

**BRAZIL**

**CURITIBA URBAN TRANSPORT PROGRAM II**

**(BR-0375)**

**LOAN PROPOSAL**

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- \* Charles L. Wright, In memoriam. The project team wishes to recognize here the valuable contribution made by our colleague Charles L. Wright, who as the program's leader in its initial stage did so much to shape it.

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## **BASIC SOCIOECONOMIC DATA**

For basic socioeconomic data for Brazil, including public debt information, please refer to the following address:

<http://www.iadb.org/RES/index.cfm?fuseaction=externallinks.countrydata>

## INFORMATION AVAILABLE IN THE RE1/FI1 TECHNICAL FILES

### **Preparation:**

Curitiba Metropolitan Region Integrated Development Plan. Government of the State of Paraná. Discussion paper, 2001.

Basic engineering designs for the program components.

The Curitiba transit system in figures. IPPUC, December 2001.

Curitiba Urban Transport Program II (BR-0375): Institutional and financial assessment of the Municipality of Curitiba. José de Arimatéa Rodrigues, May 2003.

Curitiba Urban Transport Program II: Environmental reports (environmental impact assessment/environmental impact report).

Program indicator measurement methodology. IPPUC, 2003.

### **Execution:**

Curitiba Urban Transport Program I: Project completion report, 13 October 2001.

Curitiba Urban Transport Program I: Ex post analysis report produced by the Curitiba municipal government.

## ABBREVIATIONS

BEP	Basic Environmental Plan
BRTS	bus rapid transit system
CMG	Curitiba municipal government
COFIEIX	External Financing Commission
COHAB	Companhia de Habitação Popular de Curitiba [Curitiba Public Housing Corporation]
DIRETRAN	URBS Traffic Directorate
EIRR	economic internal rate of return
EMT	Curitiba Metropolitan Transit Corridor
IPPUC	Curitiba Urban Planning and Research Agency
NPV	net present value
RIT	Integrated Transit System
SMMA	Municipal Environment Bureau
SMOP	Municipal Public Works Bureau
STAC	High-capacity Transit System
URBS	Urbanização de Curitiba S.A.
UTAG	Management Technical Support Unit



# BRAZIL

## IDB LOANS

APPROVED AS OF OCTOBER 31, 2003

	US\$Thousand	Percent
<b>TOTAL APPROVED</b>	<b>25,473,341</b>	
DISBURSED	21,432,356	84.13 %
UNDISBURSED BALANCE	4,040,986	15.86 %
CANCELATIONS	1,444,325	5.66 %
PRINCIPAL COLLECTED	8,730,904	34.27 %
<b>APPROVED BY FUND</b>		
ORDINARY CAPITAL	23,783,368	93.36 %
FUND FOR SPECIAL OPERATIONS	1,558,545	6.11 %
OTHER FUNDS	131,428	0.51 %
<b>OUTSTANDING DEBT BALANCE</b>	<b>12,701,451</b>	
ORDINARY CAPITAL	12,330,600	97.08 %
FUND FOR SPECIAL OPERATIONS	370,463	2.91 %
OTHER FUNDS	388	0.00 %
<b>APPROVED BY SECTOR</b>		
AGRICULTURE AND FISHERY	1,019,103	4.00 %
INDUSTRY, TOURISM, SCIENCE AND TECHNOLOGY	6,306,105	24.75 %
ENERGY	2,497,600	9.80 %
TRANSPORTATION AND COMMUNICATIONS	4,000,271	15.70 %
EDUCATION	886,685	3.48 %
HEALTH AND SANITATION	3,078,065	12.08 %
ENVIRONMENT	652,654	2.56 %
URBAN DEVELOPMENT	2,616,899	10.27 %
SOCIAL INVESTMENT AND MICROENTERPRISE	2,948,681	11.57 %
REFORM AND PUBLIC SECTOR MODERNIZATION	1,071,197	4.20 %
EXPORT FINANCING	294,977	1.15 %
PREINVESTMENT AND OTHER	101,103	0.39 %

\* Net of cancellations with monetary adjustments and export financing loan collections.



**Inter-American Development Bank**  
Regional Operations Support Office  
Operational Information Unit

## Brazil

### Tentative Lending Program

**2003**

<b>Project Number</b>	<b>Project Name</b>	<b>IDB US\$ Millions</b>	<b>Status</b>
*BR0407	Banco Bradesco Trade Finance	50.0	APPROVED
BR0391	Downtown São Paulo Rehabilitation Procentro	100.4	APPROVED
BR0373	Culture and Citizenship for Social Inclusion	20.0	APPROVED
*BR0398	Novatrans Energy	30.0	APPROVED
BR0324	Ceara Sanitation Program	100.0	APPROVED
*BR0401	Bandeirante Investment Program	38.9	APPROVED
<b>Total - A : 6 Projects</b>		<b>339.3</b>	
<b>TOTAL 2003 : 6 Projects</b>		<b>339.3</b>	

**2004**

<b>Project Number</b>	<b>Project Name</b>	<b>IDB US\$ Millions</b>	<b>Status</b>
BR0375	Urban Transportation Curitiba II	80.0	
BR0396	Env. Rehab. of the Paraibuna River J. de Fora	19.3	
BR0397	San. and Env. Rehabilitation Belo Horizonte	42.5	
*BR0402	Tele Norte Leste Bond Guarantee (Telemar)	75.0	
BR0302	Fortaleza Urban Transport	85.2	
BR0372	São Paulo Fiscal Administration	20.0	
*BR0370	Campos Novos Hydroelectric Power Project	75.0	
*BR0395	Termonorte	59.2	
*BR0411	Unibanco - Infrastructure Credit Facility	50.0	
BR0400	Sao Bernardo do Campo Urban Transportation	144.0	
*BR1003	TGG - Guaruja Bulk Cargoes Terminal	20.0	
*BR1007	Banespa Trade Finance Facility	50.0	
BR0390	Porto Alegre Environmental Recovery	75.0	
BR0403	External Control Modernization Program States	38.6	
BR0376	Environmental Improvement Program for Amapa	21.0	
BR0405	States and DF Administration Modernization I - PNAGE	93.0	
*BR0412	Braskem	75.0	
BR0369	Sector Program	500.0	
BR0318	Tourism Development for the South of Brazil (PRODETUR SUL)	200.0	
BR1008	BH Citizenship: Integrated Development Project	21.0	
*BR0413	Ulbra University and Hospital Project	42.3	
BR0358	Financing of PYMES - BNDES	1,000.0	
BR1004	Support to BOLSA FAMILIA Program	1,000.0	
BR1005	Igarapes de Manaus Environmental - Social Program	140.0	
BR1006	Macambira Anicuns Urban Program	52.0	
BR1009	São Paulo: Evaluation and Improvement of Social Policies	5.0	
<b>Total - A : 26 Projects</b>		<b>3,983.1</b>	
BR1001	Supporting Innovation in Food and Agriculture Research	36.0	
BR0378	Promotion of Ethics and Defense of Public Patrimony	3.0	

[BR0392](#) Cadaster and Land Regularization Program 65.0

**Total - B : 3 Projects 104.0**

**TOTAL - 2004 : 29 Projects 4,087.1**

**Total Private Sector 2003 - 2004 565.4**

**Total Regular Program 2003 - 2004 3,861.0**

**\* Private Sector Project**



# BRAZIL

## STATUS OF LOANS IN EXECUTION AS OF OCTOBER 31, 2003

(Amount in US\$ thousands)

APPROVAL PERIOD	NUMBER OF PROYECTS	AMOUNT APPROVED*	AMOUNT DISBURSED	% DISBURSED
<b><u>REGULAR PROGRAM</u></b>				
Before 1997	13	3,258,000	2,831,164	86.90 %
1997 - 1998	11	1,426,965	618,001	43.31 %
1999 - 2000	11	1,622,473	389,966	24.04 %
2001 - 2002	17	2,641,400	1,292,600	48.94 %
2003	2	120,400	0	0.00 %
<b><u>PRIVATE SECTOR</u></b>				
1999 - 2000	2	98,700	74,479	75.46 %
2001 - 2002	2	100,186	85,174	85.02 %
2003	1	30,000	0	0.00 %
<b>TOTAL</b>	<b>59</b>	<b>\$9,298,124</b>	<b>\$5,291,384</b>	<b>56.91 %</b>

\* Net of cancellations. Excludes export financing loans.

## CURITIBA URBAN TRANSPORT PROGRAM II

(BR-0375)

### EXECUTIVE SUMMARY

<b>Borrower:</b>	Municipality of Curitiba			
<b>Guarantor:</b>	Federative Republic of Brazil, for debt-service obligations			
<b>Executing agency:</b>	Curitiba Municipal Government			
<b>Amount and source:</b>	IDB (OC):	¥ 8.656 billion		
	Local:	¥ 5.770 billion		
	Total:	¥14.426 billion		
<b>Financial terms and conditions:</b>	The interest rate, credit fee, and inspection and supervision fee mentioned in this document are established pursuant to document FN-568-3 Rev. and may be changed by the Board of Executive Directors, taking into account the available background information, as well as the respective Finance Department recommendation. In no case will the credit fee exceed 0.75%, or the inspection and supervision fee exceed 1% of the loan amount. <sup>1</sup>			
	Amortization period:	20 years		
	Grace period:	5 years		
	Disbursement period:	maximum: 5 years		
		minimum: 3 years		
	Period for physical start of works:	4.5 years		
	Interest rate:	Adjustable		
	Inspection and supervision:	0%		
	Credit fee:	0.25%		
	Currency:	Yen, Single Currency Facility		
	<b>Objectives:</b>	The program’s overall objective is to make Curitiba’s urban public transit system more accessible, safer, and more efficient. This is expected to help lower operating costs on Integrated Transit System (RIT) arterial corridors.		

<sup>1</sup> With regard to the inspection and supervision fee, in no case will the charge exceed, in a given six-month period, the amount that would result from applying 1% to the loan amount, divided by the number of six-month periods included in the original disbursement period.

The specific objectives are to: (i) extend RIT coverage; (ii) integrate parts of the city that are currently separated by the old interstate BR-116/476 corridor; (iii) shorten travel times on the city's major arterial transit corridors and wait times in transit stations; and (iv) help lower the number of accidents causing casualties along the existing arterial corridors and the Metropolitan Transit Corridor.

**Description:**

The program has been divided into three components to achieve the above objectives.

**1. Creation of the Metropolitan Transit Corridor (EMT) (¥7,607,645,000)**

This component will transform the interstate highway BR-116/476 corridor that separates the city of Curitiba in two into a city boulevard serviced by a new public transit corridor featuring high-capacity biarticulated buses. The busway will be fully linked into the RIT through three transfer terminals and twelve intermediate stations. It will connect with the rest of the road system via intersecting cross streets an average of one kilometer apart. The design calls for dedicated median lanes for biarticulated buses and three express lanes and a side lane for local traffic in each direction, creating a "trinary" roadway configuration typical of Curitiba's mass transit system. All these lanes will lie within the same EMT right-of-way. Also planned along this corridor are green spaces, parks, and bicycle paths.

**2. Integrated Transit System capacity expansion (¥4,422,930,000)**

This component will expand RIT capacity by way of new construction and equipment installation, to shorten travel times for the city's mass transit riders and make the system more efficient. The bulk of the construction work is designed to modernize the Inter-2 secondary circular route, modernize and optimize the traffic signal system, and remodel four existing bus stations, which will help optimize travel on the North-South arterial corridor.

**3. Road safety improvements (¥367,680,000)**

The road safety component designed to achieve one of the proposed program's central objectives calls for new remote traffic control systems, development of an accident reporting database, and installation of traffic signals, sensors and signs to better equip the Municipality to manage road safety.

**The project's role in the Bank's country and sector strategy:**

The Bank's strategy with Brazil has four key focuses: modernization of the State, poverty, competitiveness, and the environment. The proposed program pursues the last three of these focuses by contributing to: (i) reductions in social inequity, poverty, and social exclusion; (ii) the competitiveness of metropolitan Curitiba; and (iii) air quality improvements, by fostering more efficient means of transportation.

**Coordination with other multilateral organizations:**

According to a study done, the proposed program dovetails well with the High-Capacity Transit System program to be funded by the World Bank (paragraph 1.28).

**Environmental and social review:**

A thorough analysis was done of the potential impacts—both positive and negative—of the different program components. The construction projects will be concentrated within the municipality of Curitiba; adverse impacts will be mostly temporary, related to the construction work. Civil society was actively involved in identifying and defining prevention, mitigation, and compensation programs, a number of consultations having been organized between November 2002 and May 2003 to elicit public input. These consultations prompted improvements in some program components (paragraph 3.20). The Basic Environmental Plan developed to attenuate the program's impacts includes a number of plans to ensure that environmental concerns are duly addressed and that all laws and requirements are satisfied (paragraph 3.24).

The most important social plan coming out of the impact analysis is an agreed resettlement plan for 37 families affected by the construction work, which is to be implemented following the guidelines in Bank policy OP-710 (paragraph 3.21).

**Benefits:**

Among the program's benefits will be travel time and cost savings, more comfortable waits for transit riders and better passenger boarding and alighting conditions in terminals, and safer and more comfortable rides on the city's public transit system. Further benefits will be a reduction in air pollution and more facilities and safer conditions for nonmotorized traffic. Adding new RIT routes will directly benefit residents of some adjacent municipalities, who will pay a single fare to travel throughout the system.

The program also will revitalize urban development around the Metropolitan Transit Corridor (EMT), in the process integrating two parts of the city that currently are separated by the old BR-116/476 interstate corridor. A further benefit will be new green spaces at many spots along this transitway (paragraph 2.13).

Permitting high-density development along the EMT will enable the Municipality, as provided in its current land-use plan, to preserve protected areas, thereby yielding an important environmental benefit (paragraph 4.24).

**Risks:**

The anticipated changeover in municipal administration at the end of 2004 could create implementation delays for the program. Attenuating this risk are the auxiliary management and supervision contracts that are designed to provide continuity for the program.

Another risk has to do with the private sector's willingness to make the necessary investment in the special kind of buses needed to operate the transit system. Given the track record of Curitiba's current transit system and the debt-service guarantees provided for, this risk is low (paragraph 1.4).

One minor risk has to do with the continuing political resolve of Paraná state administrations and mayors of other municipalities in metropolitan Curitiba to keep up support for moves to integrate the public transit system. The existence of active associations of mayors and metropolitan region staff who support the Integrated Transit System mitigates against this risk, as does the strong public pressure on municipal officials to maintain and improve mass transit service and make the system more efficient.

The federal government has agreed to cede to the Municipality, for 25 years, the use and development of the strip of land on which the EMT will be built. Even if the Ministry of Transport were to decide to take back the right-of-way, the federal government has already issued a favorable opinion on the future transfer of ownership of the land to the city.

The success of the first Curitiba Urban Transport Program and the fact that complete engineering designs are ready for the program proposed here reduces uncertainty and eliminates most implementation and operational risks. The program's concordance with the city's future development plans, including a High-Capacity Transit System with World Bank funding (paragraph 1.11), provides insurance against operability risks in the future.

**Special  
contractual  
conditions:**

The following will be conditions precedent to the first disbursement: (i) the legal instrument between the Municipality and the federal government giving authorization for administration and use of the 22 km section of federal highway BR-476/PR (paragraph 2.5); (ii) evidence that the tendering of the auxiliary management contract for technical, financial, and environmental support for the Management Technical Support Unit (UTAG) is under way

(paragraph 3.7); (iii) signature of agreements with (a) Urbanização de Curitiba S.A. (URBS) and with (b) the Curitiba Urban Planning and Research Agency (IPPUC), establishing the borrower's undertaking to transfer the funds for the program's implementation and containing an express reference to the aforementioned agencies' obligations for the program's implementation and maintenance of the works; and (iv) evidence of the agreement between IPPUC and the Curitiba Public Housing Corporation (COHAB) to monitor the resettlements. A condition precedent to the start of the works is the legal instrument with the Federal University of Paraná, to monitor air quality and noise levels (paragraph 3.9).

A condition precedent to contracting for any construction project will be to present evidence of legal ownership of the land required. For any construction project that requires resettlement of residents, evidence will be presented that the resettlements have been carried out as agreed with the Bank (paragraph 3.21).

**Poverty-targeting and social sector classification:**

This operation qualifies as a social equity enhancing project, as described in the indicative targets mandated by the Bank's Eighth Replenishment (document AB-1704). Though 35% of the municipality's transit system riders live below the poverty line, the operation does not qualify as a poverty-targeted investment (PTI) (paragraph 4.31).

**Exceptions to Bank policy:**

None.

**Procurement:**

Procurement thresholds above which international competitive bidding will be mandatory for this program are US\$200,000 for consulting contracts, US\$350,000 for the purchase of goods, and US\$5 million for construction contracts. The quality and price criterion may be used to select consulting services (document GN-1679-4).

## I. FRAME OF REFERENCE

### A. Urban transportation problems in the region and Curitiba's contribution

- 1.1 Historically, urban development in Latin American and Caribbean cities has been higher-density than in their North American counterparts. The result has been heavier population concentrations and automobile traffic congestion which impedes mobility and pollutes the environment. The only viable way to move people efficiently is to give priority to modes of travel that require less road space (walking, cycling, and mass transit), keeping automobile traffic volumes low particularly during peak hours. This is achieved by bringing in bus and/or rail rapid transit systems. However, the huge capital outlay that rail systems require puts them beyond the reach of most Latin American and Caribbean cities.
- 1.2 The aim of the proposed program is to expand, consolidate, and complement Curitiba's bus rapid transit system, which was set in place with Bank support (paragraph 1.8), so that it will continue, as now, to successfully address the city's urban transportation problems and as a cornerstone of a sustainable urban development framework for the city (Box 1.1).

#### Box 1.1

##### Curitiba bus rapid transit system

Curitiba's municipal government is one of the few to have successfully instilled and adhered to an urban transportation model that gives priority to the most efficient modes of transportation, adopting a modern bus rapid transit system. Such systems require the construction of busways or dedicated bus lanes for specially designed buses as well as bus stops and stations equipped to handle these vehicles, to make it easier for riders, including persons with mobility difficulties and physical disabilities, to board and exit at bus floor level. Fares are collected off-vehicle or electronically; signs are clear and legible; the bus service and transit traffic are efficiently organized; and there are mechanisms to make the revenues and costs of the different systems compatible.

### B. Modernization of Curitiba's public transit system

- 1.3 Until the early 1960s Curitiba's transportation system was as erratic as those in most other Latin American and Caribbean cities. In 1962 the city set out to modernize public transit operations: it directed the 230 bus operators then in business to consolidate and form 10 bus companies, each of which received exclusive rights to operate in a specified area. This business consolidation and the route-

#### Box 1.2

##### Urban and economic development of Curitiba and its metropolitan region

Curitiba, capital of the state of Paraná, occupies an area of 435 square kilometers. It is Brazil's seventh largest metropolis by population, its 73 districts being home to 1.6 million people. The city has been the development hub of the Curitiba Metropolitan Region (RMC) that takes in 26 municipalities and has 2.7 million residents. Echoing the situation in other Brazilian metropolitan regions, the income gap in the RMC is wide: the 40% poorest residents receive only 10% of total income. Industry leads Curitiba's economy, contributing 37.9% of the city's GDP. Next come services (37.2%) and commerce (24.8%). Between 1996 and 2002 the city's economy grew 7.1%, on average, well ahead of the 4.2% national average. In recent years industrial development in surrounding municipalities has boosted demand for intermunicipal travel in the RMC.

sharing approach devised on some bus routes paved the way for successive moves to modernize the system's structure, which began in 1974 with the first dedicated bus lanes on the North-South corridor. The next step was to institute a single-fare system and create interdistrict routes. In the following years the Curitiba mass transit system continued to expand. The Integrated Transit System (RIT) launched in 1980 added transfer terminals and ushered in a single-fare system that enabled riders to pay only once to travel everywhere in the integrated RIT area.

- 1.4 The 1988 Federal Constitution decentralized responsibility for urban transportation and gave municipal governments exclusive rights to operate urban mass transit systems within their respective jurisdictions, directly or through concession arrangements. In 1990 the Municipality awarded Urbanização de Curitiba S.A. (URBS), a quasi-public company<sup>1</sup> in charge of mass transit and traffic planning and management for the city of Curitiba, the exclusive concession for all the city's urban public transit services. URBS does not perform this service directly: it licenses private bus companies to do so and pays them on a distance-traveled basis.

**Box 1.3**

**Urbanização de Curitiba S.A. (URBS)**

URBS is responsible for managing and performing the system's cleaning and signage tasks, defraying its costs with 4% of fare revenues. It pays the bus companies the other 96%, based on distance traveled and type of vehicle, to cover all their vehicle replacement, maintenance, and operating costs and their profit. Payments are calculated on distance traveled by vehicles in service. The per-kilometer rate, which varies with the type of bus, is worked out with URBS on the basis of a cost analysis that includes a 12% annual return on capital. Payments to the private bus companies are adjusted automatically for changes in unit prices of operational inputs, calculated using a transparent methodology that is available to the public.

- 1.5 The Curitiba Metropolitan Region Coordination Commission (COMEC) was created to consolidate urban planning in the metropolitan area. Twenty-six metropolitan region municipalities are represented on the commission, a decentralized agency attached to the State of Paraná Planning Secretariat but with its own budget. Since 1992 COMEC has been responsible for public transit planning and regulation in the metropolitan region. Because this body lacked experience and had insufficient funding and human resources it entered into an agreement with URBS to which it delegated management, direct planning, and compliance monitoring of the city of Curitiba's metropolitan mass transit system.
- 1.6 The Curitiba public transit system consists currently of 28 bus companies, 18 of which operate intercity routes. Twelve of the routes form part of the Integrated Transit System. The companies operate in accordance with rules, regulations, and service directives from URBS, which decides on and checks the number and type of units in service and service frequency.

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<sup>1</sup> A corporation established by municipal law, endowed with legal personality under private law, with its own assets and revenues.

- 1.7 To keep up with steady increases in demand for public transit the city had to continue enlarging the bus fleet and put higher-capacity buses on arterial busways. By the early 1990s the integrated system was becoming overwhelmed and service quality was deteriorating, as evidenced for instance by traffic congestion, declining average travel speeds, and overcrowded buses. Remedying these problems was the objective of the IDB-funded first Curitiba Urban Transport Program.

### C. Curitiba Urban Transport Program I

- 1.8 The first Curitiba Urban Transport Program (BR-0209)<sup>2</sup> (1995-2000) helped to: (i) increase capacity of busways on the major arterial corridors; (ii) decentralize selected public services, which cut down on residents' need to travel; (iii) improve the condition of streets and intersections; and (iv) improve traffic signalization and traffic safety systems. The program's many successful outcomes are documented in the Bank's project completion report (PCR)<sup>3</sup> of 13 October 2001 and in the Curitiba municipal government's ex post analysis report.<sup>4</sup> This report also underscores the technical caliber and administrative efficiency of the municipal government units that executed components of the program and how well they coordinated their work. The program's single downside was the delay in its completion, which took five years—two more than planned. The main reason for the longer completion time was that, owing to exchange rate fluctuations over the course of the program, much more work was done than had been originally envisaged: the number of construction projects executed was almost double the plan. Other contributing factors cited in the PCR were the municipal administration changeover and the lack of experience of the Management Technical Support Unit (UTAG) with Bank projects.

**Box 1.4**  
**Curitiba Urban Transport Program I:**  
**Ex post evaluation**

The ex post evaluation of the first Curitiba Program revealed the public's satisfaction with the city's mass transit system. Fully 95% of transit riders who had been in other capital cities rated Curitiba's system higher. In 93% of cases the comparison was with the cities of São Paulo and Rio de Janeiro, which in addition to bus transit operate extensive subway and surface rail systems.

The report also highlights the appreciable reduction in air pollution and increases in travel speed and comfort achieved thanks to the modern engines used in buses running on the system and the system's energy efficiency.

A testament to what Curitiba has accomplished is the 25% of the ridership who own cars but say they choose to take public transit to work.

<sup>2</sup> The total program cost was US\$231.6 million, funded by the Bank's US\$120 million loan, US\$66.9 million from the municipal government, and US\$44.7 million from the private sector which purchased the special buses needed for the system.

<sup>3</sup> IDBDOCS #61108.

<sup>4</sup> Curitiba-IPPUC-URBS. IDB Curitiba Urban Transport Program I (1995-2000). Ex post evaluation, 2002.

## **D. Outlook for the Integrated Transit System**

- 1.9 To keep pace with the steady growth of the city of Curitiba and its metropolitan region the transit system will have to continue expanding and complement its various components following the city's Urban Development Master Plan (paragraph 1.2), which is headed up by the Curitiba Urban Planning and Research Agency (IPPUC), an autonomous municipal government agency<sup>5</sup> with a great deal of experience and a high level of professionalism.
- 1.10 Curitiba has continually distinguished itself by its mutually complementary urban planning and transportation planning processes and clear-sighted forward planning. One manifestation of this was a land-use change to permit, since 2000, higher-density development and mixed use along the urban stretch of the old BR-116/476 corridor. For that change to take real effect there needs to be public transit all along the corridor. This is the outcome sought in the Curitiba Urban Transport Program II, which also will create a vital new development and integration corridor in the city and improve connectivity.
- 1.11 The municipal government also is working on ideas for future projects to anticipate congestion problems in the transit system and potential impediments to metropolitan residents' travel in the region. One idea is to increase the capacity of the North-South corridor in future through an operation sponsored by the federal government and supported by the World Bank to implement a high-capacity rubber-tired electric transit system operating on a central guideway. This High-Capacity Transit System (STAC) would increase capacity on that corridor and help reduce environmental pollution. The STAC project will be developed in the medium term, and is not expected to coincide with implementation of Curitiba Program II.

## **E. Current issues**

- 1.12 Curitiba's public transit problems can be divided into three major groups: (i) limitations for access to the Integrated Transit System; (ii) mobility, capacity, and efficiency problems in the system; and (iii) safety concerns.

### **1. Limitations on access to the Metropolitan Integrated Transit System (RIT)**

- 1.13 Metropolitan area riders make 2.1 million trips a day on the RIT. Though more than 60% of the routes coming into Curitiba are part of the integrated system, riders on some routes that originate in adjacent municipalities (mainly to the north, northeast, and east) have to pay two or more fares to get to their destination. This is most

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<sup>5</sup> Autonomous agencies are established by municipal law, have legal personality under public law, and have their own assets and revenues.

onerous for those municipalities' low-income residents, who have trouble getting to work or to services elsewhere in the city because of the cost of transportation. Complete integration of the system has not been possible to date owing to various constraints in some transfer terminals or the absence of connecting stations at strategic points in the city, which could shorten trips. Transfer stations to be built under the proposed program will help remedy this problem (paragraph 2.7).

- 1.14 The Municipality provides no operating subsidies of any kind for the single fare collected from RIT riders. Transit revenues collected go into the Curitiba Urban Development Fund to defray the system's operating costs and those of URBS as well; they also subsidize ridership segments that require more assistance, such as the elderly, students, and persons with physical disabilities. According to the analysis done for the project, optimizing the transit service would bring down some operating costs once more efficient buses (in terms of passenger/kilometers) are put into service on routes like Inter-2 and the number of buses operating on some existing routes can be cut when the EMT becomes operational. For this reason, and given the program's magnitude vis-à-vis the overall system, the proposed operation would help keep fares where they are.

## **2. Mobility, efficiency, and capacity constraints**

- 1.15 **The interstate route BR-116/476 corridor splits the city in two.** The old interstate highway BR-116/476, now called BR-476, was built in the 1950s, outside the city limits at the time, to connect Brazil's southern and southeastern states. Since in the original design the highway traversed rural areas, no provision was made for sufficient connecting points with surrounding areas. Thus, as the city quickly grew, the highway ended up separating it in two. The strip of land on which the former freeway sits is owned by the federal government.
- 1.16 The Contorno Leste alternate route inaugurated in December 2002 enables drivers traveling from São Paulo to Santa Catarina to go around the city and avoid the BR-116/476 corridor. Anticipating that this strip could become part of the city, Curitiba's planning authorities enacted Law 9800 on 3 January 2000 to re-regulate land use along the corridor with the ultimate aim of turning it into an urban development corridor similar to the city's North-South and East-West corridors.
- 1.17 This land-use change along the above-mentioned corridor, intended to efficiently integrate the city and achieve more harmonious urban development, poses a major challenge for the city, which will have to make the corridor part of the existing public transit system, connecting with some of its present arterial and circular routes. To that end the municipality plans to create the Metropolitan Public Transit Corridor, the central component of the program described here (paragraph 2.4).
- 1.18 **North-South corridor and Inter-2 circular route.** As connectivity between the city and neighboring municipalities has improved, some busways have become

congested and some Regional Integrated Transit System (RIT) corridors are nearing the saturation point. Two parts of the system in which these problems are becoming particularly acute are the North-South corridor, with 350,000 trips a day in each direction, and the Inter-2 circular route.

- 1.19 The busway that links northern and southern Curitiba is the system's most important corridor by number of trips. The bus routes that use this artery have to go through downtown Curitiba, lengthening trip times as buses stop at many stations and cross many intersections with secondary roads. Adding to the congestion problem are obsolete traffic signal systems.
- 1.20 Inter-2 is the busiest and fastest-growing of the city's circular routes. It connects with the North-South, East-West, and Boqueirão busways, shortening the trip for riders, who do not need to go to the city center. The buses currently operating this route carry 80-110 passengers—less than half the capacity of the articulated and biarticulated buses that run along the major transit corridors.
- 1.21 The transfer stations served by metropolitan buses along these busways are overwhelmed, creating a number of problems: (i) buses queuing to access platforms to pick up and offload passengers; (ii) excessive wait times in stations on some routes; and (iii) inconvenience, discomfort, and hazards for riders. Among the causes of these problems are the lack of room on platforms, bus/pedestrian traffic conflicts, and pavement not designed to carry heavy vehicles. The works projects planned in the program's RIT expansion component will help remedy these problems (paragraph 2.16).
- 1.22 **Problems relating to nonmotorized transport.** Though Curitiba currently has 150 kilometers of bike-only paths and 266 kilometers of paths shared by pedestrians and cyclists, the city lacks a well consolidated network that would enable more people to choose this mode of transportation and make it sustainable. New bicycle paths and walkways would be built as part of the proposed program (paragraph 2.13 and paragraph 2.23).
- 1.23 **Other constraints.** Traffic congestion at various points in Curitiba is impairing the efficiency of the public transit system. For one thing, the city's mass transit system is sharing a limited physical space (intersections, roads) with mounting numbers of private vehicles. A further constraint is the obsolete traffic signalization system in the city center, where the delays are longest. One of the proposed program's main components targets this problem (paragraph 2.24).

**Box 1.5**

**Fare integration**

Thanks to Curitiba's integrated fare system and single-fare policy, riders traveling long distances are at no disadvantage to those making shorter trips. For the city, this means a difference between the system's revenues and real costs. Because it has adopted this policy which benefits the more disadvantaged sectors—the ones who have to travel the furthest—the city must seek ways of making the system more efficient and, eventually, reduce its operating costs.

### **3. Safety concerns**

- 1.24 Safety conditions for city transport generally, and for urban public transit specifically, have been steadily worsening because of increases in vehicle and pedestrian traffic and the ensuing conflicts. Vehicle/pedestrian accidents around transit stations and terminals are on the rise; cyclists using dedicated bus lanes are another sporadic source of conflict.
- 1.25 The city stretch of BR-476 accounts for the highest rate of traffic accidents causing casualties in the municipality of Curitiba. Since traffic was diverted along the Contorno Leste there has been an 80% reduction in heavy vehicle traffic but there still are many accidents causing death or injury because of high traffic speeds and the lack of traffic signals and footbridges.
- 1.26 The challenge for Curitiba as it develops a new urban growth hub around a road corridor that combines a public transitway with a large-capacity city boulevard will be to minimize the significant potential for accidents involving buses, other vehicles, and pedestrians, whether these be caused by traffic flow conflicts or the high speeds at which BR-476 corridor users are accustomed to driving. Currently, traffic control on this corridor is the responsibility of the Federal Highway Police. The Paraná State Military Police handles accidents on urban roads, and the URBS Traffic Directorate is in charge of traffic regulation, signage, and control. This overlapping jurisdiction for accident information management causes problems for reliable accident data capture and processing. The information has not been systematized and, though it is sometimes shared, the process is neither user-friendly nor reliable. Various works planned in the program's road safety component would help remedy these shortcomings (paragraph 2.27).
- 1.27 Traffic and pedestrian safety issues and concerns about the system's accessibility to persons with physical disabilities and their safety have always been a priority for local authorities. The Curitiba Urban Transport Program I also addressed these issues; for details see the project completion report.<sup>6</sup>

#### **F. Concordance with works financed by other multilateral banks**

- 1.28 To ascertain whether the proposed program was concordant with other planned projects the Bank asked the Curitiba municipal government to present a study examining the set of projects the city envisages for the future, notably the High-Capacity Transit System (STAC) for the North-South corridor, which would be funded by the World Bank (paragraph 1.11). According to the study findings, the municipalities of Almirante Tamandaré and Colombo to the north of Curitiba are growing quickly and will generate demand almost exclusively for the North corridor. Improvements to Anita Garibaldi Avenue—part of Curitiba Program II—

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<sup>6</sup> IDBDOCS #61108.

will help in this regard. To the south are the municipalities of Fazenda Rio Grande and Mandirituba and the fastest-growing part of the city, which would supply riders mainly for the South Corridor and the Metropolitan Transit Corridor (EMT) planned in Curitiba Program II. This demand can only be met by adopting different technology on the North-South corridor: this would be achieved with the STAC. Once that system is operational the city will be able to retire some direct routes that currently run along roads flanking the corridor; this will help ease congestion in the city center. The STAC cannot be implemented until the EMT is operational, or traffic in the city would become chaotic. In short, the STAC will complement Curitiba Program II.

#### **G. The Bank's country and sector strategy**

- 1.29 The Bank's strategy for its support to Brazil has four focuses: modernization of the State, competitiveness, poverty, and the environment. The proposed program addresses the poverty, competitiveness, and environment pillars by way of its contribution to: (i) the reduction of social inequity, poverty, and social exclusion; (ii) competitiveness of metropolitan Curitiba; and (iii) air quality improvements, by promoting more efficient means of transportation.
- 1.30 The program fits with three of the Bank's sector strategies. It will pursue the poverty reduction and social equity enhancement strategy by providing basic infrastructure services to help ensure the inclusion of disadvantaged sectors of society, including both the poor and persons with disabilities. As for the Bank's competitiveness strategy, the program's contribution will be to bring the private sector into the operation's design. The program supports the Bank's environmental strategy through air quality improvements that will foster social progress and improve environmental health.

#### **H. The Bank's experience and lessons learned**

- 1.31 The Bank has a long track record in urban transportation projects in all the regions in which it operates. In Brazil it has worked in São Paulo and other cities; in Curitiba it successfully carried through the Curitiba Urban Transport Program I (paragraph 1.8). At this writing it also is designing operations in Fortaleza, São Paulo, and São Bernardo do Campo. The following lessons learned informed the design of the Curitiba Urban Transport Program II and will benefit similar projects in other cities in the future.<sup>7</sup>

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<sup>7</sup> Sources of the lessons learned are: (a) for technical issues, the specialized literature; (b) for institutional issues, the team members' experience in preparing and implementing Bank programs BR-0163, BR-0302, the ex post evaluation of loans BR-0209, VE-0077, and a review of experiences in other cities such as Bogota and Campina Grande; and (c) for political aspects, experiences in Curitiba, Bogota, Santiago (ATN/7353-CH), and Campina Grande.

- 1.32 **Cost and capacity.** Modern bus rapid transit systems (BRTSs) have the same or greater capacity than streetcar and light rail systems and, since they cost less, the private sector can participate in the buses' purchase and operation. The Curitiba Urban Transport Program I helped demonstrate that BRTSs were viable, through a municipality's pooling of own resources and borrowed funds. It was shown that such bus systems can be implemented at a cost ranging from 5% to 17% of the cost of alternative rail systems, putting them within the reach of cities with limited resources.<sup>8</sup>
- 1.33 **Institutional considerations.** Cities differ widely as to: (i) the stage of development of their institutions; (ii) their traffic and mass transit planning tradition; and (iii) the makeup of their technical teams. The process of preparing a program for Bank funding performs a catalytic function in this regard, benefiting cities that have a tradition and solid technical support teams (as in Curitiba) as well as those that would need more structural, organizational, and technical capacity building.
- 1.34 **Private-sector participation.** Though public transit system quality and fares are essentially a matter for active, effective public-sector control and oversight, buses should be owned and operated by private companies. It has been demonstrated that such companies can come up with the money required to purchase, operate, and maintain the specially designed vehicles that are an integral part of BRTSs, just as trains are integral to a rail system. However, since a BRTS cannot operate with conventional buses and the specially designed buses cannot operate anywhere but on a BRTS and cannot be sold to another city to operate, there is a rationale for accepting such vehicles as a local counterpart contribution to the program.
- 1.35 **Political considerations.** Though urban public transit is the only mode of motorized transportation available to low-income residents of Latin American and Caribbean cities, BRTSs operating in high-density urban areas must compete successfully with private automobiles, which are having to contend with congestion and parking problems. If some car owners are to be persuaded to switch to mass transit the public transportation system has to work well. This means demarcating a minimum number of bus-only lanes and creating pleasant, safe pedestrian zones in the city. Such efforts will succeed only if they win political support from middle-class and well-off residents and the media—and that, in turn, will only happen if the transit system is of good quality and is used by city residents from across the economic spectrum.

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<sup>8</sup> Per capita income in the state of Paraná is only 12% higher than the Brazilian average. Curitiba's per capita figure is similar to other Brazilian regions.

**I. Value added of IDB involvement in the program's preparation**

- 1.36 The continual, open collaboration between the Bank and Curitiba municipal government staff created a team working environment in which sound solutions were found and adopted for the problems encountered, in some instances costing less than had been calculated at the outset. One example was the signal optimization system adopted in lieu of grade-separated intersections that were not only more expensive but would have solved only discrete problems.
- 1.37 The Bank's participation also was influential in building in road safety components and having the city's bike path network complement the program. Subsequent to concerns raised by the project team, city hall staff had the opportunity to work directly with the consultants on development of the basic and detailed engineering designs, on the economic appraisal, on data compilation and recording and on other facets of the program, thereby gaining technical and management proficiency.

## II. THE PROGRAM

### A. Objectives

- 2.1 The program's overall objective is to make Curitiba's mass transit system more accessible, safer, and more efficient. This is expected to help increase Integrated Transit System (RIT) ridership satisfaction.
- 2.2 The specific objectives are to: (i) expand the RIT; (ii) integrate parts of the city that are currently separated by the old interstate BR-116/476 corridor; (iii) shorten travel times on the major bus corridors and wait times in transit stations; (iv) help lower the number of accidents causing casualties along the existing arterial corridors and the Metropolitan Transit Corridor (EMT), and (v) promote the most efficient modes of transport.

### B. Components

- 2.3 To pursue the above objectives the proposed program works have been grouped into three major components: (i) creation of the EMT; (ii) RIT capacity expansion; and (iii) road safety improvements. One set of paving works in the construction projects planned for the first two components are being treated as multiple works; a representative sample of over 50% of them was examined as part of the analysis of this operation. The number of such works that ultimately could be executed will depend on the funds available, which could vary depending on the exchange market dynamic.

#### 1. Creation of the Metropolitan Transit Corridor (¥7,607,645,000)

- 2.4 This central component of the program is designed to integrate two parts of the city of Curitiba that have been separated by the old interstate highway BR-476 corridor. Creating the Metropolitan Transit Corridor will convert this section of highway into a city boulevard intersecting with cross streets every kilometer and served by a public transitway using biarticulated buses. By way of the EMT the city will be able to put into practice the densification and land-use change envisaged in its development plan (paragraph 1.16), and the transit corridor will spark a new growth and development dynamic for Curitiba.
- 2.5 Since this strip of land is owned by the federal government, **as a condition precedent to the first disbursement of the loan the Municipality of Curitiba must present to the Bank the legal instrument between the Municipality and the federal government giving authorization for administration and use of the 22 km section of federal highway BR-476/PR between the intersection of BR-116/476 *Atuba* and BR-116/376, Curitiba Sur-*Pinheirinho*.**

- 2.6 To satisfy the transportation demand that the EMT will create, the city plans to add three new arterial corridors to the RIT, with biarticulated buses running on dedicated bus lanes. There is room to build express lanes and local access lanes for private vehicles traveling in either direction. This means that the “trinary” configuration typical of the city’s other transportation corridors can be implemented within the EMT right-of-way with no need for auxiliary parallel roadways. The following is a description of the main EMT subcomponents.

**a. Transfer terminals**

- 2.7 Transfer stations are planned at three points to connect the EMT to the current RIT major transit corridors. Two new transfer terminals will be built—the Atuba station in the northern part of the city and the Central terminal. The Pinheirinho station in south Curitiba will be enlarged and remodeled. These facilities will serve as transfer points for buses running on the arterial busways and also for many existing feeder and interdistrict routes, and will bring new metropolitan routes that currently are not part of the single-fare system into the RIT. The set of as-yet unintegrated routes will benefit primarily the residents of municipalities to the north of the city.

**b. Acquisition of biarticulated buses**

- 2.8 The three EMT transit corridors with dedicated bus lanes will be: (i) the South–Center–South busway connecting with the Pinheirinho transfer station and the Central station and providing alternate city-center access for residents of south Curitiba and the municipalities of Fazenda Rio Grande and Araucaria; (ii) the North–Center–North busway with connections via the Atuba and Central stations and affording alternate city-center access for residents of northern Curitiba and the municipalities of Colombo, Campina Grande do Sul, and Quatro Barras; and (iii) the North–South–North busway providing connections via Atuba and Pinheirinho stations and expediting travel between outlying municipalities in the Curitiba metropolitan region. A fleet of vehicles specially designed to run on the EMT needs to be acquired to be able to operate these three new transit corridors. One of the specifications for the required biarticulated buses is that they be compatible with stations and platforms on the city’s other arterial busways. These 270-passenger buses can board and offload riders at bus-floor level and are built with low-emission engines.
- 2.9 The private sector will participate in the program by purchasing 40 biarticulated buses to run on the EMT. This investment will count toward the local counterpart contribution.

**c. Supplementary road works, green spaces, and bicycle paths**

- 2.10 **Intermediate transit stations.** Twelve intermediate stations will be built an average of one kilometer apart along the EMT: Vila São Pedro, Xaxim, Santa

Bernadete, Fanny, Marechal Floriano, Pontificia Universidade Católica, Avenida das Torres, Universidade Federal do Paraná, Jardim Botânico, Tarumã, Vila Olímpica, and Fagundes Varela. Vehicle and pedestrian traffic flows were analyzed in designing each of these stations, seeking to make optimal use of space and reduce the possibility of conflicts and accidents. In those intermediate tube boarding stations on the two corridors that link the EMT with the city center, along the Boqueirão and East-West busways, that will not be used for the new EMT express routes, one of each pair of stations (currently opposite each other) serving existing routes will be moved to leave room for a third bus to pass without stopping when buses are loading passengers at the stations.

- 2.11 **Paving.** At present BR-476 cannot be used for mass transit because it was designed as an interstate freeway. The right-of-way, averaging 70 meters, is wide enough to accommodate two median dedicated public transit lanes flanked on either side by three parallel lanes in opposite directions and two lateral lanes for local traffic. One requirement in implementing the new EMT arterial public transit routes and road infrastructure for private vehicles will be concrete paving of bus lanes and terminal and intermediate station areas, and asphalt paving of express lanes and local lanes for private vehicles. A further requirement at the main level intersection points at eight spots along the EMT will be asphalt paving work for intersections with cross streets and their immediate service area. To be able to carry articulated buses, asphalt pavement on the two overlapping routes (South–Center–South and Boqueirão) needs to be replaced with concrete pavement on Avenida Marechal Floriano from the intersection with the EMT to Avenida Sete de Setembro, and on the latter avenue from that same intersection to the Central station. This subcomponent also includes street-lighting works and equipment on the roadways involved. The planned paving works on nearby streets are considered to be multiple works.
- 2.12 **Grade-separated intersections.** Four grade-separated intersections will be built along the EMT to try to eliminate the most serious traffic conflicts at points where public transit routes intersect with cross-street traffic, expediting access to both sides of the BR-476 corridor.
- 2.13 **Green spaces and bicycle paths.** One important facet of the EMT design is new green areas along median strips. The width of the green band will average 30 meters in the southern part of the city (between Avenida Marechal Peixoto and Avenida Brasília). In addition to this green space the project would enlarge and improve four environmental conservation areas—Atuba Park, Portugal Woods, the Tarumã park and gardens, and the Guabirotuba tree nursery—and make them part of the RIT. The city will build 13.1 kilometers of bike paths and 5.8 kilometers of shared bicycle and walking paths, which will be developed following the green areas and will be specially configured to avoid conflicts with pedestrians and vehicles. The new bicycle paths are designed to link into the existing paths, to expand the cross-city network.

- 2.14 One of the most important features of the EMT green-spaces component is the plan to simultaneously introduce esthetic elements and elements that will directly enhance quality of life. The design sought to bring back species that were part of the area's natural landscape; hence, plantings of araucaria trees typical of the region were combined with shrubs, trees, and grasses. This will differentiate components of the built-up areas (stations) from traffic areas (roads, bicycle paths, sidewalks) and unbuilt areas along the traffic corridors.

#### **d. Traffic signalization**

- 2.15 New traffic signals and pavement-embedded vehicle sensors will be installed along the EMT and hooked up to the Area Traffic Control system. Signal sets will be mounted at the system's eight cross-street intersections, which coincide with the mass transit stations. This system will make for more efficient control of vehicle and pedestrian traffic and assure safe station access. Public transit vehicles will have signal priority, enabling real-time optimization, minimizing trip times, and reducing the costs associated with long waits at intersections.

### **2. Integrated Transit System (RIT) capacity expansion (¥4,422,930,000)**

- 2.16 The aim of the program's second investment component is to increase the RIT's capacity through a series of construction projects, new buses, installation and optimization of traffic control devices, and other elements designed to help shorten trip times on the busiest RIT routes and achieve efficiency and safety improvements. The works consist of modernization of the Inter-2 secondary circular line operating at the edge of downtown, optimization of trip times on the North-South and Boqueirão busways, and improvements in roads used by RIT feeder routes. Details of this component are provided in the following paragraphs.

#### **a. Transfer terminals**

- 2.17 The plan is to expand and remodel four transfer terminals that are part of the Inter-2 circular route: Campina do Siqueira, Capão de Imbuia, Cabral, and Hauer. In addition to helping to speed travel on the circular route, the first two stations are part of the East-West corridor while the other two are part of the North and Boqueirão routes, respectively. The proposed works will optimize bus and pedestrian traffic flows in the stations. They include more boarding and alighting platforms, new construction and paving of new areas, and elimination of pedestrian level crossings on bus lanes. The result will be improved operation of the feeder routes that use these stations and fewer accidents in which pedestrians are struck by buses in stations.

#### **b. Inter-2 route improvements**

- 2.18 **Acquisition of articulated buses.** The heavy and mounting demand for travel on route Inter-2 is causing major delays for riders, who are having to wait for two or

three buses to go by before they can manage to board. The program's solution to this problem is to replace the two-door, 120-passenger buses currently operating on this route with three-door, 160-passenger articulated buses specially designed to operate in Curitiba, with floor-level boarding and exiting. The private sector will purchase the required 48 special articulated buses, which also will count toward the local counterpart for this operation.

- 2.19 **Intermediate stations with tube boarding.** Modifying the Inter-2 line bus fleet will require modifications to bus stations along this circular route. The plan for this subcomponent is to remodel 18 stations and erect additional tube boarding modules there for access to the articulated buses. With those new vehicles and more tube stations in service, route Inter-2's capacity will increase and it will board and offload passengers more efficiently.

#### **c. Complementary multiple road works**

- 2.20 **Paving and road improvements.** The aim of activities proposed in this subcomponent is to improve the capacity of roads served by RIT feeder bus routes by correcting their alignment, building platforms to improve pedestrian safety, creating vehicle parking spaces, remedying drainage problems, and installing traffic signs and street lights. Where necessary, improvements will be made in pavement quality and bearing capacity. "Binary" road systems (parallel lanes carrying traffic in opposite directions) will be put into place, to be shared by mass transit and private vehicles. The proposed binary configuration will allow for faster mean traffic speeds along the targeted road sections. Construction projects in this component are part of the package treated as multiple works.
- 2.21 **Grade-separated intersections.** To increase bus operating speeds on RIT feeder routes the program calls for grade-separated intersections to be built on the Avenida Chile binary system and at the intersection of Avenida Reinaldo Issberner and route BR-277.
- 2.22 Thirty-seven families would have to be resettled for the Chile, Agamenon Magalhães, and Vila São Pedro binary corridors that would be part of the multiple-works group (paragraph 3.21). The Curitiba municipal government organized public consultations on this matter, worked out advance agreements with the affected residents, and presented a resettlement plan that adheres to Bank policy OP-710. The families would have to be resettled as these projects were incorporated into the program, the resettlement being a condition precedent to the start of construction.

#### **d. Green spaces and bicycle paths**

- 2.23 To give Curitiba residents more mobility options the program includes a component to expand and repair the city's bike-path network. There are 150 kilometers of bike-

only paths in Curitiba; the first stage of the IDB-funded Urban Transport Program built 266 kilometers of shared bike and pedestrian paths. In the program proposed here, bike path construction and repair would be coordinated with the road paving work. In addition to consolidating the new bicycle paths to extend and link into the current network, the program will: (i) build 16.6 kilometers of bike paths, including an 8.5-kilometer section along Avenida Juscelino Kubitschek de Oliveira to get to the city's industrial zone; (ii) build new bicycle paths along the planned binary road systems; and (iii) repair 44.7 kilometers of bike paths that are in poor condition.

#### **e. Traffic signalization**

- 2.24 Activities planned in the signalization component will increase the RIT's capacity by expanding, updating, and optimizing the city's traffic signal system to reduce delays caused by stopped traffic and intersection crossing conflicts, considerably improving road safety in the process.
- 2.25 To institute this system, Curitiba's Area Traffic Control system will need to be modernized, to give signal priority to traffic on the busiest arterial corridors (North-South and Boqueirão busways) and enlarge the service area. It will boost these corridors' transportation capacity and reduce pollution, fuel consumption, and time lost because of congestion. It also will help improve road safety.
- 2.26 The following activities make up this component: (i) installation of new traffic signalization devices and sensors at 100 intersections; (ii) modification of the signalization protocol at 190 city-center intersections; (iii) installation of new sensors and signal protocol changes on the North-South and Boqueirão busways; and (iv) installation of isolated traffic signals, coordinating this with the paving work on roads that are RIT feeder routes (paragraph 2.20).

### **3. Road safety improvements (¥367,680,000)**

- 2.27 In addition to enhancing traffic safety, activities planned in this component will smooth the flow of traffic and shorten incident response times. The component's specific focus is to better equip the municipal government to detect and remedy road safety problems.

#### **a. Traffic monitoring system**

- 2.28 In this subcomponent, 62 centrally operated traffic surveillance cameras would be mounted—31 on the EMT and 31 in the city center—to quickly detect traffic accidents and incidents at the most critical points and hasten the response. The result will be less time lost due to congestion ensuing from such incidents, with the concomitant cost saving.
- 2.29 Features of the planned EMT traffic monitoring system are: (i) a “digital corridor” with a traffic analysis system using speed sensors and traffic density detectors; (ii) a

user information system; and (iii) a speed check system. The new system will be a testing ground for the use of high-tech tools to improve efficiency and safety across the EMT and will serve as a pilot project that might eventually be expanded to the rest of the city. It also will centralize bicycle and walkway surveillance, thereby making areas around the EMT safer and encouraging the public to use them at all hours.

#### **b. Accident reporting system**

- 2.30 The program will help install a system to store and analyze data on traffic accidents causing casualties. There is provision for the hiring of specialized consulting services and for equipment procurement. Analyses of these data will be inputs into the city's planning process and will help remedy problems with accidents at critical points. The system also will provide Urbanização de Curitiba (URBS) and the Traffic Directorate (DIRETRAN) with up-to-date information. This database is a second stage of the road safety component begun in the first IDB Curitiba Urban Transport Program.

#### **c. Other road safety measures**

- 2.31 A DIRETRAN-URBS team would be given training in road safety to better equip those agencies to detect and remedy problems, such as pedestrian access to the transit system's tube boarding stations, and to assess road designs from a road safety perspective.
- 2.32 Careful attention was paid to traffic safety and personal safety when designing the EMT and the station construction and remodeling plans for the RIT capacity expansion component. This includes access ramps for pedestrians and persons with physical disabilities, traffic signs and markings on city streets, remote traffic control systems using sensors and closed-circuit television, radar, and electronic speed controls.
- 2.33 An integral element of the proposed transfer station modifications will be the redesign of vehicular and pedestrian traffic flow patterns in and around stations to reduce vehicle and vehicle/pedestrian accidents and traffic flow conflicts.

### **C. Development impact**

- 2.34 The proposed program will have considerable long-range effects on all facets of the socioeconomic development of the city of Curitiba and its metropolitan region. It will spark development of a new growth hub, revitalizing a part of the city and preserving and building on the gains achieved in 30 years of coordinated urban development and public transit planning decisions by Curitiba city officials. One example of these decisions is the continued priority given to urban mass transit and nonmotorized transport over the use of private motor vehicles.

- 2.35 The following are two of the cumulative, synergistic outcomes of this decision-making track record that the program proposed here will help to sustain:
- a. A public transit system with good connectivity, accessible to the entire population including persons with disabilities, and operating to a high standard of quality. The way in which the system is organized also ensures that it will be financially sustainable down the road.
  - b. A continual, orderly integrated urban development process. The new development hub that the EMT will create will further integrate the city and spur a new stage in its economic growth, provide recreation areas for residents, and create ways of conserving green spaces.

**D. Scaling of the program**

- 2.36 Initially, the plan was to implement the second stage of the Curitiba Urban Transport Program in two phases owing to external borrowing restrictions imposed by the External Financing Commission (COFIEX). As work proceeded, the Curitiba municipal government, giving priority to the program described herein, canceled borrowing requests then in process with other financial institutions and secured COFIEX approval to combine the two phases in one, to be able to include some priority components. This was made possible thanks to the city's financial and executive capacity.
- 2.37 The city of Curitiba's future works program is part of its urban planning process. To decide on the scale of the operation proposed here and select its components, lengthy discussions were held with city government technical staffers as to the purpose of the various works. The works projects were prioritized with a view to reaping the greatest possible benefit from the resources available. According to the analysis, the priority component was the creation of the Metropolitan Transit Corridor, followed by the remedying of bottlenecks on route Inter-2 and in the city center, both on the major transportation corridors and on secondary roads. The original plan was to do additional complementary paving and intersection improvements at a number of points across the city. Though designs have been completed for these works they will be left pending for now, for possible inclusion in the program's multiple-works group if additional resources become available in the course of the program.
- 2.38 A demand estimate done in order to decide on the size of the program and for purposes of the economic appraisal of the EMT started from two assumptions: (i) some demand will be diverted from the current North-South corridor to the city center when faster bus service is an option, and (ii) demand will be generated by the development and orderly occupation of the EMT's service area. The diverted North-South demand was estimated through direct research on that corridor; to quantify the second demand a conservative growth rate was applied to occupation

of the adjacent area. In the demand forecasting the analysts took as a control area a part of the city developed in the last 10 years following construction of the East-West corridor and as a result of land-use regulation. Growth rates in sub-areas of the city that have land-use rules in place and similar socioeconomic conditions were reviewed to use as a standard—something that was possible only because of Curitiba's managed development planning approach. The Inter-2 circular route demand forecasts were based on actual measured data and average growth trends.

**E. Cost and financing**

- 2.39 The total program cost will be US\$133.4 million\*—61% for EMT-related works, 36% for the RIT capacity expansion component, and 3% for the road safety component.
- 2.40 The Bank will finance a total of US\$80.04 million\* of the program cost. The estimated US\$53.36 million\* counterpart contribution will include up to US\$23 million\* from the private sector, of which up to US\$18.45 million\* may be used to purchase specially designed buses for use exclusively in Curitiba's public transit system. Ultimately, however, the Municipality will be contractually responsible for delivery of the full required local counterpart contribution. Table 2.1 breaks down the cost by program component.

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\* The financing for the program is being provided in Yen. These figures represent United States dollars equivalent amount.

**Table 2.1**  
**Curitiba Urban Transport Program, Stage II**  
**Project costs (¥000)**

Expenditure item	Total	IDB	Local contribution	
			Curitiba mun. govt.	Other
1. <b>Engineering and administration</b>	865,120	659,650	205,470	0
1.1 Studies and designs	97,330	0	97,330	0
1.2 Program administration	335,230	270,530	64,880	0
1.3 Works supervision	432,560	389,300	43,260	0
2. <b>Investment components</b>	12,398,250	7,725,520	2,677,550	1,995,180
2.1 Creation of RIT Metropolitan Corridor	6,391,070	5,562,720	828,350	0
2.2 RIT capacity expansion	3,644,320	1,978,960	1,665,360	0
2.3 Purchase of buses	1,995,180	0	0	1,995,180
2.4 Road safety, monitoring and evaluation	367,680	183,840	183,840	0
3. <b>Associated expenses</b>	562,330	270,350	291,980	0
3.1 Expropriations	129,770	86,510	43,260	0
3.2 Environmental compensation, resettlements	432,560	183,840	248,720	0
4. <b>Financial expenses</b>	600,180	0	600,180	0
4.1 Interest	573,140	0	573,140	0
4.2 Credit fee	27,040	0	27,040	0
4.3 Inspection and supervision	0	0	0	0
Program total	14,425,900	8,655,500	3,775,200	1,995,200
Percentage	100.0	60.0	26.2	13.8

### III. PROGRAM IMPLEMENTATION

#### A. Organization of the Municipality of Curitiba for the program's implementation

##### 1. Agencies in charge of administration of Curitiba's urban transport system

- 3.1 The decentralized arrangement adopted by the city of Curitiba for the organization, operation, and management of its mass transit system lends itself readily to public/private partnerships. The system thus operates more efficiently than its counterparts elsewhere in Brazil and the region. The main agencies that participated in the program's conceptual design are the Curitiba Urban Planning and Research Agency (IPPUC) and Urbanização de Curitiba S.A. (URBS).
- 3.2 The IPPUC's core mandate is comprehensive planning of the city of Curitiba. Some key focuses of its work are the adaptation of sector plans, primarily for the transportation sector (except for mass transit planning, for which it shares responsibility with URBS), Curitiba's urban development plan, and studies and research as inputs for the work of this institution and other municipal agencies to equip them to discharge their mandates.
- 3.3 URBS acts as an administrator for the collection of fare revenues, which go into the Curitiba Urban Development, and for expending Fund monies to pay for urban infrastructure and equipment programs and public transit operations. As a fee for its administrator duties URBS receives 4% of the total Fund revenues. Roughly 90% of Fund receipts pay for urban transit services provided by private concessionaires. The balance, net of administrative costs, pays for infrastructure works needed to deliver the transit services.
- 3.4 Other agencies that would participate directly in the proposed program are the Municipal Finance Bureau, which administers all municipal funds, and the Municipal Public Works Bureau, which is in charge of physical execution of road infrastructure works. Table 3.1 briefly describes the above agencies and others associated with the Curitiba municipal government which will be participating or directly or indirectly helping to carry out the program.

#### Box 3.1

##### URBS: Mandate and resources

URBS is a quasi-public corporation established by the Municipality of Curitiba, with private-sector participation, to manage mass transit and city traffic. It also administers the Curitiba Urban Development Fund, public spaces, and parking permits. It oversees the city's taxis and, with the Paraná State Military Traffic Police, enforces Curitiba's traffic laws via the Traffic Directorate (DIRETRAN).

**Table 3.1**  
**Agencies associated with the Municipality that will be participating in the program**

Agency	Abbrev.	Type	Establishing instrument	Functions
Legal Department, Municipality of Curitiba	PGM	Curitiba municipal government department	Municipal Law 7,671 of 10/06/91	Approve drafts of contracts to be signed by the Municipality, including the loan contract for the operation proposed herein.
Curitiba Urban Planning and Research Agency	IPPUC	Decentralized agency of the Curitiba municipal government	Municipal Law 2,660 of 15 December 1965	Comprehensive planning of the city of Curitiba.
Urbanização de Curitiba S.A.	URBS	Quasi-public corporation	Municipal Law 6,155 of 26 June 1980	Sole transit service concessionaire; administrator of Curitiba Urban Development Fund. Allocates bus routes; decides on number of buses and traffic control requirements.
Municipal Public Works Bureau	SMOP	Curitiba municipal government department	Municipal Law 7,671 of 10/06/91, amended by Law 8,240 of 26/08/93 and Law 8,260 of 30/09/93.	Operational planning and execution, directly or via third parties, of all Municipality of Curitiba transportation works.
Municipal Finance Bureau	SMF	Curitiba municipal government department	Municipal Law 7,671 of 10/06/91	Plan and implement the Municipality's economic, tax, and financial policy. Manage relations with city taxpayers. Advise other Curitiba municipal agencies on finance matters.
Municipal Environment Bureau	SMMA	Curitiba municipal government department	Municipal Law 7,671 of 10/06/92	Make, implement, and enforce the Municipality of Curitiba's environment policy by coordinating and executing environmental protection and conservation plans, projects, and programs.
Municipal Public Affairs Bureau	SMCS	Curitiba municipal government department	Municipal Law 7,671 of 10/06/93	Assist the mayor in public relations matters and act as interlocutor with civil society.
Municipal Administration Bureau	SMAD	Curitiba municipal government department	Municipal Law 7,671 of 10/06/94	Assess properties slated for expropriation and negotiate the process.
Curitiba Housing Corporation	COHAB	Quasi-public company	Law 2,545 of 29 April 1965	Assist the municipal government in family resettlements required because of residents' vulnerability or direct Municipality action.
Social Action Foundation	FAS	Social assistance foundation	Municipal Law 2,585 of 23 June 1965	Monitor and assist vulnerable segments of the population, including families resettled for any reason.

## **2. Borrower, guarantor, and executing agency**

- 3.5 The borrower and executing agency for the program will be the Curitiba municipal government (CMG). The guarantor for the debt-service obligations will be the Federative Republic of Brazil. The program components will be carried through by various CMG agencies and bureaus, using an institutional implementation arrangement similar to the one adopted for the first Curitiba Urban Transport

- Program. Coordination and supervision will be the responsibility of a Management Technical Support Unit (UTAG) reporting directly to the mayor and staffed by a general coordinator, an operations manager (the latter two officials appointed by the mayor), and a secretary. A consulting firm will be hired to provide technical and logistical support to the UTAG for the program's numerous complex works projects; a call for proposals to select that firm is part of the proposed operation. The Curitiba Urban Planning and Research Agency (IPPUC) will prepare bid documents for construction projects and consulting contracts. Depending on their nature, works projects will be awarded by and responsibility for their implementation will rest with Urbanização de Curitiba S.A. (URBS) or the Municipal Public Works Bureau (SMOP). The SMOP will engage a consulting firm to supervise each set of construction projects. The Municipal Finance Bureau, which manages the Municipality's finances, will administer all the program funds and allocate resources to the executing entities as planned. The IPPUC, URBS, and SMOP are the only agencies that will be receiving funds for the execution of program components.
- 3.6 Other agencies providing support for the program will be the Municipality's Legal Department, the Social Action Foundation, the Municipal Public Affairs Bureau, the Curitiba Housing Corporation, and the Municipal Administration Bureau. They will assist with activities falling under their jurisdiction using own resources that will not form part of the local counterpart contribution. The Municipal Environment Bureau (SMMA) will monitor and enforce the environmental plans approved for the program, which are part of the contract conditions for works projects and of the program's environmental permits. The program's design calls for four professionals to be hired by the construction supervision consulting firm to assist the SMMA.
- 3.7 Because this is a complex program, the UTAG will receive technical support from a consulting firm to be hired to help manage the program. The firm's terms of reference include the provision of financial management and management support for the various construction contracts and verifying that they satisfy technical and environmental requirements. **A condition precedent to the first disbursement is that tendering of this contract must be underway.**
- 3.8 The UTAG will be the permanent conduit for dealings with the Bank and for coordination, supervision, and submittal to the Bank of all pertinent documentation on all activities relating to the program's implementation, which will be carried out by the participating agencies.
- 3.9 The Municipality of Curitiba formally established the UTAG by way of Orders 556 and 557 of 1 July 2003, which spelled out the responsibilities of all the municipal agencies that will be participating in any manner in the program's execution. **As a condition precedent to the first disbursement, the Municipality must have signed agreements with URBS and the IPPUC, stating the borrower's undertaking to transfer the funds for the program's implementation and the**

**aforementioned agencies' obligations for the program's implementation and maintenance of the works. An agreement between the IPPUC and COHAB for monitoring resettlements will also be signed.** These agreements have already been agreed upon and just need to be formalized after the operation is approved. **A condition precedent to the start of the works is the legal instrument with the Federal University of Paraná, to monitor air quality and noise levels.**

- 3.10 One of the IPPUC's responsibilities for the program's execution is to produce final engineering designs for all the program's building construction and road system improvement and expansion projects and tendering of the auxiliary management and works supervision contracts. URBS will be in charge of acquiring and erecting new tube boarding stations, deciding on intermediate and transfer station remodeling, specifying the type of buses that need to be purchased by the private companies involved in the program, tendering service delivery for the new lines,<sup>9</sup> and coordinating and supervising those companies' participation. The Municipal Public Works Bureau will tender out contracts for paving work, parks and green spaces, bicycle paths, street lighting, traffic signalization, and implementation of the digital corridor, as well as supervision of their execution. The Municipal Finance Bureau will be in charge of budget and financial programming of the program components, matching the physical and financial timetables devised, and will administer the proceeds of the Bank's loan. A condition precedent to contracting for any construction project will be to present evidence of legal ownership of the land required. Annexes III and IV describe the organizational arrangement developed for the program's implementation, the flow of funds, and each participating agency's responsibilities.
- 3.11 The UTAG will be accountable to the Bank for the following: (i) opening and operation of specific, separate bank accounts to administer the loan proceeds and the local counterpart funds; (ii) maintenance of a sound contract administration system; and (iii) implementation and operation of an accounting system in the UTAG and in the IPPUC, SMOP, and URBS in which funds received and activities funded can be clearly identified, in detail, by source of funding and by coexecuting agency. (The accounting system is to include a chart of accounts, accounting operations manuals, reporting guidelines, financial statement format, etc., and specify the accounting software to be used); (iv) institution of an internal control and supervision system for the program; (v) preparation of disbursement requests and accounts of expenditures and their submittal to the Bank; (vi) proper filing of supporting documents for program expenditures for review by Bank staff and

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<sup>9</sup> For purposes of awarding the permits for operating the new lines, URBS will modify the existing bidding system by areas and will open the bidding process for them, following the guidelines of Brazil's Federal Constitution. The enterprises currently delivering the services may participate in the bidding process without restrictions and without such participation affecting their acquired rights. URBS has ample experience in system administration and sufficient financial and executing capacity to conduct the bidding process without external support. The proposed deadlines are compatible with the local counterpart contribution timetable.

external auditors; (vii) preparation of six-month reports on the revolving fund and their submittal to the Bank within 60 days after the end of each six-month period; and (viii) preparation of the project's financial statements and such other financial reports as the Bank may request.

- 3.12 URBS, IPPUC, and SMOP will be responsible for: (i) opening and operating separate bank accounts to administer the loan proceeds and the counterpart funds; (ii) implementing the uniform accounting system ultimately approved for the program, one feature of which will be to keep detailed information on activities funded out of the loan proceeds and counterpart resources; (iii) the arrangement for rendering of accounts to the UTAG; and (iv) keeping files of supporting documents for eligible expenditures.
- 3.13 According to the capacity assessment done of the Municipality of Curitiba agencies that would be involved in the program and the private companies operating buses on the transit system,<sup>10</sup> the program implementation structure devised is satisfactory.

### **3. Multiple-works selection criteria**

- 3.14 The following criteria will guide the selection of multiple works in the course of the program: (i) the works must be technically and financially viable on their own; (ii) they must be similar in nature to those analyzed in the representative sample; (iii) they must be priorities for operation of the Integrated Transit System; (iv) if they require resettlement of low-income residents, such resettlement must have satisfied the requirements in Bank policy OP-710; and (v) they must be of a nature not requiring (in the Municipal Environment Bureau's judgment) an environmental impact assessment.

### **4. Private-sector participation in the program**

- 3.15 The program calls for the private sector to purchase vehicles for the bus transit system. The US\$18 million cost of these buses plus the US\$35.36 million to be furnished by the Municipality of Curitiba make up the local counterpart contribution to the program's financing. Since the bus companies operating under URBS concessions are paid on a distance-traveled basis there is no financial risk to these private firms, which thus can readily borrow to finance the purchase of the new buses needed for the program. URBS provides the concessionaires with the full information they need to be able to negotiate bank loans, since the investments are part of Curitiba's integrated mass transit program. This arrangement is a permanent one, so the city can keep pace with the mounting demand for bus service and be able to renew the bus fleet. Since the buses are financed in Brazilian

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<sup>10</sup> Institutional and financial assessment of the Municipality of Curitiba. Curitiba Urban Transport Program II (BR-0375). José de Arimatéa Rodrigues, May 2003 (IDBDOCS #72819).

currency there is no exchange rate risk of any kind. URBS will be responsible for accounting for the private investments.

- 3.16 **A condition for the acquisition of the new buses to count toward the program's local counterpart is that the vehicles not be financed directly or indirectly using IDB funds.**

## **5. Advance contracting, retroactive financing, and recognition of counterpart expenditures**

- 3.17 The contracts for auxiliary management of the program and for supervision of the first set of works projects will be tendered as approval of the Bank's loan is processed, so the city will have the elements in place to expedite execution of priority works. In addition, the Municipality of Curitiba sought a nonobjection statement from the Bank in order to advance tendering for the Metropolitan Transit Corridor's South Corridor, which it considers to be high priority. It was agreed that the works and services listed in Table II-2 in Annex II to this proposal could be tendered. If these begin before the loan is approved, any payments made to contractors (which would correspond to local expenditures) would be recognized as local counterpart contributions. It is estimated that such outlays could come to the equivalent of US\$6 million.

## **6. Operation and maintenance**

- 3.18 A review of the first Curitiba Urban Transport Program and checks done by the project team showed the Curitiba municipal government (CMG) to have been efficient in every operations and maintenance sphere in all facets of the Integrated Transit System (RIT). To ensure that this same standard will be adhered to for existing works and those that would be funded by the program described here, the CMG will undertake to: (i) conduct regular inspections to check the condition of the roads, buildings and structures, and installations; and (ii) present, in the first quarter of each year, a report on the previous year's maintenance work and the maintenance plan and associated budget for the next fiscal year. The reports are to be submitted as from year one, for a total of 10 years.

## **B. Socioeconomic considerations**

- 3.19 Given its characteristics, the second stage of the Curitiba Urban Transport Program will achieve considerable gains in RIT system efficiency while helping to enhance residents' quality of life, restore green spaces, reduce air pollution, modify land use and occupation patterns, spur new

### **Box 3.2**

#### **The environmental authority**

To obtain an environmental permit for the program the CMG sought an opinion from the environmental authority, the Paraná State Environmental Agency (IAP). Since all construction work for the program will be within the Municipality of Curitiba, the IAP delegated supervision and enforcement authority to the Curitiba Municipal Environment Bureau, which has the requisite technical capacity and is bound by a set of stringent regulations that address all the anticipated potential impacts of the program works.

productive activities, create direct and indirect employment, open up a new development hub, and lower the transit system's operating costs. It also will make the integrated transit system accessible for the first time to a sizable number of Curitiba residents, benefiting particularly those of modest means.

- 3.20 Before deciding on the program components and at various stages along the way, public consultations were held with residents of communities in the program's areas of influence. More than 2,000 people took part in these events, contributing ideas and asking questions during the consultation sessions and subsequently on the Internet. The CMG provided the Bank with records of the consultations. The Bank promoted additional consultation forums, notably for some program components for which public input was considered important to back up the socioenvironmental impact analysis.

- 3.21 For the multiple works envisaged in this program up to 37 low-income families may need to be resettled to be able to build the Chile, Agamenon Magalhães, and Vila São Pedro binary corridors. The Bank will not provide a statement of nonobjection for the tendering of a given set of works projects until any affected families have been resettled.

**Box 3.3**  
**Resettlement plan**

The CMG commissioned the Curitiba Public Housing Corporation (COHAB) to develop a resettlement plan, agreed on with the families, that adhered to Bank policy OP-710. The families will be relocated to mutually agreed locations where they will be assured decent housing and access to city services in similar or better conditions than at their previous residence. The resettlement costs will be defrayed with counterpart funds to be furnished by the Municipality of Curitiba. COHAB will be in charge of developing and implementing the plan; the Social Action Foundation will monitor the resettlement process and help the families become part of a new community.

- 3.22 The potential benefits and adverse impacts of operating mass transit along the Metropolitan Transit Corridor (EMT) are as follows: (i) noise and vibrations that could disturb hospitals, schools, or other sensitive areas; (ii) displacement of low-income residents away from the transit corridor when property values in its direct area of influence rise following completion of construction work; (iii) displacement of productive activities that will be unable to operate there once property values increase; (iv) alteration of the socio-spatial stratification of neighborhoods; (v) mobility improvements and more travel options for residents and easier home-work commuting; (vi) concomitant increases in employment, services, and recreation options; (vii) a rise in living standards and enhanced quality of life in neighborhoods benefiting from the transit system; (viii) safer and more comfortable public transit; (ix) the spurring of new productive activities, primarily in the services sector, when access is enhanced and there are market stimuli; and (x) an increase in formal and informal sector jobs when economic activity increases.
- 3.23 One feature of the EMT will be a 4.5-kilometer-long green band averaging 30 meters in width in the southern part of the corridor between Avenida Marechal Peixoto and Avenida Brasília. In addition, the project calls for enlarging and

improving four environmental conservation areas and making them part of the EMT: Atuba Park, Portugal Woods, the Tarumã park and gardens, and the Guabirota tree nursery. In this latter facility the Guabirota garden will be expanded and opened to the public; seedlings to maintain and sustain the city's green areas, including parks and all other planted areas that are part of the program, will be cultivated there.

- 3.24 Each of the potential adverse social and economic impacts identified can be attenuated or compensated for. A Basic Environmental Plan (BEP) developed for the construction work sets out mitigation measures proposed

**Box 3.4**

**Environmental requirements**

Apart from the components discussed, the Basic Environmental Plan specifies a number of contract conditions that contractors must satisfy. These requirements, to be inserted in bid documents and works contracts, are intended inter alia to protect public safety and worker health and safety, reduce congestion during construction, protect existing infrastructure, and restore construction sites.

by the environmental consultants and reflects the discussions with the project team. It describes the full set of prevention, mitigation, and compensation plans required for the program's sustainable implementation. The BEP consists of 9 programs and 15 subprograms with the following content: (i) rationale; (ii) objectives; (iii) planned actions; (iv) scope; (v) outcomes sought; (vi) executing entities and responsibility; (vii) implementation timetable, and (viii) costs. The BEP components are outlined in Table 3.2; for details see the environmental reports.<sup>11</sup>

- 3.25 Reports on the environmental impact assessments, management plans, resettlement plan, and public consultations were released at the prescribed times to the public locally and via the Bank's Public Information Center. The last document was published on 8 May 2003.
- 3.26 The Curitiba Municipal Environment Bureau reviewed the environmental impact assessments and, on 30 May 2003, granted an initial environmental permit for the Curitiba Urban Transport Program II, specifying a number of requirements for the construction work. The environmental programs, including resettlements and compensation for low-income residents, account for about 5% of the total program cost.

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<sup>11</sup> Environmental impact assessment/environmental impact report (IDBDOCS #216962) and resettlement plan (IDBDOCS #65417).

**Table 3.2**  
**Basic Environmental Plan (BEP) – Components**

<b>BEP programs</b>	<b>Objective</b>	<b>Executing body</b>
Information/Community relations / Social integration	Interact with the community and address residents' needs and concerns.	Municipal Public Affairs Bureau, Social Action Foundation, IPPUC.
Environmental education	Build awareness in the community and construction company workers.	UTAG, with support from a management firm. Oversight by Municipal Environment and Public Affairs bureaus.
Environmental management – construction projects	Environmental management: vehicle maintenance, fuel and lubricant use, worker health and safety, accident prevention.	Contractors, supervised by UTAG and Municipal Environment Bureau (SMMA).
Landscaping, creation of green spaces, park revitalization	Create green spaces and parks and plant cover in areas affected by construction. Plant native species of trees, shrubs and grasses.	Contractors, supervised by UTAG and Municipal Environment Bureau (SMMA).
Remedying EMT environmental liabilities	Remedy old route BR-116 liabilities—drainage problems, pavement failures, erosion, silting, water quality.	Contractors, supervised by UTAG. Compliance monitoring by SMMA.
Resettlement plan and compensation for low-income residents	Identify, profile, and consult with affected groups to reach an effective solution; monitor resettlement process and assist resettled families.	Curitiba Housing Corporation, Social Action Foundation. Compliance monitoring by SMMA.
Air quality and noise monitoring	Record air and noise pollution levels to identify areas that may require additional mitigation measures.	Federal University of Paraná. <sup>12</sup>
BEP operationalization and management	Manage and supervise BEP environmental programs and those required in environmental permits.	UTAG, with support from the management firm. Compliance monitoring by SMMA.
Operational support for SMMA	Support SMMA with personnel qualified for environmental supervision for the program.	UTAG, SMMA.

## **C. Procurement**

3.27 Goods and services procurement and construction contracting must adhere to the procedures prescribed in Annex B to the loan contract. International competitive bidding will be mandatory for procurement valued at US\$350,000 or higher for purchases of goods and at US\$5 million and up for construction contracts. Tendering for amounts below these thresholds will be governed by Brazilian law,

<sup>12</sup> The Curitiba municipal government is to sign an agreement with the Federal University of Paraná for execution of the air quality and noise monitoring program. The agreement, in which the two parties will undertake to execute the program effectively, will provide assurances that the required resources will be forthcoming.

concordant with Bank procedures. For consulting contracts the provisions in Annex C will apply; these require international competitive bidding for contracts worth more than US\$200,000. The quality and price criterion may be used to select consulting services (document GN-1679-4), in which case a ratio of quality 70%/price 30% will be used.

#### D. Implementation timeframe and disbursement timetable

3.28 The program is to be completed and the loan proceeds disbursed within 60 months after the effective date of the loan contract. The

Table 3.3 Disbursement timetable (¥000)						
Funding source	2004	2005	2006	2007	2008	Total
IDB	3,059	2,082	2,474	804	235	8,656
Local counterpart	1,877	1,283	1,773	510	327	5,770
Municipality	1,049	894	1,044	510	327	3,824
Private sector	827	389	730	-	-	1,947
<b>Total</b>	<b>4,936</b>	<b>3,365</b>	<b>4,248</b>	<b>1,314</b>	<b>562</b>	<b>14,426</b>

time limit for physical start of construction is four and a half years. Table 3.3 presents the planned disbursement timetable. Annex II to this proposal contains the procurement plan.

#### E. Monitoring and evaluation

3.29 The Bank's Brazil Country Office will monitor construction tendering and construction work. The UTAG will report to the Bank every six months on the project's progress, measured against the tracking and technical indicators in the project's Logical Framework (Annex I). These reports also must: (i) indicate the state of the program relative to the agreed completion and disbursement timetables; (ii) provide updated completion and disbursement timetables by reference to the rest of the program; (iii) provide a work plan and detailed action plan for the following two six-month periods; (iv) report on progress and compliance with the BEP environmental programs and achievement of their indicators; and (v) report on achievement of the technical performance indicators set out in the Logical Framework so that the project performance monitoring report (PPMR) can be updated. Administration missions will be arranged as necessary to monitor and evaluate the program.

3.30 **Ex post evaluation.** Discussions were held with the Municipality of Curitiba regarding performance of an ex post evaluation of the program in accordance with Bank policy OP-305. The Municipality opted against such an evaluation but agreed to provide the Bank

##### Box 3.5

##### Type of ex post evaluation

If the Bank should decide in future that an ex post evaluation needs to be done, the evaluation would have the following features: (i) it will contain an economic evaluation and outcomes assessment, using the same methods employed for the ex ante economic appraisal of the program and to measure the Logical Framework indicators;<sup>A</sup> (ii) it would not be started until at least two years after the final loan disbursement; (iii) it would take an estimated 45 days; and (iv) it would cost about US\$50,000 to process the data and produce the evaluation report.

<sup>A</sup> Methodology for measurement of the program's indicators. IPPUC, 2003 (IDBDOCS #216846)

with all the necessary data twice a year as part of the loan progress reports. URBS regularly compiles much of this data and the Municipality will be in charge of preparing the requisite data for delivery to the Bank to fulfill this commitment. The cost of this work will be covered by the Municipality.

**F. Audits**

- 3.31 The program's annual financial statements are to be submitted to the Bank within 120 days after each fiscal year end by the International Credit Operations Audit Coordination Office of the State of Paraná General Accounting Office. The audits are to be performed in accordance with terms of reference previously approved by the Bank (document AF-400) and with the Bank's external audit requirements (documents AF-100 and AF-300). The audits will review the fulfillment of all the program's objectives and will include the environmental programs that make up the Basic Environmental Plan.

**G. Revolving fund**

- 3.32 In order for funds to be on hand to pay for Bank-financed activities a revolving fund of not more than 5% of the loan proceeds will be created. The executing agency will provide the Bank with a report on this fund every six months, within 60 days after the end of each six-month period.

## **IV. VIABILITY AND RISKS**

### **A. Technical feasibility**

- 4.1 The basic purpose of the proposed program is to increase the capacity of Curitiba's mass transit system and make it more accessible, safer, and more efficient. Experience with the first stage of the Curitiba Urban Transport Program clearly showed how well the system is organized and operates, giving this city one of the best, more efficient public transit systems in the world.
- 4.2 The planned Metropolitan Transit Corridor will become Curitiba's new development hub. It will lighten the load on the city's other major transportation corridors and improve service, using the same kind of facilities and vehicles that proved their worth in previous stages and continue to operate today. The municipal government's demonstrated technical and management proficiency and the availability of companies with experience in constructing similar works make physical execution of the proposed program feasible.
- 4.3 Engineering designs for the projects submitted to the Bank during the program's preparation stage were developed using modern appraisal, calculation, and scaling criteria and methods and internationally accepted engineering standards. The Curitiba municipal government (CMG) has recent, reliable baseline data on mass transit and traffic and the characteristics and condition of the city's public transit operations and existing roadways, which were referenced in deciding on the main design parameters for the proposed works. Unit prices to cost the projects presented to the Bank were obtained from the CMG's regularly updated budget system. The project team reviewed the technical documentation for most of the projects that would be funded in part by the Bank and found it to be satisfactory; the city of Curitiba thus could put these projects out to tender shortly.

### **B. Institutional viability**

- 4.4 The program will be implemented by bureaus and agencies of the CMG, which has succeeded in developing one of Brazil's most efficient public transit systems. However, to ensure that all activities falling to the various participating agencies are duly coordinated and monitored the CMG will create a Management Technical Support Unit (UTAG) similar to the arrangement in the first Curitiba Urban Transport Program (paragraph 3.6). Another institutional asset is the sound organization and management of the private business sector that operates the transit buses, which has contributed considerably to the system's success. For these reasons, and by virtue of measures adopted by the CMG, the proposed structure is considered to satisfy the proposed program's implementation requirements. It is evident from the CMG's track record that it is equipped to take on the responsibilities and functions the proposed program will entail. The current

institutional arrangement satisfies Bank requirements for the program's implementation.

## **C. Financial viability**

### **1. Financial situation of the borrower and executing agency**

- 4.5 The past financial performance of the program's borrower and executing agency and projections of its finances were examined to assess its financial capacity to carry out the works for which it would be responsible and its viability as a Bank borrower.
- 4.6 In the six-year period 1997-2002 the Municipality's revenues averaged around US\$416 million annually. Own revenues accounted for 95% of the total; the other 5% was capital earnings.
- 4.7 The breakdown of own revenues was as follows: 42% from the Municipality's portion of federal and state revenue shareouts, 47% from municipal taxes and fees, and the balance from capital earnings and other sundry income. During the above-mentioned period, revenues rose sharply in 1998 but then fell off when the nation's economy was plunged into crisis. Tax revenues are expected to increase thanks to a new compliance enforcement system and the new Municipal Tax Code, leaving the Municipality less reliant on federal transfers. Federal transfer payments already account for less than 10% of Curitiba's total transfer revenues. State government transfers are separate from the federal arrangement. Consequently, transfers have only a modest impact on municipal revenues.
- 4.8 An analysis of the Municipality's 1997-2002 expenditures shows that, on average, its operating costs accounted for 80.4% of total outlays over that period, municipal debt service for 5.2%, and capital works for 14.4% of the total.
- 4.9 A comparison of 1997-2002 revenues and expenditures shows the Municipality's finances in balance, which enabled it to program new capital works and take on new commitments. Over that interval (except in 1997<sup>13</sup>) the Municipality had sufficient resources to honor financial commitments assumed for its operations, service its debt, and pay for its capital works program. The Municipality funded 95% of these outlays using own resources and borrowed the rest.
- 4.10 Table 4.1 compares current authorized ceilings and figures calculated from the Municipality's 2002 balance sheet. According to this information, the Municipality is below the ceilings prescribed in Brazilian law and would be able to manage borrowings even beyond the COFIEX authorized limit.

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<sup>13</sup> In 1997 capital expenditures were very high relative to current savings.

<b>Table 4.1</b>		
<b>Current legal ceilings</b>		
<b>Ceiling and law</b>	<b>Legal ceiling</b>	<b>Calculated</b>
1. Payroll costs (Art. 19 of Law 101/00)	60%	26.04%
2. Overall operations/NCR <sup>(a)</sup> (RSF <sup>(b)</sup> 43/01, Art. 7, section I)	16%	1.43%
3. Annual amortization and other debt costs/NCR (RSF 43/01, Art. 7, section II)	11.5%	4.29%
4. Authorized net consolidated debt (RSF 43/01, Art. 7, section III and RSF 40/01, Art. 3)	1.2 times	0.28 times

(a) NCR: Net current revenue

(b) RSF: Federal Senate Resolution

4.11 Financial projections run for the Municipality for 2003-2012 show that its current-revenue structure would resemble the historical makeup observed in the analysis. Thus, roughly 42% of total current revenues would come from its share of federal and State of Paraná shareouts, about 47.3% from local taxes, 1.4% from capital earnings, and 9.3% from other sources. The remaining 5% would be borrowed funds, including the proposed Bank loan for this program.

4.12 Payroll and other operating costs would account for 69.7% of municipal expenditures, on average. Debt service would take up only 4.5% of total projected expenditure and current transfers 13.5%. Works projects including the proposed program would account for 12.2% of aggregate municipal expenditure.

4.13 If the Municipality had to come up with counterpart funding for the High-Capacity Transit System (STAC) program (paragraph 1.11) it would incur a deficit in the period 2004-2009. It was posited in the simulations that the municipal government would supply approximately US\$72 million over five years, taking 2005 as the STAC program launch date. The 2004 deficit could be made up from the 2003 surplus. If no financial contribution to the STAC is needed as from 2005 the Municipality's financial accounts would balance and, with some minor adjustments, it would post a surplus from 2003 onward.

4.14 Table 4.2 presents the Municipality's financial position according to an average-percentage analysis of the 10 projection years.

<b>Table 4.2</b>		
<b>Financial projections (2003-2012)</b>		
	<b>Percentage (*)</b>	
Current revenue		100.0
Current expenditure		73.1
Payroll costs	43.6	
Operating costs	29.5	
Operating result		26.9
Debt service		4.8
Net generation		22.1
Capital earnings		4.9
Funds available		27.0
Capital and other expenditure		27.0
Financial surplus/shortfall		0.0

\* Percentage of current revenue

## 2. Financial projections

4.15 Between 2004 and 2008 the Municipality would need to fund approximately US\$35 million of the proposed program's cost using own resources. This equals about 1.6% of its projected current revenues over the life of the program. Table 4.3 shows the findings of an analysis of the Municipality's annual revenue performance and the local counterpart requirements.

4.16 As the table shows, the Municipality's own resources will be sufficient to defray its payroll and operating costs, service the debt, and contribute a share of the program's financing, leaving a surplus with which to fund the rest of its capital works program. Many of these other capital projects will considerably enhance social conditions in the community, including health, education, and housing; some of them would have to be put off in the absence of Bank funding for the operation proposed here.

<b>Table 4.3</b> <b>Analysis of municipal resources and local counterpart requirements</b> (US\$ million)					
	2004	2005	2006	2007	2008
Current revenues, less:	415.5	451.8	492.4	536.8	585.1
Payroll costs	180.9	197.2	214.9	234.3	255.3
Operating costs	113.1	123.3	134.3	146.4	159.6
Transfers	58.8	64.1	69.8	76.1	83.0
Operating result, less:	52.7	57.4	62.6	68.2	74.5
Debt service	18.9	20.7	22.2	23.7	34.2
Net cash generation, less:	33.8	36.7	40.4	44.5	40.3
Local contrib. IDB program	7.6	7.6	7.6	7.6	5.0
Remaining for other investments	26.2	29.1	32.8	36.9	35.3

## D. Economic viability

### 1. Economic returns

4.17 The municipal government did an economic feasibility study for the program as a whole and separate studies for its individual components. Table 4.4 presents the economic indicators accepted by the Bank—economic internal rate of return (EIRR) and net present value (NPV)—for each component, and the sensitivity analysis findings for 25% higher costs and 25% lower benefits.

<b>Table 4.4</b> <b>Economic return indicators</b>		
	<b>EIRR</b> <b>(%)</b>	<b>NPV</b> <b>(US\$ million)</b>
Overall program	62.73	405.95
Metro. Transit Corridor	62.98	222.93
RIT capacity expansion / Inter-2	60.64	79.12
<b>Sensitivity analysis</b> <b>(+25% costs and -25% benefits)</b>		
Overall program	37.89	-
Metro. Transit Corridor	37.95	-
RIT capacity expansion/ Inter-2	36.12	-

4.18 The program's benefits were quantified as savings in vehicle operating costs and in travel time costs, treating the latter as 30% of equivalent work time. In the road

safety component, the new traffic signalization system will significantly reduce bus operating costs.

- 4.19 Among the numerous other benefits which the analysis did not quantify in monetary terms are: (i) a reduction in number of accidents; (ii) urban enhancements and development around the Metropolitan Transit Corridor, and (iii) reduced pollution once fewer heavy vehicles are traveling that corridor.
- 4.20 The program yields high economic returns: an EIRR of 62.73% and NPV of US\$405.95 million at 12% real annual interest.
- 4.21 Though the program is conceived as an integrated set of works, rates of return were calculated for its chief cost components: (i) Metropolitan Transit Corridor works gave an EIRR of 62.98% and NPV of US\$222.93 million, and (ii) RIT improvements had an EIRR of 60.64% and NPV of US\$79.12 million. The execution, or not, of multiple works that could form part of the program would not affect the EIRR calculation.

## **2. Sensitivity analysis**

- 4.22 The sensitivity analysis findings presented above show that the program would continue to yield high economic returns even in the scenario of a 25% increase in costs and simultaneous 25% reduction in benefits, which would take the EIRR to 37.89%. In that same downside scenario the EIRR of the individual components—Metropolitan Corridor improvements, RIT capacity expansion, and road safety investments—would still be high (Metropolitan Corridor 37.95%, RIT expansion 36.12%).

## **E. Socioenvironmental viability**

- 4.23 The program proposed here is a continuation of Curitiba's IDB-funded Urban Transport Program. The Municipal Environment Bureau (SMMA) has judged it to be environmentally viable based on the findings of technical studies required under Brazilian law (environmental impact assessment/environmental impact report), on additional requirements developed by the SMMA (Basic Environmental Plan—BEP), and on the public consultations and hearings held. The program's potential adverse impacts can be satisfactorily mitigated and a balance will be struck between economic growth and environmental conservation in pursuit of sustainable development.
- 4.24 The program's chief socioenvironmental benefits, to be achieved by implementing the BEP components, are: (i) improvements in socioenvironmental conditions and land-use regulation along the Metropolitan Transit Corridor (EMT) and on roadways directly affected by the program, plus the stimulus to the city's economy that this new development hub will create; (ii) better conditions for pedestrian and bicycle traffic; (iii) an increase in green spaces and more trees in the city; (iv) better

housing conditions for families who are resettled; (v) improved transit conditions, accessibility to social services and to the workplace; (vi) a reduction in polluting emissions; and (vii) the possibility, in accordance with Curitiba's land-use law, of preserving conservation areas in the city in exchange for allowing higher-density construction along the EMT.

- 4.25 The program's potential adverse impacts, concentrated in the construction stage, would be temporary and discrete. They can be duly controlled and attenuated by implementing the design recommendations and recommendations in the environmental plans. The individual BEP components describe actions required and timetables for same (matching the construction timetable) and provide a detailed budget. The construction contracts will require contractors to perform environmental management measures in works projects as spelled out in the BEP. The Management Technical Support Unit will assure that these requirements are satisfied, with support from an environmental team and compliance monitoring by the Municipal Environment Bureau, which will receive institutional support funded by the program.
- 4.26 Like the first Curitiba Urban Transport Program, the second-stage program proposed here will continue to help improve the quality and safety of mass transit in the municipality, including improvements to benefit low-income residents. It will do the same for pedestrian and bicycle traffic and municipal transportation planning in this city that is acclaimed world-over for its quality of life and environmental health and stands as a model for ventures of this same kind in other Latin American and Caribbean cities.

#### **F. Benefits**

- 4.27 The program's benefits include travel time savings, more comfortable waits for transit riders and better boarding and alighting conditions in terminals, and safer and more comfortable rides on the city's public transit system. Further benefits will be a reduction in air pollution and more facilities and safer conditions for pedestrians and cyclists. Residents of some adjacent municipalities who currently have to pay two fares stand to benefit directly when all bus routes coming into Curitiba are brought into the integrated single-fare system.
- 4.28 An additional benefit will be the creation of a new development hub in the city around the Metropolitan Transit Corridor and the ensuing functional integration of two parts of the city which at the moment are separated by the old interstate highway BR-116/476 corridor.
- 4.29 Such benefits typically translate into high economic internal rates of return: the EIRR for the first Curitiba Urban Transport Program as a whole was 41% in the ex ante appraisal and 47% in the ex post evaluation.

- 4.30 Though all the program's investments would be within the city of Curitiba they will benefit mass transit riders across the metropolitan region, including its poorest residents, most of whom live in the 13 municipalities in the closest-in metropolitan belt and in outlying districts of the city itself. Virtually the entire poor population of the municipality and of the innermost ring of the metropolitan region stand to benefit, since they do not own motor vehicles and have to rely on Curitiba's integrated mass transit service, walk, or ride a bicycle to get to work, school, health services, or other destinations. Benefiting as it does all of these different actors, the program unquestionably will enhance social equity.
- 4.31 The number of the program's low-income beneficiaries was calculated using the findings of a June 2002 Instituto Bonilha survey and IPPUC data which estimate that 35% of Curitiba public transit users live below the poverty line, i.e., have household incomes of 600 reais (2002) or less. Accordingly, the proposed operation does not qualify as a poverty-targeted investment.
- 4.32 Municipal Law 9800 of 3 January 2000 which regulates land use in the municipality permits higher building density along the Metropolitan Transit Corridor in exchange for conserving spring zones in the metropolitan area. Implementing the second Curitiba Urban Transport Program will make such a swap possible, yielding major environmental benefits for the metropolitan region.

#### **G. Risks**

- 4.33 The Curitiba municipal government successfully carried out a similar program funded in part by the Bank (paragraph 1.8). All the engineering studies and designs needed to begin most of the construction projects for the proposed program are ready. Since the IPPUC, URBS, and Municipal Public Works Bureau have a great deal of experience gained with the first stage of the Urban Transport Program there are fewer institutional, construction, or tendering risks. The planned projects entail no radical changes for mass transit users or residents of areas the construction will affect.
- 4.34 As for operational risks relating to the remodeling of existing intermediate bus stops, expanding arterial routes along the Metropolitan Transit Corridor, and the planned new equipment, the experience gained in the first stage of the city's Urban Transport Program, the bus route allocation method, and the system maintenance and operating procedures in place offer assurances that there will be no need for structural or technical modifications to the existing systems. Consequently, no problems are anticipated in this regard.
- 4.35 One risk when simultaneously building parts of a transit system and acquiring vehicles to run on it is that the two processes might not be duly synchronized. The planned construction works and the transit buses the private sector would be purchasing for the program described here are substantively similar to the ones in

the first stage of the program, in which the two processes were successfully carried out in tandem. Accordingly, no particular new problems are anticipated in applying that experience to the proposed program.

- 4.36 The changeover in municipal administration toward the end of 2004 will bring with it a minor risk of delays in implementing the program, as is normal at any such juncture. The planned auxiliary management contract will assure continuity in the program, alleviating that concern.
- 4.37 There are other minor risks which could lessen the program's impact. One has to do with the need for continuing political resolve of Paraná state governments and mayors of other Curitiba metropolitan region municipalities to keep up their support for moves to integrate the public transit system. The existence of associations of mayors and officials at various levels who have a track record in this area and have supported the Integrated Transit System mitigates against this risk. Municipal policy continuity has had much to do with the high caliber of public transportation in the municipality, as transit users continually put pressure on local officials and the Curitiba Metropolitan Region Coordination Commission to maintain and improve the transit service. This pressure attenuates any political-resolve risks.
- 4.38 The federal government has agreed to delegate to the Municipality, for 25 years, the use and development of the strip of land on which the Metropolitan Transit Corridor will be situated. One contingency in this regard would be a decision by the Ministry of Transport to take back the right-of-way, but the federal government has already issued a favorable opinion on the future transfer of ownership of that land to the city. The legal documentation that specifies authorization to administer the strip of land for 99 years (paragraph 2.5) is at an advanced stage of preparation.
- 4.39 Another risk has to do with the private sector's willingness to make the necessary investment in vehicles specially designed to operate on the city's transit system. This risk is low given the track record of Curitiba's present mass transit system and the contracts in place with the system's concessionaires.
- 4.40 The success of the first Curitiba Urban Transport Program and the fact that complete engineering designs are ready and the initial environmental permit has been secured for the program proposed here reduces uncertainty and eliminates most of the implementation and operational risks that would be an issue in other cities.

**CURITIBA URBAN TRANSPORT PROGRAM (BR-0375)**  
**LOGICAL FRAMEWORK**

Narrative summary of objectives	Indicators	Means of verification	Assumptions
<b>Impact (Goal)</b>			
Help reduce operating costs on Curitiba Integrated Public Transit System (RIT) city routes.	Increased ridership satisfaction with Curitiba's mass transit system.	Opinion poll.	
<b>Outcome (Purpose)</b>			
RIT coverage, accessibility, integration, safety, and efficiency improved.	By the end of the proposed project (EPP), number of bus routes integrated into the RIT has risen from 273 to over 310 (> 13%).	Urbanização de Curitiba S.A. (URBS) operations records.	URBS's operating cost optimization system continues to be efficient.
	By EPP, RIT ridership is up 3%.	URBS survey and records.	
	By EPP, number of accidents at Capão de Imbuia, Cabral, Campina da Siqueira, Hauer and Pinheirinho terminals has dropped from 7.24/1 million bus trips to less than 6/1 million trips (> 17%).	Accident reporting system of URBS Traffic Directorate (DIRETRAN).	
	By EPP, number of accidents causing casualties per million vehicles/year operating on Metropolitan Transit Corridor (EMT) right-of-way strip (both directions – near Fanny station) has dropped from 16 to < 12.	SIATE (Integrated Trauma and Emergency Aid System) and URBS accident reporting system (program component).	
	By EPP, the following reductions in average complete trip time (round trip by bus) at peak hour (6:30-7:30 a.m.) have been achieved: South Corridor (Pinheirinho) to city center, from 68 to 56 minutes (> 17%), and North Corridor (Colombo) to city center, from 64 to 50 minutes (> 22%).	URBS time and route records.	
	By EPP, a 5% reduction has been achieved in time buses are stopped at traffic lights on a complete round trip at peak hour 6:30 to 7:30 a.m. on Pinheirinho – Rui Barbosa, Santa Cândida – Capão Raso and Boqueirão routes.	URBS research in 2003 and at end of program.	The new municipal administration keeps up support for the program.

Note: The methodology for evaluating the indicators is provided in IDBDOCS # 216846.

Narrative summary of objectives	Indicators	Means of verification	Assumptions
	By EPP, a 5% reduction has been achieved in dwell time in tube boarding stations on a complete clockwise run of Inter-2 route buses during 6:30 to 7:30 a.m. peak hour.	URBS research in 2003 and at end of program.	
Outputs (Components )			
1. Implementation of RIT arterial route corresponding to metropolitan transportation corridor (EMT)			
1.1 Transfer terminals remodeled or built and in service.	By EPP, two new terminals have been built along EMT arterial routes and one existing terminal has been remodeled; all stations are in service.	URBS certificates of acceptance of works.	Demand increase is within the forecast range.
1.2 Intermediate stations built and in service.	By EPP, 12 new intermediate stations have been built for EMT arterial routes and 10 existing tube stations in the two EMT-city center connecting corridors have been relocated.	URBS certification.	Operation and maintenance continue to be efficient.
1.3 Special biarticulated buses acquired and in service.	By EPP, 40 biarticulated buses are in service on three arterial routes along the EMT.	Receipts for bus acquisitions approved by UTAG.	
1.4 Grade-separated intersections built and opened to traffic.	By EPP, four grade-separated intersections have been built along the EMT.	Municipal Public Works Bureau (SMOP) certificates of acceptance of works.	
1.5 Road paving and improvements completed.	By EPP, 17.8 km of concrete bus lanes have been built, 35.8 km of parallel lanes, 33 km of lateral local traffic lanes, and 10.7 km of roadways around corridor intersections.	SMOP certificates of acceptance of works.	There is political will to continue public transit system integration.
1.6 Traffic signalization devices installed and in service.	By EPP, 64 new traffic signal sets and sensors have been installed at eight binary-road-system intersections along the EMT.	Certification by URBS DIRETRAN.	
1.7 Green spaces and bicycle paths constructed and in service.	By EPP, four parks and one 6-km green band have been built; 13 km of shared bike/pedestrian paths and 5.8 km of bike-only paths along the EMT South Corridor.	SMOP certificates of acceptance of works.	
2. RIT expansion			
2.1 Transfer terminals built/remodeled and in service.	By EPP, four transfer stations have been remodeled for Inter-2 circular line and are in service.	URBS certificates of acceptance of works.	Demand increase is within the forecast range.
2.2 Intermediate stations expanded and in service.	By EPP, 18 intermediate stations have been remodeled to use tube boarding modules on Inter-2 circular route.	URBS certification.	Congestion remains at predicted levels.
2.3 Articulated buses acquired and in service.	By EPP, 48 articulated buses are operating on the Inter-2 circular route.	Receipts for bus acquisitions approved by UTAG.	
2.4 Grade-separated intersections built and opened to traffic.	By EPP, two grade-separated intersections have been built on the Chile and BR-277 binaries.	SMOP certificates of acceptance of works.	

Narrative summary of objectives	Indicators	Means of verification	Assumptions
2.5 Surface paving completed on roads; roads open to traffic.	By EPP, 62.7 km of roads have been paved, serviced, and opened to traffic.	SMOP certificates of acceptance of works.	
2.6 Traffic signalization devices installed and in service.	By EPP, signalization equipment has been installed at 100 city-center intersections and the signal protocol has been modified at 350 Area Traffic Control intersections (city center, Boqueirão, N-S Corridor). Traffic signals have been installed at 26 new isolated intersections and adjusted at 64 existing intersections.	Certification by URBS DIETRAN.	
2.7 Bicycle paths built or repaired and in service.	By EPP, 16.6 km. of bike paths and 2.6 km of shared bike/pedestrian paths have been built and 44.7 km of bike paths have been repaired.	SMOP certificates of acceptance of works.	
<b>3. Road safety</b>			
3.1 Traffic monitoring system installed and in service.	By EPP, 62 centrally remote controlled surveillance cameras have been mounted—31 on EMT and 31 in city center. A traffic analysis system, speed check system, and EMT user information system have been implemented as part of the “digital corridor”.	Certification by URBS DIETRAN.	The same levels of quality and safety are maintained in the other components of the city’s mass transit system.
3.2 Accident reporting system implemented and operating.	By EPP, DIRETRAN is equipped to organize, update, and use a database of all accidents causing casualties within the municipality of Curitiba.	Certification by URBS DIETRAN.	Traffic control and enforcement system continues to operate at current levels of efficiency.
<b>Inputs (Activities)</b>			
	See cost table.		Exchange rate remains within an acceptable range. Counterpart funds are furnished as planned Private investors provide the agreed contribution for bus fleet acquisition. Federal government remains politically committed to continue delegating to the Municipality the use and development of BR-476 right-of-way strip.

**CURITIBA URBAN TRANSPORT PROGRAM II  
(BR-0375)**

**Table II-1  
Procurement plan**

Item	Agency in charge of procurement	Type of bidding	Amount (US\$)	Timetable			
				2003		2004	
				1 <sup>st</sup> half	2 <sup>nd</sup> half	1 <sup>st</sup> half	2 <sup>nd</sup> half
Auxiliary management	CMG	ICB	2,760,000		2,760,000		
Works supervision	CMG	ICB	3,940,000		3,940,000		
Works: South Sector Metropolitan Corridor	CMG	ICB	25,698,000		25,698,000		
Works: North Sector Metropolitan Corridor	CMG	ICB	29,225,000			29,225,000	
RIT capacity expansion works	CMG	ICB	35,884,000			35,884,000	
Traffic signalization devices	CMG	ICB	7,158,000			7,158,000	
Street lighting works	CMG	ICB	2,188,000			2,188,000	
<b>Grand total</b>			<b>106,853,000</b>		<b>32,398,000</b>	<b>74,455,000</b>	

CMG      Curitiba Municipal Government  
ICB      international competitive bidding

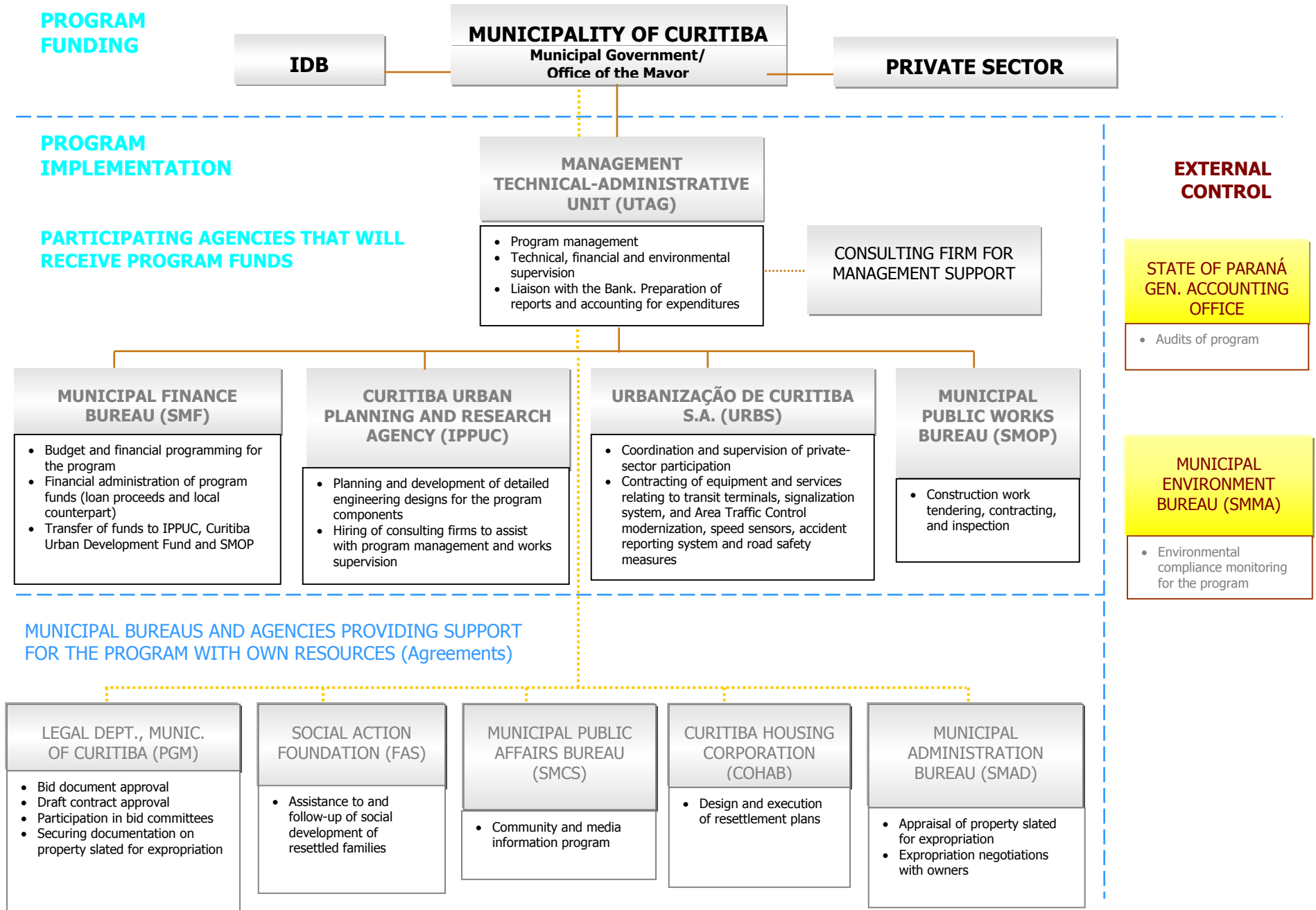
**Table II-2  
Advance tendering**

Expenditure item		Advance expenditures (US\$)		
		Total amount	Before approval	After approval
1	<b><u>Engineering and administration</u></b>	<b>4,395,000</b>	<b>600,000</b>	<b>650,000</b>
1.1	Studies and designs	580,000	400,000	180,000
1.1.1	Program setup **	278,000	200,000	78,000
1.1.2	Designs during setup **	302,000	200,000	102,000
1.2	Program administration	2,760,000	100,000	270,000
1.2.1	Management support	2,760,000	100,000	270,000
1.3	Construction supervision	1,055,000	100,000	200,000
2	<b><u>Investment components</u></b>	<b>24,634,000</b>	<b>1,050,000</b>	<b>3,000,000</b>
2.1	EMT creation	24,634,000	1,050,000	3,000,000
2.1.1	Transfer terminals	1,344,000	200,000	400,000
2.1.1.1	Pinheirinho Terminal expansion	677,000	100,000	200,000
2.1.1.2	Central Terminal	667,000	100,000	200,000
2.1.3	Road works and intermediate stations	23,290,000	850,000	2,600,000
2.1.3.1	Pinheirinho-Vila São Pedro route	5,678,000	250,000	800,000
2.1.3.2	Vila São Pedro-Santa Bernadete route	7,789,000	250,000	800,000
2.1.3.3	Santa Bernadete-Marechal Floriano route	8,977,000	250,000	800,000
2.1.3.4	Marechal Floriano-city center connection	846,000	100,000	200,000
3	<b><u>Other expenditures</u></b>	<b>903,000</b>	<b>350,000</b>	<b>350,000</b>
3.1	Expropriations *	381,000	200,000	100,000
3.2	Environmental compensation, resettlements	522,000	150,000	250,000
3.2.1	Environmental monitoring *	142,000	50,000	50,000
3.2.2	Resettlements *	380,000	100,000	200,000
<b>Grand total</b>		<b>29,932,000</b>	<b>2,000,000</b>	<b>4,000,000</b>

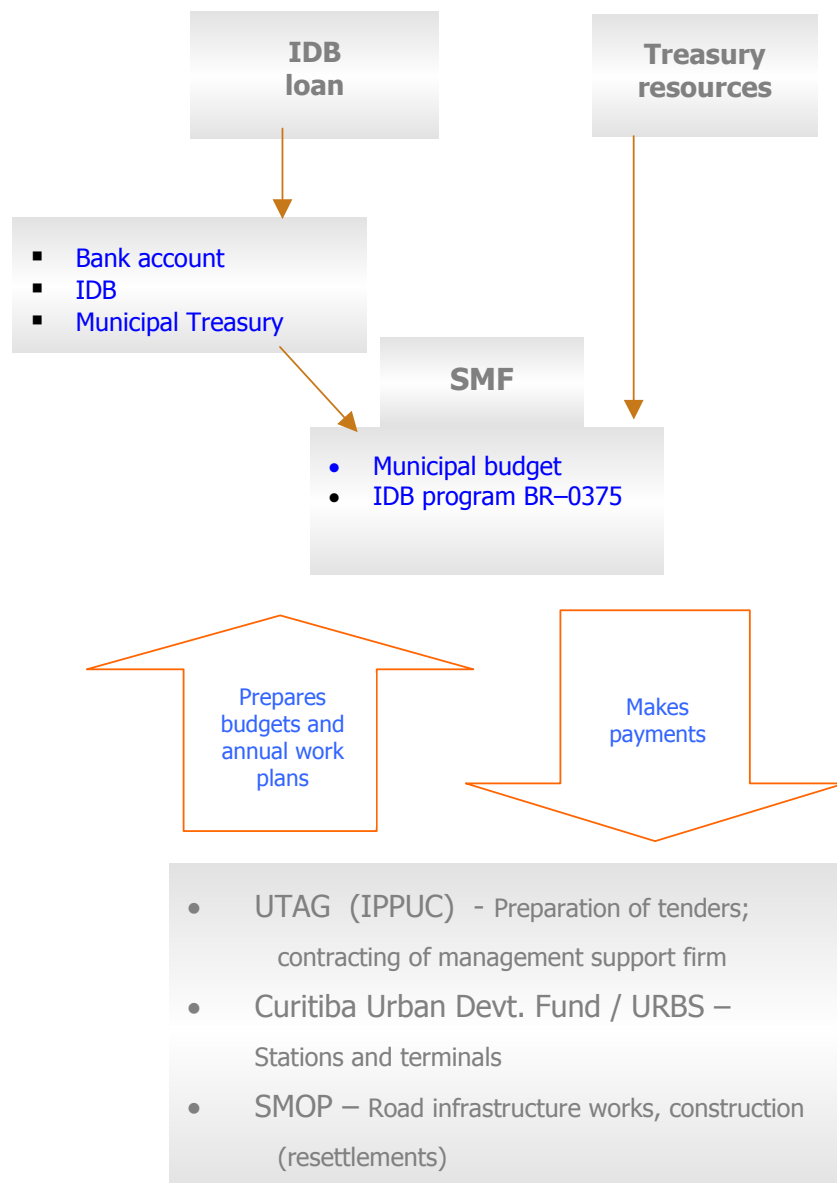
\* No tendering

\*\*Already tendered

**CURITIBA URBAN TRANSPORT PROGRAM II (BR-0375)**  
**ORGANIZATION CHART FOR THE PROGRAM'S EXECUTION**



# **CURITIBA URBAN TRANSPORT PROGRAM (IDB-II)** **FLOW CHART – ADMINISTRATION OF PROGRAM FUNDS**



Schedule II ("Municipal Government Targets and Priorities") to Municipal Law 10,350 of 18/12/2001 which contains the 2002-2005 Multiyear Plan classifies activities relating to the IDB-II program works as follows:

- Class 15 – Urban development: Program 0008 – Curitiba On The Move, and Program 0020 – Curitiba Urban Transit.

Municipal Law 10,514 of 27/06/2002 authorizes the city government to enter into a contract to borrow from the Inter-American Development Bank (IDB). Both for use of the IDB loan proceeds and allocation of counterpart funds by the Municipality.

For fiscal years 2003 and 2004 the Executive will make application to the Municipal Council for a budget supplement to the annual budget law (counterpart) for the Urban Transport Program.

For fiscal year 2005 the annual budget law and budget guidelines law will contain resources from the above-mentioned loan contract and the municipal counterpart funds.

Allocated funds will be transferred to municipal government bureaus and agencies as required for works execution. Recipient agencies will be the Curitiba Urban Planning and Research Agency (IPPUC), the Curitiba Urban Development Fund (managed by URBS), and the Municipal Public Works Bureau (SMOP), for execution of designs and construction work included in the Municipal General Plans and for activities relating to management of the services performed by the Management Technical-Administrative Unit (UTAG).