

UPGRADING OF THE FERNÃO DIAS HIGHWAY – STAGE II

(BR-0126)

EXECUTIVE SUMMARY

BORROWER AND GUARANTOR: The Federative Republic of Brazil

EXECUTING AGENCY: The National Highway Department (DNER), with the State Highway Departments of São Paulo (DER/SP) and Minas Gerais (DER/MG) as coexecuting agencies

AMOUNT AND SOURCE:

IDB:	US\$275.0 million
Federal government:	US\$137.5 million
Government of Minas Gerais:	US\$110.3 million
Government of São Paulo:	<u>US\$ 27.2 million</u>
Total:	US\$550.0 million

FINANCIAL TERMS AND CONDITIONS:

Amortization period:	20 years
Disbursement period:	3 years
Grace period:	3.5 years
Interest rate:	variable
Inspection and supervision:	1%
Credit fee:	0.75%
Currency:	U.S. dollars

OBJECTIVES: The objective of the project is to upgrade the level of service of highway BR-381 between São Paulo and Belo Horizonte, so as to ease congestion and reduce the accident rate, and to institute a financially self-sustaining concession arrangement for private-sector operation and maintenance of the highway. This will help lower transportation costs for highway users, and ultimately bring down the so-called "Brazil cost".

DESCRIPTION: Works proposed in this operation constitute the second stage of the project to upgrade the Fernão Dias Highway between São Paulo and Belo Horizonte. Stage I is currently being financed by the Bank (767/OC-BR); its full benefits cannot be realized until the second phase proposed herein is implemented, and the highway's operation and maintenance can be concessioned out, on the basis of a toll collection system. The construction work planned for this stage entails adding lanes for and/or rehabilitating close to 287.8 km of the 292.6 km highway linking the cities of Nepomuceno in Minas Gerais and Atibaia in São Paulo, and

construction of 4.7 km of divided highway for the Careaçú belt road in Minas Gerais. Other structures to be built are two toll stations and three highway police posts; one weigh station in Minas Gerais will be reactivated.

Studies for the project will address environmental, economic, and engineering questions, with a view to (i) producing bid documents to award an operating and maintenance concession for the highway to a private firm; (ii) resolving the Belo Horizonte interchange problem from the entry of the Fernão Dias Highway to the exit for Governador Valadares; and (iii) technical, economic, and environmental feasibility reports, and basic design and bid documents to expand the capacity of the 325-km stretch of highway BR-381 between Belo Horizonte and Governador Valadares.

**ENVIRONMENTAL
CLASSIFICATION:**

Environmental impact studies for the entire highway (stages I and II) were completed between June 1992 and January 1993, and were made available for public review in accordance with Bank policies. Public hearings were held in the city of São Paulo and in Betim (Minas Gerais). The Bank's Environment Committee, at its meeting of August 20, 1996, classified this as a Category III operation. All the permits required in advance for all highway segments covered by the program in São Paulo and Minas Gerais (stages I and II) have been obtained, as have the permits needed to start work on stage II in Minas Gerais. Start-up permits for stage II in São Paulo are now being arranged. On October 22, 1996, the Environment Committee approved the environmental report, which was released to the Bank's Public Information Center on the same date.

BENEFITS:

The project will improve peak-hour levels of service on the highway, which now is severely congested and often saturated. Traffic moves slowly and is often stop-and-go. When the level of service of the highway is upgraded, traffic will flow more smoothly, thus opening up one bottleneck in the region's road infrastructure and improving industry and commerce in the region as constraints on transportation capacity are removed. Travel times will be shortened, transportation costs will come down, and highway accidents will be reduced, particularly the type that occur in heavy two-way traffic on undivided roadways. Passenger and freight vehicles will move more quickly and more safely — a crucial consideration for the modern sector of the economy. The project will also pinpoint other stretches of highway that need to be

upgraded, and provide engineering input to tender out some of those works.

RISKS:

Problems addressed in stage I mean fewer risks at this second proposed stage, though there will always be some measure of risk associated with possible delays in awarding the concession if protests are lodged by bidders, and with possible commercial losses by the concession-holder during the operation. To guard against these contingencies, (a) the concession process has been moved to mid-1998, to give time to resolve any protests that may arise and allow the concessionaire to be fully set up before the final phase of dividing the highway, and (b) bidders will have to post performance security, making it less likely that they will submit over-optimistic offers (paragraphs 5.29, 5.30, and 5.31).

**THE BANK'S
COUNTRY AND
SECTOR STRATEGY:**

The Bank's strategy and operations program for Brazil from 1995 to 1997, described in the February 1996 country paper, are fully concordant with the Eighth Replenishment objectives, the government's focus on systematically eliminating poverty at its roots (and alleviating some of its social consequences), and the need to build a modern economy. In keeping with the core elements of its lending strategy, the Bank is supporting, directly and in concert with others, efforts on the following fronts: (i) **modernization of the State**, the priorities being the strengthening of planning and management capacity, revamping of public sector operations, and fiscal reform; (ii) **production infrastructure**, to help open the economy, advance regional integration, and lower the "Brazil cost", through priority investments in the transport and energy sectors; and (iii) **the social sectors, basic sanitation, and the environment**. The support envisaged in the proposed project falls into categories (i) and (ii): it would increase the highway's current capacity fourfold and lower vehicle operating costs for traffic moving between the capitals of the two states involved, and would, through a concession arrangement, pass one of the country's busiest highways over to the private sector to operate and maintain. The concomitant reduction in public transportation spending, plus new DNER revenues from tolls collected to repay the loan, will help balance the fiscal accounts. As for category (iii) above, elements of the project will help reduce highway accidents and ease critical environmental situations (paragraphs 1.21 and 1.22).

**POVERTY-TARGETING
AND SOCIAL
ASPECTS:**

Pursuant to the Eighth Replenishment document (AB-1704), it has been determined that the proposed program does not have the features of a poverty-targeted operation, either geographically or in terms of intended beneficiaries, and that it is not specifically targeted to women (paragraph 5.12).

**SPECIAL
CONTRACTUAL
CONDITIONS:**

As conditions precedent to disbursement of the Bank's loan, the borrower, through DNER, the executing agency, must demonstrate the following to the Bank's satisfaction: (i) that the operation of the stage I project coordination units (PCUs) has been extended through to the end of stage II, that technical and administrative staff have been appointed to the PCUs in DNER and the two coexecuting agencies, and that consultants have been hired to advise those units (paragraphs 3.2 and 3.3); (ii) that the PCUs have support from an environmental specialist and that firms have been hired to supervise the environmental side of construction projects in the two states (paragraphs 3.13 and 3.14); (iii) that addenda have been signed to the agreements delegating implementation of the project to DER/MG and DER/SP, in their respective spheres of jurisdiction (paragraph 4.2); and (iv) that a firm has been hired to produce a study on operation of the highway and draw up bid documents for its concession to private hands (paragraphs 3.40, 3.41, and 3.42).

For the construction component, the borrower, through DNER, is to (i) clearly state in the bid documents that the contractor must furnish bid and performance security and construction and liability insurance (paragraphs 3.21, 3.24, and 5.26); (ii) issue calls for bids for a highway section only when the respective environmental permit has been secured (paragraph 3.10); (iii) initiate calls for tenders in São Paulo only after DER/SP has demonstrated that it has a qualified technical officer assigned full-time to its standing committee on environmental management (paragraph 3.16); and (iv) demonstrate, before a contractor is allowed to set up at the work site for a highway section, that a firm has been hired to supervise construction there (paragraph 3.28).

Six months after signature of the loan contract, the borrower is to demonstrate to the Bank that (i) for São Paulo, formal agreements are in place between DER/SP and the Forestry Administration and the Environment Department and (ii) for Minas Gerais, the following have been signed: an order designating the Jaguarí-Camanducaia and Sapucaí Mirim watershed as an environmental protection area; agreements with the

State Forestry Administration for environmental management in the Papagaio and Fernão Dias Park conservation units and establishment of the Jaguarí-Camanducaia and Sapucaí Mirim environmental protection area; and an agreement with the Military Police to institute an emergency response plan for accidents involving hazardous loads (paragraph 3.15).

Twelve months after signature of the loan contract, the borrower is to demonstrate to the Bank that (i) DER/SP has fully implemented the plan to resettle people affected by the stage I works (paragraph 3.11); (ii) DER/MG has formally established the Jaguarí-Camanducaia and Sapucaí Mirim protection area and the Papagaio and Fernão Dias Park conservation units; (iii) DER/SP and DER/MG have reviewed their highway design and construction standards, including environmental protection elements (paragraph 3.16); and (iv) terms of reference and instructions have been produced for the ex post evaluation (paragraph 3.51).

Twenty-four months after signature of the loan contract, the borrower is to demonstrate to the Bank that (i) the hazardous-load management system is in place and operating in the two states; (ii) training courses on environmental assessment of highway projects have been completed; (iii) DER/MG has taken the action required in the agreement to develop plans for support to municipalities in the highway's service area; and (iv) DER/SP has implemented the required agreements with the Forestry Administration and the Environment Department (paragraph 3.16).

In regard to international competitive bidding for the highway operation and maintenance concession, the borrower is to demonstrate the following to the Bank's satisfaction: (i) four months after signature of the contract, the bid documents for the concession, containing provisions as to safety and environmental measures and the collection of tolls; (ii) five months after signature of the contract, that the concession tendering process has been initiated with international publicity; and (iii) 13 months after signature of the contract, that the concession-holder has begun work (paragraphs 3.17, 3.40, 3.41, and 3.42).

If no concession contract were awarded after the call for bids, until concession arrangements could be formalized the weigh stations and auxiliary accident response and toll collection equipment will continue to be the government's responsibility, which it will

assume upon acceptance of the project works. The construction work, services, and operation would be contracted out to private companies, to be engaged four months after the impossibility of the concession were ascertained (paragraphs 3.43, 3.46, and 3.47).

Studies on the Belo Horizonte interchange must be completed by December 31, 1998. The feasibility study, with basic designs for works for the stretch of highway BR-381 between Belo Horizonte and Governador Valadares, is to be finished by June 30, 1999 (paragraphs 3.48 and 3.50).

Three years after the last disbursement, the borrower is to present the findings of an ex post evaluation (paragraphs 3.51, 3.52, and 3.53).

**CONTRACTING FOR
CONSTRUCTION WORK,
GOODS, AND ENGI-
NEERING AND
CONSULTING
SERVICES:**

Procedures agreed upon with the Bank will apply for the procurement of goods and contracting for construction work and consulting services to be funded by the loan. Thresholds above which international competitive bidding or calls for proposals will be required are US\$200,000 for consulting services (call for proposals), US\$350,000 for goods (call for bids) and US\$5 million for construction (call for bids). Procurement paid for with counterpart funds, or costing less than the aforesaid thresholds, will be governed by Brazilian legislation (paragraphs 3.18 and 3.19).

ADVANCE OF FUNDS:

Upon express request by the borrower, funds equivalent to up to 20% of the Bank's loan may be advanced to expedite construction work in São Paulo and Minas Gerais (paragraphs 3.30 and 3.38).

**RETROACTIVE
FINANCING:**

A total of US\$3.28 million in expenditures incurred as from January 1996 could be recognized against the local counterpart (paragraph 3.35).

I. FRAME OF REFERENCE

A. Background

a. Brazil's highway system

- 1.1 Brazil has serious weaknesses in its transportation infrastructure, which drive up the cost of domestic transport and are an impediment to integration with neighboring countries and trade dealings with the rest of the world. The country has only 17 km of paved highways per 1,000 km² - one of the lowest ratios in Latin America, and barely comparable to the German and U.S. figures, which are respectively 38 and 100 times higher.
- 1.2 Most Brazilian highways are undivided two-lane motorways. The few multilane ones are those serving some larger urban areas, one small network in the state of São Paulo, and another joining Rio de Janeiro to the cities of São Paulo and Juiz de Fora.

b. The project region

- 1.3 The South-East region, made up of the states of São Paulo, Minas Gerais, Rio de Janeiro, and Espírito Santo, occupies 10.8% of Brazil's territory but is home to 42.7% of its population. The nation's largest producer and consumer markets are concentrated here.
- 1.4 The state of São Paulo has an area of 248,809 km² (2.9% of the country total) and 32 million people (21.3% of total population). The city of São Paulo is South America's largest industrial agglomeration. The state of Minas Gerais, with an area of 588,834 km² (6.9% of the country), has a population of 16 million (10.8% of the total).

c. The Fernão Dias Highway

- 1.5 Federal highway BR-381 was completed and paved in 1961. Its inauguration completed the interconnection of the so-called "Brazilian economic triangle", the other two sides being the Presidente Dutra Highway (BR-116) between Rio de Janeiro and São Paulo, and the Juscelino Kubitschek Highway (BR-040) joining Belo Horizonte and Rio de Janeiro.
- 1.6 The segment of highway BR-381 between metropolitan and industrial São Paulo, home to 16 million people, and Belo Horizonte, with 4 million, is called the Fernão Dias Highway. It traverses 34 municipalities (28 in Minas Gerais and 6 in São Paulo), serving a heavily built-up area with huge agglomerations at either end. Eighteen mid-sized and small cities lie between the two metropolises (see Map 1).

- 1.7 The portion of the highway that traverses São Paulo is a gateway to the entire southern part of the country; and through Belo Horizonte it links south-central Brazil to Brasília, from which other highways branch out toward different regions. Apart from its economic, social, and cultural importance, this highway is very strategic for national development, providing as it does a link between the North-East and the South.
- 1.8 The rugged terrain of the Sierra del Mar has made it impossible to lay a rail line between São Paulo and Belo Horizonte. Thus, the Fernão Dias Highway supplements other modes of transport, giving vehicles access to ports and rail terminals. The breakdown of traffic using this road attests clearly to its economic importance: 72% are commercial vehicles (55% trucks, 17% buses), and only 28% are automobiles.

d. Congestion, saturation, and accidents

- 1.9 Traffic flows on this highway have increased steadily, and are particularly heavy near the capital cities. As far back as 1970 a second lane had to be built between Belo Horizonte and Betim, and at the approach to São Paulo, to accommodate traffic volumes. Designs were drawn up to expand the other sections of highway, but because of funding constraints, the work was never done. In 1983, to deal with steadily worsening congestion, shoulders were turned into climbing (third) lanes; this eased the traffic flow on the steepest segments, but left some safety problems unresolved.
- 1.10 Traffic on this highway now exceeds capacity on many stretches, notably in metropolitan São Paulo, through which more than 40,000 vehicles pass each day. Congestion is extreme, and passing is hazardous. There are just under 1,000 accidents a year, which on average leave over 10 people dead every month.
- 1.11 According to traffic forecasts, if current conditions are not improved, 15 sections of the highway will be completely saturated by 2004.

e. Proposed solution

- 1.12 With the expansion and upgrading work proposed in this project, the Fernão Dias Highway will have the roadway features needed to handle current and future traffic demand, and the safety standards adopted will bring down what is now a very high accident rate.
- 1.13 A second roadway is to be built within the present right-of-way. This will reduce accidents, lower vehicle operating costs, and shorten travel times. The separation of traffic into two one-way streams will do away with head-on and lateral collisions that occur when vehicles traveling in opposite directions must share the same roadway, and will also reduce other types of side and rear-end collisions. This improvement, plus new walkways and other safety

devices in built-up areas, also will also considerably reduce the number of pedestrians being struck.

B. Importance of the project in the national highway strategy

- 1.14 The government is having to address different needs in the highway sector, with tight budgets ensuing from the national deficit reduction policy. Among these needs are: (i) increase the capacity of the national highway system and upgrade the quality of service; (ii) rehabilitate federal highways that were not properly maintained in the 1980s; and (iii) provide routine and periodic maintenance for the federal highway system. The Fernão Dias Highway falls into the first of these sets of needs; it would be financially viable under the concession arrangement proposed herein (paragraph 1.37). To address the second type of needs, the National Highway Department (DNER) is preparing a federal highway rehabilitation program (project BR-0195), to be cofinanced by the World Bank. Actions proposed for the third category of needs (maintenance) are described in paragraphs 1.27, 1.28, and 1.29 of this proposal. The project described herein would help resolve, through undertakings to be required of the contractor, the future maintenance needs of the Fernão Dias Highway. Concessioning of other highways to private firms will likewise help solve highway rehabilitation and maintenance problems (paragraph 1.35).
- 1.15 The widening and upgrading of the Fernão Dias Highway will free up a bottleneck that is holding back economic development in the highway's service area, and will promote integration of the North-East, west-central Brazil, the South-East, and the South. It will expedite haulage of grains and foodstuffs headed for the home and foreign markets, and make for a rational distribution of industries in its service area. Given the external diseconomies evident in metropolitan São Paulo, southern Minas Gerais will be a major new industrial development enclave.
- 1.16 The Fernão Dias Federal Highway can also be an alternative to, or supplement, the two main federal highways (BR-101 and BR-116) which cross the country from north to south. Work to improve critical stretches of those highways began in the 1960s and has been proceeding little by little. The proposed operation, coupled with another IDB-funded project that will turn the São Paulo-Florianópolis highway into a multilane motorway, will expedite the transportation of goods and passengers between regions that have the largest populations and strongest export potential.
- 1.17 In light of the foregoing considerations, in September 1993 the Bank approved financing for the first stage of a project to upgrade and widen the São Paulo-Belo Horizonte section of the Fernão Dias Federal Highway (loan 767/OC-BR). Stage I takes in about 270.7 km, 217 km of which are in the state of Minas Gerais, starting from the state capital, and the other 53.7 km in the state of São Paulo, likewise starting from its capital. This first construction stage

is now under way, with US\$267 million in IDB financing, which is defraying 50% of the total cost. The cost of rehabilitating and upgrading the highway is being shared by the federal government (25%) and the states involved, each with a 25% share. Contracts have been let for all of the physical works for this project, and construction is expected to be more than half finished by the end of 1996.

- 1.18 The full benefits of widening the highway at this first stage cannot be realized until the second phase proposed herein is implemented, to complete the section linking the two state capitals. Specifically, stage II addresses the 292.5 km of highway between Nepomuceno in Minas Gerais and the intersection of BR-381 and Dom Pedro II Highway in Atibaia, São Paulo. Stage I should be completed by mid-1997; in order for work to continue without interruption, stage II would begin around April 1997 (at the start of the dry season). The proposed operation thus is very timely.

C. Rationale for the project, country strategies, and rationale for IDB participation

- 1.19 The core objectives of the federal government's macroeconomic policy are to institute a market economy in the country, rewrite the role of the State, overhaul the workings of government, bring down inflation, and rekindle social and economic development. In pursuit of these aims, a new approach was adopted for the transport sector, spelling out the spheres of action and responsibilities of federal, state, and municipal government. The goal was to persuade private enterprise to take a more active part in service delivery and in expanding, administering, and maintaining the transportation infrastructure.
- 1.20 The government intends to upgrade the safety and quality of road transport facilities and lower the so-called "Brazil cost", through sustained reductions in vehicle operating costs, with measures to protect the environment. To that end, in addition to expanding and improving infrastructure, the government is awarding highway and bridge concessions to the private sector for facilities that carry heavy traffic, when private firms can make them financially viable. The government also is seeking permanent cost-recovery mechanisms, through tolls or specific levies, to upgrade and conserve the entire national highway network.
- 1.21 The Bank's strategy and operations program for Brazil from 1995 to 1997, described in the February 1996 country paper, are fully concordant with the Eighth Replenishment objectives, the government's focus on systematically eliminating poverty at its roots (and alleviating some of its social consequences), and the need to build a modern economy. In keeping with the core elements of its lending strategy, the Bank is supporting, directly and in concert with others, efforts on the following fronts:

- a. Modernization of the State: Here, the priorities are strengthening of planning and management capacity, revamping of public sector operations, and fiscal reform. The proposed project would pursue this objective by handing over one of the nation's major highways to private enterprise to operate and maintain, through a concession arrangement. The reduction in public transportation spending that should ensue from this initiative, coupled with new DNER revenues in the form of a share of the concessionaire's toll receipts to repay the loan, will help balance the fiscal accounts.
 - b. Production infrastructure: The Bank's strategy supports initiatives to open the economy, advance regional integration, and lower the "Brazil cost", through priority investments in the transport and energy sectors. The proposed project's contribution toward this goal will be actions to lower vehicle operating costs between the two state capitals, which are the nation's leading production centers.
 - c. Social sectors, basic sanitation, and the environment. The salient features of the proposed project in this respect will be a reduction in highway accidents (currently the leading cause of death, nationwide, of young people and adults under 50) and the mitigation of critical environmental situations.
- 1.22 The project also is in step with national priorities through to the year 1998, as confirmed last August by the federal government in a target plan and in agreements between the Bank and the government, as a direct follow-on to another IDB-funded operation.
- D. IDB experience in federal highway funding in Brazil
- 1.23 To date, the Bank has provided funding for the following federal highway upgrading and construction projects, with the National Highway Department (DNER) as executing agency: improvement of the Paranaguá-Foz de Iguazú highway (1965); improvement of federal highways in the North-East (1968); improvement of highways linking Brazil and Uruguay (1971); construction of the Rio de Janeiro-Santos highway (two stages, 1972 and 1973); improvement of the São Paulo-Curitiba highway (1974); and upgrading of the Porto Velho-Rio Branco highway (1985). All of the works planned for these operations were carried through to completion. Work is currently under way on two projects: stage I of upgrading and widening the Fernão Dias Highway, approved in 1993, and upgrading of the São Paulo-Curitiba-Florianópolis highway, approved in 1995.
- 1.24 DNER's coexecuting agencies for stage I of the Fernão Dias Highway project were the São Paulo and Minas Gerais state highway departments (DERs). A number of problems that arose in that project, having to do with construction contracts and resettlement, have been resolved. The Minas Gerais State Highway Department (DER/MG) has been administering the Minas Gerais component of stage I of the

has been administering the Minas Gerais component of stage I of the Fernão Dias project satisfactorily, and had performed well in past programs to upgrade highways in the Jequitinhonha Valley (1986) and the state highway system (1989), both of which were completed, with direct IDB funding to the State of Minas Gerais. The Fernão Dias stage I work being done by the São Paulo State Highway Department (DER/SP) is likewise satisfactory.

- 1.25 The main lessons learned from the above-mentioned projects, and from experience gained in work with Brazilian highway agencies, were taken into account in preparing the operation proposed herein: (i) the importance of appropriate environmental measures, duly built into the project design, with quantified costs included in the budget (learned from positive and negative features of the Rio-Santos, Porto Velho-Rio Branco, Fernão Dias I, and São Paulo-Florianópolis projects); (ii) the effect of the concession-holder's capital costs on toll fares and the possibility of servicing all or part of the debt with toll revenues (from findings of studies on this issue when preparing the São Paulo-Florianópolis project); (iii) guidelines to be adopted in bidding out construction contracts, including bid and performance security (from problems encountered in stage I, and successful solutions); and (iv) the project management scheme (the same model used in stage I is being recommended).
- 1.26 During stage I in Minas Gerais, special masonry structures were put out to bid on a lump-sum basis. For stage II, that state wishes to use lump-sum contracting also for the roadway construction and rehabilitation work, because in its view this reduces the risk of cost overruns for the executing agency, and concentrates oversight and inspection on the quality of service. Such an approach, however, requires particular care in drawing up bid documents, as well as special security and contract covenant requirements. For that reason, the State of São Paulo prefers to continue with the unit price approach used for all its construction work in stage I.

E. Maintenance of the federal highway system

- 1.27 Maintenance of Brazil's federal highways is the responsibility of the National Highway Department (DNER), which operates through 21 regional districts (one per state), subdivided into a total of 110 district offices (*residências*). The district offices oversee maintenance work, all of which is outsourced to private companies; a similar procedure is followed when maintenance is delegated, under agreements, to the respective state highway departments (DERs). DNER is currently developing a program to rehabilitate federal highways with cofinancing from the IDB and World Bank, which is expected to be approved in early 1997. The object of that program is to restore roads that fell into disrepair in the 1980s because of their age and insufficient spending on resurfacing, periodic maintenance, etc. In recent years, adequate funding has been available for routine maintenance.

- 1.28 DNER's Engineering Division oversees these maintenance programs, using a pavement supervision and management program for highways under its jurisdiction, to (i) draw up a detailed annual maintenance program, setting out actions needed on priority sections and the cost thereof; (ii) create a database, for analysis of maintenance strategies, and (iii) adopt a methodology for periodic monitoring of operating conditions and maintenance on the highway system, update the database, and gradually develop the DNER management system.
- 1.29 The Fernão Dias Highway comes under the Oliveira and Pouso Alegre district offices in Minas Gerais, and under the Guarulhos district office in São Paulo. These offices supervise the maintenance work performed by private firms. The government has decided that once this highway has been widened and upgraded, it will be operated by a private company under a concession. Under the terms of the concession agreement, the private firm or consortium will be required to meet high maintenance and operating standards, and will collect tolls to that end.

F. Weight limits

- 1.30 Between 1975 and 1980, DNER instituted a program to monitor the axle weight of commercial vehicles (trucks and buses) using federal highways. It built weigh stations and ancillary facilities and purchased dynamic in-motion electronic scales to monitor truck loads. Only some of these stations were put into operation, because of a lack of budget appropriations, weaknesses in the fine-collection system, and damage to equipment. As part of preparations for the above-mentioned federal highway rehabilitation program, DNER is working to resolve the institutional problems and is drawing up a plan to overhaul the entire weighing system.
- 1.31 As part of the Fernão Dias project, weigh stations along this section of highway will be reactivated. They will be operated by the highway concessionaire, which has the most to gain from keeping the pavement in good repair, to hold down its own operating costs. The concession-holder will also train staff to operate the scales.

G. Cost recovery

- 1.32 The highway was built in the late 1950s with resources from the National Road Fund, 1/ the bulk of them from taxes on fuel and lubricants. When this fund was dismantled by the 1988 Constitution, DNER was left with negligible resources of its own, and had to rely thereafter on budget appropriations from the Treasury to be able to repay loans taken on in earlier years.

1/ In the original Portuguese, *Fundo Rodoviário Nacional*.

- 1.33 The operation described herein would follow the model proposed in a previous IDB-funded operation, the upgrading of the São Paulo-Florianópolis highway (BR-0150), to produce a flow of funds, in the form of toll revenues, to (i) maintain and operate the highway and (ii) amortize and service all or part of the debt to the IDB. According to the simulations run, a toll on the order of US\$0.03 to US\$0.04 per vehicle-kilometer for cars (proportionally higher for trucks and buses) would yield the required funds. This is on a par with tolls charged on other Brazilian highways, and has been accepted by users.
- 1.34 Law 8,987 of February 13, 1995, governing public works and utility concessions expressly allows fares (tolls) to be set in proposals for calls for bids. Thus, the company or consortium offering the government the highest share of toll receipts would win the contract.

H. Private-sector participation through concessions

- 1.35 DNER is successfully using concession arrangements to repair, maintain, and operate heavily traveled highways and bridges. However, in its only experience with a construction concession (for the São Borja bridge), it twice failed to elicit any interest from private firms. The arrangement became viable only after the government redesigned the operation to inject some public funding into the bridge construction project.
- 1.36 The project team was in contact with private-sector representatives for stage I of the Fernão Dias project and during preparation of the São Paulo-Florianópolis highway project referred to above. The private contractors consulted explained that they are faced with real interest rates on the order of 12% to 20% per annum, plus investment-loan repayment periods always shorter than eight years. Under these conditions they would not be able to contribute much capital funding at the construction stage. Their position mirrors the difficulty that other countries are experiencing in attempts to attract private venture capital for highway construction, which is viable only in exceptional cases with very high tolls (in the range of US\$0.08 to US\$0.25 per vehicle-kilometer), and even then, many commercial operations fail.
- 1.37 With due regard to the aforesaid constraints, the system devised for the operation described in this proposal would see half the construction and rehabilitation costs defrayed with public funds and the other half with the IDB loan proceeds. With toll revenues, a concession-holder will maintain and operate the highway, and turn over a percentage of the toll charged on each vehicle to the government, which would use these monies to repay the loan. The proposed concession arrangement is a mix of two toll models: (i) DNER awarding of concessions for rehabilitation, maintenance, and operation of existing highways, thereby drawing on private-sector efficiency for these activities, and (ii) the approach taken

by Turnpike Commissions in the United States, which have successfully attracted capital at low interest rates and with lengthy repayment terms.

- 1.38 Under the proposed model, highway users will have excellent quality facilities and services for an affordable fee; the government will pay only one half of the construction costs, and will not have to shoulder subsequent operating or maintenance costs. All or part of its principal repayments and interest payments on the debt will be covered by its share of toll receipts, received from the concessionaire. The government will award the concession to the bidder offering to turn over the highest share of toll revenues; the portion of the debt service the government will be able to cover with these transfers will depend on the percentage share it receives, traffic volumes, and the variable interest rate on the loan principal. With this arrangement, the government will lower its expenditures now and in future, without affording any guarantees to the concessionaire.
- 1.39 This approach will virtually eliminate the problem of short repayment terms and high cost of private capital, since the concessionaire's up-front costs will be confined to outlays for equipment and personnel needed to operate the highway, and it will be able to start collecting tolls very shortly thereafter. The concession is expected to start operating as soon as construction is completed, whereupon the concessionaire could immediately start charging tolls and take over the highway's operation and maintenance.

I. Highway safety

- 1.40 The project to make the Fernão Dias Highway a multilane facility (stages I and II) will more than halve the number of accidents causing death or injury, for vehicle occupants and pedestrians alike, when separate lanes are in place for traffic moving in either direction and walkways and other safety features are installed along the highway (paragraphs 1.12 and 1.13).
- 1.41 An IDB traffic-safety consultant and specialists from DNER and the two state DERs have reviewed specific features of the project designs and have examined the full length of the highway. They found the designs to be generally adequate, and suggested some adjustments in specific areas, which were subsequently incorporated into the engineering designs.
- 1.42 The concession agreement will spell out what the operating company is to do to assure basic safety conditions for the highway, and will specify standards for the emergency medical and mechanical assistance the concessionaire is to provide. Such conditions and measures will include those pertaining to sign, signal, and pavement marking maintenance; setup and operation of a system to alert drivers to hazardous weather and traffic conditions; technical specifications for ambulances and emergency aid and

rescue equipment; required number, qualifications, and training of doctors and paramedics; response standards (e.g., ambulances to arrive within 15 minutes of an accident report 85% of the time); operation of the hazardous-load management system; and arrangements to assist the Federal Highway Police in enforcing legal speed limits.

- 1.43 A comparative log of accidents and traffic (including vehicles, cyclists, and pedestrians on accesses and crossings) is to be set up, to provide data for assessing the effect of the actions undertaken and to identify potential problems. The concessionaire also will be required to provide safety training and to research causes of accidents and measures to bring down the accident rate, for its own highway safety team and for employees of municipalities through which the highway runs.

II. THE PROJECT 2/

A. Objectives

- 2.1 The general purpose of the project is to bring down vehicle operating costs for traffic moving between the Belo Horizonte and São Paulo metropolitan areas. Its principal specific objective is to raise the level of service of highway BR-381 between those two cities and improve safety conditions on this road.
- 2.2 The project will foster economic activity in the highway's service area and expedite commercial dealings between central and northeast Brazil with the South, by offering vehicles an alternative to the Atlantic Coast corridor.

B. Targets

- 2.3 The targets listed below will be achieved as the various project components go on stream (see Logical Framework in Annex II-1):
 - a. **Reduction in vehicle operating costs.** By December 2000 (compared to 1996), the following reductions in vehicle operating costs on stage II sections between São Paulo and Belo Horizonte, measured in constant terms per vehicle-kilometer by the Highway Design and Maintenance Model (HDM-Q): from US\$0.216 to US\$0.203 for cars; from US\$0.817 to US\$0.771 for buses, and from US\$0.537 to US\$0.444 for single-unit trucks.
 - b. **Upgrading of peak-hour levels of service of the highway.** By December 2000 (compared to December 1995): in São Paulo, km 0 to km 19, upgrade from level E to level A; km 19 to km 36.3, upgrade from level F to level B; in Minas Gerais, for km 699 to km 719 (currently level F), km 817 to km 843 (currently level E), and km 868 to km 893.2 (currently level F), upgrades respectively to levels C, A, and B. The different levels of service are defined in the 1994 *Highway Capacity Manual*, based on vehicle speed and flow, both of which go into determining operating costs. 3/
 - c. **Accidents causing death or injury.** By 2000 (compared to 1995), a 50% reduction in such accidents, measured in millions of vehicle-kilometers/year. According to 1994 statistics, this highway was the scene of 124 fatal accidents, 461 accidents causing injury but no fatalities, and 854 causing only property damage. From 2000 forward there is to be no increase in the

2/ Support documentation for chapters II, III, IV, and V of this proposal is available in the project technical files.

3/ See definitions of levels of service in Appendix 1 to Annex II-3.

rate of accidents causing death or injury, measured in millions of vehicle-kilometers.

- d. By the last quarter of 1999, the new lanes are to be in operation and existing ones in good repair; toll booths and weigh stations are to have been built, and Federal Highway Police posts are to be in place on the Fernão Dias Highway (BR-381) between São Paulo and Belo Horizonte.
- e. By August 1997, a study on the highway concession is to have been completed, and open tendering is to have started to seek a private firm or consortium to operate and maintain the entire above-mentioned stretch of highway BR-381. Under the terms of the concession arrangement, tolls will be collected to pay annual operating and maintenance costs and to recoup part of the investment. The concession will start in the second quarter of 1998 (with construction for stage II still under way) and be completely operational by December 1999, when construction finishes.
- f. Completion dates for the other studies are as follows:
 - (i) late 1998 for the Belo Horizonte interchange; and
 - (ii) mid-1999 for basic designs for work to adjust the capacity of BR-381 between Belo Horizonte and Governador Valadares.

C. Project description

a. Construction work

- 2.4 DNER and the Minas Gerais and São Paulo state highway departments have developed a project to upgrade the entire 563.2-km length of the Fernão Dias Highway. The plan is to improve roadway conditions and increase capacity, in order to raise levels of service for vehicles using the road. The Bank is providing part of the funds for stage I of this upgrading project (BR-0162), which is working on 270.7 km, involving two sections starting at either end of the highway, one from metropolitan São Paulo and the other from Belo Horizonte. The stretch leading out of São Paulo – the most heavily traveled of the stage I segments – accommodates 45,000 vehicles a day.
- 2.5 The operation proposed herein would be stage II of the Fernão Dias Highway project. It covers the middle segment between the two metropolitan areas (see Map 1), which is about 292.5 km long – 256.2 km in Minas Gerais, from the Nepomuceno access to the São Paulo state border, and 36.3 km in São Paulo, from the Minas Gerais border to Dom Pedro I Highway SP-061 in Atibaia. These sections carry from 5,800 to 13,900 vehicles a day.
- 2.6 For the most part, construction work for stage II will be similar to stage I. It includes (i) rehabilitation and upgrading of pavement over 287.8 km on the existing two-lane roadway;

(ii) construction of a second roadway parallel to and the full length of the current one, with similar roadway conditions, within the existing right of way, and with the required bridges, viaducts, and other structures; (iii) construction of 4.7 km of divided highway (two lanes in each direction) as a belt road around the city of Careaçú in Minas Gerais; (iv) expansion of existing bridges and drainage structures, as necessary; (v) construction, upgrading, and widening of accesses and crossings in built-up areas through which the highway passes, with partial access control through safety devices, service roads, and pedestrian walkways where necessary; (vi) highway safety features, including improvements in alignment and turnabouts every 5 km, grade separation at intersections, roadside barriers, signs, signals, and markings, and complementary landscaping and measures to protect the environment or undo environmental damage; (vii) building and equipping of two toll booths in Minas Gerais; and (viii) setup of three Federal Highway Police posts and reactivation of one weigh station for commercial vehicles in Minas Gerais.

- 2.7 The planned construction work will give the highway a cross-section composed of two wearing courses, with two traffic lanes each 3.5 m wide, outer shoulders 2.5 m to 3 m in width, and an interior safety zone 0.6 m to 1 m wide. The two roadways will be separated by a 3-m-wide median, except where the topography or other physical constraints require instead a concrete (New Jersey-type) divider. Map 2 presents a longitudinal view of the stretches of highway included in stage II.

b. Studies

- 2.8 This highway will be operated and maintained under a concession agreement with private companies, awarded through an international call for bids. Since the concession is to be operational as the works are being wound up, the project will fund the environmental, economic, and engineering studies needed to draw up the bid documents.
- 2.9 As was noted above, the Fernão Dias Highway is the backbone of the transportation corridor linking Brazil to MERCOSUR, which is a federal government priority. To expand the corridor's capacity northward, the project includes environmental, economic, and engineering feasibility studies for works to adjust the capacity of the Belo Horizonte-Governador Valadares section of highway BR-381, with attention particularly to the first segment joining Belo Horizonte and Ipatinga, which has reached the saturation point.
- 2.10 To relieve severe congestion on the metropolitan segment of BR-381 in Minas Gerais, the project includes a study of Belo Horizonte interchange options, from the approach to that city to the exit toward Governador Valadares.

D. Costs

1. Total cost

- 2.11 The total cost of the project is estimated at US\$550 million equivalent. The following table presents a breakdown by cost item and source of financing.

TABLE II-1 Project costs (in thousands of U.S. dollars)						
COST ITEM	IDB	COUNTERPART			TOTAL	% SHARE
		Federal	SP	MG		
1. ENGINEERING AND ADMINISTRATION	10,620	8,770	2,330	7,180	28,900	5.2
1.1 Supervision	10,620	5,770	1,530	6,280	24,200	4.4
1.2 Administration	0	3,000	800	900	4,700	0.9
2. DIRECT COSTS	227,330	65,260	11,850	80,910	385,350	70.0
3. ASSOCIATED COSTS	3,190	21,400	11,290	13,260	49,140	8.9
4. STUDIES	4,690	4,060	0	0	8,750	1.5
5. CONTINGENCY	26,420	7,700	1,740	8,940	44,800	8.1
5.1 Contingencies	25,630	7,470	1,680	8,670	43,450	7.9
5.2 Price escalation	790	230	60	270	1,350	0.3
6. FINANCIAL COSTS	2,750	30,310	0	0	33,060	6.0
6.1 Interest	0	27,640	0	0	27,640	5.0
6.2 Credit fee	0	2,670	0	0	2,670	0.5
6.3 Inspection and	2,750	0	0	0	2,750	0.5
7. GRAND TOTAL	275,000	137,500	27,210	110,290	550,000	100.0
8. Percentage	50	25	5	20	100	

2. Cost components

a. Engineering and supervision (US\$28.9 million)

(i) Supervision (US\$24.2 million)

- 2.12 This subcategory includes funds for supervision and technical oversight of the project works and environmental protection measures. Supervision work will be performed by one or more consulting firms specializing in highway engineering, in accordance with the general terms of reference presented in Annex II-3. The

budget item for supervision is 6.3% of the direct construction cost, and is considered adequate.

(ii) Administration (US\$4.7 million)

- 2.13 Included under administration costs are (i) the equivalent of US\$900,000 to pay a consulting firm to advise DER/MG on works management in Minas Gerais and that state's other expenses for its project coordination unit (PCU/MG); (ii) the equivalent of US\$800,000 for a consulting firm to advise DER/SP on economic and financial oversight for its portion of the project; and (iii) US\$3 million for these same purposes for DNER. The consulting firms will be hired in accordance with the general guidelines in Annex II-3.

b. Direct costs (US\$385.35 million)

- 2.14 This category covers direct construction costs of the planned highway works. The costs were calculated from work quantities derived from the final engineering designs and unit prices, based on basic wages, construction equipment and machinery leasing costs, and prices currently being charged in the construction trade for materials and other inputs. This item includes costs of building the highway itself plus the cost of civil works for toll booths and highway police posts. Work in Minas Gerais will account for US\$323.35 million and in São Paulo for US\$62 million (see Annex II-2).

c. Associated costs (US\$49.14 million)

(i) Rights-of-way (US\$10.3 million)

- 2.15 Additional rights-of-way will need to be obtained at certain points to accommodate viaducts, intersections, and pedestrian walkways. A total of US\$5 million will be needed for this purpose in Minas Gerais and US\$5.3 million in São Paulo.

(ii) Environmental protection (US\$38.84 million)

- 2.16 Funds budgeted in this item will pay for general measures to alleviate and repair environmental damage, as agreed with environmental agencies. These will include (i) hazardous load management, (ii) creation of environmental protection areas; (iii) strengthening of environmental management in protected areas located in the highway's area of influence; (iv) development of land-use plans for municipalities in the highway's service area; (v) restoration of degraded areas and curbing of erosion; (vi) preservation of the area's archaeological heritage; (vii) training courses on environmental assessment of highway projects; (viii) review of highway design and construction standards, to build in adequate environmental safeguards; and (ix) studies to assess environmental damage in the state highway

system. Of the total budgeted, US\$18.22 million will be expended in Minas Gerais and US\$20.62 million in São Paulo. These amounts do not include any of the mitigating measures that were included, for operational reasons, in the civil works, equivalent to 6% of the cost of those works.

d. Studies (US\$8.75 million)

- 2.17 Studies to be produced under this project, as described in Annex II-3, will include (i) documents needed to bid out the concession to operate and maintain the highway to private firms (US\$500,000); (ii) a study of Belo Horizonte interchange alternatives (US\$750,000); and (iii) technical, economic, and environmental feasibility studies for adjusting the capacity of the 325 km of BR-381 between Belo Horizonte and Governador Valadares (northerly continuation of the Fernão Dias Highway), with basic designs for construction work to that end (US\$7.5 million).

e. Contingency (US\$44.8 million)

- 2.18 This item includes (i) price escalation during construction, from the date of preparation of the basic estimates until completion (US\$1.35 million), and (ii) contingencies in designs of the works, attributable to the construction trade market (US\$43.45 million).
- 2.19 Price escalation was computed using domestic and external inflation indexes and exchange-rate indexes projected by the Bank for the coming years. The contingency allowance is 10% of the estimated direct construction and associated costs.

f. Financial costs (US\$33.06 million)

- 2.20 Included in this item are (i) interest on the Bank's loan during implementation of the project (US\$27.64 million); (ii) a credit fee of US\$2.67 million; and (iii) the Bank's inspection and supervision charge of US\$2.75 million.

E. Financing

1. IDB funds

- 2.21 The Bank will contribute US\$275 million in funding for the project (one half of the total cost), to be disbursed in foreign currency from the ordinary capital.
- 2.22 The Bank's loan will fund 59% of (i) supervision costs for works in Minas Gerais, (ii) direct construction costs, and (iii) contingent costs. It also will finance (i) 17.5% of environmental protection costs in Minas Gerais, (ii) 100% of the Bank's inspection and supervision charge, and (iii) 53.6% of the cost of studies.

2. Local counterpart

- 2.23 The local counterpart, which will defray 50% of the total project cost, will be the equivalent of US\$275 million. One half of the local share (25% of the total project cost) will come from national treasury budget appropriations aggregating US\$137.5 million. The State of Minas Gerais budget will furnish the equivalent of US\$110,295,000 (40.1% of the local counterpart) and the State of São Paulo the equivalent of US\$27.21 million (9.9% of the local contribution). In all, Minas Gerais and São Paulo would furnish 25% of the aggregate counterpart funding and 25% of the total cost of sections of highways located within the respective states.
- 2.24 These local counterpart funds will defray the total cost of (i) administering the project; (ii) supervising the environmental protection measures; (iii) acquiring rights-of-way; and (iv) interest and the credit fee on the Bank's loan (91.7% of financial costs). They also will cover (i) 56.1% of construction supervision costs; (ii) 41% of direct construction and contingency costs; (iii) 46.4% of the cost of studies; and (iv) 91.8% of the environmental protection outlays.

F. The highway concession

- 2.25 As one approach to public-private partnerships in highway construction and operation, this project is proposing a concession arrangement to get around the constraints facing investors, highway users, and the government, which would be underpinned by the Concessions Act referred to earlier in this proposal (paragraph 1.34).
- 2.26 In principle, the bid documents will specify a base fare for cars; tolls for other classes of vehicles will be calculated using the fixed weighting system already in use on other toll roads in Brazil. The concession contract will be awarded to the company or consortium offering the highest share of toll revenues to the government, for payment of principal and interest on the loan. As an illustration, assume that the bid documents set a base rate of US\$0.03 per automobile-kilometer. Company A wins the bid by offering to pass US\$0.02 per automobile-kilometer on to the government. This leaves the concessionaire with US\$0.01 per automobile-kilometer to operate and maintain the highway, plus a profit, and gives the government US\$0.02 per automobile-kilometer to pay back the loan principal and interest. The base fare, and confirmation as to the adoption or not of the above-mentioned method, are to be determined by a specific technical study to be funded under the proposed project, with adjustments from time to time to compensate for inflation. The government's share will be eliminated and tolls lowered accordingly to the extent that the government's actual receipts are sufficient to repay the debt.

- 2.27 Under this arrangement, the concessionaire would not be liable for the debt assumed by the government to build the highway, but would act as its collection agent. If traffic volume forecasts failed to materialize, it would take the government longer to receive monies to defray the full real cost of the loan, and the concessionaire's only loss will be lower receipts from its share of the tariff. Conversely, if traffic volumes are heavier than anticipated, the government will receive the full amount needed for principal and interest payment more quickly, and the concessionaire's profits will go up.
- 2.28 This approach also slashes the public spending requirement for the highway's operation and maintenance (which would fall entirely to the private sector) and repayment of the debt. It transfers from government to users the impact of interest charges, principal repayments, maintenance and operating costs. Toll revenues will not, however, be used to reimburse the federal government or the state governments for counterpart outlays during construction.
- 2.29 Users also stand to benefit from the arrangement, in the form of (i) a new highway that will be properly maintained throughout its service life, and (ii) emergency mechanical and medical assistance. The concessionaire will be required to provide prompt service at toll booths, raising barriers if delays are too long; tolls will not be charged for local traffic in urban areas where there is no room to install the large toll plazas required.
- 2.30 According to initial simulations and specific studies for the São Paulo-Florianópolis highway (which carries similar traffic flows), a base rate in the range of US\$0.03 to US\$0.04 per automobile-kilometer would be sufficient to defray operating and maintenance costs and repay the loan to the Bank. From the users' standpoint such a toll is reasonable on three grounds: (a) per-kilometer tolls in that range are being charged for cars on the toll road system being operated by the public enterprise Desenvolvimento Rodoviário, S.A. (DERSA) in the state of São Paulo; (b) tolls in the United States range from US\$0.04 to US\$0.08 per kilometer on comparable highway sections, where constructional interest costs (and not just maintenance) are passed on to users; and (c) the proposed toll is about half the US\$0.06 cost per kilometer of gasoline that an automobile using the highway would be consuming.

III. PROJECT IMPLEMENTATION

A. Executing agency

- 3.1 The executing agency for the project will be the National Highway Department (DNER), an agency attached to the Ministry of Transport. Under an agreement with the parties, DNER has delegated execution of the project works to two coexecuting agencies, the state highway departments of Minas Gerais (DER/MG) and of São Paulo (DER/SP), which will contract the construction work out to private firms. Construction will be supervised by the coexecuting agencies and by specialized consulting firms, likewise to be hired by DER/MG and DER/SP. Since the administrative scheme used for stage I of this highway project has proved satisfactory, it will continue, with a few minor adjustments, in stage II. The three project coordination units (PCUs) will continue to operate, the central unit being at DNER headquarters in Brasilia and the other two in the respective state highway department head offices.
- 3.2 The functions and staffing of the PCUs are described in Annex IV. These units report to the Directors General of the DERs and are their liaison point with the Bank. The PCUs will continue to receive advisory support, from consultants hired for stage II (under Brazilian law, the firms providing those services for stage I cannot be rehired without a call for bids). Since DNER will be working both in Brasilia and in the states, through its highway districts, and does not have enough staff of its own to assign to the project full-time as the two states do, DNER's advisory support costs will be higher than the states'. As a condition precedent to disbursement of the Bank's loan, the borrower, through the executing agency, must demonstrate to the Bank's satisfaction that DNER and the DERs have extended the operation of the PCUs through to the end of stage II and have hired consultants to assist those units.
- 3.3 Calls for proposals for consulting services will be initiated before the end of 1996, following procedures prescribed in Brazilian legislation. The cost will be paid out of local counterpart funds. The consultants' terms of reference will be those already agreed upon with the Bank at stage I (see general guidelines in Annex II-3).
- 3.4 The proposed project administration format has been reviewed by the Bank. It meets project implementation requirements, and the necessary capacity is available in the executing agencies, which have taken measures needed to set the arrangement in motion.

B. Engineering designs and construction plans

- 3.5 Among the documents in place for execution of the project are technical studies; final engineering designs; detailed construction drawings for all the highway works, including bridges, viaducts, and other planned civil works; and general construction technical specifications and those needed for individual items. Data for these documents were obtained from surveys and hydrology, geology, geotechnical, environmental, and other studies conducted.
- 3.6 The original 1992 designs were reviewed and adjusted in 1996 on the basis of stage I experience. Pavement data on the existing roadway slated for rehabilitation were updated, as was information on deposits of materials for the construction work. The Bank has reviewed all these studies and technical documentation, and has found them to be sufficient and adequate. The required environmental and socioeconomic studies also have been done for the project (chapter V).

C. Rights-of-way

- 3.7 Wherever possible, the engineering designs place the new carriageway within the right-of-way in which the current roadway lies. The alignment meets requirements as to roadway conditions and environmental protection concerns, and is up to prescribed standards. However, work planned on some subsections (detours, lateral widening, accesses to intermediate towns, viaducts, interchanges, drainage and other special structures such as pedestrian walkways) may require additional right-of-way footage.
- 3.8 Under Brazilian law, the highway authority may take immediate possession of land required for rights-of-way, even before expropriation proceedings are completed. However, before putting any works project for this operation out to tender, the borrower would have to demonstrate to the Bank that it was in legal possession of the land needed.
- 3.9 Stage II, unlike stage I, has no resettlement component, since those living in areas that would require expropriating are legal owners of their homes, and will be compensated pursuant to the country's laws governing expropriation in the public interest.

D. Environmental protection measures

- 3.10 The 1993 environmental impact assessment (EIA), which looked at all sections of the highway, was released for public review and approved by the country's environmental authorities. The environmental report for stage I was approved by the Bank's Environment Committee on May 18, 1993. During the preparations for stage II, the mitigating measures recommended in the EIA and those required for environmental permits were compiled and their costs estimated. The environmental report for stage II was approved by the

Environment Committee on October 22, 1996, and released to the Bank's Public Information Center that same day. Advance environmental permits have been obtained for all the highway sections. DER/MG already has start-up permits for all the sections in the state of Minas Gerais. DER/SP is in the process of obtaining its permits, and must show the Bank, as one condition in the contract, that they have been received before calls for bids are issued for the construction work.

- 3.11 Though no residents will need to be relocated for stage II, the project team, as part of the preparations for the project described herein, oversaw a review of the stage I resettlement plan and adjuncts. In June 1996, DER/SP drew up a socioeconomic cadastre of the entire population, instituted measures to prevent new squatter settlements, and started social work with the affected families. Based on those data, in September 1996 DER/SP sent the Bank a final resettlement plan, with different approaches for the 1,800 families in the census, depending on their preferences. Thus, 64 families were moved to existing single-family dwellings, 736 families will receive cash compensation, and the other 1,000 families will be relocated to a housing complex to be built near the highway. This plan will be carried through and supervised by Companhia de Desenvolvimento Urbano do Estado de São Paulo (CDHU). The cost of the plan is part of the stage I budget. Full implementation of this resettlement plan is a condition of the contract.
- 3.12 The environmental impact studies set out environmental mitigation and protection actions: improvement of slopes, material deposits, and quarries; construction of stiff barriers to keep vehicles hauling hazardous substances from overturning and polluting water sources; and construction of special parking areas for vehicles carrying hazardous loads. These measures are listed, with full particulars as to technical specifications, cost, and administrative and supervisory responsibility, in the bid documents and construction contracts. In each works project or works package there will be measures to compensate for direct and indirect impacts on the environment, for instance: strengthening of environmental management in protected areas; creation of environmental protection areas near water sources; management of hazardous-goods transport (including the purchase of spill management equipment); adjustment of land-use ordinances in municipalities through which the highway passes; and training in environmental impact assessment of highway works.
- 3.13 For stage II, environmental mitigation and offset actions that are part of the total project cost but not included in the civil works budget item would cost about US\$38.84 million. Institution of these measures is a condition of the loan contract, and one section of the monitoring reports that the coexecuting agencies will be producing twice a year will be a status report on this component.

- 3.14 Provision is being made in stage II, as it was in stage I, for oversight and monitoring to ensure that these environmental measures are implemented. This oversight will be entrusted to consulting firms hired by the coexecuting agencies. In addition, the PCU of each of the state highway departments must have an environmental expert to oversee the consultants' work and keep the executing agencies informed. This environmental monitoring and oversight arrangement must be in place before disbursements from the loan can be authorized.
- 3.15 Each DER is to execute formal agreements for the compensatory actions to be taken. DER/SP will sign such agreements with the Forestry Administration and the Environment Department for measures to strengthen environmental management in Parque da Cantareira and adjust land-use plans in municipalities through which the highway passes. DER/MG is to obtain an order designating the watershed of the Jaguari-Camanducaia and Sapucaí Mirim rivers an environmental protection area, and conclude agreements with the Forestry Administration to (i) institute a management plan for that protection area and (ii) strengthen environmental management in the Papagaio and Fernão Dias Park conservation units. DER/MG must also sign an agreement with the State Military Police to institute an emergency response plan to deal with accidents on the highway involving hazardous loads, and to implement the agreement it has already signed with Fundação João Pinheiro to develop plans to support municipalities in the highway area.
- 3.16 Other duties of the coexecuting agencies in this connection will be to (i) fully implement the resettlement plan to move families affected by stage I works in São Paulo; (ii) carry through all of the measures prescribed in the agreements referred to in the preceding paragraph; (iii) review current highway design and construction standards, to build in the necessary environmental protection features; (iv) implement and set in motion the hazardous-load transportation management system; (v) deliver training courses in environmental assessment of highway works projects; and (vi) in the case of DER/SP, demonstrate that at least one member of its standing committee on environmental management is a qualified professional assigned full-time (paragraph 5.17).
- 3.17 One requirement in DNER bid documents for the highway operation and maintenance concession will be that the concession-holder bring in all the environmental control measures agreed upon to secure the environmental permits. The concessionaire's responsibility for operating a system to prevent and manage accidents involving vehicles and hazardous loads will be spelled out, as will its responsibility for monitoring the proposed mitigating measures, and how it is to ensure that no new environmental damage is caused during the life of the concession.

E. Implementation procedures

- 3.18 Goods will be purchased and construction and consulting contracts awarded following procedures agreed upon with the Bank. When such procurement is done with Bank funds, the procedures set forth in Annexes B and C to the loan contract will apply. International competitive bidding will be required for consulting contracts over US\$200,000, for goods over \$350,000, and for construction projects over US\$5 million, inasmuch as similar projects in Brazil have elicited foreign bids only at or above these levels. IDB-funded items falling below these thresholds, or calls for bids for construction work or services being financed with the local counterpart, will be governed by procedures in Brazilian legislation, which requires open tendering for construction projects costing more than US\$1.37 million equivalent. Construction work below that amount, and goods worth less than US\$350,000, can be obtained using limited bidding or shopping.
- 3.19 Construction for the project will be done by contractors hired in accordance with the tender procedures in Annex B to the loan contract.
- 3.20 The project works have been divided into two packages for tendering and contracting. The first package encompasses 256 km in Minas Gerais, made up of 11 segments of highway and 14 lots of special masonry structures. The second comprises 36 km in São Paulo, with three sections of highway and their respective concrete structures. A list of these bid calls and cost estimates is given in Annex III-1.
- 3.21 All of the construction work, including bridges and viaducts and civil works for the toll booths, weigh stations, and Federal Highway Police posts, will be put out to international tender, with no restrictions on participation of firms from member countries of the Bank. The bid documents will specify that companies may bid on one or more lots, but will have to present separate bid security for each lot.
- 3.22 To speed up construction and elicit more bids, the bid documents will allow alternative bids to execute a package or two or more lots simultaneously, with a maximum of three lots per contractor. The contract will be awarded to the lowest evaluated bid that substantially complies with the bid documents for the full set of lots. This procedure will enable Brazilian and foreign, large and mid-sized companies to take part. However, before a contract can be executed with a firm that has been awarded two or more lots, it will have to demonstrate convincingly, for each lot, and with performance guarantees for each, that it has the personnel, equipment, and financial resources to execute the highway sections simultaneously and adhere to the construction timetable.

- 3.23 No specialized or leading-edge technology is needed for the project works, so there should be no problems on the construction side.
- 3.24 Bids will be prequalified and evaluated at the same time. In stage I, this approach saved time and elicited good results in the second tender for that stage. Amounts of bid and performance guarantees will be similar to those required in stage I, when bidders encountered little difficulty in posting that security. One provision of the contract will be that bid documents for tenders to be called in São Paulo and Minas Gerais require contractors to provide bid and performance security and have construction insurance (paragraphs 3.48 and 3.50) and liability insurance.
- 3.25 In São Paulo, the stage I procedure will be followed, whereby bids are judged on the basis of unit prices, and the streamlined procedures already agreed upon with the Bank will be adopted for bidding (paragraphs 5.22 and 5.23). Supervision contracts for these works will be awarded through local calls for offers, as part of the local counterpart, using the stage I terms of reference.
- 3.26 In Minas Gerais, contracts for bridge work will be let following stage I procedures used in that state, with lump-sum proposals. Invoices will be calculated based on the percentage of the service provided relative to the total infrastructure, mesostructure, superstructure, and finishing, weighted for the incidence of those costs in the lump-sum price. Bids for construction of the new roadway and rehabilitation of existing lanes will provide for one or all items to be executed on a lump-sum basis. In this case, each contractor will have to present its lump-sum quotation to execute works on each specific segment of highway, specifying the cost it is ascribing to rehabilitation works and the cost of adding the second roadway, for purposes of future invoicing for work in these two areas. One advantage of this approach is that it lowers the risk of cost overruns for the client during the construction period, enabling it to obtain fixed prices for all works. Furthermore, adoption of this system will simplify the measuring work required for invoice approvals. The major focus of the construction supervision thus will be on quality assurance.
- 3.27 For this reason, DER/MG has decided to conduct an international call for proposals to seek a highway engineering consulting firm to supervise the works and monitor their technical quality. A single firm will be engaged to supervise exclusively the highway sections in Minas Gerais, to ensure uniform quality of construction over the full length of that state's highway component. Because the Bank would be funding part of this cost, the rules set out in Annex C to the contract would apply.
- 3.28 The general guidelines for terms of reference for supervision work in the two states (Annex II-3) were discussed with the executing agencies during the analysis mission, and the Bank found them to be

adequate. The final terms of reference are to be submitted to the Bank for approval before a call for proposals is issued to hire the supervision firms. These definitive terms of reference are to state minimum requirements as to personnel, engineering and technical laboratory equipment, nature and frequency of technical construction-quality checks, and content and frequency of reports. Before awarding contracts for these services, the borrower, through the executing agency, is to supply the Bank with the names of the selected firms, their qualifications, and the price of their services (Annex A to the contract). It will be a condition of the contract that the borrower, through DNER, demonstrate that the supervision firms have been engaged before contractors are allowed to move to and set up on the work site on each stretch of highway.

- 3.29 With the lump-sum system, the contractor will assume the risk of quantity variances. There will be a 90-day timeframe for presenting offers, to give prospective bidders time to thoroughly examine the designs and other information supplied by DER/MG, which will include information about stage I. Bidders may perform their own field studies if they consider it necessary; invoices will be paid by kilometer of roadway constructed, simplifying checks of work quantities completed to that end.
- 3.30 The lump-sum pricing arrangement entails a system of initial monthly payments to help the contractor move its staff and equipment to the site, start construction, and submit the first invoice for one section of finished highway. According to DNER estimates, this amount should not exceed 20% of the cost of works required for each section to complete at least 1 km of surfaced roadway. This percentage will be paid in as many monthly installments as are needed to get to the first invoice for a finished section, following the timetable for rehabilitation and construction of the new roadway that the contractor is to present in its bid.
- 3.31 Signage will be installed and landscaping done after the highway is built. A portion of the lump sum payable upon completion of that work must be set aside for this purpose. Invoices will be calculated by kilometer of roadway (with separate amounts for rehabilitation and new construction) as follows: the balance of the lump-sum price (net of monthly payments made at the start of the works and the aforesaid withholdings) is divided by the total kilometer length of the section, and the quotient is multiplied by the number of kilometers completed in the month.
- 3.32 The IDB-funded studies will be commissioned following the procedures set forth in Annexes B and C to the loan contract. This includes prefeasibility studies and technical, economic and environmental feasibility studies - including an environmental impact assessment and environmental impact statement (RIMA) - and basic designs for the Belo Horizonte-Governador Valadares capacity expansion works. Studies to draw up bid documents for the

concession to run and maintain the São Paulo-Belo Horizonte highway will be commissioned through local calls for bids and paid for with local counterpart funds.

F. Advance tendering and contracting of works and services

- 3.33 To avoid any break in administrative continuity between stage I and stage II of the project, the Bank has agreed that the coexecuting agencies will begin hiring consulting firms to support the PCUs before the proposed operation is presented to the Board of Executive Directors, so as to expedite compliance with the condition precedent to this effect (see paragraph 3.2).
- 3.34 In Minas Gerais, where stage I work is furthest along, there needs to be continuity in field work, using the dry season (summer) for construction. The Bank has assented in principle to having the stage II tendering and contracting process begin before the loan is approved. Accordingly, DNER will have to select the works to be contracted out on a lump-sum basis, draw up bid documents, and submit them to the project team before any call for tenders is issued. DER/MG could still begin this process in the final quarter of 1996, to enable contracts to be awarded in April 1997, having complied with the Bank's publicity requirements for international bidding. Likewise, DER/MG and DER/SP will have to start the process of hiring consulting firms to supervise the project works, since the consultants are to begin work before the contractors set up on their respective sites.

G. Retroactive financing

- 3.35 Provision is being made for recognizing, against the local counterpart, expenditures incurred to fund the executing units and the consulting firms that will be advising DNER, DER/MG, and DER/SP on project administration. There will likely be advance expenditures for environmental measures that will need to be instituted before the operation is approved. It may also become necessary to acquire land before the loan approval date. The procedures set out in Brazilian law, which are acceptable to the Bank, will apply. It is estimated that advance expenditures for the aforesaid items as from January 1996 will not exceed US\$3.28 million.

H. Execution period and investment timetable

- 3.36 The project will be completed in three years. This timeframe is consistent with the type and volume of the project works, the planned construction procedures (which will maintain normal traffic flow), the institutional capacity of the executing and coexecuting agencies, and the ability of the national treasury and the Minas Gerais and São Paulo state treasuries to provide their respective shares of the local counterpart.

- 3.37 Annex III-1 presents a tentative tendering timetable for the various highway sections covered by the project. The investment timetable in Annex III-2 (in thousands of U.S. dollars) was drawn up on the basis of that bidding timetable and the construction timetable. The following table summarizes the investment timetable.

TABLE III-1 Investment timetable (US\$000)					
SOURCE	1996	1997	1998	1999	TOTAL
IDB		101,280.0	139,330.0	34,390.0	275,000.0
FEDERAL	300.0	46,470.0	66,500.0	24,230.0	137,500.0
MINAS GERAIS	1,340.0	37,510.0	55,160.0	16,280.0	110,290.0
SÃO PAULO	1,640.0	6,790.0	12,030.0	6,750.0	27,210.0
TOTAL	3,280.0	192,050.0	273,020.0	81,650.0	550,000.0
% IDB	0.0	52.7	51.0	42.1	50.0
% FEDERAL	9.1	24.2	24.4	29.7	25.0
% M. GERAIS	40.9	19.5	20.2	19.9	20.1
% S. PAULO	50.0	3.5	4.4	8.3	4.9
% TOTAL	0.6	34.9	49.6	14.8	100.0

I. Advance of funds

- 3.38 At the express request of the borrower, up to the equivalent of 20% of the proceeds of the Bank's loan could be advanced, in accordance with the construction timetable for works in each state. This procedure, which was adopted for stage I, will ensure a steady pace of construction in São Paulo and Minas Gerais, from contractor mobilization through to completion.

J. Concession for the highway's operation and maintenance

- 3.39 DNER is currently in charge of operating and maintaining the Fernão Dias Highway. Maintenance is outsourced to private companies, with contracts administered and supervised by DNER district offices (paragraphs 1.27, 1.28, and 1.29). The operation proposed herein will transfer responsibility for operating and maintaining the highway to a concessionaire, which will produce funds by collecting tolls. DNER will oversee these activities, gauging their quality by reference to indicators set out in the concession agreement.
- 3.40 The concession will be awarded through an internationally publicized call for tenders. Bid documents will be prepared by a consulting firm hired to advise DNER on administration of the

project, which also will develop a toll-collection plan and base-fare proposal.

- 3.41 The concession plan will be drawn up in accordance with the general guidelines in Annex II-3. It is to address two time horizons: (i) the period starting from completion of the first stage II works (when all stage I works are completely finished – second quarter of 1998), and (ii) the period starting from completion and acceptance of all the stage II works (late 1999) and continuing through to the end of the concession contract. The plan is to specify operating and capital costs, financing timetables, income statements, financing data, insurance and security, and accounting and financial statements. It also will indicate basic timetables for bidders to follow in their offers, the services needed for implementation and for the concession arrangement, and traffic studies available, to guide bidders.
- 3.42 The consulting firm is to be hired before the Bank's loan may be released for disbursement. The plan that it produces must be acceptable to the Bank, as must the bid documents for the concession, to be presented to the Bank 12 months after the operation is approved. DNER will be required to demonstrate to the Bank, 14 months after the operation is approved, that it has begun the tendering process for the concession.

1. Maintenance

- 3.43 To ensure that the highway is kept in good repair as from the completion of the first works of stage II construction (mid-1998), the borrower, through the executing agency, must pledge to maintain, directly or through concession or outsourcing arrangements with private firms, the paved sections of the highway between São Paulo, Belo Horizonte, and the junction with BR-116 at Governador Valadares, along with immediate accesses and equipment, in accordance with acceptable technical standards. By August 31 each year, for 10 years after the effective date of the loan contract, DNER is also to provide the Bank with maintenance reports, including an evaluation of the results of maintenance done the preceding year and the maintenance plan for the following fiscal year. If no concession arrangement materializes, DNER will include funds for maintenance in its budget proposal.

2. Weight limits

- 3.44 As part of stage I of the project, a weighing station was built to monitor commercial vehicle loads in São Paulo. In Minas Gerais, two such stations were built some years ago but have not been operated. The concessionaires will activate these facilities so as to have three weighing stations operational; the number, type, and location of these facilities is considered adequate. The concessionaire may enforce weight restrictions in other areas using mobile scales that it would purchase for that purpose. The annual

maintenance report is to include information on weigh station operations and statistics on the number of freight vehicles weighed at each weigh station, the number and magnitude of excess loads documented, and fines levied on offenders.

3. Tolls

- 3.45 Stages I and II include the construction of five toll booths along the 563 km of the Fernão Dias Highway: four in Minas Gerais (in which 473 km of the highway lie) and one in São Paulo (90 km). The number and location of these booths is adequate for toll collection at strategic points for long-haul traffic; no tolls will be charged for short-haul traffic in or near cities located along the highway. A study will be done, with a specific plan as outlined below, to determine form of payment, toll fares, and how to implement the system under a private concession arrangement.
- 3.46 It is being recommended that, within 13 months after signature of the contract, the borrower demonstrate to the Bank that the concessionaire is operating the highway, and that the tolls being charged are sufficient to defray the concessionaire's maintenance, operating, and administrative costs, and amortize and service all or part of the debt incurred to finance the project.
- 3.47 If a concession arrangement fails to materialize, the government will take charge of services to operate and maintain the highway, with toll collection and operation of scales until the services can be concessioned out. If such a concession arrangement should prove, definitively, to be impossible, the government pledges to operate the highway by outsourcing construction and services to the private sector to run it as a toll road. In such an event, tolls must be high enough to cover at least the cost of those contracts, which are to be signed four months after it is ascertained that no concession arrangement is possible, plus amortization and service of all or part of the debt to the Bank.

K. Studies

- 3.48 The Bank will fund part of the (i) Belo Horizonte interchange study and (ii) economic, technical, and environmental feasibility studies (including the environmental impact assessment/environmental report - RIMA) and basic designs for construction to upgrade the segment of BR-381 between Belo Horizonte and Governador Valadares. These studies will be commissioned through an international call for proposals, as provided in Annex C to the loan contract. It will be a condition of the contract that these studies be completed by December 1998 and June 1999, respectively.

L. Audits

- 3.49 The financial statements of the project will be audited by the Federal Audit Office (SFC), pursuant to criteria established for that purpose by the Bank.

M. Provisions for natural disasters

- 3.50 The project region is not prone to earthquakes, hurricanes, or tornados that could jeopardize the highway works. DNER's design standards for drainage and special structures such as bridges and viaducts make due allowance for peak flows and water levels to be taken into account for the planned construction work, to minimize the risk of damage and material loss in the event of extraordinarily heavy rainfall during the service life of the project. During the construction phase, the contractor will have to have construction insurance in place to guard against these contingencies.

N. Ex post evaluation

- 3.51 When stage I was being prepared, DNER indicated that it wished to have an ex post evaluation done of the project after the stage II work was complete; it reconfirmed this intention to the Bank when the operation described herein was being prepared. The terms of reference and instructions for an ex post evaluation are to be presented to the Bank within one year after signature of the loan contract. The evaluation findings must be presented to the Bank within three years after the date of the last disbursement. DNER will have at hand the information it needs on vehicle flows and levels of service to do this work at no additional cost. It is recommended that it use the economic cost data and methodology utilized for the original feasibility studies, contained in DER/MG documents produced in September 1996, which are in the project technical files.
- 3.52 Two considerations are preeminent for an ex post evaluation of the project: quality of service available to highway users, and the financial success of the highway's operation for the concessionaire and for the government. The concession bid documents will specify the data that the concessionaire is to provide on traffic flow and mix, as well as specifications on (a) maximum waiting time at toll booths, with the requirement that vehicles be allowed to drive through for free when waiting times exceed the limit; (b) maximum response time for mechanical and medical assistance, and other indicators of the quality of those services; and (c) facilities, equipment, environmental control measures and highway maintenance standards. These requirements, plus feedback from the monitoring done by local DNER offices, will provide a constant flow of data and facilitate the ongoing oversight of levels of service that the concessionaire is offering users.

- 3.53 The same data will facilitate ongoing monitoring of the concessionaire's reporting of revenues and amounts transferred to the government. DNER, with the national treasury, is to maintain a permanent record of revenues in nominal and real terms and of payments and payment dates, and send a summary of these data to the Bank each year as part of its maintenance report on the highway (paragraph 3.43).

IV. THE BORROWER AND THE EXECUTING AGENCY

A. The National Highway Department (DNER)

- 4.1 The borrower of the prospective IDB loan will be the Federative Republic of Brazil, which also will have ultimate responsibility for the local counterpart.
- 4.2 The executing agency in charge of the project's implementation will be the National Highway Department (DNER). Under the terms of an agreement signed by the parties for stage I, which will be updated for stage II, DNER, on behalf of the Ministry of Transport, delegated to the Minas Gerais Highway Department (DER/MG) and the São Paulo Highway Department (DER/SP) responsibility for executing the project in their respective states. The updating and signature of that agreement is a condition precedent to disbursement of the Bank's loan. Implementation arrangements are described in chapter III.

1. Nature and functions

- 4.3 DNER is a decentralized agency attached to the Ministry of Transport. It is responsible for planning, coordinating, and overseeing the federal highway system and for administering policies governing the system. It operates by authority of Decree 8463 of 1943, as amended, and in accordance with its 1991 by-laws.
- 4.4 As the project's executing agency, DNER will have the following functions: (i) general technical support and monitoring, including inspections; (ii) administration and compliance monitoring of agreements and liaison with federal and state agencies and the Bank; (iii) financial control of requests for disbursements of the IDB loan; (iv) disbursement of local counterpart funds, in coordination with DER/MG and DER/SP, including oversight of accounting and financial records; and (v) presentation of annual accounts for review by the Federal Audit Office (SFC) of the Ministry of Finance, which will be charged with auditing the project.

2. Organization

- 4.5 DNER's current structure is as follows:
- Decision-making body: Executive Board
 - Executive and executive support units: Office of the Director General; Technical Advisory Office
 - Central departments: Legal; Internal Audit; Administration and Finance
 - Technical units: Engineering, Operations, Technology Development, and Concessions departments

- Regional offices: regional highway offices (DVRs)

- 4.6 DNER is in the midst of a reorganization, to decentralize administration and transfer part of the federal highway system to the states and to the private sector under concessions. This will be formalized through the National Transportation System, 4/ which is to be passed into law by the National Congress.
- 4.7 This process will streamline DNER's organization, equipping it to perform its new planning function (to be decentralized to the regional highway districts - DVRs) and to carry out and oversee operations. Nevertheless, its present structure is adequate for its operations, and for the functions that would fall to it under the proposed project.

3. Human resources

- 4.8 DNER's staffing table was reconfigured during a first reorganization process begun in 1990, which saw some substitutions and a sharp reduction in staff numbers.
- 4.9 By August 31, 1996, as a result of the aforementioned strategy, DNER had 66% fewer staff than in 1990. Over that same interval, DNER conducted a training program for its executive and technical staff, funded by the World Bank. Though the outcome of this program was satisfactory, it was not sufficient. Accordingly, DNER staff training will continue though a component included in the Bank's loan for the upgrading of the São Paulo-Florianópolis highway, and another to be included in the program to rehabilitate and decentralize federal highways, with IDB and World Bank financing.

4. Concessions

- 4.10 Stage II works include the construction of toll booths. Toll fares will be determined from a study to be conducted by DNER, with a view to turning over operation and management of the highway to the private sector under a concession arrangement. The toll revenues must be high enough to defray the costs of operating and managing the highway and leave a profit for the concessionaire plus a share to repay part or all of the IDB loan.
- 4.11 As part of the reorganization mentioned above, DNER created a Concessions Department to handle all aspects of concessions. Technical-cooperation funding to strengthen that department is being included in the federal highway rehabilitation and decentralization program. Nevertheless, DNER is hiring a specialized consulting firm for two years to help it handle these activities, to ensure that the concession process is managed efficiently.

4/ In the original Portuguese, Sistema Nacional de Viação.

5. Financial management and audit system

- 4.12 DNER finances are handled by the Finance Division of the agency's Administration and Finance Department. That division also monitors DNER budget performance. Each department and regional district office manages its own budget, committing funds in accordance with approved timetables for the various programs. The framework for DNER financial management is the Integrated Financial Management System administered by the Secretariat of the National Treasury Department through the so-called "single account" system, wherein every public agency is a "depository", and payments are made through accounts overseen by that department. All of these activities are being performed and overseen satisfactorily.
- 4.13 The federal government's audit system for DNER operations envisages two levels of oversight: (i) internal audits performed by DNER's Audit Division, and (ii) external audits by the Ministry of Transport, the Federal Audit Office of the Ministry of Finance, and the General Accounting Office. Each of these units acts within its respective sphere and jurisdiction; their work is considered adequate.
- 4.14 External audits of projects funded by multilateral lending agencies fall to the Federal Audit Office of the Ministry of Finance, which thus would perform external audits of the project proposed herein, as explained in chapter III (paragraph 3.49).
- 4.15 The following table shows DNER budget performance for the period from 1991 to 1995.

Table IV-1 National Highway Department (DNER) Budget performance 1991-1995 (US\$ million)					
	1991	1992	1993	1994	1995
REVENUE					
Total current revenues	393.3	327.3	348.2	506.7	730.8
Total capital revenues	836.0	785.8	414.2	409.0	396.3
TOTAL REVENUE	1,229.3	1,113.1	762.4	915.7	1,127.1
EXPENDITURE					
Current expenditure	372.7	344.9	383.7	506.4	703.7
Capital expenditure	716.6	681.6	704.3	540.5	547.7
With Treasury funds	524.3	525.1	508.8	330.4	407.5
Other	192.3	156.5	195.5	210.1	140.2
TOTAL EXPENDITURE	1,089.3	1,026.5	1,088.0	1,046.9	1,251.4
SURPLUS(DEFICIT)	140.0	86.6	(325.6)	(131.2)	(124.3)

Source: DNER annual budget performance reports.

4.16 As the foregoing table shows, DNER's aggregate annual revenues averaged US\$1.1 billion from 1991 to 1995. Revenues dipped in 1993 and 1994 when national treasury funding (the main source of DNER revenues) was cut back owing to the recession. In 1994 and 1995, after the economy stabilized in the wake of the 1994 *Plano Real*, transfers to DNER picked up again.

4.17 DNER expenditures in the period under review also averaged about US\$1.1 billion a year. The budget deficit recorded in the last three years shown is due largely to the aftermath of the above-mentioned recession. However, national treasury transfers to DNER increased in 1995, and the situation is even better in 1996 since the approval of the federal government's multi-year (1996-1999) capital spending plan, which contains the equivalent of US\$13.4 billion in transportation funding.

6. Cofinancing

4.18 The federal government is negotiating a loan from the Export-Import Bank of Japan to fund part of its counterpart commitments for the proposed operation, because this highway project is on the list of Brazilian projects potentially eligible for funding from that financial institution. Even if this cofinancing failed to materialize, there should be no problems with local counterpart funding, given the allocations in the multi-year plan and the

priority accorded to this project by the federal government, as evidenced by the funding made available as needed for stage I.

B. The Minas Gerais Highway Department

- 4.19 Under the terms of the agreement signed with DNER for stage I, which will be updated for stage II, the Minas Gerais State Highway Department (DER/MG) will be in charge of construction, administration, supervision, technical oversight, and inspection of works carried out in its jurisdiction, with support from specialized consulting firms.

1. Nature and functions

- 4.20 DER/MG is a decentralized agency with legal status, part of the indirectly administered state-level public sector, which is financially and administratively autonomous. It is attached to the state Executive Branch through the State Department of Transportation and Public Works.
- 4.21 DER/MG's basic functions, which it is performing adequately, are (i) help develop the state highway and transportation plan; (ii) plan, coordinate, and oversee highway operations in the state; and (iii) build, pave, maintain, repair, and upgrade highways comprising the state road system and the delegated federal highway system.

2. Organization

- 4.22 DER/MG's current structure came out of a reorganization pursuant to State Law 11,403 of January 21, 1994, which sought to coordinate and decentralize its operations. This law ratifies the above-listed functions of DER/MG and reorganizes the agency to make it run more efficiently. The new structure is as follows:

- Office of the Director General and Legal Counsel
- Office of the Deputy Director (Planning and Coordination Advisor; Technical Standards Advisor; Information Services; Public Affairs; Technical Assistance to Municipalities; Tenders Unit; Audit Division)
- Highway Operations, Construction, Maintenance, Finance and Administration, Engineering, Human Resources, and Metropolitan Transit departments
- Forty regional coordination offices

3. Human resources

- 4.23 DER/MG personnel matters are handled by the agency's Human Resources Department, which is operating satisfactorily.

- 4.24 In 1991 DER/MG had 8,874 people on staff; by August 31, 1996, it had only 7,122, a drop of about 20%. The reduction was achieved through attrition, and despite the agency's having absorbed 510 employees of the dismantled state enterprise Transportes Metropolitanos (TRANSMETRO). In 1991, one half of DER/MG staff were at headquarters and one half in the regional offices; in 1996 the breakdown was 20% headquarters, 80% regions, a clear indication of the ongoing decentralization process.
- 4.25 A further reduction in force is expected, since a large number of DER/MG employees are expected to opt for its voluntary retirement program. Staff retiring under that program will be replaced only if their functions are essential for day-to-day DER/MG operations; in that case, DER/MG authorities will explore the option of private outsourcing before hiring directly.

4. Financial management and control systems

- 4.26 DER/MG's Finance and Administration Department manages and oversees the agency's finances and accounting. Budget control is computerized and performed by subprogram and activity, centralized at headquarters. However, budget management is decentralized to all the agency's constituent units.
- 4.27 This work is being done satisfactorily, and includes DER/MG operating cost management and management of payments of short-, medium-, and long-term financial commitments, through the state treasury. The existing internal audit system includes DER/MG's Technical and Management Audit Division, which reports to the Deputy Director General. Work is done according to an established program, using acceptable audit procedures. The organization and staff of this structure are adequate for its purposes.
- 4.28 External audits of DER/MG financial transactions are done by the state departments of Transportation and Public Works, Finance, and Planning, and ultimately by the State Accounting Office, which reviews and approves the agency's annual accounts.
- 4.29 The following table shows DER/MG budget performance for the period from 1991 to 1995.

Table IV-2 Minas Gerais State Highway Department (DER/MG) Budget performance 1991-1995 (US\$ million)					
	1991	1992	1993	1994	1995
REVENUE					
Total current revenues	63.5	56.4	58.7	135.6	187.0
Total capital revenues	138.7	373.5	224.6	678.8	333.8
TOTAL REVENUE	202.2	429.9	283.3	814.4	520.8
EXPENDITURE					
Current expenditure	70.1	64.4	80.9	141.0	192.6
Capital expenditure	82.7	368.7	257.3	741.6	294.9
Investments	70.0	343.6	255.0	738.8	293.2
Other	12.7	25.1	2.3	2.8	1.7
TOTAL EXPENDITURE	152.8	433.1	338.2	882.6	487.5
SURPLUS (DEFICIT)	49.4	(3.2)	(54.9)	(68.2)	33.3

Source: DER/MG annual budget performance reports.

- 4.30 As the table shows, DER/MG revenues climbed between 1992 and 1995, with a particularly strong upturn in 1994. Expenditures followed the same pattern. DER/MG commits funds only against incoming state treasury transfers; the deficit shown for several successive years is attributable in large part to year-end invoicing those years recorded as "Balances payable" for the following period. This situation ended in 1995.
- 4.31 Since DER/MG derives its funding from the state treasury, the State's financial situation during the period under review, and forecasts for the next four years, were also examined. In the recent past, the State also ran a deficit, but in 1994, as the *Plano Real* stabilized the economy, the situation began to improve. One additional element of note is the upturn in state tax revenues in 1994. The deficit was the result of a public service salary adjustment, particularly for teachers, and heavier capital spending on public works by the previous authorities.
- 4.32 The State's financial condition is stronger in 1996, now that it has concluded a rescheduling of its debt to the federal government which will save it from US\$50 million to US\$75 million a year in debt service. It also has launched a process of fiscal adjustments and privatization of public enterprises, including Banco do Estado. One noteworthy step in the adjustment process was the approval of a series of laws, among them Law 813/96 in July 1996, which requires

payment of 3.5% of public servants' base salary into the retirement fund. In the past, the State had to make the full contribution to this fund. Thanks to these measures, in 1997 the State will definitively reverse the 1992-1994 deficit.

- 4.33 Its deficits notwithstanding, the State of Minas Gerais continued to transfer funds regularly to DER/MG, particularly so it could furnish, on schedule, the local counterpart for stage I of the operation described herein, which the authorities view as the most important project for the state's development.

5. Cofinancing

- 4.34 Minas Gerais is also negotiating a loan with Banco Nacional de Desenvolvimento Econômico e Social (BNDES) to cover 85% of the approximately US\$110 million the State will need for its share of the local counterpart for the proposed project over the next three years. A BNDES specialist took part in the IDB analysis mission in Minas Gerais, and confirmed that the Bank's evaluation satisfies BNDES requirements. Even if this loan were not to materialize, with the measures the State has taken to strengthen its finances, it will be in a position to furnish the stage II local counterpart funds as and when required.

C. The São Paulo State Highway Department

- 4.35 São Paulo's state highway department (DER/SP) will be in charge of construction of the project works within its geographical jurisdiction, and for their supervision, technical oversight, and inspection, with support from specialized consulting firms.

1. Nature and functions

- 4.36 DER/SP is a decentralized agency with legal status, operating under the Executive Branch but with independent administration and finances, through the State Department of Transportation Infrastructure. Its basic mandate is to plan, build, maintain, operate, and administer, directly or through third parties, the highways of the state of São Paulo and federal highways that have been transferred to that state.

2. Organization

- 4.37 DER/SP's current organization structure is as follows: Office of the Superintendent; Advisory Board; Legal Counsel; Accounting and Finance Division; Planning, Engineering, Transport, Administration, and Operations departments; and regional divisions.
- 4.38 With this organization, DER/SP can adequately discharge its responsibilities and those set out in the agreement signed with DNER for execution of the project. A DER/SP institutional reform program now being studied would, *inter alia*, (i) modify its

organizational structure, (ii) make optimum use of human resources, and (iii) develop a performance monitoring and assessment system.

- 4.39 Under the new DER/SP organization model, work on force account is to be confined to instances in which this approach affords higher quality and costs less than when the services are done under contract by private firms.

3. Human resources

- 4.40 DER/SP personnel matters are handled by the agency's Personnel Administration Division in the Administration Department. In 1991, the agency had a staff of 10,578; by June 30, 1996, it had 7,761 employees, a drop of 27%. Staff numbers will continue to come down, owing to the voluntary retirement program.

4. Financial management and control systems

- 4.41 DER/SP's Accounting and Finance Division, reporting directly to the agency's Superintendent, manages and oversees its finances and accounting. Accordingly, it is in charge of accounting, budgeting (preparation and tracking), cash transactions (receipts and disbursements), and toll administration. Funds management is adequate, being organized and coordinated with other units of the DER/SP and the State. DER/SP's internal audit unit, which reports to the Superintendent, has as its basic functions the evaluation of accounting, budget, and financial matters and, more superficially, the operations area. The performance of this system is adequate.
- 4.42 As for external controls, DER/SP finances are overseen generically and adequately in the form of supervision by the state departments of Transportation, Finance, and Planning. The State Accounting Office does detailed examinations of DER/SP accounts and issues an opinion. However, the financial statements of the proposed project, which are to be presented each year to the Bank, will need to bear the opinion of the Federal Audit Office of the Ministry of Finance.
- 4.43 The following table shows DER/SP budget performance for the period from 1992 to 1995.

Table IV-3 São Paulo State Highway Department (DER/SP) Budget performance 1992-1995 (US\$ million)				
	1992	1993	1994	1995
REVENUE				
Current revenues	83.6	151.6	235.9	354.1
Total capital revenues	447.9	476.5	396.1	118.9
TOTAL REVENUE	531.5	628.1	632.0	473.0
EXPENDITURE				
Current expenditure	132.4	311.6	235.7	301.0
Capital expenditure	504.2	497.9	573.8	216.4
Investments	483.0	393.2	545.0	187.0
Other	21.2	104.7	28.8	29.4
TOTAL EXPENDITURE	636.6	809.5	809.5	517.4
SURPLUS(DEFICIT)	(105.1)	(181.4)	(177.5)	(44.4)

Source: DER/SP annual budget performance reports.

- 4.44 As the table shows, DER/SP revenues and expenditures rose steadily from 1992 to 1994. Its deficit had narrowed considerably by 1995.
- 4.45 Unlike DER/MG, which relies on the Minas Gerais state treasury for funding, DER/SP generates resources of its own by collecting tolls on state highways. The state Executive Branch has earmarked these toll revenues for DER/SP. The first toll booths were set up early in 1993; by June 30, 1996, there were 14 such facilities in operation. Toll revenues in 1993, 1994, and 1995 were respectively US\$74 million, US\$100 million, and US\$129 million. First-half receipts in 1996 totaled US\$78.6 million; the intake for the full year is expected to top US\$150 million, accounting for about one third of aggregate DER/SP revenues.
- 4.46 The 1993 and 1994 increases in expenditures stemmed from a staff salary adjustment and debt repayments. DER/SP has decided to check this rise in expenditures through two measures: (i) more efficient operations, by contracting services out to the private sector and cutting staff through a voluntary retirement program, and (ii) rescheduling its debt with the recently created Companhia Paulista de Administração (CPA). CPA is a public company established by State Law 9,361 of July 7, 1996, to reorganize and divest São Paulo public entities.

5. The State of São Paulo

- 4.47 The State of São Paulo reported a deficit from 1992 to 1995, and is expected to continue to run a deficit in the short term. However, the state treasury has been able to continue transferring needed funds to DER/SP, including the local counterpart for stage I of the project described herein. No change is anticipated in this connection for stage II, because completion of this project is one of the State's top priorities, and because the local counterpart contributions are but a marginal share of the state budget.

V. FEASIBILITY OF THE PROJECT

A. Technical feasibility

- 5.1 The project's technical features are such as to achieve the aim of upgrading levels of service and reducing the accident rate. The planned toll booths, police posts, and weighing stations are likewise technically sound.
- 5.2 Current practices and the proposed concession arrangement are adequate for maintenance of the works and operation of the highway, including traffic safety features and emergency mechanical and medical assistance.
- 5.3 The project presents no special technical difficulties. Final engineering designs for the proposed works are complete, affording suitable solutions and with reasonable construction costs. There are funds in the budget for associated costs and contingencies, including construction price escalation.
- 5.4 DNER, DER/MG, and DER/SP have a great deal of experience in executing highway projects, and their current performance on stage I of the work to widen and divide the Fernão Dias Highway is satisfactory. Indeed, the technical and environmental problems dealt with at stage I were much more serious than those likely to come up in stage II.

B. Economic feasibility

(i) The model, and quantified and nonquantified benefits

- 5.5 Adding an additional roadway will increase the highway's capacity almost fourfold on most segments, relieving congestion and cutting intervehicle conflicts and accidents by more than half. Once traffic can flow smoothly on two roadways with good surface conditions, vehicle operating costs will drop considerably, and travel times for passenger and commercial traffic will be far shorter. The highway then will be able to absorb part of the long-haul north-south traffic that currently is forced to take longer routes to avoid the congestion and dangers of the Fernão Dias Highway.
- 5.6 The above-mentioned benefits have been quantified using the Highway Design Model, version Q (Highway Design and Maintenance Model - HDM-Q). HDM-Q is still being tested, as a replacement for the previous version HDM-III, a model developed under a World Bank-administered program in Brazil in the 1970s for lightly traveled rural roads. The Q version includes a simplified representation of the effect of congestion on transportation costs, and thus is appropriate for the Fernão Dias case.

- 5.7 Benefits from reducing accidents are estimated externally to the HDM-Q and treated as an exogenous impact, i.e., they are simply added to the benefits calculated in the model. They are estimated from research on previous initiatives to increase highway capacity with new, divided roadways, and are quantified on the basis of reductions in (i) costs of repairing or replacing damaged vehicles, and freight losses; (ii) medical and hospital expenses associated with accidents; and (iii) wages foregone because of injury and death. These values, like all the others, are computed in economic terms and discounted present value. The average accident costs US\$21,510, ranging from US\$11,849 for one causing no deaths or injury to US\$118,211 for fatal accidents. These figures are considered to be very conservative, given the traffic mix (72% commercial vehicles, in the form of trucks and buses) and the fact that many accidents involve multiple vehicles. The traffic growth rates also are conservative, varying from 2.4% to 2.8% a year depending on the class of vehicle.
- 5.8 A number of benefits that are either difficult to express in monetary terms or can only be loosely estimated, and thus would be unreliable, are not included in the HDM-Q. Examples are (i) the value of lives saved by the project and of the pain and suffering thereby averted; (ii) the value of reversing some environmental damage; and (iii) the economic development that will ensue when transport costs are reduced and the quality and reliability of transportation improves. Counted as project costs are the full cost of building, maintaining, and operating the highway, including the environmental and traffic safety components. Costs and benefits are calculated by stage and by highway section, to keep from double-counting benefits; in other words, stage II benefits are kept separate from those of stage I, and stage II benefits for the section of highway in Minas Gerais were examined separately from those in São Paulo.
- 5.9 The table below presents economic internal rates of return (EIRRs) and net present value at 12% real interest for stage II as a whole, and for the portions of the highway within each state. The EIRRs attest to the project's high returns: 28% for the São Paulo section, 40% for Minas Gerais, and 38% for the entire highway to be upgraded in stage II.

(ii) Sensitivity analysis

- 5.10 The project overall, and the portions within each state as mentioned above, would still yield a very high return even in a scenario of 10% higher costs and 10% lower benefits. With the expected benefits, the year 1 return would be 17% for São Paulo, 30% for Minas Gerais, and 27% for stage II generally; this suggests that the project should be started immediately. Similarly, the project would produce strong returns even in a scenario of zero future traffic growth, since the growth rates being used in the base-case scenario are conservative (paragraph 5.7).

Table V-1 Stage II rates of return		
Highway section	EIRR (%)	NPV (US\$ million)
São Paulo	28	117
Minas Gerais	40	673
Stage II	38	790
Sensitivity analysis		
São Paulo	25	95
Minas Gerais	34	560
Stage II	32	655

(iii) Breakdown of benefits

- 5.11 The benefits of the project, quantified as explained above, break down as follows: reduction in vehicle operating costs, 88% (74% for existing traffic and 14% for induced traffic); shortened passenger and commercial vehicle travel times, 7% (6% for existing traffic and 1% for induced traffic); reduction in accidents, 5%.

(iv) Poverty impact

- 5.12 Pursuant to the Eighth Replenishment document (AB-1704) it was determined that the proposed project does not have the features of a poverty-targeted program either geographically or in terms of intended beneficiaries, and it is not specifically targeted to women.

C. Financial feasibility

- 5.13 To assess the project's financial feasibility, the capacity of the borrower (the Brazilian federal government) and of the States of Minas Gerais and São Paulo to furnish the necessary counterpart funds, pursuant to an agreement signed by the parties to execute the works, was examined. Under the financial arrangement adopted for the proposed operation, the federal government would have sole responsibility for repaying the IDB loan.
- 5.14 The national treasury's share in the project's financing will be limited to US\$137.5 million, to be disbursed over three years. This sum is the difference between the total project cost and the IDB loan plus contributions from the States of Minas Gerais and São Paulo; it is a negligible figure when compared to the federal government's regular transportation spending in the country.

5.15 The coexecuting States have been regularly supplying local counterpart funds for stage I of the project, which they consider to be their most important works project, and there is no reason to expect any change in stage II, inasmuch as the amounts that will fall to them are not even 1% of their total current revenues. In the worst scenario of noncompliance by the two States, the federal government would have to come up with US\$275 million more in counterpart funds to disburse from 1997 to 1999. A look at the federal government's 1996-1999 multi-year plan (see Annex V-1) quickly reveals the modest fiscal impact of such a federal contribution:

- a. The plan allots US\$85.7 billion for infrastructure and US\$13.4 billion for transportation.
- b. The above-mentioned sum of US\$275 million would be barely 2% of the transportation budget, a manageable figure when one considers that the proposed operation is viewed by the federal authorities as one of the most vital and priority projects for the transportation sector.

D. Institutional capacity

5.16 The project will be implemented, by delegation of DNER, by the state highway departments of Minas Gerais (DER/MG) and São Paulo (DER/SP), both of which have considerable experience with this type of operations. Nevertheless, to ensure sound planning, coordination, implementation, and oversight of all the activities their different units will be performing, and those falling to DNER as it oversees the work of the coexecuting agencies, three "project coordination units" set up in stage I will remain in place - one in DNER and one in each coexecuting agency. These units will have the staff and administrative, accounting, technical, and information services and systems needed for the project, as well as continued support from specialized consulting firms to help these units manage the project.

5.17 On the environmental front, DER/MG already has the capacity to oversee highway works permanently in the state of Minas Gerais. DER/SP, for its part, recently set up a four-member standing committee on environmental management to handle the environmental component of highway works for which it is responsible. The requirement that there be one full-time, qualified professional on this committee will ensure that environmental concerns will be properly addressed.

5.18 In light of the foregoing, and of the additional measures adopted by DNER and the two coexecuting agencies, the proposed institutional structure satisfies the Bank's requirements for implementation of this project. No institutional problems such as would hamper the project are anticipated.

E. Environmental feasibility

- 5.19 The project proposed herein is the continuation of a first stage which was funded by the Bank and was judged by São Paulo and Minas Gerais state environmental authorities to be environmentally feasible, on the basis of the findings of the environmental impact assessments performed pursuant to Brazilian legislation, and the outcome of consultations with the public when the required environmental permits were being sought. The project team reviewed the studies conducted and found them to conform to the Bank's requirements.
- 5.20 The environmental monitoring and protection features built into the project (hazardous-load management, adjustment of municipal land-use plans, strengthening of environmental management in conservation units, protection of water sources, etc.) go far beyond mere mitigation of direct impacts, and mark a strong advance in addressing environmental aspects of highway projects in Brazil. The technical specifications and instructions to bidders include measures that contractors will have to take to avert or alleviate direct damage that the project might cause to the environment. Provision has been made in the project for the institutional arrangements needed to ensure that these environmental requirements will be satisfied, and a structure to ensure proper environmental management of the project.

F. Risks

a. Past problems overcome

- 5.21 Contracts for construction work for stage I of the Fernão Dias Highway were awarded in 1994, totaling about 50% of the official estimate. They included standard escalation clauses. When the *Plano Real* imposed a one-year price freeze, DNER had to recalculate the contract amounts, removing the inflation factor that had been built in at the start. In these circumstances, contractors asked for their contracts to be terminated without penalty, as permitted in the legislation that launched the *Plano Real*.
- 5.22 The Bank and the borrower quickly moved to rebid the works, adopting two measures to keep lost construction time to a minimum: (i) simplifying international publicity requirements and, since the works in question were not complex, shortening the period for presentation of bids from 90 to 45 days; and (ii) reconfiguring the highway sections being put out to bid into larger packages, to heighten competition and speed up completion of construction.
- 5.23 The Bank also assented to having each coexecuting agency employ its own approaches for the work, so as not to further complicate the construction process. All tenders in São Paulo were unit priced, with completion times of 18 to 20 months. Minas Gerais tendered the highway construction using unit prices, and associated masonry

structures on a lump-sum basis, with construction times of 12 months. The new calls for bids went out, contracts were awarded, and construction has been proceeding apace since work resumed in the two states.

- 5.24 These problems are not expected to recur in stage II, since prices are stable in the country and because the second round of tendering for stage I elicited offers close to the cost estimates, and work is now proceeding normally. Furthermore, as will be explained below, preventive measures have been taken to resolve these problems, which are not uncommon in construction projects of this type.
- 5.25 The likelihood of protests by unsuccessful bidders is being minimized by the decision to allow ample time for the submittal of offers and award the contract on the basis of the single criterion of lowest evaluated bid that substantially complies, for each lot, with the bid documents, including financial and technical requirements (paragraphs 3.25 and 3.29). Nevertheless, there is always a possibility of frivolous protests that could cause substantial delays.
- 5.26 To ensure that the successful bidder's quote will not subsequently prove to be unfeasible and thus stall construction, as occurred early in stage I of increasing this highway's capacity, bidders will need to provide bid security from a bank, equivalent to 30% of their total price proposal; when this same procedure was followed to rebid the stage I works, it elicited prices very close to the cost estimates.
- 5.27 It is very unlikely that actual construction volumes will be much larger than those envisaged in the project designs, because the proposed work is to be done on and parallel to the existing highway; enough time was taken to produce exact designs; quantities were recently reviewed, in light of the experience in stage I; the location and availability of materials deposits was reconfirmed, and the current status of the stretch of highway to be rehabilitated was recently reassessed. Bidders also will have ample time to verify all this information, which will be made available to them to draw up their bids.
- 5.28 To ensure that construction is up to the design standards, firms will be hired to supervise all field work, with an emphasis on quality.

b. Risks

- 5.29 The foregoing notwithstanding, there are some risks involved in bidding out the concession for the highway and in its operation by the concessionaire. The following paragraphs describe these contingencies and steps that have been taken to avert them.

- 5.30 Delays in bidding out the concession. This problem arose in previous calls for tenders, for instance for the operation and maintenance of the Rio-Niterói bridge and Dutra Highway. Some of the protests stemmed from problems of the type mentioned above in paragraph 5.25; one factor that encouraged the protests was the absence of specific legislation governing such circumstances pursuant to provisions in the 1988 Constitution, which forced DNER to rely on previous legislation and on judicial interpretations arising as the call for bids was in process. The passage of the Concessions Act in February 1995 has alleviated this problem. The decision, for stage II, to move the concession award to mid-1998 will allow time to resolve any protests in time for the concessionaire to be completely set up for the final stage of the work to widen, divide and upgrade the Fernão Dias Highway.
- 5.31 Commercial risks for the concession-holder. The concessionaire's risk would be confined to outlays for equipment, vehicles, and personnel to operate and maintain the highway, since it will not have to recoup capital costs during construction, and it is not liable for repayment of the government's debt, but is merely its collection agent to that end. The requirement that bidders present performance security will discourage over-optimistic offers.

LOGICAL FRAMEWORK

UPGRADING OF FERNÃO DIAS HIGHWAY - STAGE II (BR-0216)

OBJECTIVES	INDICATORS	MEANS OF VERIFICATION	ASSUMPTIONS																								
GOAL Help lower operating costs of vehicles traveling between metropolitan Belo Horizonte and São Paulo and other regions and states that use that corridor.	By 12/2000 (compared with 1996), the following reductions in economic vehicle operating costs, measured in constant terms per vehicle-km by the HDM-Q method on stage II sections between São Paulo and Belo Horizonte: for automobiles, from US\$0.216 to US\$0.203, for buses, from US\$0.817 to US\$0.771; and for single-unit trucks, from US\$0.537 to US\$0.444.	New run of HDM-Q model based on concessionaire's traffic counts for last half of 1999.	(Goal to Supertarget) Brazilian traffic laws, education campaigns, and traffic policing unchanged or improved, particularly in the states of Minas Gerais and São Paulo.																								
PURPOSE Upgrade level of service of highway BR-381 between São Paulo and Belo Horizonte, lowering accident rates and instituting a sustainable system for operating and maintaining that highway.	<div>1. By the second half of 2000 (compared with 1995), the following improvements in level of service on the following sections of the highway at peak times: <div>Half</div><table><thead><tr><th>Section</th><th>2nd/95</th><th>2nd/00</th></tr></thead><tbody><tr><td colspan="3">São Paulo</td></tr><tr><td>km 0-km 19</td><td>E</td><td>A</td></tr><tr><td>km 19-km 36.3</td><td>F</td><td>B</td></tr><tr><td colspan="3">Minas Gerais</td></tr><tr><td>km 699-km 719</td><td>F</td><td>C</td></tr><tr><td>km 817-km 843</td><td>E</td><td>A</td></tr><tr><td>km 868-km 893.2</td><td>F</td><td>B</td></tr></tbody></table></div> <div>2. By 2000 (compared with 1995), a 50% reduction in fatal accidents, accidents causing injury, and accidents without victims, on stage II sections of the highway, in millions of vehicle-km/year (1995 totals were 124, 461 y 854 respectively). No increase in these rates from 2000 onward.</div>	Section	2nd/95	2nd/00	São Paulo			km 0-km 19	E	A	km 19-km 36.3	F	B	Minas Gerais			km 699-km 719	F	C	km 817-km 843	E	A	km 868-km 893.2	F	B	<div>1. For 1995, item II.1, "Estudo de Tráfego", Vol. 2, <u>Estudos Econômicos e Avaliação</u>. DER/MG Engineering Department. Levels of service are as defined in the 1994 <u>Highway Capacity Manual</u>.</div> <div>2. For 1995, Estatística e Estimativa de Redução de Acidentes da Rodovia BR-381, Vol. III (or DNER/Brasília statistical records). For 2000 and thereafter, Federal Highway Police data.</div>	<div>1. Proper maintenance of the auxiliary road network in highway BR-381 service area.</div> <div>2. No institutional or macroeconomic changes such as would compromise the viability of the construction or concession contracts</div>
Section	2nd/95	2nd/00																									
São Paulo																											
km 0-km 19	E	A																									
km 19-km 36.3	F	B																									
Minas Gerais																											
km 699-km 719	F	C																									
km 817-km 843	E	A																									
km 868-km 893.2	F	B																									

OBJECTIVES	INDICATORS	MEANS OF VERIFICATION	ASSUMPTIONS
COMPONENTS			(Component to Goal)
1. Current roadway rehabilitated and highway widened and divided between São Paulo and Belo Horizonte.	<p>1.1 By 12/99, new roadways built parallel to the existing ones on the following stretches of BR-381:</p> <p>a. From km 637 (Nepomuceno) to km 893.2 (MG/SP border).</p> <p>b. From km 0 (MG/SP border) to km 36.3 (junction with SP-065).</p> <p>1.2 By 12/99, rehabilitation of existing roadway on following sections of BR-381:</p> <p>a. From km 637 (Nepomuceno) to km 893.2 (MG/SP border).</p> <p>b. From km 0 (MG/SP border) to km 36.3 (junction with SP-065).</p>	<p>1.1 Terms of acceptance of the respective works by DNER.</p> <p>1.2 Idem.</p>	<p>1. Concessionaire is operating the highway as prescribed in bid documents.</p> <p>2. No legal problems impeding operation of truck weighing stations or working relations with the Federal Highway Police.</p>
2. Toll booths in place.	2. By 12/99, two toll booths in operation as specified in the report on <u>Projeto de Execução de Postos de Pedágio</u> km 718.4 (Campanha) and km 813 (Pouso Alegre), Dec. 1993.	2. Idem.	3. Toll system politically acceptable; no legal restrictions hampering its use.
3. Federal Highway Police posts in place.	3. By 12/99, three police stations in place (km 441, Betim; km 662.5, Perdões; km 813, Pouso Alegre) and four branch units (km 480, Itatiaiuçu; km 552.3, Oliveira; km 701.8, Varginha; km 868.8, Itapeva), as specified in Vol.II of the <u>Projeto de Execução: Delegacia/Subdelegacia de Polícia Rodoviária Federal</u> .	3. Idem.	
4. Weigh stations in place.	4. By 12/99, two stationery weigh stations in operation plus mobile stations as necessary, as specified by DNER in concession bid documents.	4. Idem.	

OBJECTIVES	INDICATORS	MEANS OF VERIFICATION	ASSUMPTIONS
<p>5. Highway now at the operating stage under a concession agreement, with tolls being charged and weighing, maintenance, emergency mechanical and medical assistance, and other services.</p> <p>6. Institutional strengthening of the road subsector and allied agencies.</p>	<p>5. By 12/99, concessionaire has begun to operate the highway with all equipment and staff required in bid documents.</p> <p>6.1 By 12/98, Belo Horizonte interchange alternatives study completed.</p> <p>6.2 By 08/97, highway concession study completed.</p> <p>6.3 By 06/99, feasibility study completed on capacity adjustment for Belo Horizonte-Governador Valadares highway.</p>	<p>5.1 Terms of the concession for use of DNER property by concessionaire.</p> <p>5.2 Terms of transfer of highway operation from DNER to concessionaire.</p> <p>6.1 Final report on the study.</p> <p>6.2 Final report on the study.</p> <p>6.3 Final report on the study.</p>	
<p>ACTIVITIES</p> <p>1.1 Setup of the project coordination unit (PCU) (see project implementation timetable).</p> <p>1.2 Tendering and contract award for PCU advisory services.</p> <p>1.3 Tendering and contract award for construction supervision.</p>	<p>1.1 See itemized project budget.</p> <p>1.2 Idem.</p> <p>1.3 Idem.</p>	<p>1.1 Accounting records to be produced by PCU showing all project execution costs, in accordance with chart of accounts duly drawn up by the executing agency and approved by the Bank.</p> <p>1.2 Contract award document.</p> <p>1.3 Idem.</p>	<p>(Activities to Component)</p> <p>No frivolous protests of construction or concession awards.</p>

OBJECTIVES	INDICATORS	MEANS OF VERIFICATION	ASSUMPTIONS
<p>1.4 Tendering and contract award for following construction lots:</p> <p>(i) in MG, lots 8-17, total 256.2 km;</p> <p>(ii) in SP, lots 6-8, total 36.3 km;</p> <p>(iii) in MG, lots of special masonry structures 8-17.</p> <p>2. Tendering and contract award for concession to operate the highway.</p> <p>3. Studies with terms of reference tendered, contracts awarded.</p>	<p>1.4 Idem.</p> <p>2. Idem.</p> <p>3. Idem.</p>	<p>1.4 Idem.</p> <p>2. Idem.</p> <p>3. Idem.</p>	

TENTATIVE TIMETABLE OF CALLS FOR BIDS

A. International competitive bidding for IDB-funded construction work

HIGHWAY SECTION	Length km	Prequali- fication (Yes/No) *	Direct cost (US\$000) **	Date of notice
Lots 8 to 18 (highway — Minas Gerais)	256.2	No	298,240	Dec 96
Lots 15 to 22 (new special masonry structures [SMS] — Minas Gerais)	SMS	No	19,450	Dec 96
Lots 8R to 13R (widening of current SMS — Minas Gerais)	SMS	No	5,660	Dec 96
Total Minas Gerais group	256.2		323,350	
Total lots 6 to 8 (São Paulo)	36.3	No	62,000	Mar 97
GRAND TOTAL	292.5		385,350	

* In all the IDB-funded calls for bids, the procedure will be to verify the qualifications only of the firm submitting the lowest evaluated bid.

** Direct costs are preliminary estimates, in 1996 prices.

B. Calls for offers from consulting and engineering firms

	Mode of tendering	Prequalifica- tion (Yes/No)	Date of notice (quarter)	Amount (US\$000) May 96
1 - ENGINEERING AND ADMINISTRATION				28,900
1.1 Supervision				24,200
1.1.1 Construction in Minas Gerais	ICP	Yes	IV — 1996	18,000
1.1.2 Environmental measures in Minas Gerais	LCP	Yes	IV — 1996	600
1.1.3 Construction in São Paulo	LCP	Yes	I — 1997	5,000
1.1.4 Environmental measures in São Paulo	LCP	Yes	I — 1997	600
1.2 PCU administration Management support (DNER, DER/MG, DER/SP)	LCP	Yes	IV — 1996	4,700
2 - ENVIRONMENTAL MITIGATION MEASURES				38,840
2.1 Minas Gerais	LCP	Yes	Various	18,220
2.2 São Paulo	LCP	Yes	Various	20,620
3 - STUDIES				8,750
3.1 Belo Horizonte interchange	ICP	Yes	I — 1997	750
3.2 Feasibility and basic designs, Belo Horizonte-Governador Valadares segment	ICP	Yes	II — 1997	7,500
3.3 Fernão Dias Highway operation study	LCP	Yes	IV — 1996	500
4 - TOTAL				76,490

ICP = International call for proposals, with IDB financing

LCP = Local call for proposals, with counterpart funding

MULTI-YEAR PLAN: CAPITAL AND OPERATING EXPENDITURES

	Capital expenditure R\$ million	Operating expenses R\$ million	Total R\$ million
Economic infrastructure	85,389	332	85,721
Transportation	13,347	72	13,419
Energy	38,299	260	38,559
Communications	33,743	0	33,743
Water resources	6,742	920	7,662
Water resources management	60	124	184
Irrigation	3,165	703	3,868
Infrastructure	3,517	93	3,610
Agriculture	7,289	15,627	22,916
Industry and foreign trade	3,735	2,971	6,706
Tourism	1,091	333	1,424
Science and technology	9,430	4,925	14,355
Environment	1,735	774	2,509
Social development	29,838	270,800	300,638
Social insurance	12	184,767	184,799
Social assistance	0	9,513	9,513
Health	4,737	40,924	45,661
Education	4,988	6,921	11,909
Sanitation	9,594	431	10,025
Housing	8,072	39	8,111
Urban development	2,277	68	2,345
Labor	158	28,137	28,295
Culture, justice, public order and safety, citizenship	1,831	2,016	3,847
Government and public service	658	1,958	2,616
National defense	5,652	4,917	10,569
TOTAL	153,390	305,573	458,963

PROPOSED RESOLUTION

BRAZIL. LOAN /OC-BR TO THE FEDERATIVE REPUBLIC OF BRAZIL
(Modernization and Expansion of the Fernão Dias Highway, Stage II Project)

The Board of Executive Directors

RESOLVES:

That the President of the Bank, or such representative as he shall designate, is authorized, in the name and on behalf of the Bank, to enter into such contract or contracts as may be necessary with the Federative Republic of Brazil, as Borrower, for the purpose of granting a financing to cooperate in the execution of the Modernization of the Fernão Dias Highway, Stage II Project. Such financing will be for the amount of up to US\$275,000,000 (two hundred and seventy five dollars of the United States of America) from the Single Currency Facility of the Ordinary Capital resources of the Bank and will be subject to the "Terms and Financial Conditions" and the "Special Conditions" of the Executive Summary of the Loan Proposal.