(250.3)	(232.9)	(173.5)	(48.9)
Working Ratio	86%	98%	98%	92%	99%	99%	96%	96%
Operating Ratio	115%	129%	127%	120%	126%	125%	120%	117%
Working Cost Coverage (%)	120	106	105	114	108	108	111	112

**SÃO PAULO METRO SOURCES AND APPLICATIONS OF FUNDS 2001 - 2021**  
**PRESENT SYSTEM + NEW PROJECTS**  
 US\$ Million

	2000	2001	2005	2007	2008	2010	2015	2021
<b>SOURCES</b>								
Internal Cash Generation	42.0	5.3	8.9	38.0	6.0	6.9	17.4	20.1
Net Operating Revenue	-44.9	-87.0	-115.7	-92.0	-122.4	-117.0	-96.1	-82.6
Net Non- Operating Income								
Depreciation	69.0	76.7	96.8	124.7	122.8	117.7	105.8	93.1
Deferred Expenses	17.9	15.6	27.8	5.3	5.6	6.2	7.7	9.6
Net Borrowing	16.8	211.3	698.1					
BIRD			52.7					
JBIC			505.7					
BID			103.2					
BNDES - New Financing		52.3						
BNDES - Other Projects		147.2	36.5					
BNDES - Contracted	16.8	11.8						
Government's Contribution for								
New Investment Programs	100.4	275.6	275.8	24.7	24.7	24.7	24.7	24.7
Operational Support	23.5							
Interest Payment Support	41.6	48.3	187.4	154.5	158.9	147.4	110.1	
<b>Total Sources</b>	<b>224.3</b>	<b>540.5</b>	<b>1,170.2</b>	<b>217.2</b>	<b>189.6</b>	<b>179.0</b>	<b>152.2</b>	<b>44.8</b>
<b>APPLICATION</b>								
Investment	122.3	481.5	1,009.1	18.0	18.0	18.0	18.0	18.0
Line 4 - Morumbi / Luz			239.8					
Other Projects	122.3	481.5	769.3	18.0	18.0	18.0	18.0	18.0
Interest Payment	41.6	48.3	187.4	154.5	158.9	147.4	110.1	
Amortization	37.4	40.6	80.0	217.7	236.7	236.7	195.7	
Change in the Working Capital	23.0	-29.9	-106.3	-173.0	-224.0	-223.1	-171.6	26.8
<b>Total Application</b>	<b>224.3</b>	<b>540.5</b>	<b>1,170.2</b>	<b>217.2</b>	<b>189.6</b>	<b>179.0</b>	<b>152.2</b>	<b>44.8</b>

DF/GOC/OEF-CEC

P775/CEC/0804/LINHA aprovado GESP/balanco projetado

26-Jun-01

**SÃO PAULO METRO LINE 4 INCOME STATEMENT 2005 - 2035**  
**US\$Million**

	2,005	2,007	2,010	2,015	2,020	2,025	2,030	2,035
<b>(+) Net Income</b>	-	84,720	143,375	151,342	157,203	158,080	158,080	158,080
<b>(-) Costs</b>	-	63,008	96,331	100,754	75,630	79,919	81,026	75,673
Operating Costs	-	41,772	59,079	59,079	59,079	59,079	59,079	59,079
Depreciation	-	21,236	37,252	41,675	16,551	20,840	21,947	16,594
<b>(-)Financial Costs</b>	8,457	20,688	33,052	11,095				
(-) Concession Fee (*)	-	10,205	17,270	18,230	18,936	19,042	19,042	19,042
<b>(=)Profit bef.taxes</b>	<b>(8,457)</b>	<b>(9,181)</b>	<b>(3,278)</b>	<b>21,263</b>	<b>62,637</b>	<b>59,119</b>	<b>58,012</b>	<b>63,365</b>
<b>(-)Prov. for Taxes</b>	-	-	-	5,048	21,283	20,088	19,711	21,531
Social Sec.	-	-	-	1,340	5,637	5,321	5,221	5,703
Income Tax	-	-	-	3,708	15,646	14,767	14,490	15,828
<b>(=)Oper. Results</b>	<b>(8,457)</b>	<b>(9,181)</b>	<b>(3,278)</b>	<b>16,215</b>	<b>41,354</b>	<b>39,031</b>	<b>38,301</b>	<b>41,834</b>

DF/GCT  
6/21/2001

**São Paulo Metro Line 4- Traffic Forecast  
(in 1000's)**

	2006	2007	2008	2009	2010	2015	2021
<b>PAYING PASSENGERS</b>	<b>131,658</b>	<b>204,121</b>	<b>280,760</b>	<b>285,203</b>	<b>289,577</b>	<b>305,719</b>	<b>319,530</b>
<b>METRO ONLY</b>	<b>122,259</b>	<b>189,548</b>	<b>260,716</b>	<b>264,842</b>	<b>268,903</b>	<b>283,893</b>	<b>296,718</b>
Exclusive	112,819	174,912	240,585	244,392	248,141	261,972	273,805
Students	9,440	14,635	20,130	20,449	20,763	21,920	22,912
<b>INTEGR. WITH OTHER MODES</b>	<b>9,399</b>	<b>14,573</b>	<b>20,044</b>	<b>20,362</b>	<b>20,674</b>	<b>21,826</b>	<b>22,812</b>
<b>BUS SERVICE</b>	<b>7,212</b>	<b>11,181</b>	<b>15,379</b>	<b>15,622</b>	<b>15,862</b>	<b>16,746</b>	<b>17,503</b>
Oneway	4,300	6,666	9,169	9,314	9,457	9,984	10,435
Return	2,912	4,515	6,210	6,308	6,405	6,762	7,067
<b>TROLLY BUS</b>	<b>369</b>	<b>572</b>	<b>786</b>	<b>799</b>	<b>811</b>	<b>856</b>	<b>895</b>
Oneway	158	245	337	342	347	367	383
Return	211	327	449	456	463	489	511
<b>CPTM EAST</b>	<b>1,619</b>	<b>2,510</b>	<b>3,452</b>	<b>3,507</b>	<b>3,560</b>	<b>3,759</b>	<b>3,929</b>
Oneway	860	1,333	1,833	1,862	1,891	1,996	2,086
Return	759	1,177	1,619	1,644	1,669	1,762	1,842
<b>CPTM WEST</b>	<b>200</b>	<b>311</b>	<b>427</b>	<b>434</b>	<b>441</b>	<b>465</b>	<b>486</b>
Oneway	132	204	281	285	290	306	320
Return	69	107	147	149	151	160	167
<b>LEGALLY EXEMPT</b>	<b>2,573</b>	<b>3,988</b>	<b>10,349</b>	<b>10,513</b>	<b>10,674</b>	<b>11,270</b>	<b>11,762</b>
<b>TOTAL TRIPS</b>	<b>134,231</b>	<b>208,109</b>	<b>291,109</b>	<b>295,716</b>	<b>300,251</b>	<b>316,989</b>	<b>331,292</b>

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**Annex 6: Procurement and Disbursement Arrangements**  
**BRAZIL: São Paulo Metro Line 4 Project**

**Procurement**

Bank procurement guidelines for goods and works will be applied (Guidelines-Procurement under IBRD Loans and IDA Credits, January 1995, revised January and August 1996, September 1997, and January 1999). There will be one ICB for the construction of infrastructure and fixed installations and provision of some system-wide facilities. This will be procured through no more than three lump-sum turnkey contracts, with one pre-qualification. Because the Bank will not be financing the concession or other PSP arrangements, the Borrower will follow its own procedures, which should be satisfactory to the Bank, and subject to the Bank's prior review. The procurement documents to be used will be an adaptation of the standard bidding documents for supply and installation and major works.

Consultant services will be selected in accordance with Bank guidelines (Guidelines- Selection and Employment of Consultants by World Bank Borrowers, January 1997, revised September 1997 and January 1999), under QCBS procedures.

A procurement capacity assessment was carried out. METRO has a procurement department with a good number of engineers and procurement specialists very qualified to carry out procurement. The risk assessed was AVERAGE due to the excellent experience of the unit but considering the large size of the bidding package. To reduce risks the Borrower has advanced procurement actions and the prequalification documents are ready, and the Bank is carrying out a close contact with the borrower in the preparation of the bidding package. The frequency of supervision required will be very tight during the bidding process and every six months during the first 2 years after starting works and yearly after that.

Procurement methods (Table A)

**Table A: Project Costs by Procurement Arrangements<sup>1</sup>**  
(in US\$ million equivalent)

Expenditure Category	Procurement Method			N.B.F	Total Cost (including contingencies)
	ICB	NCB	Other		
<b>1. Works</b>					
Turnkey Contract	495.33 (201.91)				495.33 (201.91)
<b>2. Goods under the concession</b>				357.48	357.48 (4)
<b>2. Consulting Services</b>					
a. PMOC & Supervision			15.2 (1.00)		15.2 (1.00)
b. Technical Assistance			17.8 (4.0)		17.8 (4.0)
<b>3. Expropriation</b>				46	46
<b>4. Front end fee</b>	2.09 (2.09)				2.09 (2.09)
<b>Total</b>	<b>497.42</b> <b>(204)</b>		<b>33.0</b> <b>(5.0)</b>	403.48 (0)	<b>933.9</b> <b>(209)</b>

Note: N.B.F. = Not Bank-financed (includes elements procured under parallel cofinancing procedures, consultancies under trust funds, any reserved procurement, and any other miscellaneous items).

Other- Consultant services to be procured under QCBS

**Table A1: Consultant Selection Arrangements (optional)**  
(US\$ million equivalent)

Consultant Services Expenditure Category	Selection Method							Total Cost <sup>1</sup>
	QCBS	QBS	SFB	LCS	CQ	Other	N.B.F.	
<b>A. Firms</b>	33.00 (5.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	33.00 (5.00)
<b>B. Individuals</b>	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)
<b>Total</b>	33.00 (5.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	33.00 (5.00)

1\ Including contingencies

Note: QCBS = Quality- and Cost-Based Selection  
 QBS = Quality-based Selection  
 SFB = Selection under a Fixed Budget  
 LCS = Least-Cost Selection  
 CQ = Selection Based on Consultants' Qualifications  
 Other = Selection of individual consultants (per Section V of Consultants Guidelines), Commercial Practices, etc.  
 N.B.F. = Not Bank-financed  
 Figures in parenthesis are the amounts to be financed by the Bank Loan.

**Prior review thresholds (Table B)**

Prior review thresholds were revised by the Regional Procurement Adviser to reflect the experience of METRO with procurement.

**TableB: Thresholds for Procurement Methods and Prior Review<sup>1</sup>**

Description	Type of Procurement	Prior Review Limit	Contract Value
<b>1. Works</b> Turnkey Contracts	ICB	All ICB	No threshold
<b>2. Goods</b> (not applicable. Shown as reference)	ICB NCB Shopping	All First Two Contracts None	>350,000 100,000 to 350,000 <100,000
<b>3. Consulting Services</b> Firms	QCBS	TORs, short list, technical and financial evaluation and contract	> \$100,000



confirmed that the project satisfies the Bank's minimum financial management requirements. However, the project does not have in place an adequate project financial management system that can provide, with reasonable assurance, accurate and timely information on the status of the project (PMRs) as required by the Bank/IDA for PMR-Based Disbursements. An action plan has been agreed with the borrower to adequate the system from current to desirable to generate the PMRs not later than one year after loan effectiveness.

**Audits**

The Special Account and Statement of Expenditures (SOEs) or Project Management Reports: i) will be audited by independent auditors acceptable to the Bank; and (ii) audits will be submitted to the Bank by June 30 of each year.

**Annex 7: Project Processing Schedule  
BRAZIL: São Paulo Metro Line 4 Project**

<b>Project Schedule</b>	<b>Planned</b>	<b>Actual</b>
Time taken to prepare the project (months)	12	15
First Bank mission (identification)	09/23/2000	09/23/2000
Appraisal mission departure	07/23/2001	07/22/2001
Negotiations	11/30/2001	11/21/2001
Planned Date of Effectiveness	03/30/2002	

**Prepared by:**

Bank staff with the assistance of São Paulo Metro staff and the São Paulo Secretary of Metropolitan Transport.

**Preparation assistance:**

The environmental analysis of the SPMR was facilitated by a PHRD grant TF25255.

**Bank staff who worked on the project included:**

<b>Name</b>	<b>Speciality</b>
Jorge M. Rebelo	Task Manager/Lead Transport Specialist
José Augusto Carvalho	Lead Counsel
Pierre Graftieaux	Transport Economist
Moazzam Mekan	Project Finance Specialist
Paula Pini	Environment and Resettlement Specialist
Armando Araújo	Build-Operate-Transfer Procurement
William Dillinger	State Financial Analysis
Túlio Correa	Financial Management Specialist
Antonio Estache	Peer Reviewer
Ken Gwilliam	Peer Reviewer
Solange Van Veldhuizen	Staff Assistant
Henrique Cruz	Civil Works Infrastructure Consultant
Luiz Queiroz	Finance and Project Finance Consultant
Protran Engenharia	Environmental Consultants
Fundação Getúlio Vargas	Project Finance Advisors

**Annex 8: Documents in the Project File\***  
**BRAZIL: São Paulo Metro Line 4 Project**

**A. Project Implementation Plan**

1. Linha 4-Amarela - Project Implementation Plan, July 2001- Prepared by the São Paulo Metro Company.
2. Linha 4-Amarela - Apresentações - Meeting of October 10, 2000 -Prepared by the São Paulo Metro Company.

**B. Bank Staff Assessments**

**C. Other**

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21. Transporte Urbano (Municipal e Metropolitano) Quem Decide?
22. Remodelação e Melhoria do Transporte Coletivo na RMSP, Secretaria dos Transportes Metropolitanos, Companhia do Metropolitano de São Paulo.
23. Relatório de Impacto Ambiental - Estudo Preliminar para o Banco Mundial - Linha 4 - Vila Sônia-Tatuapé, Setembro de 1993.
24. Análise Técnica, Econômica e Financeira da Ligação Roosevelt - Barra Funda - Versão 2.
25. Use of Consultants in LAC's Lending Operations - Latin America and Caribbean Region.
26. Tables: População, Número de Viagens, etc.
27. Plano Diretor de São Paulo, Propostas para os Transportes - Prefeitura do Município de São Paulo.
28. Análise Técnica, Econômica e Financeira da Ligação Paulista - Pinheiros - Versão 3.
29. Estudo de Viabilidade do Modelo de Parceria Estado - Iniciativa Privada - Terminais do Metrô - Companhia Paulista de Desenvolvimento - CPD.
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61. Sistema Integrado de Transporte Urbano da Região Metropolitana de São Paulo - SITU/RMSP - Projeto Integração Centro - Volume III - Anexos - Desenhos.
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92. Considerações sobre a Importância do Salário Mínimo - Grande São Paulo 1989-1993 - SEADE - Abril 1994.
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95. Estudo de Impacto Ambiental Vols. I, II, III - Secretaria de Estado Dos Transportes Metropolitanos.
96. Relatório de Impacto no Meio Ambiente - Secretaria de Estado Dos Transportes Metropolitanos.

\*Including electronic files

## Annex 9: Statement of Loans and Credits

### BRAZIL: São Paulo Metro Line 4 Project

Project ID	FY	Purpose	Original Amount in US\$ Millions			Cancel.	Undisb.	Difference between expected and actual disbursements*	
			IBRD	IDA	GEF			Orig	Frm Rev'd
P050772	2001	LAND-BASED POVERTY ALLEVIATION I	202.10	0.00	0.00	0.00	204.19	0.00	0.00
P059565	2001	BR- BA BASIC EDU PROJECT (PHASE I)	69.60	0.00	0.00	0.00	69.60	1.00	0.00
P059566	2001	BR- CEARA BASIC EDUCATION	90.00	0.00	0.00	0.00	90.00	0.00	0.00
P060575	2001	PRGM.FISCAL REFORM SAL	757.58	0.00	0.00	0.00	757.58	0.00	0.00
P039199	2000	PROSANEAR 2	30.30	0.00	0.00	0.00	30.00	-0.30	0.00
P006449	2000	CEARA WTR MGT (PROGERIRH)	136.00	0.00	0.00	0.00	131.65	27.16	0.00
P047309	2000	BR ENERGY EFFICIENCY (GEF)	0.00	0.00	15.00	0.00	14.11	0.83	0.00
P062619	2000	INSS REF LIL	5.05	0.00	0.00	0.00	3.61	1.73	0.00
P035741	2000	NATL ENV 2	15.00	0.00	0.00	0.00	13.40	2.17	1.10
P050776	2000	NE Microfinance Development	50.00	0.00	0.00	0.00	42.00	-8.00	0.00
P039200	2000	ENERGY EFFICIENCY (ELETROBRAS)	43.40	0.00	0.00	0.00	42.97	2.23	0.00
P050763	1999	BR- Fundescola 2	202.00	0.00	0.00	0.00	77.07	-49.20	0.00
P054120	1999	BR- AIDS & STD Control II	165.00	0.00	0.00	3.50	87.49	55.16	0.00
P055388	1999	ANIMAL&PLANT DIS. CO	44.00	0.00	0.00	0.00	44.00	19.87	0.00
P043874	1999	BR- DISEASE SURVEILLANCE - VIGISUS	100.00	0.00	0.00	0.00	82.66	66.83	0.00
P058129	1999	BR EMER. FIRE PREVENTION	15.00	0.00	0.00	0.00	12.15	11.49	2.63
P048869	1999	SALVADOR URBAN TRANS	150.00	0.00	0.00	0.00	136.45	53.12	0.00
P050762	1998	BR- Fundescola I	62.50	0.00	0.00	0.00	0.78	-2.96	0.00
P042565	1998	PARAIBA R.POVERTY	60.00	0.00	0.00	0.00	32.53	7.57	0.00
P043420	1998	WATER S.MOD.2	150.00	0.00	0.00	0.00	148.29	123.23	83.15
P043421	1998	RJ M.TRANSIT PRJ.	186.00	0.00	0.00	17.17	150.97	164.23	0.00
P048357	1998	CEN.BANK TAL	20.00	0.00	0.00	0.00	7.31	7.31	0.00
P038947	1998	BR- SC. & TECH 3	155.00	0.00	0.00	0.00	128.13	118.13	0.00
P006474	1998	BR LAND MGT 3 (SAO PAULO)	55.00	0.00	0.00	0.00	53.00	27.34	12.33
P038895	1998	FED.WTR MGT	198.00	0.00	0.00	0.00	128.69	96.61	23.69
P057910	1998	BR PENSION REFORM LIL	5.00	0.00	0.00	0.00	3.33	3.33	-1.59
P035728	1998	BAHIA WTR RESOURCES	51.00	0.00	0.00	0.00	32.81	26.41	0.00
P051701	1998	MARANHAO R.POVERTY	80.00	0.00	0.00	0.00	15.78	-13.35	0.00
P006559	1998	(BF-R)SP.TSP	45.00	0.00	0.00	0.00	41.96	41.30	0.00
P048870	1997	BR MT STATE PRIV.	45.00	0.00	0.00	0.00	5.00	5.00	1.67
P038896	1997	R.POVERTY(RGN)	24.00	0.00	0.00	0.00	3.83	3.83	0.00
P046052	1997	CEARA WATER PILOT	9.60	0.00	0.00	0.00	4.77	4.77	1.22
P006562	1997	BAHIA MUN.DV	100.00	0.00	0.00	0.00	68.05	56.39	-3.14
P006475	1997	LAND RFM PILOT	90.00	0.00	0.00	0.00	24.23	21.91	0.00
P034578	1997	RGS HWY MGT	70.00	0.00	0.00	0.00	54.97	43.97	20.64
P006532	1997	FED HWY DECENTR	300.00	0.00	0.00	0.00	157.25	157.25	0.00
P042566	1997	R.POVERTY(PE)	39.00	0.00	0.00	0.00	5.76	5.76	0.00
P043873	1997	AG TECH DEV.	60.00	0.00	0.00	0.00	37.82	30.64	9.24
P043871	1997	(PIAUJI)R.POVERTY	30.00	0.00	0.00	0.00	2.28	2.28	0.00
P043868	1997	RGS LAND MGT/POVERTY	100.00	0.00	0.00	0.00	70.47	37.59	0.00
P006210	1996	NAT'L BIODIVERSITY	0.00	0.00	10.00	0.00	3.63	4.93	5.55
P006554	1996	BR- HEALTH SECTOR REFORM - REFORSUS	300.00	0.00	0.00	0.00	159.84	160.28	0.00
P040028	1996	RAILWAYS RESTRUCTURG	350.00	0.00	0.00	50.00	43.42	93.42	43.42
P044597	1996	BR BIODIVERSITY FUND	0.00	0.00	20.00	0.00	8.19	9.97	0.00
P037828	1996	BR (PR)R.POVERTY	175.00	0.00	0.00	0.00	103.07	92.94	0.00
P038882	1995	RECIFE M.TSP	102.00	0.00	0.00	0.00	47.17	46.17	0.00
P006436	1995	Ceara Urban Development & Water Resource	140.00	0.00	0.00	0.00	23.64	23.64	2.69
P006564	1995	BELO H.M.TSP	99.00	0.00	0.00	0.00	26.61	25.61	0.00
P035717	1995	RURAL POV. (BAHIA)	105.00	0.00	0.00	0.00	1.66	1.66	0.00
P006558	1994	BR- PARANA BASIC EDUC	96.00	0.00	0.00	0.00	5.87	5.87	0.00
P006543	1994	BR- MINAS GERAIS BASIC EDU.	150.00	0.00	0.00	0.00	10.68	10.68	0.00
P006524	1994	BR MINAS MNC.DEVELOPMT	150.00	0.00	0.00	9.70	20.75	30.45	25.45
P006522	1994	ESP.SANTO WATER	154.00	0.00	0.00	54.00	18.29	72.29	3.07
P006541	1993	BR WTR Q/PLN(SP/PR/FED)	245.00	0.00	0.00	3.15	8.05	11.20	0.37

Project ID	FY	Purpose	Original Amount in US\$ Millions					Difference between expected and actual disbursements <sup>a</sup>	
			IBRD	IDA	GEF	Cancel.	Undisb.	Orig	Frm Rev'd
P006454	1992	RONDONIA NTRL RES. M	167.00	0.00	0.00	0.00	25.66	25.66	0.00
P006505	1992	MATO GROSSO NAT RES	205.00	0.00	0.00	0.00	34.36	34.36	0.00
Total:			6448.13	0.00	45.00	137.53	3557.85	1803.79	231.50

BRAZIL  
STATEMENT OF IFC's  
Held and Disbursed Portfolio  
May-2001  
In Millions US Dollars

FY Approval	Company	Committed				Disbursed			
		IFC				IFC			
		Loan	Equity	Quasi	Partic	Loan	Equity	Quasi	Partic
1987/96	Perdigao	21.88	0.00	0.00	8.00	21.88	0.00	0.00	8.00
1989/95	Politeno Ind.	8.77	0.00	0.00	0.00	8.77	0.00	0.00	0.00
1994/00	Portobello	16.00	0.00	0.00	0.00	15.29	0.00	0.00	0.00
2000	Puras	5.00	0.00	0.00	0.00	5.00	0.00	0.00	0.00
1998	Randon	7.00	0.00	3.00	0.00	7.00	0.00	3.00	0.00
1991	Rhodia-Ster	1.43	5.95	0.00	0.00	1.43	5.95	0.00	0.00
1995	Rhodiaco/PTA	12.50	0.00	0.00	9.00	12.50	0.00	0.00	9.00
1990	Ripasa	0.00	5.00	0.00	0.00	0.00	5.00	0.00	0.00
1997	Rodovia	31.11	0.00	0.00	63.60	31.11	0.00	0.00	63.60
	S.A.I.C.C.	0.00	0.00	6.87	0.00	0.00	0.00	6.87	0.00
1994/96	SP Alpargatas	20.00	0.00	5.00	0.00	20.00	0.00	5.00	0.00
1987/97	Sadia	24.00	0.00	8.00	128.00	24.00	0.00	8.00	128.00
1994/95/97	Samarco	13.50	0.00	0.00	9.33	13.50	0.00	0.00	9.33
1997	Samaritano	20.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2000	Saraiva	12.69	3.00	0.00	0.00	12.69	3.00	0.00	0.00
1998	Sucorrico	10.50	0.00	0.00	0.00	10.50	0.00	0.00	0.00
1997	TIGRE	17.31	0.00	5.00	10.68	17.31	0.00	5.00	10.68
1996	TRIKEM	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1992/93	Tecon Rio Grande	7.50	0.00	5.50	18.00	6.65	0.00	5.50	15.95
1998	Votorantim	5.86	0.00	0.00	0.43	5.86	0.00	0.00	0.43
1993	Vulcabras	20.00	0.00	0.00	0.00	20.00	0.00	0.00	0.00
1999	Wembley	0.00	10.00	0.00	0.00	0.00	10.00	0.00	0.00
1997	Wiest	0.00	0.00	8.00	0.00	0.00	0.00	8.00	0.00
1999	Arteb	20.00	7.00	0.00	20.00	20.00	7.00	0.00	20.00
1998	AutoBAn	35.00	0.00	0.00	31.00	22.84	0.00	0.00	20.23
1999	BACELL	6.00	15.70	0.00	16.20	6.00	15.70	0.00	16.20
1993	BBA	40.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2000	BSC	11.53	0.00	0.00	6.18	11.53	0.00	0.00	6.18
1998	Bahia Sul	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1990/91/92	Banco Bradesco	13.00	0.00	0.00	16.77	13.00	0.00	0.00	16.77
1996	Bompreco	20.83	0.00	5.00	0.00	20.83	0.00	5.00	0.00
1997	Bradesco-Bahia	1.50	0.00	0.00	0.00	1.50	0.00	0.00	0.00
1991	Bradesco-Eucatex	5.00	0.00	0.00	0.00	5.00	0.00	0.00	0.00
1991	Bradesco-Hering	7.50	0.00	0.00	0.00	7.50	0.00	0.00	0.00
1995	Bradesco-Petrofl	7.50	0.00	0.00	0.00	7.50	0.00	0.00	0.00
1991	Bradesco-Romi	0.00	0.40	0.00	0.00	0.00	0.40	0.00	0.00
1991	Brahma - BRA	12.50	0.00	5.00	12.30	12.50	0.00	5.00	12.30
1995	CEVAL	0.00	10.00	0.00	0.00	0.00	10.00	0.00	0.00
1993/96	CHAPECO	15.00	0.00	0.00	5.00	15.00	0.00	0.00	5.00
1994/96	CODEMIN	0.00	0.40	0.00	0.00	0.00	0.40	0.00	0.00
1973/78/83	CRP-Caderi	0.00	0.68	0.00	0.00	0.00	0.68	0.00	0.00
1992	Cambuhy/MC	11.25	0.00	0.00	0.00	11.25	0.00	0.00	0.00
1995	Copesul	30.00	0.00	0.00	128.57	30.00	0.00	0.00	128.57
1997	Coteminas	0.00	0.53	0.00	0.00	0.00	0.53	0.00	0.00
1993/97/00									
	Total Portfolio:	763.81	145.07	132.21	852.27	667.74	117.01	128.91	809.80

FY Approval	Company	Approvals Pending Commitment			
		Loan	Equity	Quasi	Partic
2000	Sepetiba	27.00	0.00	6.00	18.00
2001	Tecon Salvador	3.50	0.00	1.00	5.00
2000	BBA	0.00	0.00	0.00	50.00
1997	CTBC	35.00	0.00	0.00	150.00
1999	Cibrasec	0.00	0.00	7.50	0.00
1998	FSA	35.00	10.00	0.00	45.00
1996	Globocabo II	0.00	0.00	0.00	38.00
1998	Ipiranga-RI 2	0.00	0.00	0.09	0.00
1999	MBR LTDP	20.00	5.00	0.00	115.00
Total Pending Commitment:		120.50	15.00	14.59	421.00

## Annex 10: Country at a Glance

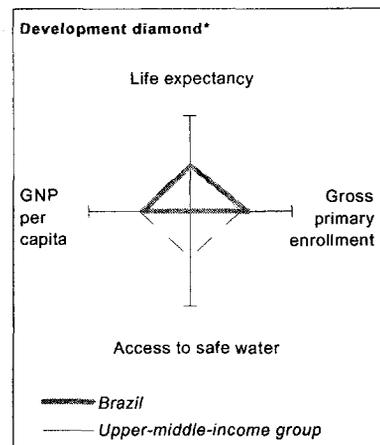
### BRAZIL: São Paulo Metro Line 4 Project

POVERTY and SOCIAL	Brazil	Latin America & Carib.	Upper-middle-income
<b>1999</b>			
Population, mid-year (millions)	168.1	509	573
GNP per capita (Atlas method, US\$)	4,420	3,840	4,900
GNP (Atlas method, US\$ billions)	742.7	1,955	2,811

Average annual growth, 1993-99	Brazil	Latin America & Carib.	Upper-middle-income
Population (%)	1.4	1.6	1.4
Labor force (%)	2.1	2.5	2.1

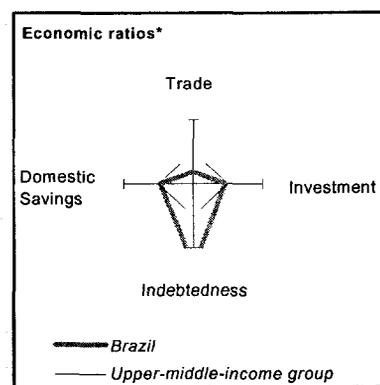
#### Most recent estimate (latest year available, 1993-99)

Poverty (% of population below national poverty line)	Brazil	Latin America & Carib.	Upper-middle-income
Urban population (% of total population)	81	75	76
Life expectancy at birth (years)	67	70	70
Infant mortality (per 1,000 live births)	33	31	27
Child malnutrition (% of children under 5)	6	8	7
Access to improved water source (% of population)	..	75	78
Illiteracy (% of population age 15+)	15	12	10
Gross primary enrollment (% of school-age population)	125	113	109
Male	..	..	..
Female	..	..	..



#### KEY ECONOMIC RATIOS and LONG-TERM TRENDS

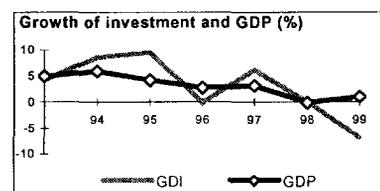
	1979	1989	1998	1999
GDP (US\$ billions)	225.0	448.8	787.1	791.4
Gross domestic investment/GDP	22.8	24.8	21.3	21.0
Exports of goods and services/GDP	7.1	8.2	7.4	9.7
Gross domestic savings/GDP	20.7	28.0	18.6	21.7
Gross national savings/GDP	18.0	25.0	16.3	18.8
Current account balance/GDP	-4.7	0.4	-4.3	-3.1
Interest payments/GDP	2.1	0.9	1.4	1.5
Total debt/GDP	27.3	25.5	29.5	28.0
Total debt service/exports	62.8	36.3	73.5	120.8
Present value of debt/GDP	..	..	27.9	..
Present value of debt/exports	..	..	337.5	..



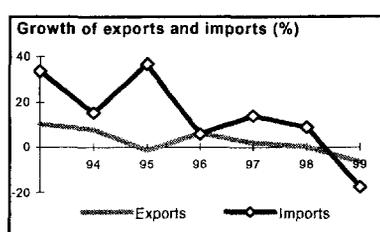
(average annual growth)	1979-89	1989-99	1998	1999	1999-03
GDP	2.9	2.6	-0.1	1.0	4.0
GNP per capita	0.9	0.7	-1.4	-2.6	2.8
Exports of goods and services	8.9	4.2	0.2	-6.5	5.6

#### STRUCTURE of the ECONOMY

(% of GDP)	1979	1989	1998	1999
Agriculture	11.0	8.5	8.4	8.4
Industry	40.6	42.7	28.8	31.7
Manufacturing	31.0	29.5	22.7	22.7
Services	48.3	48.8	62.8	59.9
Private consumption	69.5	57.8	63.6	62.8
General government consumption	9.7	14.3	17.8	15.6
Imports of goods and services	9.2	5.0	10.1	9.0



(average annual growth)	1979-89	1989-99	1998	1999
Agriculture	3.4	2.9	0.0	9.5
Industry	2.3	2.1	-1.3	-1.7
Manufacturing	1.9	1.1	-2.0	-0.7
Services	3.4	2.7	0.8	1.3
Private consumption	1.9	5.8	-3.4	9.4
General government consumption	6.4	-2.0	2.1	-9.3
Gross domestic investment	-0.1	2.4	0.1	-6.9
Imports of goods and services	-1.4	12.4	8.9	-17.4
Gross national product	2.9	2.2	0.0	-1.3

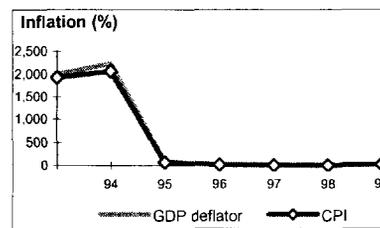


Note: 1999 data are preliminary estimates.

\* The diamonds show four key indicators in the country (in bold) compared with its income-group average. If data are missing, the diamond will be incomplete.

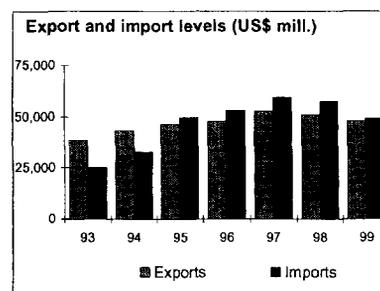
## PRICES and GOVERNMENT FINANCE

	1979	1989	1998	1999
<b>Domestic prices</b>				
<i>(% change)</i>				
Consumer prices	..	1,430.7	2.7	8.6
Implicit GDP deflator	56.5	1,322.5	3.9	11.3
<b>Government finance</b>				
<i>(% of GDP, includes current grants)</i>				
Current revenue	..	..	20.4	21.9
Current budget balance	..	..	-4.4	-5.2
Overall surplus/deficit	..	..	-5.5	-6.2



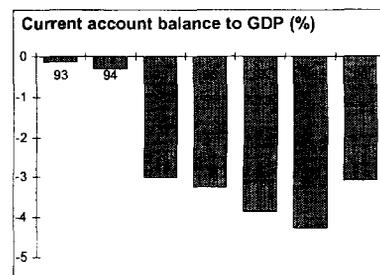
## TRADE

	1979	1989	1998	1999
<i>(US\$ millions)</i>				
Total exports (fob)	..	34,375	51,140	48,011
Coffee	..	1,803	2,576	2,441
Soybeans	..	3,647	4,755	3,784
Manufactures	..	17,575	31,964	30,251
Total imports (cif)	..	18,264	57,733	49,219
Food	..	1,249	3,057	2,078
Fuel and energy	..	3,753	1,965	2,169
Capital goods	..	4,873	25,283	21,157
Export price index (1995=100)	..	98	92	86
Import price index (1995=100)	..	85	84	89
Terms of trade (1995=100)	..	115	108	97



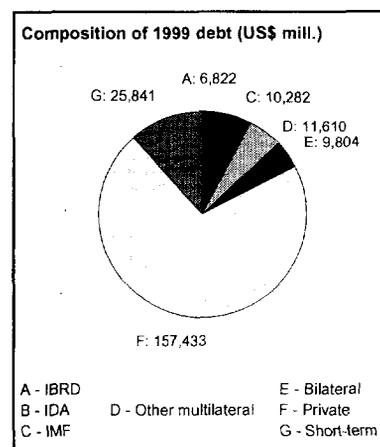
## BALANCE of PAYMENTS

	1979	1989	1998	1999
<i>(US\$ millions)</i>				
Exports of goods and services	16,708	36,394	55,473	51,887
Imports of goods and services	21,724	21,486	69,650	57,516
Resource balance	-5,016	14,908	-14,177	-5,629
Net income	-5,479	-13,265	-21,217	-20,786
Net current transfers	5	249	1,778	2,040
Current account balance	-10,490	1,892	-33,616	-24,375
Financing items (net)	7,703	-7,087	16,331	13,634
Changes in net reserves	2,787	5,195	17,285	10,741
<b>Memo:</b>				
Reserves including gold (US\$ millions)	9,045	7,672	43,971	35,725
Conversion rate (DEC, local/US\$)	9.79E-12	1.03E-6	1.1	1.3



## EXTERNAL DEBT and RESOURCE FLOWS

	1979	1989	1998	1999
<i>(US\$ millions)</i>				
Total debt outstanding and disbursed	61,327	114,532	232,004	221,792
IBRD	1,790	8,311	6,298	6,822
IDA	0	0	0	0
Total debt service	11,310	14,122	47,887	73,694
IBRD	234	1,475	1,373	1,380
IDA	0	0	0	0
Composition of net resource flows				
Official grants	10	44	97	..
Official creditors	436	223	4,911	-1,077
Private creditors	5,236	-3,716	21,930	-15,796
Foreign direct investment	2,419	1,267	31,913	26,916
Portfolio equity	0	0	542	3,234
World Bank program				
Commitments	674	933	1,290	1,465
Disbursements	302	819	1,240	1,533
Principal repayments	74	871	995	952
Net flows	228	-52	245	580
Interest payments	160	604	378	428
Net transfers	67	-656	-133	153



**Additional  
Annex 11**

**BRAZIL: SÃO PAULO METRO (LINE 4) PROJECT**

**THE IMPACT OF LINE 4 ON POVERTY IN THE SÃO PAULO METROPOLITAN REGION  
(SPMR)**

This annex describes an evaluation of the impacts of Line 4 on poverty in the São Paulo Metropolitan Region (SPMR) prepared jointly by the Borrower's and Bank staff. Over the last decade, income poverty has fluctuated considerably. Using a relatively high poverty line, and even considering the positive effect of economic stabilization in 1994, the total number of poor<sup>1</sup> in 1997 was 22% higher than in 1987 and reached 5.2 millions in 1997. The inequality gap is widening. Low mobility, partly explained by unsatisfactory public transport supply, is one of the symptoms of the poor's overall exclusion and reflects their weak involvement in the social, cultural and economic life of the SPMR. Geographical exclusion is worsening : the poor are either priced out of the central areas and endure long trips or move into central favelas to avoid spending too much time and money in traveling. Transport has a key role to play to address these issues and reintegrate the poor in the society by providing them with access to the job market and to the SPMR services and opportunities at affordable prices and reasonable travel times. Line 4, through a widely spread catchment area which covers some of the poorest municipalities of the SPMR, and thanks to good physical and fare integration with the suburban rail lines which serve the low income areas, will open the metro network to low-income users and will help unlock the city's opportunities to the poor. Twenty-two per cent (22 %) of Line 4 future users are from poor households which earn less than US\$ 2/day/capita while approximately 50 % of the estimated users belong to households which earn less than US\$ 4/day/capita. Because it interconnects so many existing rail and road -based systems, Line 4 will bring to the poor enhanced accessibility to health, education and education facilities, increased job opportunities, shorter travel times, better door-to-door affordability, potential economic revitalization of their neighborhoods and positive environmental impacts. Finally, Line 4 is expected to increase the labor market size and therefore allow a better "matching" of jobs and workers thereby positively impacting the output of SPMR and generating a trickle-down effect that will most likely have a very positive impact on the poor.

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<sup>1</sup>In accordance with Sonia Rocha's definition of the poverty line, i.e. for the São Paulo Metropolitan Region, R\$152.51 per capita, in 1997 R\$ (IPEA). The methodology differs from the one used in other Bank studies, for example "Fighting Brazil's Poverty" Report No 20475-BR, June 2001, which uses a poverty line less than half that level.

## Introduction

A reliable, fast and efficient urban transport system does contribute to economic welfare and growth. This issue was studied by Prud'homme and Lee<sup>2</sup>:

“A key notion to explore this relationship is the *effective size of the labor market* for a given city. Consider a city with 1,000,000 jobs and workers (assuming away unemployment, for the sake of simplicity). From the viewpoint of workers, the effective size of the labor market will not be 1,000,000 jobs. Workers living at one end of the city do not have access at a reasonable cost in time and money to the jobs located at the other end of the city; for these workers, the effective size of the labor market may be only 500,000 jobs. For other workers, located in the center of the city, the effective size of the labor market will be higher, perhaps equal to 900,000 jobs. This size can be calculated for each zone of the city. An average can be calculated for the entire city, weighting the size of each zone by the number of workers in each zone. From the viewpoint of workers, the average effective size of the labor market in our city may thus be equal to 700,000 jobs. A similar calculation can be made from the viewpoint of enterprises. It will show that the effective size of the labor market is equal to, say, 800,000 workers.”

That means that Line 4, by reducing substantially the travel times for public transport users, increases the effective size of the labor market. More jobs will be accessible in less than a given amount of time from most neighborhoods in the metropolitan region. Theoretically, one must also take into account the out-of-pocket cost of the trip, which may be high enough to deter potential workers to commute from their place to a potential workplace but, one can assume in a first approximation that the Vale-Transporte<sup>3</sup> makes work-related transport affordable to most of the poor (even though informal workers don't benefit from it). Since the State has decided that Line 4 will have the same tariff as the rest of the public network, one can assume that time is the only constraint to consider.

According to Prud'homme and Lee, the effective size of the labor market is one of the factors which explain the productivity of cities:

“The larger the effective size of the labor market, the greater the probability that a given enterprise will find exactly the workers it needs, and the greater the probability that workers will find exactly the jobs they want. A larger labor market makes it possible to better adjust the supply and the demand of labor. This better "matching" of workers and jobs is a source of efficiency”.

The effective size of the labor market is of course closely related, among other factors, to the urban transport characteristics and to the quality of the public transport system. There is therefore a close link between urban transport and productivity, and hence between urban transport and general welfare.

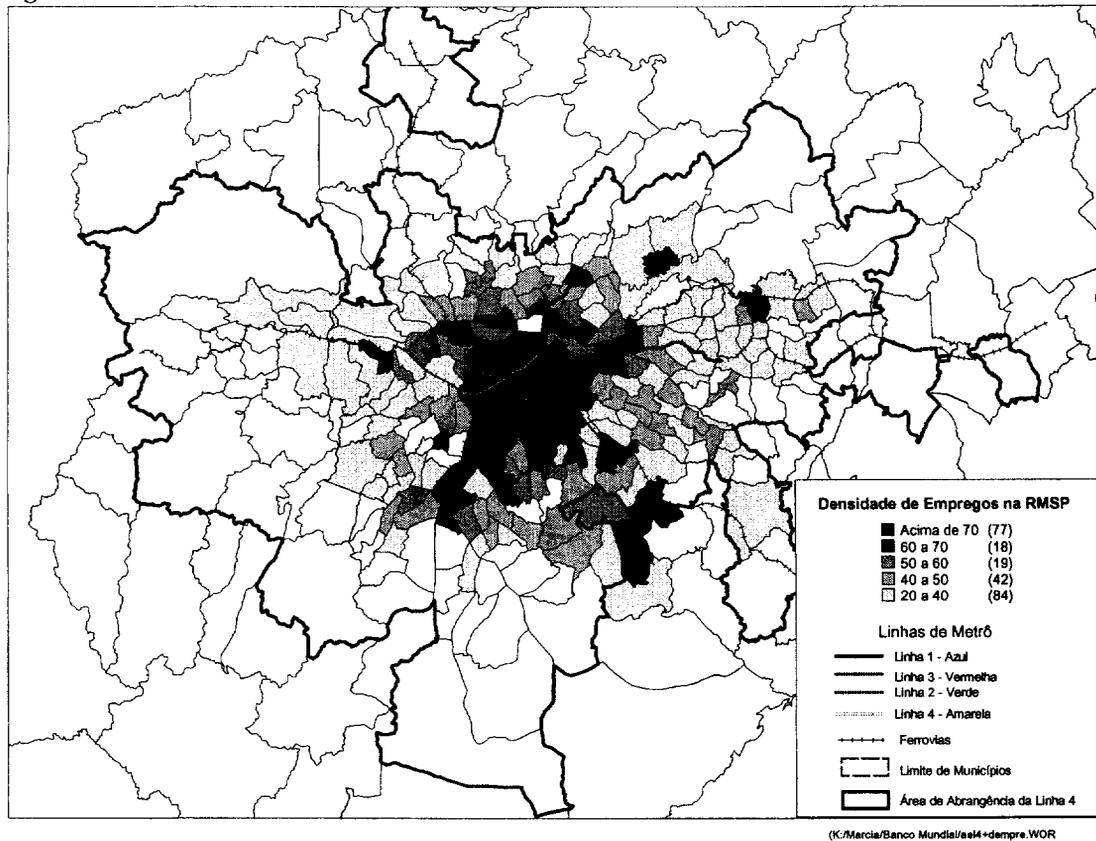
The map below displays the location of jobs in the SPMR and shows that Line 4 serves the densest areas in terms of jobs.

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<sup>2</sup>"Size, Sprawl, Speed and the Efficiency of Cities", Rémy Prud'homme and Chang-Woon Lee, November 1998, Observatoire de L'Économie et des Institutions Locales, IUP, Université de Paris XII.

<sup>3</sup> Mechanism created in 1985 and which functions as follows: every employee can opt for a deduction of 6% of his/her wages in exchange for transport tickets paid by his/her employer for his/her journey to work and back. Obviously, only formal workers benefit from this measure

**Figure 1 : Jobs location in the SPMR**



## 1 Poverty in São Paulo

### 1.A. 5.2 million poor in São Paulo: substantially more than 15 years ago

In Brazil as a whole, thirty-four per cent (34 %) of the population are still living below the poverty line (600 R\$ per month per household)<sup>4</sup>.

In the Brazilian Metropolitan Regions, the poor represent 29.8 % of the population. The number of low-income households has been increasing, both in relative and absolute terms<sup>5</sup> from 1987 to 1997.

**It's in the São Paulo Metropolitan Region (SPMR), that the sharpest poverty increase was experienced.** The SPMR concentrates more than 25 % of the Brazilian favelas. Using a poverty line of R\$ 600 per month and per household, **the percentage of poor in the SPMR increased from 20% in 1990 to 32,09 % in 1997.**

<sup>4</sup> Approximately equivalent to US\$2-3 per day per person.

<sup>5</sup> According to the revenue distribution surveys carried out during the last decade by the Brazilian Institute of Statistics (IBGE).

**Table 1 : the poor in Brazil**

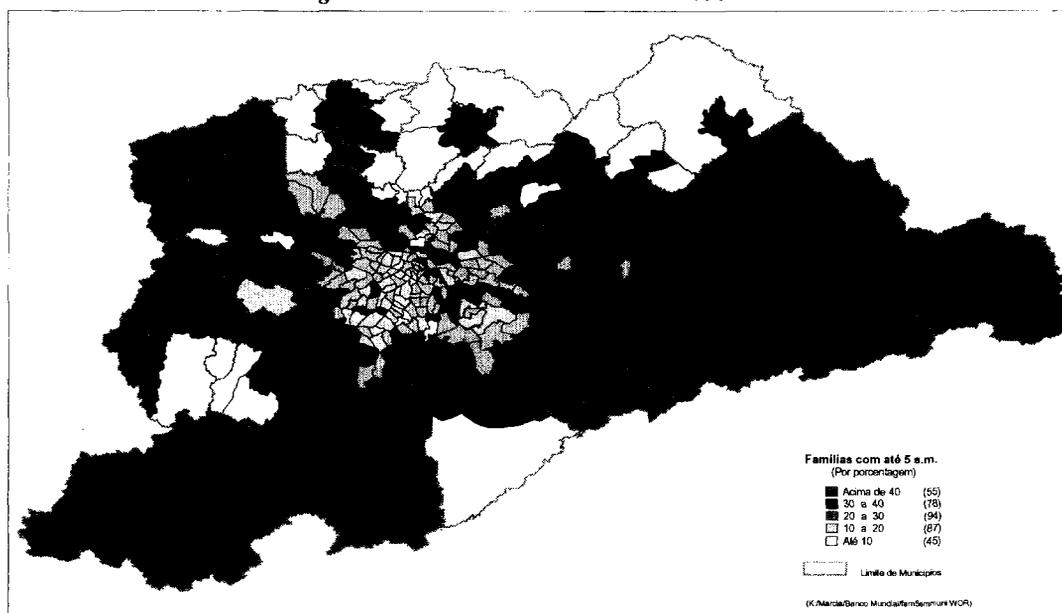
	Absolute number of poor (x 1.000)	Proportion of poor households
Metropolitan Areas	15,435.0	29.8%
Urban Areas	23,896.1	46.1%
Rural Areas	12,504.0	24.1%
<b>Total Brazil</b>	<b>51,836.0</b>	<b>100.0%</b>

Source : data from PNAD, reviewed by IPEA  
Poverty line definition based in POF/IBGE

From 1995 to 1997, the absolute increase of the number of poor in the metropolitan Region of São Paulo, was close to 1 million. Since then, even though more recent data are not available, one can reasonably assume that the poor are still worse off, especially since 1999 when a large number of low-skilled workers were made redundant. These low-skilled workers represent one fourth of the active population in the Brazilian Metropolitan Regions and their overall revenues are estimated to have plunged by a further 11 % since 1999.

To end with, the distribution of poverty within the SPMR is uneven : the poor reside mainly on the outlying fringes of the metropolitan regions but many poverty pockets are dotting the central areas as well, as shown on Figure 2:

**Figure 2 : Low income households location**

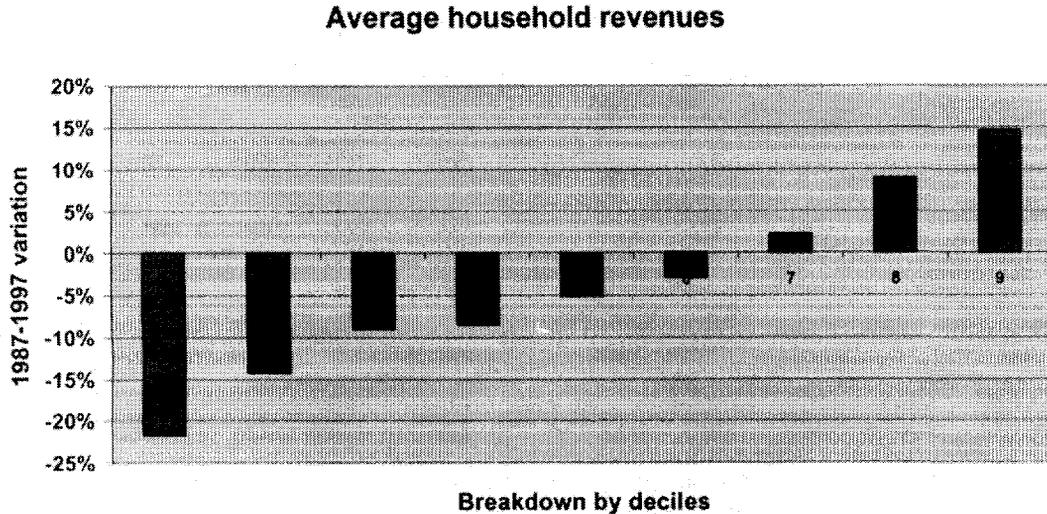


### 1.B. A widening inequality gap

The formal-sector income (not revenue) evolution between 1987 and 1997 in the SPMR shows a substantial increase of the average formal income per household, from R\$1,218 to R\$ 1,567 per month (1997 median salary is around R\$1,000) but unfortunately **this increase was very unevenly distributed** between socio-economic layers and between the different municipalities of the SPMR. This growth was

concentrated in the central municipalities. The average formal revenues for those who experienced the highest population increase, i.e. the peripheral municipalities, have been declining<sup>6</sup>. This brings to light a worrisome phenomenon and shows, that even though the total revenues of the poor may have decreased less than that, lack of job security and of formal employment is manifest, as shown on the chart below, on a population breakdown by deciles:

**Figure 3: Formal-sector income variation by decile between 1987 and 1997 in the SPMR**



People whose revenues in 1987 were below average are now earning less than ten years ago whereas formal revenue growth benefited to the segments of the population above the average revenue level. **The poorer people are, the more their formal revenues decreased, by more than 20% for the lowest decile.** The inequality gap has been getting wider and wider for the last ten years and poverty is increasing in the SPMR, especially in the peripheral municipalities which bear the brunt of poverty. According to data from the Monthly Employment Survey from IBGE, the richest one percent of the SPMR population get revenues (12.1 % of the total SPMR revenues) which are almost equal to the income of the poorest 50 % (15.6 %).

## **2 Access to Transport in the SPMR**

### **2.A. The poor's mobility: low and repressed**

The mobility of the poor in São Paulo is very low, either because they can't afford public transport fares, or because travel times are so long that the number of opportunities within their reach is rather small or simply because they are unemployed and have not many reasons to travel for. These reasons are intertwined : long travel times and/or relatively high fares reduce considerably the number of jobs they could apply for, and reciprocally, unemployment excludes them from the Vale-Transporte program and hence from transport subsidies. These families are either cornered in remote suburbs where housing is cheap or live in unhealthy and unsafe favelas in order to be closer to the center. That locks them into a non-ending spiral of exclusion by severing them from the job opportunities and services offered by the Metropolitan Region.

<sup>6</sup>It may be difficult to compare 1987 and 1997 data, since the share of formal revenues in the total household revenues decreased substantially during this period and that the above-mentioned figures are based on formal revenues.

Differences in mobility between the rich and the poor are impressive: according to the two last OD surveys, those living with less than R\$250 per family and per month make 1.16 trip per person per day, whereas the average mobility in the SPMR in 1997 was 1.87 (and 2.64 for the richest). Lack of reliable and rapid public transport infrastructure, combined in some places with lack of fare integration and the exclusion of the unemployed and of informal workers from the Vale-Transporte, represses the poor's mobility. In addition, worsening traffic conditions, unemployment, and insecurity have further pushed down the mobility in the SPMR in general and of the poor in particular. It's worth noticing that the upper socio-economic layer's overall mobility is 2.27 times higher than the lower socio-economic layer's. When considering only motorized trips, this ratio goes up to 4.66.

**Table 2: 1997 Mobility rate by income levels**

<b>Income level in R\$ per month</b>	<b>All trips</b>	<b>Motorized trips</b>
Less than 250	1.16	0.49
250<x<500	1.47	0.74
500<x<1000	1.76	0.99
1000<x<1800	2.07	1.35
1800<x<3600	2.34	1.80
More than 3600	2.64	2.27
<b>SPMR</b>	<b>1.87</b>	<b>1.23</b>

Source: 1997 OD Survey

On an average day, 55 % of the members of households earning less than R\$250 per month do not travel at all, either because they have no reason to travel or because they cannot afford the fares. This is a kind of chicken-and-egg situation where it is difficult to tell whether they do not travel because they are jobless or whether they are jobless because they cannot travel, due to an inefficient and unaffordable transport system which proves inefficient to bring enough jobs within their reach. Strikingly enough, those who travel do it mainly by foot, as shown in the following table and the share of their revenues dedicated to transport is nevertheless quite high:

**Table 3: Immobility, walking trips and transport expenses among the poorest**

<b>Income level in R\$ per month</b>	<b>"immobility" rate</b>	<b>Percentage of trips by foot</b>	<b>Percentage of revenues spent in transportation needs</b>
Less than 250	56%	58%	30%
250<x<600	45%	50%	18%

(1) "immobility" rate: Percentage of persons who didn't travel the day the OD survey was carried out

Source: 1997 OD Survey

**Table 4: transport users breakdown by mode and socio-economic layer**

Mode	Up to 250	250-600	600-1.000	1.000-1.800	1.800-3.600	> 3.600	TOTAL
Public	4%	15%	23%	31%	20%	7%	100%
Private (motorized)	2%	5%	11%	23%	32%	28%	100%
Walk	7%	20%	25%	28%	15%	5%	100%
<b>Total of the population who travels</b>	4%	13%	20%	27%	22%	13%	100%
<b>Total of the population in the SPMR</b>	7%	17%	22%	26%	19%	10%	100%

Source: 1997 OD Survey

**2.B. Two alternatives for the poor to choose from :a remote and badly accessible but relatively decent house, or a closer-in but hazardous living environment in a favela?**

A two-fold phenomenon is worth mentioning when dealing with the quality of the public transport system and its impact on the location of poor households:

- Increasingly, **the poor are being priced out of central areas** with good accessibility to jobs. They are obliged to move to peripheral municipalities with cheap housing but lower quality of services, especially when it comes to public transport. This translates into long and sometimes expensive trips to and from work, which of course negatively impact the quality of life of those who are squeezed out of the central municipalities.

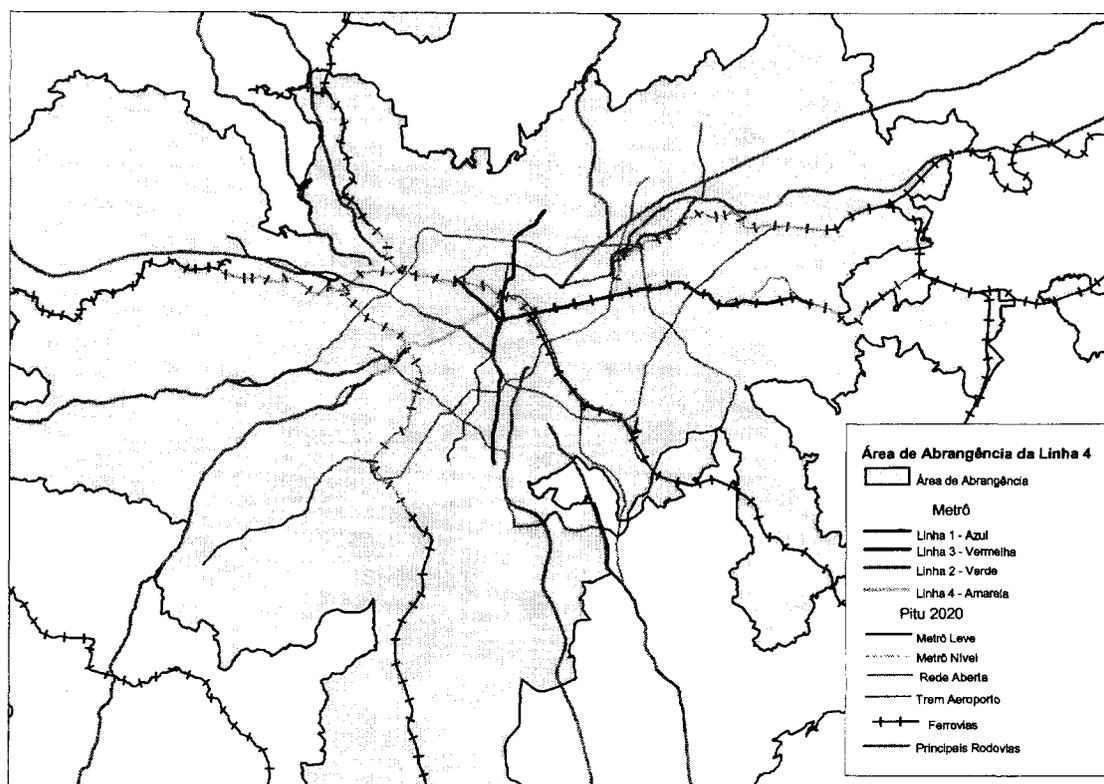
- On the other hand, nowadays, an ever-increasing number of low-middle class households decide to abandon their relatively decent dwellings in areas poorly served by public transport to move to favelas located much closer to the central neighborhoods (such as Paraisópolis, the largest one in the SPMR with 18,000 dwellers) which provide better accessibility to places where the labor market offers them the jobs they need and they are qualified for. These families are faced with a painful trade-off between travel times and costs, and housing quality. Year 2000 census showed a dramatic increase of the number of dwellings built outside the formal real estate market, i.e. illegal settlements in unhealthy favelas, where living conditions are hazardous. **During the last decade, the number of favelas in the SPMR increased by 19,5 %.** In most of the central areas regarded as middle or high income neighborhoods, the percentage of poor living in small and segregated poverty pockets can be as high as 10 to 20 %. In some specific cases such as the Parque São Pedro and the Praça João Mendes neighborhoods, this figure can go up to 35 %. In addition to this, current public investments to rehabilitate some of these deteriorated areas aim at maintaining this social mix and avoid pricing the poor out. This may partly explain why, although Line 4 will be built in the metropolis center, **no fewer than 50,000 people living below the poverty line are housed less than 2 km away from Line 4.**

### 3 Line 4: its zone of influence and its benefits

#### 3.A. A catchment area<sup>8</sup> spread all over the SPMR

Line 4 catchment area is not limited to the neighborhoods directly served by its stations. Its “missing link” role between the suburban railway and the METRO network makes it attractive to a huge number of transit users. The number of poor living in Line 4 catchment basin amounts to 3.15 million persons (and 1.28 million jobs), i.e. 79 % of the overall poor population in the SPMR. **This line will be significantly used by users from the poor municipalities located at the periphery and connected to the Metropolitan Area center by suburban railway lines serving overwhelmingly low-income people, or by bus feeder lines.** Line 4 will not only increase the number of jobs accessible from the periphery but also improve the travel conditions of public transport users.

*Figure 4 : Line 4 catchment area*



(C/Marcia/Banco Mundial/wa464atranspcom2 WOR)

<sup>8</sup> The catchment area is the union of the zones of the Origin-Destination survey from which depart or to which go the users of Line 4.

The following table displays the proportion of poor households in the municipalities which are part of Line 4 catchment basin:

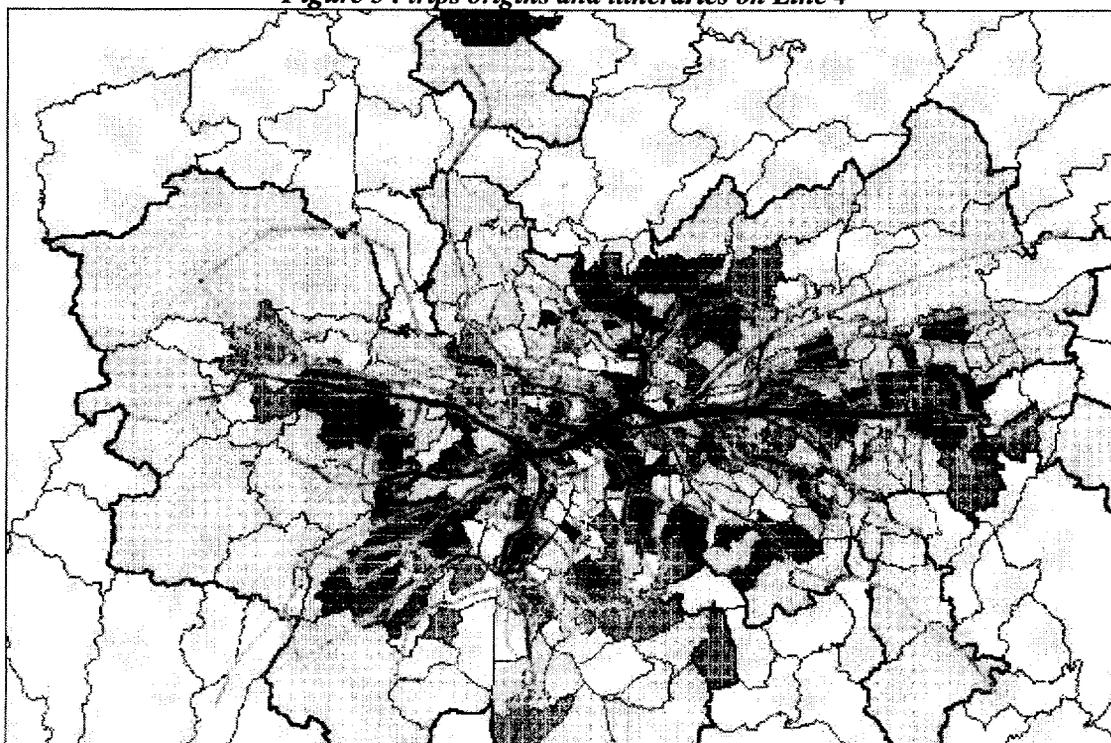
*Table 5 : Poor families in Line 4 catchment basin*

Municipalities within the catchment area	Poor families					
	Indigent (up to R\$250,00)		Poor (from R\$250 to R\$600,00)		Total Poor families	
		%		%		%
Taboão da Serra	4,336	9.0	8,767	18.2	13,103	27.1
Embu	3,298	6.5	12,429	24.6	15,727	31.2
Cotia	2,377	7.6	6,223	19.9	8,599	27.5
Embu Guaçu	1,463	12.6	3,647	31.3	5,110	43.9
Itapeçerica da Serra	3,065	10.2	7,941	26.4	11,006	36.5
Juquitiba	1,570	30.0	1,194	22.8	2,764	52.8
São Lourenço	530	21.4	531	21.4	1,061	42.8
Vargem Grande Paulista	444	6.1	1,502	20.7	1,946	26.8
<b>Total :</b>	<b>17,083</b>	<b>9.1</b>	<b>42,234</b>	<b>22.6</b>	<b>59,316</b>	<b>31.8</b>

*Source : 1997 OD survey*

The following figure shows the overall itineraries of the trips made on Line 4 during morning peak hours and brings to the fore the use of Line 4 by residents of poor areas such as Juquitiba, São Lourenço, Taboão, Embu, etc, which present the highest concentration of poor in the SPMR.

*Figure 5 : trips origins and itineraries on Line 4*



Even though Line 4 is located in the southwestern quadrant of the SPMR, trip origins are far from being restricted to this area : as an example, 20 % of the trips on Line 4 are originated in the peripheral districts of the eastern part of the SPMR (which are amongst the poorest areas in the SPMR), thanks to the good connection between the rail network and Line 4.

**3.B. A wide list of benefits for the poor**

Recent surveys and traffic forecasts demonstrate that 22 % of future Line 4 users are living below the poverty line. The benefits for them are high, especially through:

- Enhanced accessibility to the main service centers and job opportunities of the SPMR through improved overall connectivity of the urban transport network and increase in the so-called grid effect. In particular, Line 4 will put more low-skilled jobs within reach for the low-income populations. The decrease of the lowest quintile average revenue over the 1987-1997 period is explained, amongst other factors, by the scarcity of unskilled jobs in the area, which strikes predominantly the less educated people. Out of the 1.28 million jobs which are located within Line 4 catchment area, 29.5 %, i.e. 350,000 jobs, are for low-skilled workers. This betterment in accessibility derives mainly from two factors:

- affordability: although the families living with less than R\$250 per month are traveling much less than the wealthier socio-economic layers, they are dedicating up to 30 % of their revenues to transportation. Those living with less than R\$600 per month are spending 18 % of their revenues on transportation. Line 4 will alleviate this financial burden and/or make more trips affordable to the poor by promoting tariff integration between the suburban train network and the METRO network. Today, the poor living in the suburban areas pay R\$ 2.5 per trip on the intermunicipal buses. There is a strong commitment to keep the future integrated tariff (train + metro) below this figure.

- shorter travel times: in addition, low income users are expected to save more time and travel distance than the average Line 4 user because Line 4 roughly rectilinear alignment will shorten their itineraries compared to their current tortuous bus trips and offer much higher commercial speed.

***Table 6 : pass-km saved on Line 4 by socio-economic layer***

Socio-economic layer 1997 R\$ per month	Pass-km saved On L4 (%)
Up to 600 R\$	44
From 600 to 1800	34
From 1800 to 3600	15
More than 3600	6

*Source: Line 4 traffic forecasts based on the 1997 OD survey*

- Positive environmental impacts: being usually more exposed to noise and air pollution than the rest of the population, the poor will be the biggest beneficiaries of the overall environmental improvement brought about by Line 4.
- A social equalizer role: sprawl and spatial growth in the RMSP have increased trip distances, which adversely affects the poor who reside on the outlying fringes of these metropolitan regions. When

these trips became too long to be made by non-motorized modes such as walking or bicycling, the poor ended up captive of road-based public transport modes. Road vehicles such as buses suffer disproportionately from increasing congestion due to their larger size which reduces their maneuverability, and to the need to stop to pick up and drop off passengers. Thanks to relatively high speed and segregated right-of-way, METRO line 4 equalizes accessibility between car drivers and public transport users and does have a substantial positive impact on the quality of life of those who are captive to public transport, notably the poor.

- Direct jobs for the poor: the implementation of Line 4 – Yellow will generate around 30,000 person-year over four years in the areas of civil engineering, manufacturing and assemblage of rolling stock and electromechanical systems. From this total, approximately 16,000 are related with civil construction activities and will employ mainly low-skilled workers. At the operation stage, one can expect an estimate of 1,500 permanent jobs (train operation and maintenance, fare collection and management), out of which a substantial share will be occupied by low-skilled workers.
- Economic revitalization in the catchment basin of Line 4: the other impact that one can expect from Line 4 is the creation of a more favorable environment for investors to locate new businesses in these areas and launch a process of economic vitalization. To really benefit the poor, this impact will have to be accompanied by some land use regulations which would reserve a number of dwellings for the poor to avoid that the resulting gentrification ends up expelling the low-income households.

### **3.C. More poor than on any other metro line**

Presently, those living below the poverty line approximately represent 19 % of public transport users and 13 % of metro users. As much as 22 % of future Line 4 users are living below the poverty line, and, given that most of them travel on longer distances than average, 24 % of the passenger-km on Line 4 will be attributed to poor users. This is slightly higher than the share of bus users who are poor (21 %), although the bus network catchment area covers the SPMR more extensively than the METRO network, and especially the most remote and poorest municipalities. In addition, the poor will get 28 % of the overall time savings, mainly because the poor travel on longer distances. For example, for someone going from Vila Sônia to Luz by bus today, the trip time will be reduced at peak hour from 60 minutes to 20 minutes by metro.

Given that these figures are based on traffic forecasts that assume no change in mobility (no additional trips are generated by the model), these calculations are a lower bound estimate, since the poor are today the likeliest to be restrained in terms of mobility due to the present lack of affordable and reasonably rapid means of transport. Line 4 is expected to trigger part of this repressed demand. Line 4 will help “democratize” the metro network and will increase the participation of the poor in the metro ridership and making this highly regarded public transport system more accessible to the poor and low-middle class than it is today.

### **3.D. How to maximize these benefits: affordable fares and tariff integration**

To make all these benefits accessible to the poor, it is essential that fares on the metro system be lower or equal to what buses charge today, especially since the road-based public transport system will be partially restructured to feed the metro. A narrow focus on cost-recovery aiming primarily at assuring the financial sustainability of this new line may harm the poor if the issue is not systemically approached. Fare integration between buses and metros and trains and metros is a prerequisite to succeed in meeting poverty alleviation objectives.

**Additional  
Annex 12**

**BRAZIL: SÃO PAULO METRO (LINE 4) PROJECT**

**FISCAL IMPACT**

**São Paulo State Fiscal Situation:** At present, São Paulo is in a sound fiscal position. Having rescheduled over R\$50 billion in outstanding debt to the federal government on favorable terms and significantly reduced spending on active personnel, the state ran an operational surplus in 2000 (excluding capitalized interest) and will be capable of doing so over the project implementation period.

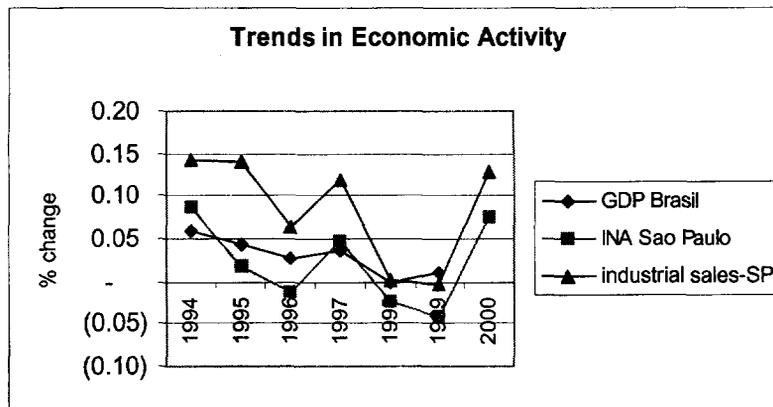
**Revenues:** São Paulo derives 75% of its gross revenues from taxes, the vast majority of them from a state value added tax (ICMS). Transfers from the federal government account for another 10% of current revenue. Interest income, rents, service charges, and other miscellaneous sources make up the remainder.

**Table 1: Trends in Current Revenues  
(Rs Mn of July 2000)**

	1997	1998	1999	2000
Current revenue	<b>36967</b>	<b>38738</b>	<b>38913</b>	<b>42626</b>
ICMS	26299	25063	26438	29508
other taxes	3143	3747	3255	3963
transfers	2807	3509	4413	4172
other	4718	6420	4807	4983

Source: Execução orçamentária 1997-2000. Figures for 2000 annualized based on results through November. Index: IPCA

*ICMS:* As shown in table 1, the state's current revenues grew only modestly over the period 1997-1999. The performance of the ICMS was particularly disappointing. Revenues in 1999 were virtually unchanged from 1997. The principal cause was slow growth in the state's economy. The ICMS is imposed on ad valorem basis on the sale or distribution of merchandise and on selected services (principally telecommunications, electric energy and intercity bus transportation). Tax rates on interstate sales are set by the federal government. Rates on sales within the state are set by the state government, subject to parameters fixed at the federal level and agreements with other states.



The base of the ICMS declined during the late 1990's. As shown in the chart above, the Central Bank's index of economic activity for São Paulo (INA) indicates an absolute decline in the economic activity from 1997 to 1999. Similarly, the index of industrial sales in São Paulo showed no growth in those two years. What growth did occur in the ICMS base was due not to economic expansion but to Federally mandated price increases on fuels and electricity, two principal components of ICMS revenues.

ICMS revenues in 2000 show considerable improvement. Revenues through November of 2000 were 12% higher in real terms than in the equivalent period in 1999. Although a tax amnesty accounts for 15% of the increase, the remainder appears to reflect an economic recovery. In 2000, the index of economic activity (through September) was six percent higher than the equivalent period one year earlier. The index of industrial sales grew 13 percent. If these trends continue, ICMS revenues should continue their upward direction.

*Intergovernmental transfers:* Intergovernmental transfers account for only ten percent of São Paulo's current revenues—the lowest proportion in Brazil. Federal revenue sharing—the mainstay of poorer states—is not a significant revenue source. Instead, most of Sao Paulo's federal transfers are derived from (1) the retention of the federal income tax liabilities of state employees; (2) fixed shares of the federal education-salary tax; (3) payments by the national health insurance system (SUS), and (4) compensation for federally imposed tax exemptions. Transfer revenues grew by about 15% per year in real terms between 1997 and 1999. This was largely due to increases in SUS transfers, income tax withholding, and federal tax compensation.

**Expenditures :**With revenues stagnating during the late 1990's, São Paulo tightly controlled expenditures in order to maintain fiscal equilibrium. This has principally involved large cuts in personnel and the refinancing of its considerable stock of debt.

*Personnel:*Personnel is the largest single item of state expenditure in São Paulo. Staff costs were equal to 64% of net current revenues in 1997. Of this, active staff (including benefits and social contributions) accounted for roughly 60%, with payments to retirees and dependent survivors comprising the remainder.

The state's ability to control personnel costs is constrained by the 1988 Constitution, which limits its authority to dismiss staff or reduce nominal salaries, and mandates generous pension benefits. Within the framework of existing legislation, Sao Paulo has done a considerable amount. Between 1995 and 1998, the state instituted three programs of voluntary separation, resulting in a reduction of 15,000 staff. The state has also instituted an across-the-board hiring freeze and a policy of not renewing the contracts of fixed

term staff. This was facilitated by a new federal program—Fundefe. Under Fundefe, fixed shares of state and municipal revenues are pooled and then reallocated among state and municipal primary schools on the basis of enrollment. Because the state government was the predominant provider of primary education throughout the São Paulo, it stood to capture the majority of Fundef funds. To avoid the loss of revenues, the municipalities opted to take over state primary schools, shifting students—and a corresponding number of teaching slots—off the state system. As a consequence, the number of active teachers on the state payroll dropped from 245,000 in 1994 to 204,000 in 2000.

It has dismissed staff employed under private sector labor law (particularly in state enterprises that are fiscally dependent on the treasury). The result was a 21% reduction in the number of active staff between 1994 and October of 2000. The state has also been conservative in granting wage increases. Nominal wage increases have been largely confined to health workers, teachers, and the police. As a result, the total wage bill of active staff is only about six percent higher in 2000 than it was in 1997.

*Pension costs:* São Paulo nevertheless faces growing personnel expenditures, in the form of payments to retirees. Between 1994 and October 2000, the number of retirees eligible for state-financed pensions increased by 26%. Total spending on retirees and dependent survivors jumped 18 percent in real terms between 1997 and 2000, and consumed 22% of net current revenues in the latter year. Given the age profile of São Paulo’s staff, these costs are likely to increase.

The pension problem arises from two facts. First, the majority of pensions are unfunded. Except for staff employed under private sector legislation, retirement benefits are paid directly out of current general revenues. Staff employed under private sector legislation are paid by the federal social security system, to which the state contributes 21% of wages. Second, the level of benefits is untenable. Under federal law, benefits are fixed at 100% of exit salaries, and are subject to indexation. Recent changes in the federal Constitution will allow the state to reduce its pension obligations in the long run. The 19th Amendment allows the state to hire staff under private, rather than public sector law, shifting the eventual burden of their retirement onto the federal social security system. The 20th Amendment toughened retirement criteria for statutory employees. Neither amendment will have an immediate impact, however, as both apply only to newly hired staff. As documented in recent Bank sector work, the solution to the pension problem lies in reducing the benefit levels now guaranteed to existing active staff. This will require further changes in the federal Constitution.

*Debt service:* São Paulo has a considerable amount of debt. In principle, debt service should be making a major claim on revenues. As shown in Table 2, the state’s contractual and debt (excluding accounts payable) totaled roughly R\$70 billion as of November 2000, equal to 2.1 times estimated net current revenues for 2000.

**Table 2: Trends in Stock of Debt  
(RS Mn)**

	1997	1998	1999	2000
Domestic	51311	50953	59664	66856
National treasury	51099	50680	59321	66458
Bonds (precatórios)	212	273	343	398
Foreign contractual debt	454	820	1459	1736
Total**	52101	52650	62184	69652
*as of Dec 31, except 2000 (November 30)**Excluding accounts payable				

The largest block of debt—accounting for 87% of the total—had its origins in bonds and debt to the state’s two commercial banks. The state ceased servicing both types of debt in the early 1990’s. Interest was instead capitalized into principal. In 1997, the state sought debt relief from the federal government. Under the resulting agreement, the federal government agreed to refinance 87% of the total, at a concessionary real interest rate of six percent. The state was required to liquidate the remainder through the transfer of assets.

The refinancing agreement also established a cap on debt service. This applied not only to the rescheduled bonds and state bank debt, but to all previously rescheduled debt—virtually all of São Paulo’s domestic obligations. For 2000 and all subsequent years, the cap is fixed at 13% of net current revenues. Any debt service in excess of the ceiling is capitalized into the stock of debt. The cap substantially reduces São Paulo’s immediate debt service obligations. Without a cap, it is estimated that interest payments in 2000 would equal 20% of net current revenues. With debt service confined to 13% of net current revenue, however, interest will continue to capitalize, adding to the stock of debt.

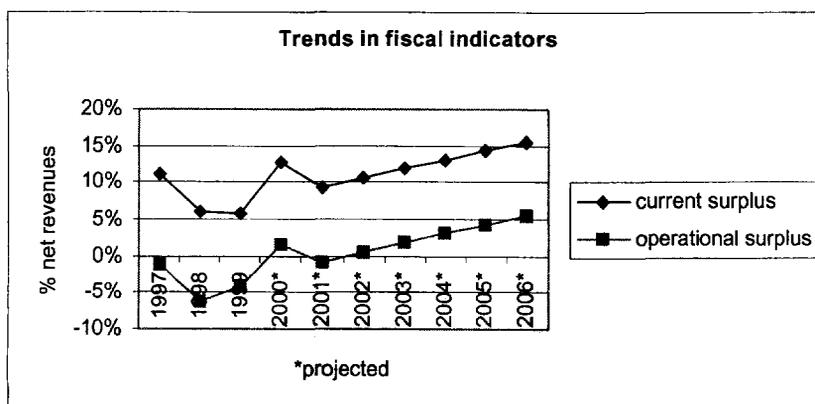
Debt not subject to the cap is a small proportion of the total and is likely to remain so. The state’s refinancing agreement with the federal government sets a schedule for annual declines in the state’s debt:revenue ratio, and prohibits new borrowing if the state fails to achieve the scheduled targets. (An explicit exemption is given for the METRO loan currently under consideration and for the final disbursements of ongoing IDB and Caixa-financed projects.) Due to the capitalization of interest on the state’s rescheduled debt, the stock of debt is likely to grow on its own, leaving little room for new borrowing.

*Other expenditures:* São Paulo’s two other major items of expenditure—operating expenditures (*custeio*) and capital works—have remained roughly constant as a percentage of net current revenues. Operating costs have averaged 20% of net current revenues over the last three years; capital spending has ranged from ten to twelve percent of net current revenues. Given the constraints on state borrowing, capital spending is not expected to increase above the level permitted by operational surpluses.

**Prognosis:** Over the past three years, this combination of restraint on personnel spending and debt rescheduling permitted Sao Paulo to run a substantial current account surplus. (See chart below.) The state’s *overall* balance was substantially negative in 1998 and 1999. The resulting deficit was financed not through borrowing but through the sale of assets. The state’s debt stock nevertheless increased by R\$ 6 billion over the three-year period, due to the capitalization of interest. Results through November of 2000 suggest improvement in the state’s finances. Due largely to growth in the ICMS, the state is projected to run a current account surplus equal to 13% of net current revenues in 2000. Based on seasonally adjusted capital spending, it is projected to run a small overall surplus.

The outlook for the state’s finances beyond 2000 depends largely on two factors. The first is the rate of growth in the state’s economy. With little flexibility to increase the rate of the ICMS, the state will largely depend on growth in the underlying tax base to increase its resources. Transfers, as a relatively small contributor to revenues, would not be expected to affect the outcome.

The second is the state’s ability to resolve its pension liabilities. While the costs of active personnel have been substantially reduced, the state still confronts looming pension liabilities. Given the present Constitutional guarantees on pension benefits, there is little the state can do to address this problem on its own. Because state pension funding is a problem throughout Brazil, some form of resolution at the federal level is not out of the question.



To estimate the state's fiscal prospects over the implementation period of the project and its ability to service the resulting debt, a medium term fiscal projection was prepared. The projection is based on estimated results for 2000, and assumes: (1) 4% annual growth in net current revenues; (2) no growth in spending on active personnel; (3) 4% annual growth in spending on retirees; (4) interest on rescheduled debt limited to 13% of net current revenues, with the remaining interest capitalized into the stock of debt; and (5) operating costs and capital expenditure fixed at 20% and 10% of net current revenues, respectively. (All growth rates are in real terms. Inflation is projected at 4% per year.) Proceeds from privatization after 2000 are assumed to be nil. The proposed project is assumed to cost US\$ 900 million (R\$ 1.8 billion in prices of December 2000), with the World Bank and the Japanese government financing US\$ 200 million each. The remainder would be financed from general revenues of the state. The results, illustrated in the chart above, are promising. Both the current account surplus and the operational surplus would continue to grow over the projection period (with the latter presumably used to finance additional capital works). While the state's debt stock would continue to grow, the debt revenue ratio would decline gradually, reaching 1.56 times revenue by 2006. The project itself would have only a minor impact on the state's finances. Counterpart financing would equal eight percent of projected capital spending during the implementation period. Annual interest on the two loans (in nominal terms) would total about R\$ 67 million once they are fully disbursed, or less than 0.1% of net current revenues.

**Additional  
Annex 13**

**BRAZIL: SÃO PAULO METRO (LINE 4) PROJECT**

**ENVIRONMENTAL ASSESSMENT**

An environmental impact assessment of the São Paulo Metro's Luz-Vila Sônia link undertaken by independent consultants was required by Brazilian law. During pre-appraisal, the following information was made available: (a) a **typology of the affected population** and of proposed solutions; (b) the **institutional matrix**, which supports the expropriation process, specifying for each activity the responsibilities of the METRO's various units as well as those of other agencies and the relationship of social and environmental management within the overall project coordination arrangements; (c) a **chronogram** of all activities pertaining to expropriation and related activities to be carried out by the METRO or other agencies; including consultations with affected population and the possibilities of delays in beginning of construction if compensation offered to the affected population were to be rejected; and (d) a **budget estimate** and **sources of funds** required for expropriation and other related activities.

The project would have a net beneficial impact on the environment. The new subway link would help relieve congestion in major transport corridors and central areas, resulting in lower emission of pollutants per vehicle-kilometer. Junction improvements and pedestrian overpasses will improve safety and quality of life.

The proposed underground routing of the Metro line and use of tunneling rather than cut-and-cover for its construction will minimize environmental impacts, which are expected to consist essentially of limited expropriation of land for stations, and noise and traffic disruption during construction. The design of the underground stations is innovative and makes full use of the advantages of the Tunnel Boring Machine (TBM) and New Austrian Tunneling Method (NATM) methods of construction. The environmental impact of station construction is minimized, with the major part of the stations constructed completely underground. This is expected to eliminate disruptions to street traffic and underground utilities and services. Some negative impacts during construction will occur during haulage of excavated materials from the construction sites and along disposal routes. The subway works may have localized adverse impacts, mainly related to excavation for construction materials and disposal of work site wastes. The problems of excavated material are likely to be less severe than if cut-and-cover methods were to be used. Measures to mitigate such impacts will be specified in the bidding documents for works.

Land and/or property expropriation are limited to the areas close to the Vila Sônia subway yard and to some stations. Evidence that the Installation Licence (supported by the appropriate technical documentation) was requested to the Sao Paulo State environmental licensing authority was provided to the Bank **prior to negotiations.**

Bidding documents for the construction and operation of Metro Line 4 will include the METRO's Internal Complementary Instruction IC-4.00.00.00/3N4-001 which spells out very clearly the implementation procedures for mitigating any adverse environmental impacts.

To ensure that environmental impacts are properly evaluated and adequate mitigating measures are proposed, METRO's planning division is staffed with experienced environmental/resettlement specialists in charge of reviewing the final engineering design from the environmental standpoint and clear the project

for implementation; and supervise the implementation of the project to ensure that the participating operating agencies carry it out in accordance with the design approved by STMSP.

This project has been rated "A" by the Bank for environmental assessment (EA) purposes. In accordance with Brazilian legislation, a full EA was prepared. TORs were developed by METRO in consultation with the state licensing agency (*Secretaria do Meio Ambiente*). A final draft was discussed by the QAT (LCSES) whose comments were subsequently incorporated. A summary of the full report was prepared and circulated to the Board on July 27, 2001.

METRO is an experienced company and engineering designs are very advanced. Underground construction methods will be used along the full extent of the line, significantly reducing expropriation requirements and environmental impacts as compared to traditional cut-and-cover methods. Stations have similarly been designed with special attention to reducing above-ground space requirements. Whereas the initial layout of the Vila Sônia maintenance yard called for acquisition of more than 300 buildings and plots, alternative sites and designs were sought in an attempt to minimize public acquisition. The current proposal has managed to minimize project impact. In total, for the full extension of the Bank-financed segment, 274 buildings will be affected, of which 77 residential and 197 non-residential. All those properties have legal titles and are located in regular and planned urban settlements, rated as middle and upper class areas. Physical characteristics of current housing are, i.e., two-story, single family, middle-to-low income residences. As to the business, their predominant typology, is of single small/medium enterprises, at the address for more than five years. The area has been undergoing rapid transformation from one and two-story structures to high-rise buildings. Sampling conducted during origin-destination studies within a 1 km strip along the corridor indicate an average turnover of five years per resident. Given the relative high value of the affected construction, as well as their regular titling condition, construction of replacement housing is not called for. Nevertheless, national counterpart funds (US\$64 million) are ensured to allow for the compensation of all the affected constructions.

METRO's usual practice in the past has been to expropriate at market value, which is established according to criteria defined by ABNT (*Associação Brasileira de Normas Técnicas*), taking into account local real estate transactions. The METRO's Civil Works Department follows a standard set of internal procedures, comprising preparation of a physical cadastre, calculation of the asset's value, and presentation of METRO's purchase proposal to the proprietor. The Legal Department carries out the purchase if the stipulated price is accepted by the proprietor, or takes the case to court if an agreement is not reached. Over the past 25 years, METRO has carried out over 10,000 expropriations. In roughly 70% of these, the proposed buying price was accepted. The adequacy of compensation at market value is difficult to establish since monitoring and evaluation studies to verify how the affected population relocated, were not carried out for the three metro lines which are in operation. The company also provides assistance in finding replacement housing, logistical support for moving, legal support to regularize property titles, relocation grants and other services.

In the case of Line 4, the company proposes to revert to land acquisition procedures it adopted during implementation of Line 1, i.e., negotiated settlements, avoiding judicial process. A social assessment of the affected population was conducted. The expropriation decrees have been signed by the State Governor. A cadastre of physical assets to be expropriated has been carried out. Valuation and title verification are concluded. A Relocation Plan, comprising guidelines and specific detailed options, has been approved by the METRO's Board of Directors. In addition to cash compensation, the plan includes the use of indexed letters of credit (for proprietors), facilitated access to lines of credit (for non-proprietors) and other grants (mainly for renter and very small business) and services (such as legal assistance) which the company will make available to the affected population. Institutional arrangements, timetables and budgets required for

the implementation of relocation options and services have been worked out. The Bank has reviewed and commented on the drafts, final versions and updated resettlement documents. An *ad hoc* Relocation Task Force has been created by the Board of Directors to guarantee appropriate coordination of asset expropriation and population relocation with other project activities. Meetings with the affected population at Vila Sônia and other sites were held to present and discuss project characteristics, expropriation requirements, expropriation procedures and timing, proposed valuation criteria and other forms of compensation and assistance. Minutes of these meetings were sent to the Bank. A monitoring and evaluation plan has been designed and will be implemented until at least six months after conclusion of the relocation. The updated cadastre of the affected constructions, as well as the updated social-economic analysis of the affected families, reviewed and approved by the Bank and the Brazilian authorities **was provided prior to negotiations.**

**Additional  
Annex 14**

**BRAZIL: SÃO PAULO METRO (LINE 4) PROJECT  
SOCIAL-ECONOMIC CHARACTERISTICS OF THE  
SÃO PAULO METROPOLITAN REGION**

**Socioeconomic characteristics, land use and travel patterns of São Paulo, Brazil**

**Abstract**

The São Paulo metropolitan region has been experiencing intense growth in the last decades: the population doubled and the motorized vehicle fleet was multiplied by six from 1970 to 1996. The region has consolidated itself as the most important economic and political region in the country, with the tertiary sector corresponding to 70% of jobs. Average income, although high for Brazilian standards, is relatively low, with 58% of people earning less than US\$500 a month (and highly skewed towards the upper strata). The region has also experienced increasing transportation problems, that are unevenly distributed among social groups and classes, considering those with and without access to private transportation. Most of the problems are related to the sharp increase in the use of private transportation and the corresponding decrease in the use of public transportation: the percentage of congested roads in the afternoon peak is currently 80% and average bus and auto speeds are very low (12 km/h and 17 km/h respectively). Severe congestion is causing a waste of 300 million passenger-hours per year in the city (for bus and auto trips), and atmospheric pollutant concentration is inadequate in 10% of the days. In addition, the city of São Paulo presents some of the highest traffic accident figures among large cities in the developing world, with 60,000 injured people and 2,300 fatalities in 1995.

Current problems are challenging the region's economic efficiency and its position as a candidate world city and have also been promoting an intense debate on alternative transportation solutions, that include the coordination of urban, transport and traffic problems at the metropolitan scale, the provision of high quality public transportation and the restraint to the use of private transportation.

**Introduction**

The São Paulo metropolitan region is the largest in Brazil and in South America as well, with an area of 8,051 km<sup>2</sup> and an estimated population of 16.6 million in 1996. It is formed by 39 cities, with the city of São Paulo being the largest and most important in economic and political terms, with a population of about 10 million people in 1996 (see figure 1).

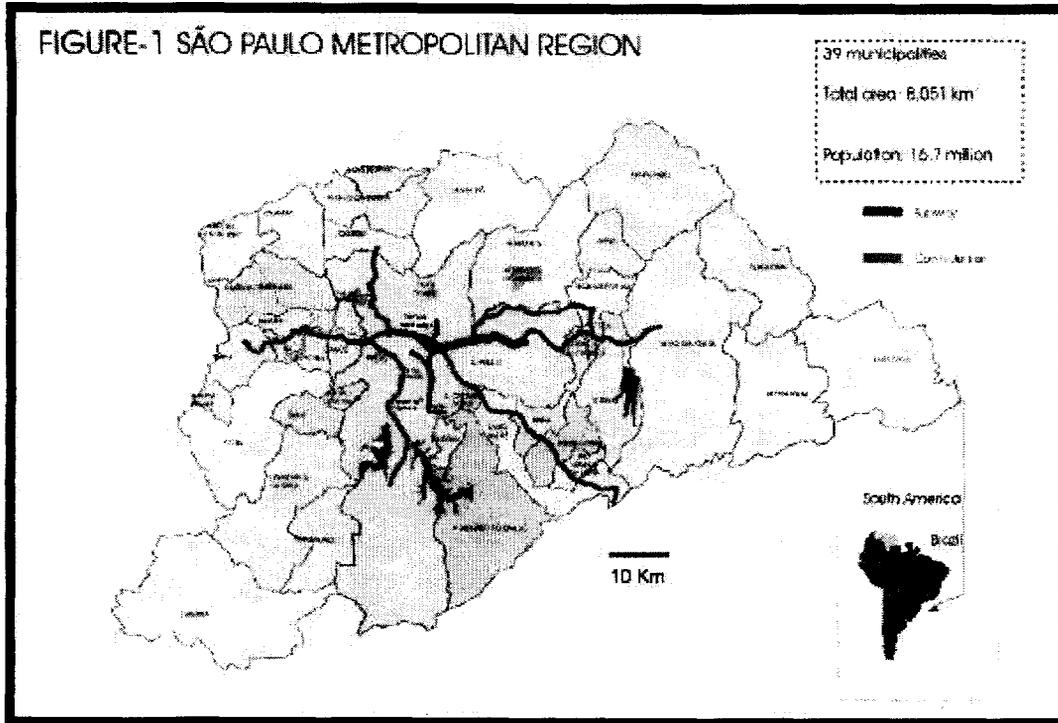
The paper describes the main social and economic characteristics of the region and the transport demand as well. The paper is divided into 4 parts: Part 1 makes a brief description of the social and economic development of the region and the associated transport development. Part 2 describes current social and economic conditions. Part 3 describes current transport and traffic conditions. Part 4 summarizes main conclusions and recommendations.

## **Urban development and transport policies in Sao Paulo**

In last century, the city of São Paulo and its metropolitan region experienced large physical, economic and social changes, reflecting the major changes at the country and world levels. At the metropolitan scale, the first large transformation initiated in the 30's, when the coffee based economy began to be replaced by the industrial economy. In the two following decades, the region would consolidate as the most important industrial area in the country, with the city of São Paulo itself occupying a prominent position. Nearby cities known as the "ABC region" would in the 50's concentrate large investments in the newly organized Brazilian automotive industry and the related supply industries. The large industrial development would place the region, in this period, as responsible for 35% of the country's industrial production (Emplasa, 1994).

In the 70's, the large growth of Brazilian economy was paralleled by important changes in the region's economy, with a sharp increase in the overall economic output and in the tertiary sector as well: the region consolidated itself as the most important financial and technological center of the country. During the 80's, the region suffered from the economic recession in the country and the industrial sector experienced negative growths in production and employment around -1% to -2% a year, while the overall economy was influenced by the decrease in average income. In the same period, the first industrial decentralization started to occur, with the nearby countryside in the state of São Paulo receiving large investments and increasing its share in the overall industrial output. However, the metropolitan region and the city of São Paulo never lost their prominent position as centers of strategic decisions.

With transport policies, the first major plans and investments initiated in the 30's, when the Prestes Maia arterial system started to be built. In the 40's, the main public transportation system provided by the Canadian Light & Power street cars started to be replaced by diesel buses, in a movement that would last until the 70's, when the last street car line was terminated. The buses, initially operated by many small private firms, were eventually run also by a special public (city) company created in 1947, the Cia Municipal de Transportes Coletivos, CMTC, which shared the market with private operators. Between 1960 and 1980, mobility increased, road capacity was greatly improved and efficient traffic operation was organized, while keeping public transportation in poor conditions (Vasconcellos, 1997). Space was occupied in conflicting ways - often irregularly - and the urbanized area increased rapidly. Conurbation began to spread, however without changing the dominant role of Sao Paulo. In the 1980's, following the economic depression that reduced activities, mobility decreased and the fiscal crisis of the state deeply reduced investment capacity, making mass transportation infrastructures even less viable. No special policy was adopted and average transportation conditions remained the same. Democratization of the political system in 1982 helped little to alleviate poor transport conditions, in face of diminishing state resources and high inflation rates. Recently, as the new "Real" economic plan succeeded in lowering inflation, the country and the region experienced an intense traffic growth, with parallel high increases in the number of automobiles (see table 5). Mobility conditions started to deteriorate rapidly, with major daily congestion becoming the normal rule, followed by severe environmental pollution and by a steady decrease on overall transport efficiency, for both people and merchandise. The evidence of the crisis brought about a public discussion about alternative transportation policies, which is still under way.



Population

**Table 1: Population increase, São Paulo Metropolitan Region, 1970-96.**

Year	Metropolitan Region		City of São Paulo	
	Population	Increase (%)	Population	Increase (%)
1970	8,139,730	-	5,924,615	-
1980	12,588,725	54.7	8,493,226	43.3
1991	15,416,416	22.5	9,626,894	13.3
1996	16,583,234	7.3	9,836,129	2.2

Metropolitan population doubled from 1970 to 1996. The city of São Paulo has grown more slowly and its population has recently stabilized (table1). The annual average growth has also been different among the subregions. Between 1980 and 1991, the North and Southwest areas grew at around 5% a year, while the metropolitan region and the city of São Paulo grew, respectively, at 1.9% and 1.2% a year.

## Age distribution

**Table 2: Age distribution, São Paulo Metropolitan Region, 1996.**

Age (years)	People	%
0 – 9	2,927,972	17.7
10 – 19	3,297,009	20.8
20 – 29	3,153,404	19.1
30 – 39	2,781,154	16.7
40 – 49	2,011,669	12.1
50 – 59	1,172,410	7.1
60 – 69	749,879	4.5
> 69	489,737	3.0
Total	16,583,234	100.0

Table 2 shows that the population is relatively young, with 58% of people with less than 29 years of age.

## Employment

In face of the described deep changes in the economic structure, the tertiary sector (commerce, services) is the dominant employer. Its share has grown from 62% in 1985 to 70% in 1992 (table 3) and it is estimated that it has already reached the 77% level (CMSP, 1998).

**Table 3: Employment by sector, São Paulo metropolitan region, 1985/1992.**

Sector	Employment (%)	
	1985	1992
Primary	0.9	0.5
Secondary	36.9	29.1
Tertiary	62.2	70.4

Ref: Emplasa (1994)

## Income

**Table 4: Average Family income, São Paulo metropolitan region, 1997.**

Family Monthly Income (R\$ 1997)	%
Up to 250	6,9
250 - 600	17,0
600 - 1.000	21,9
1.000 - 1.800	26,1
1.800 - 3.600	18,7
> 3.600	9,6
<b>Total</b>	<b>100,0</b>

(2) Ref: Origin-Destination Survey, 1997. The IPEA survey on family monthly income yields different results, with a higher share of households living below the poverty line (32.09%). The poverty line is set at less than R\$ 600 per month.

Average income, although high for Brazilian standards, is relatively low, with a median income around R\$1000. Income is badly distributed, highly skewed towards the upper strata: the poorest 50 % of families in the scale receive just 15.6% of all income, while the richest 1 % receives 12.1% (IBGE, 1998).

## Vehicle ownership

The number of motorized vehicles in the city of São Paulo was multiplied by six from 1970 to 1996 (table 5). From 1980 to 1995, the number of persons per vehicle has decreased from 5.4 to 2.1 (CET, 1998 a).

**Table 5: Growth in the number of motorized vehicles, city of São Paulo, 1970 -1996.**

Year	Motorized Vehicles(1)	Increase (%)
1970	731,728	-
1980	1,585,986	117
1990	3,421,059	116
1996	4,671,362	36 (6 years)

(1): automobiles, buses, trucks, motorcycles, vans;  
Ref: CET, 1998a.

## Travel Patterns

**Table 6: Social and transport characteristics, São Paulo metropolitan region, 1967 – 1997.**

Subject	1967	1977	1987	1997
Population (1,000s)	7,097	10,273	14,248	16,792
Annual pop. growth(%)	-	3.77	3.33	1.66
Motorized trips (1,000s)	7,163	15,758	18,749	20,267
Mobility rate <sup>1</sup>	1.01	1.53	1.32	1.21
Automobile fleet (1,000s)	493	1,384	2,014	3,436
Automobile rate <sup>2</sup>	70	135	141	205
Jobs (1,000s)	-----	3,960	5,647	6,920
School enrollments (1,000s)	1,088	2,523	3,676	4,986

(1) motorized trips per person, per day.

(2) Automobiles/1,000 people.

Ref: CMSP, 1998.

Data from the household travel surveys (table 6) show that the metropolitan overall population more than doubled in 30 years, however with decreasing rates. The mobility rate presented sharp changes and is currently at the 1.2 level. Automobile fleet was multiplied by seven.

### The use of transport modes

The use of motorized transport modes has changed dramatically in the last three decades, with the major change occurring with the use of private transportation, that increased from 26% in 1967 to 48% in 1997. Accordingly, bus use has decreased from 59% to 39% in the same period. The subway, which was opened in 1974 with its first line (10 km), progressively enlarged its network (although slowly) to the current 45 km. The subway attracted a higher share of the trips. The train system, subjected to decreasing investments and offering low levels of service, remained serving a small part of the demand (table 7). Table 8 compares the share of foot trips to those by motorized travel.

**Table 7: Change in the use of motorized transport modes, 1967-1997.**

Transport mode	Trips/day (%)			
	1967	1977	1987	1997
Public	63.5	60.7	54.8	50.8
Train	4.4	3.2	4.4	3.2
Subway	--	3.4	7.6	8.3
Bus	59.1	54.1	42.8	39.3 (1)
Private (auto and taxi)	25.9	34.8	41.9	47.3
Other	10.6	4.4	3.3	0.9
Total	100.0	100.0	100.0	100.0

(1) includes 1% of declared trips on illegal minivans.

Ref: CMSP, 1998.

**Table 8: Share of foot and motorized trips, São Paulo metropolitan region, 1977-1997.**

Mode	Trips (%)		
	1977 <sup>1</sup>	1987	1997
Motorized	74.8	64.0	65.6
Foot <sup>2</sup>	25.2	36.0	34.4
Total	100.0	100.0	100.0

(1) the 1967 survey did not include foot trips.

(2) trips longer than 500 meters only.

Ref: CMSP, 1998.

Current division of daily trips according to mode is shown in table 9. It can be seen that public modes, private modes and foot trips account each for approximately one third of trips. With respect to trip purposes, work and school are the dominant ones. Considering just non-home trips, these two motives account for 74% of all trips (table 10). Within work trips, 61% are related to the service sector, 22% to commerce and 17% to industry jobs.

**Table 9: Trips (main mode), São Paulo metropolitan region, 1997.**

Main mode <sup>1</sup>	Trips per day	
	Number (1,000s)	%
Public	10,307	33.4
Bus <sup>2</sup>	7,965	25.8
Subway	1,688	5.5
Train	654	2.1
Private <sup>3</sup>	9,578	31.0
Other <sup>4</sup>	382	1.2
Motorized – total	20,267	65.6
Foot	10,615	34.4
Grand total	30,882	100.0

(1) the mode of highest capacity within all modes used (in combined trips).

(2) includes regular transit, hired buses, hired school buses and 200,000 trips per day on illegal minivans.

(3) automobile and taxis.

(4) motorcycle and bicycle.

Ref: CMSP, 1998.

**Table 10: Purpose of trips, São Paulo metropolitan region, 1997.**

Purpose	Figure		
	Trips/day (1,000s')	Share in all trips (%)	Share without home trips (%)
Work	6,874	22.2	41.0
School	5,525	17.9	32.9
Shopping	746	2.4	4.5
Health	637	2.1	3.8
Leisure	1,145	3.7	6.8
Other	1,852	6.0	11.0
Home	14,103	45.7	--
Total	30,882	100.0	100.0

Ref: CMSP, 1998.

### Travel conditions

#### a) Traffic speeds and congestion

Automobile speeds increased from 25 km/h in the last years of the 70's to 27-28 km/h in the 1980-1984 period and then dropped to less than 20 km/h in the 90's. Currently it is 17 km/h in the PM peak and 27 km/h in the AM peak (IPEA/ANTP, 1998). The declining trend of the latest years is directly related to the sharp increase in the automobile fleet that followed the success of the "Real" economic plan. In the afternoon peak, total length of congested roads tripled between 1992 and 1996 - from 39 km to 122 km - (CET, 1998a) and the percentage of congested roads in the main system is currently 80%. Automobile speed in the main arterial system in the afternoon peak hour is 17 km/h and bus speed is 12 km/h (IPEA/ANTP, 1998). It is estimated that 3,000 among the 11,000 buses used could be taken out of service if severe congestion was eliminated, and that this extra supply causes an extra cost of 16% on bus fares. Congestion under such conditions is causing a waste of 316 million passenger-hours per year in the city, for bus and auto trips (ANTP/IPEA, 1998).

#### b) Travel times and access to transport

The occupation of the outskirts of the city increased average travel distances. The bus system was not expanded into the outskirts quickly. In addition, tight fare controls led private operators to constantly adapt supply to ensure minimum profitability, often at the expense of service frequency and service to low density areas. Suburban railways offered extremely low levels of service, reproducing the same conditions found in other Brazilian towns. The result was a poor public transportation system, characterized by service irregularity, unreliability and discomfort, and with very limited integration. A sharp contrast with respect to private transportation was clear. Public transportation users also faced traffic problems. Most of the new arterial streets did not have any special physical and operational devices to ease the circulation of buses, and few special traffic priority schemes were organized to improve bus operation. Some of the resulting differences in the quality of public and private transportation may be seen on table 11.

**Table 11: Access and travel times to transportation, Sao Paulo, 1997.**

Mode	Access time (min) (1)	Travel time (min) (2)
Automobile	1	29
Bus	6	57
Metro	7	77
Train	11	93

(1) walking (one-way);

(2) one-way, from origin to destination (includes walking links)

Ref: CMSP (1997)

c)Traffic safety

The city of São Paulo presents some of the highest traffic accident figures among large cities in the developing world. The yearly number of fatalities has been falling around the 2,500 level since 1980 and the majority is composed by pedestrians (table 12). In 1995, there were about 60,000 victims of these accidents. Among them, it is estimated that 9,000 were seriously injured and that 6,000 remained with permanent injuries (CET, 1996). Currently there are more than 200,000 accidents per year (94% vehicular accidents) (table 13).

**Table 12: Traffic fatalities, 1980 – 1997, city of São Paulo.**

Year	Vehicle occupants	Pedestrians	Total	Fatalities/ 10 <sup>5</sup> pop
1980	750	1,580	2,330	27.4
1985	1,044	1,515	2,559	27.8
1990	1,094	1,621	2,715	28.3
1995	846	1,432	2,278	23.0
1996	906	1,339	2,245	22.4
1997	933	1,109	2,042	20.4

Ref: Cia. de Engenharia de Trafego - CET (1996 and 1998b)

**Table 13: Traffic accidents by type, city of São Paulo, 1997.**

Type of accident	Number	%
Vehicle-only	189,911	94.1
Pedestrian	11,876	5.9
Total	201,787	100.0

Ref: Cia de Engenharia de Trafego - CET (1998b)

Tables 12 and 13 show that streets are inherently dangerous to pedestrians (Vasconcellos, 1996). As most of pedestrian trips are made by the lowest income levels, this extremely grave externality is mostly imposed by the few with access to vehicles on the majority.

#### d) Pollution

The air in the city of Sao Paulo also shows high concentration levels for some important pollutants (table 14). In addition to long term effects to the atmosphere, pollutants in São Paulo have already shown a negative effect on people's health: air pollution and mortality of elderly people (over 65 years) were found statistically associated with respirable particles (Saldiva et al, 1995). In addition, a plausible relationship between child poverty-related malnutrition and respiratory diseases was found in the city (Saldiva et al, 1994).

**Table 14: Days with inadequate pollutant concentration, 1994.**

Pollutant	Days with inadequate concentration (%)
Carbon monoxide (city average)	13.1
Nitrogen oxides (city average)	26.2
All pollutant (metropolitan area average)	10.8

Ref: Cetesb, 1994.

### Summary and conclusions

The São Paulo metropolitan region has been experiencing intense growth in the last decades and has consolidated itself as the most important economic and political region in the country. In parallel, the region has been experiencing increasing transportation problems, related to accessibility, speed, safety, comfort and environment conditions. These conditions are unevenly distributed among social groups and classes, in face of the large social and economic differences among social strata. While private transportation users are supported by a series of transport policy actions, public transportation captive users face unfavorable travel conditions, characterized by discomfort, unreliability and inefficiency.

Current conditions are deteriorating quickly, in face of diminishing investments in subway and trains, lack of proper priority treatment for buses and increasing automobile based congestion, leading to high travel times and excess pollution. Current problems are challenging the region's economic efficiency and its related position as a candidate world city and have been promoting an intense debate on alternative transportation solutions.

The experience of the region leads to some basic recommendations. First, at the institutional and organizational sides, decisions on land use, transport and traffic are highly interdependent and agencies in charge of these affairs have therefore permanent crossing paths. Therefore, major efforts should be taken to supersede the historic disconnection between the metropolitan-scale transport actions and local transport policies. Also, inside the cities themselves, urban, transportation and traffic actions should be permanently coordinated. In the same token, it is important to work in order to avoid the occupation of the outskirts or developing areas without adequate urban planning for job and public service location, and provide good public transportation provision. Second, the supply of large, integrated public transportation means should be promoted, offering high quality services. Accordingly, road construction should be reassessed, in order to examine who is going to pay and benefit from it. Third, at the operational side, the management of the bus service has to be greatly improved, by organizing surveillance systems to control service quality in a comprehensive and permanent way and by offering different services to different market sectors. Fourth, at the social side, the irresponsible and uncivilized use of the space by motorized transportation – specially the automobile - has to be reversed, trough better traffic management, pervasive enforcement on user behavior and vehicle pollutant emission, fiscal and economic deterrents to automobile use and large scale traffic educational programs.

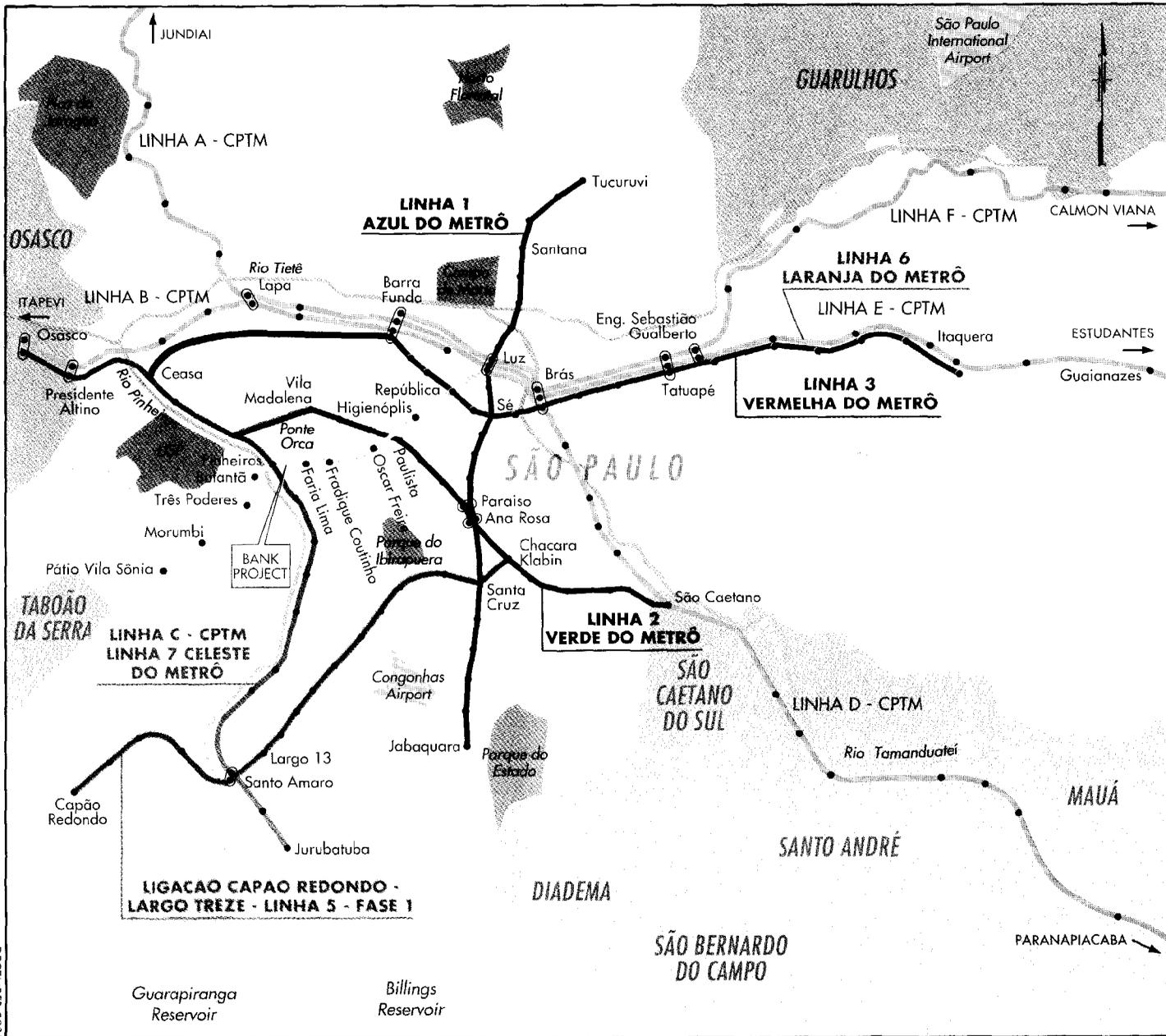
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MAP SECTION





## BRAZIL SÃO PAULO METRO LINE 4 PROJECT

0 2 4 6 8 10  
KILOMETERS

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