

Document of
The World Bank

FOR OFFICIAL USE ONLY

Report No. 1026

INTERNATIONAL BANK FOR RECONSTRUCTION AND DEVELOPMENT

PROJECT PERFORMANCE AUDIT REPORT

ON

BRAZIL FIRST HIGHWAY PROJECT (LOAN 567-BR)

February 12, 1976

Operations Evaluation Department

This document has a restricted distribution and may be used by recipients only in the performance of their official duties. Its contents may not otherwise be disclosed without World Bank authorization.

PROJECT PERFORMANCE AUDIT REPORTBRAZIL FIRST HIGHWAY PROJECT (Loan 567-BR)PREFACE

This report presents an audit of achievements under the Brazil First Highway Project for which Loan 567-BR in the amount of US\$26.0 million was closed in June 1974.^{1/} The loan and its preparation involved important objectives of institutional and sector policy nature, and the attempt has been made to treat these fairly thoroughly in the perspective of the last ten years, involving some coverage in this connection of the several subsequent loans which have been made in support of Brazilian transportation development.

This performance audit is based mainly on correspondence and reports in Bank files (Loan and Guarantee Agreements, President's and Appraisal Reports, Progress Reports, Supervision Reports, and correspondence between the Bank and the Borrower), as well as on discussions with staff members of the Departamento Nacional de Estradas de Rodagem (DNER). A Project Completion Report, prepared by the Latin American and the Caribbean Regional Office in March 1975, also was useful in the preparation of this report.

In May 1975, a two-week visit was made to Brazil in connection with this performance audit. The valuable assistance of the DNER is gratefully acknowledged.

^{1/} US\$3.15 million of the loan amount was cancelled.

PROJECT PERFORMANCE AUDIT REPORT

BRAZIL FIRST HIGHWAY PROJECT (LOAN 567-BR)

TABLE OF CONTENTS

	<u>Page No.</u>
Project Data	
Summary	
I. Introduction	1
II. The Bank and the Loan	3
III. Project Implementation and Costs	6
IV. Economic Justification	9
V. Institutional Achievements	10
VI. The Role of the Bank	22
VII. Conclusions	23

List of Annexes

- Annex 1: Freight and Passenger Transport by Mode, 1961-73
- Annex 2: Federal, State, and Municipal Highway Network, 1961-73
- Annex 3: Important Events Preceding Signature of the Loan Agreement
- Annex 4: Main Points Covered in the Letter of Intent
- Annex 5: Details About Roads Included in Project
- Annex 6: Project Costs and Delays
- Annex 7: Reasons for Cost Increases in BR-386, RS-4, and BR-116
- Annex 8: Forecast and Actual Traffic, 1974

Table of Contents (Cont'd)

- Annex 9: Vehicle Operating Cost on a Paved Level Road
- Annex 10: Actual as a Percentage of Forecast Cost and Benefits at Appraisal and Changes in the Appraisal Rate of Return
- Annex 11: Policy Objectives, Achievements and Bank Participation in the Transport Sector of Brazil 1965-74
- Annex 12: Maintenance of the Federal Highway Network, 1971 and 1974
- Annex 13: Highway Maintenance Expenditures of DNER

Charts: Staff Working in the Federal Railways

Supervision Organization Chart

- Maps:
1. Brazil
 2. Brazil, State of Minas Gerais, First Highway Construction Project
 3. Brazil, State of Parana, First Highway Construction Project
 4. Brazil, State of Santa Catarina, First Highway Construction Project
 5. Brazil, State of Rio Grande do Sul, First Highway Construction Project

PROJECT PERFORMANCE AUDIT REPORT

BRAZIL FIRST HIGHWAY PROJECT (LOAN 567-BR)

PROJECT DATA

Loan Amount	US\$26.00 million
Amount Disbursed	US\$22.85 million
Amount Cancelled	US\$3.15 million
Date of Appraisal Missions	June 1967 and May 1968
Loan Agreement Date	October 23, 1968
Original Effective Date	February 25, 1969
Actual Effective Date	May 16, 1969
Original Closing Date	December 31, 1972
Final Disbursement Date	June 1974

Exchange Rates (Brazilian cruzeiros)

1968-----	US\$1 = Cr\$3.8
1969 -----	US\$1 = Cr\$4.4
1970 -----	US\$1 = Cr\$5.0
1971 -----	US\$1 = Cr\$5.6
1972 -----	US\$1 = Cr\$6.2
1973 -----	US\$1 = Cr\$6.2
1974 -----	US\$1 = Cr\$7.4

PROJECT PERFORMANCE AUDIT REPORT

BRAZIL FIRST HIGHWAY PROJECT (LOAN 567-BR)

SUMMARY

Loan 567-BR for the Brazil First Highway Project was intended to finance construction and/or paving, detailed engineering, and supervision of seven road sections totalling 429 km. The Bank's involvement with this project goes back to 1964. Late that year, the Bank sent an economic mission to Brazil which identified important and deep-seated deficiencies in the transport sector. In 1965, a basic strategy was selected to deal with the problems. First, the need for a detailed study of the sector was clear. Second, immediate implementation was possible of certain improvements, such as readjustment of rates and tariffs, elimination of excessive personnel, closing of uneconomic services, and stopping of untimely construction of new facilities.

Implementation of this strategy began in 1965 when a Transport Survey, partially financed with a Bank grant, was initiated. The Government and the Bank agreed to include in this Survey feasibility studies of ten road sections that could be considered by the Bank for early financing. The feasibility studies were ready by September 1966, and the final engineering was contracted by the Government in October.

The formal application for the loan, including those ten road sections, was made in January 1967. An appraisal mission was sent to Brazil in June 1967, and four road sections were deleted from the proposal because their final engineering was not yet ready. Preparation of the appraisal report took about eight months mainly because of shortages and changes in Bank staff. In the meantime, one road section requiring urgent construction was dropped from the project because of deficiencies in bidding procedures. Also, final engineering of the four sections dropped from the project earlier was completed, and the Government asked the Bank to consider including them in the project. Another Bank appraisal mission went to Brazil in May 1968 and found two of these roads suitable for Bank support.

During loan negotiations, the Government pledged to sign a letter containing agreements on future transport policies and on a specific action program; signature was to be a loan condition. The main aspects covered in the letter referred to the reorganization of the Departamento Nacional de Estradas de Rodagem (DNER), need for adequate road user charges, reduction of the railway deficit, and improvements in port administration.

A US\$26.0 million loan was approved in October 1968. The total project cost was estimated at US\$65.5 million. Main project components

were: (a) construction, including paving, of three road sections (165 km); (b) paving of four road sections (264 km); and (c) detailed engineering and supervision of (a) and (b).

The loan did not become effective until about seven months after loan signature because of legislative difficulties, despite the Bank's insistence from the beginning of negotiations on the need to revise the legislation so as not to delay effectiveness. Fortunately, this delay did not negatively affect the project because it did not delay bidding.

No foreign firms participated in bidding and all contracts were awarded to Brazilian firms. The role of the Bank and the consultants in bid analysis and contract award was substantial. The Government informed the performance audit team that the help provided by the Bank and the consultants in improving traditional practices was an important contribution toward the training of local staff.

The project was completed in September 1972, about a year later than expected. At the time of the original completion date, about 82% of the work had been executed. The reasons for the delays were adverse weather, design changes, and problems with earthworks. The actual cost of the project (US\$56.5 million) was 14% below the appraisal estimate including contingencies (US\$65.5 million). Road construction (95% of the actual project cost) was completed with a cost underrun of 10%. On three of the road sections (23% of the actual construction cost), cost overruns occurred mainly due to design changes and additional work required. However, these design changes and additional works cannot be blamed on poor engineering, construction, or supervision. Moreover, the changes made and the way they were discussed and approved reflect very well on the quality of supervision by the Bank and the consultants.

There was a saving of US\$3.15 million in the loan account. Proposals for alternative use of this saving did not materialize, and the funds were cancelled in June 1974.

The audit rates of return on the seven road sections are satisfactory, ranging from 14% to 40%, and in five (77% of the actual construction cost) are higher than the appraisal rates. The main reasons explaining the higher than expected rates of return are: higher than forecast traffic growth, vehicle operating costs, and participation of heavy trucks in truck traffic, and lower than expected construction costs. For one of the remaining two roads, the audit rate of return is similar to the appraisal expectation, 14%, because the lower than forecast traffic growth was compensated by a cost underrun. For the other road, the audit rate of return is less than the appraisal expectation, 31%, because of a 35% cost overrun, but it is still satisfactory at 25%.

Together with this loan, the Bank reached a general policy agreement with the Government regarding the transport sector in general and

highways, railways, and ports in particular. However, the achievements in this regard can only be usefully examined in the context of agreements between the Government and the Bank during the last ten years and advances made in this whole period.

Policy objectives in the sector have basically covered the whole spectrum of existing problems. In the area of organization and operations, reorganization of most transport agencies has been sought, with special emphasis on improving efficiency and obtaining an adequate share of responsibilities between federal and state agencies. The establishment of a good coordinating group has also been a major objective. In regard to the planning area, the main goals have been preparation of modal master investment plans, initiation of construction only after proper analysis of feasibility and engineering, and rationalization of the budget process accordingly. In the pricing, financing, and regulation area, the main objectives have been to obtain cost based rates and user charges assuring an efficient allocation of traffic and to reduce deficits in an environment of free selection of alternative transport modes by users.

Achievements have been substantial in the area of organization and planning, but in general more limited in pricing, financing, and regulation. There are also several deficiencies to be corrected. In most cases where deficiencies have been detected, actions are being considered or implemented to correct them in the future, usually with important Bank participation.

Reorganization of the major transport agencies and improvements in their management and operations has made good progress. A coordinating agency for the transport sector, GEIPOT, has been established, but problems have arisen in fulfillment of its main function. The major deficiencies in this area are highly related to inadequate personnel policies in the public sector. This is probably the only important problem where action considered for the future is not adequate. The performance audit team is of the opinion that, unless this problem is aggressively dealt with, past advances may be lost and future improvements hard to achieve.

Planning has substantially improved and become institutionalized. Technical and economic feasibility is now generally studied before starting project implementation. The technical capacity of Brazilians, especially private consultants, has substantially improved as a result of the intensive planning and study work done during the last ten years. The main deficiency is the poor coordination of the studies being made and the lack of capacity of the public sector to absorb and properly examine the planning work done by consultants. General agreement can be observed between the projects implemented and the plan prepared with Bank assistance. The major differences are related to highway projects which, due to their special (social or strategic) nature, were not examined in the plan.

Achievements in the area of pricing, financing, and regulation have been more limited. The decrease in railway deficits after 1968 has been modest. Rail rates are low in general and are not properly related to costs. The level of highway user charges is now adequate. There is, however, a lack of studies to ascertain whether the structure is reasonable. At the Bank's suggestion, this problem will be examined in the ongoing Fifth Highway Project (Loan 1075-BR of 1975). Highway freight transport has remained free of regulation despite efforts by interested groups to restrict entry into the sector. The Bank has played an important role in preventing undesirable developments in this area. The program to control axle-load limits in the highway system has been unsuccessful. The administrative and political aspects of weight control received less attention from the Bank than the physical aspects, thus contributing to the lack of success of the program. It seems that the Bank could have taken earlier action to help correct the situation. Only very recently, in the Fifth Highway Project, has a more comprehensive approach been adopted.

The contribution of the Bank to the institutional build-up of the sector has been substantial. Probably its most significant general contribution has been promoting continuity in the objectives set for the sector. It can also be credited with important efforts to convince the Government of the importance of an adequate personnel policy. Unable to tackle the salary problem in the public sector, the Bank has emphasized the need for training programs.

In the relative preoccupation of the Bank with the different modes, there has been an imbalance favoring highways. This imbalance is in the process of being corrected as a result of the Second Railway Project (Loan 1074-BR of 1975).

In short, the First Highway Project has been successfully completed. The audit rates of return of the roads included in the project are satisfactory and important institutional changes in the Brazilian transport sector have been achieved. The institutional build-up of the sector has advanced but is not completed, and continued Bank efforts seems essential for its fruition.

PROJECT PERFORMANCE AUDIT REPORT

BRAZIL FIRST HIGHWAY PROJECT (LOAN 567-BR)

I. INTRODUCTION

1.01 Substantial World Bank involvement with the Brazilian transport sector dates from 1964.^{1/} Late that year, the Bank sent a mission to prepare a report on the economic position and prospects of Brazil, with special emphasis on the transport sector. This mission discovered important and deep-seated deficiencies. First, development, management, and operation of the system were largely oriented by political considerations and not subject to rational planning and control. Second, transport was not coordinated between agencies and sector policies were not clearly designed. Third, transport agencies were poorly organized, and there was a large degree of duplication and overlapping among agencies in the same mode. Fourth, the transport sector was the single most important cause of the large public deficit because costs were not being covered by users. Fifth, users were free to choose transport alternatives, but costs were not reflected in rail and port rates and proper user charges were not applied on highways, probably resulting in misallocation of traffic between modes and inefficiencies in the geographical distribution of activities. Finally, there was a clear need to provide the country with a larger transport capacity to allow for its development.

1.02 The Government and the Bank selected a basic strategy to deal with the problem. First, the need for a detailed study of the sector was clear. This study was to begin as soon as possible and cover the analysis of investment programs, organization and operations, and transport policies. Second, immediate implementation of certain improvements was possible, such as readjustment of rates, elimination of excessive personnel, closing of uneconomic services, and stopping of untimely construction of new facilities. These actions were to form the backbone of a short-term transport policy. Once the studies were completed, new investment projects were to be started and old ones which proved economically feasible were to be continued, and the sector was to be reorganized following the recommendations. The Government and the Bank concurred that this was the best course to follow.

1.03 Bank participation in the Brazilian transport sector has been substantial. Eight loans for a total of US\$642 million, and one grant for US\$1.5 million have been approved since 1965:

^{1/} The only previous loans for the transport sector were a railway loan (65-BR for US\$12.5 million in 1952) and a highway maintenance loan (75-BR for US\$3 million in 1953).

1965--US\$1.5 million grant to help finance Phase I of a Transport Survey

1968--First Highway Project, Loan 567-BR, US\$26 million

1970--Second Highway Project, Loan 676-BR, US\$100 million

1971--Santos Port Project, Loan 756-BR, US\$45 million

1971--First Railway Project, Loan 786-BR, US\$46 million

1972--Third Highway Project, Loan 813-BR, US\$89 million

1972--Fourth Highway Project, Loan 854-BR, US\$51 million

1975--Second Railway Project, Loan 1074-BR, US\$175 million

1975--Fifth Highway Project, Loan 1075-BR, US\$110 million

1.04 The loans for the highway sector have supported construction and improvement of 5,446 km, paving of 5,710 km, final engineering of 8,084 km, and feasibility studies of 7,818 km. In addition, they have supported consultants' services for: supervising construction and paving of roads, improving the supervisory capacity of the Departamento Nacional de Estradas de Rodagem (DNER), and strengthening of planning. In the last loan (1075-BR of 1975), finance was also provided for consulting services in maintenance and for acquisition of weighstations for DNER and maintenance equipment for two State Highway Departments (DERs). The Bank has approved highway loans totalling US\$376 million, which cover 40% of programs amounting to US\$946.4 million. Other international agencies active in the Brazilian highway sector have been IDB and USAID.

1.05 Between 1964 and 1973, substantial changes have taken place in the transport sector. Ton-kilometers of freight transported have increased at 10% a year and passenger-kilometers have increased at 11.9% a year. Major changes have taken place in the modal distribution of transport, with the share of highways having increased from 68% of total freight and 81% of total passenger-kilometers in 1964 to 74% and 94%, respectively, in 1973 (Annex 1). During this period, a very intensive program of highway construction and improvement has been implemented. Paved federal and state roads have increased by approximately 50,000 km, from 18,000 km in 1964 to 68,000 km in 1973 (Annex 2). Railways have experienced important changes both in organization and operation, and ports have been improved. Investment in transport was 50% of total federal investments between 1968 and 1973.

II. THE BANK AND THE LOAN

2.01 The history of Loan 567-BR goes back to 1965, when the terms of reference for the Transport Survey were prepared. At that time, the Bank and the Government agreed to include, as part of Phase I of the Survey, feasibility studies on road projects that could be considered by the Bank for early financing. After careful analysis and discussion by a Bank Mission that went to Brazil in May/June 1965, the sections to be studied were selected from the four states where Highway Master Plans were going to be prepared under Phase I. Important steps in project preparation during the three years and three months before signature of the First Highway Loan in October 1968 are summarized in Annex 3.

2.02 The greatest difficulty in the selection of these high priority roads for appraisal was the fact that improvements, not only for grading, drainage works, and bridges but also for the asphalt paving structure, for most of them were already under contract. Many of these construction contracts had been hastily awarded under political pressure to show activity on particular roads, despite lack of proper engineering and sufficient funds. In all these cases, the Bank required Government assurance that engineering would be completed and construction limited to grading, drainage works, and bridges. Construction of pavement structures was to be cancelled until the feasibility studies were ready. Ten road sections were selected (two in Minas Gerais, three in Parana, one in Santa Catarina, and four in Rio Grande do Sul); work had begun on all but two.

2.03 The feasibility studies, supported by the Bank's Transport Survey grant, started in October 1965 and were ready by September 1966. In October 1966, the Government asked the consultants who had prepared the studies to complete final engineering for the ten road sections. There was an implicit understanding that retroactive financing of these studies under the proposed loan was to be considered. The Minister of Transport formally applied for the loan in January 1967. The Bank agreed to appraise all road sections for which earthwork and final engineering would be ready by the time of appraisal in June 1967. Only six out of the ten sections were completed in time and the remainder were left for consideration some time in the future.

2.04 While the Bank was preparing the appraisal report, a process that took about eight months (June 1967-February 1968) due to Bank staffing shortages and changes as well as the need to update costs and construction schedules on the basis of detailed engineering, the Minister of Transport requested Bank agreement to award contracts before loan signature. The Minister was under heavy pressure to start work on road BR-262, joining Belo Horizonte with the Western region of the State of Minas Gerais. Considering the delays in loan processing, the Bank agreed, providing that its approval would be obtained for prequalification of firms, bid and contract documents, and contract award.

2.05 In October 1967, DNER started prequalification procedures, but in March 1968 the Bank, while reviewing the procedures, discovered that advertisements for prequalification of firms had been placed in foreign newspapers after the closing date for prequalification. The delay apparently was caused by the complex bureaucratic process involved in placing the advertisements.^{1/} As a result, in April 1968, the Bank requested DNER to reopen prequalifications. The delay involved in this new process was not acceptable to the Brazilians, who decided to drop BR-262 from the project (about 30% of the proposed project cost) and asked to substitute for it four sections eliminated earlier for which engineering and earthwork then was ready. Another Bank mission went to Brazil in May 1968 to appraise the additional four sections and update information. Consequently, the Bank agreed to incorporate in the project two of the four road sections requested by the Government.

2.06 Another issue discussed during the period was contractual arrangements for implementation and control of the loan. These arrangements presented problems since the project included both federal and state roads. Initially, the idea was to sign the loan agreement with the Federal Government (DNER as executing agency) and project agreements with each state involved, providing more leverage to the Bank with the states. But, as these agreements would require approval by the Federal Senate, it was decided that, as a condition of loan effectiveness, the Federal Government (DNER) would sign agreements with the states guaranteeing proper implementation. Out of the seven sections included in the project, only two were to be contracted and supervised by DNER; the rest were to be contracted and supervised by the states.

2.07 The Bank also gave substantial attention to the establishment of a disbursement procedure to avoid exhaustion of the loan before project completion in case the exchange rate was not increased according to changes in domestic costs. A procedure was agreed in which disbursements were to be made on the basis of unit costs expressed in dollars, at the exchange rate applicable on the date of bid opening. These dollar unit prices, rather than a fixed percentage of costs at the prevailing exchange rate at the time of payment, were to be the basis for reimbursements. This procedure, constituting an innovation when this loan was discussed, has worked well, with some improvements, for this and other loans in Brazil.

2.08 During negotiations in May/June 1968, the Federal Government gave undertakings concerning:

- (a) supervision of construction by the consulting firms responsible for detailed engineering;
- (b) legalization of the revised bidding and contract procedures prepared for this loan; and

^{1/} In the Second Highway Project, the Bank made sure that advertisements for prequalification of firms were placed on time.

- (c) effectiveness of a law regarding duty free import of road construction equipment if such equipment were not produced domestically or, if produced domestically, was 15% more expensive than the imported equipment (valued at c.i.f. price).

2.09 Also during negotiations, the Bank made a point of obtaining from the Federal Government a letter containing certain agreements on future transport policies and on a specific action program; signature would be a condition for loan signature. The main aspects covered in the letter concerned the reorganization of DNER, need for adequate road user charges, reduction of the railway deficit, and improvements in port administration (Annex 4). A reference to this letter was included in the loan agreement. Failure to perform in respect of undertakings in this letter would not be an event of default, although it would have a bearing on Bank decisions to make further loans in the transport sector.

2.10 A loan for US\$26 million was approved by the Board in October 1968. The total project cost was estimated at US\$65.5 million. The loan was to finance 40% of the construction cost and the full foreign exchange cost of consultants, including retroactive financing of their services from April 1, 1967. The project consisted of: ^{1/}

- (a) construction, including paving, of three road sections totalling 165 km (see map);
- (b) paving of four road sections totalling 264 km (see map); and
- (c) detailed engineering and construction supervision for the proposed works.

2.11 Loan effectiveness was contingent upon fulfillment of the undertakings in para. 2.08 and upon conclusion of agreements with the states, satisfactory to the Bank, for construction of sections under their responsibility and for adoption of the procedures for construction supervision and contract award explained in two of the undertakings ((a) and (b)). In addition to the standard loan covenants, special covenants were included to ensure enforcement of weight regulations; implementation of the consultants' recommendations about highway maintenance; reorganization of the DNER and of the DERs of Minas Gerais, Parana, Rio Grande do Sul, and Santa Catarina; maintenance of the revolving fund at a level sufficient to cover three months' construction work; acquisition of right-of-way for the roads, and implementation of construction supervision arrangements.

^{1/} Details about the roads included in the project are shown in Annex 5.

III. PROJECT IMPLEMENTATION AND COSTS

3.01 The loan became effective on May 16, 1969, about six months after loan signature. The delay was due to difficulty in complying with the following conditions:

- (a) issuance of the decree to facilitate duty free import of equipment for contracts under the project. This action was delayed by the bureaucratic process involved;^{1/}
- (b) agreements between DNER and some of the states where road sections were to be constructed. These arrangements were hard to settle on the terms requested by the Bank. With the state of Minas Gerais, agreement was easy, but with the others, especially Santa Catarina, it was more difficult. Substantial points of friction arose. The most sensitive concerned supervision of works by foreign private consultants, which was seen as discrediting the technical capacity of State Highway Department engineers, who had been doing supervision for a long time, and the capacity of Brazilian engineers in general;^{2/} and
- (c) legalization of the revised bidding and contract procedures of the loan. This action was delayed by DNER's lack of experience in this regard. Fortunately, the delay did not affect the project negatively because it did not slow down the bidding process.

3.02 Contracts for the construction works were let on the basis of international competitive bidding. But despite reopening of prequalification (para. 2.05), no foreign firms participated in the bidding. The reason for their lack of interest seems to have been the competitiveness and efficiency of the Brazilian construction industry. This competitiveness was mainly the result of underutilization of the Brazilian construction firms at the time of bidding. Efficiency of these firms was confirmed later by their successful participation in works outside the country. Bids were received in April 1969 and contracts were awarded to the lowest bidders, except in one case where the lowest bidder presented extremely low prices and had major equipment deficiencies. In this case, the next eligible bidder was selected. After revision of bids, the Bank recommended that additional equipment be included by the contractors so that delays in implementation would be avoided. All contracts were signed between

^{1/} From the beginning of negotiations in 1966, the Bank had made clear the need to revise legislation regarding import of equipment. The Bank raised this point again in letters and during appraisal.

^{2/} Professionals had been strongly arguing against the intensive use of foreign consultants in the Transport Survey. (See para. 5.11.)

July and September, and work on most road sections started immediately.

3.03 The role of the Bank and the consultants in bid analysis and contract award was substantial. This was the first loan for highways in the country, and a great effort was made by the Bank to improve traditional practices in this regard. The Government pointed out to the performance audit team that the help provided by the Bank and the consultants was an important contribution toward the training of local staff.

3.04 The total cost of the project was US\$56.5 million as against US\$65.5 million estimated at appraisal. Therefore, the cost underrun was 14% (Annex 6). Road construction (95% of the actual project costs) was completed at a cost 10% lower than the appraisal estimate (including contingencies). The reasons for this cost underrun are not clear in the files, but it seems that the major factors were the Brazilian construction industry's competitiveness and its underutilization at the time of bidding for this project.^{1/} The contract cost for each road section was below the appraisal estimate. Four of the seven sections were completed with cost underruns and the remaining three sections with cost overruns ranging from 8% to 35%.

3.05 The main reason for the cost overruns was the need to increase earthworks. In general, embankment failures and settlements were encountered where earthworks were finished before the start of the Bank-supported project (especially on RS-4). In sections where no previous earthwork had been done, difficult soil conditions led to more work than originally foreseen. In these sections, the amount of material needed for the fills also was miscalculated. The designs assumed that material taken from cuts could be used for fills in a one-to-one proportion. This was not possible because the fills required more material due to compaction. Additional erosion protection and drainage, not provided in the original designs, also proved very costly. Some sections, especially BR-116, also required additions to provide better conditions for traffic and to improve safety. A more detailed analysis of the reasons for the cost overruns on Sections BR-386 (9%), RS-4 (8%), and BR-116 (35%) is given in Annex 7.

3.06 In regard to the changes that had to be made and the failures that occurred, it is important to stress that:

- (a) only in certain cases can they be blamed on inadequate engineering. The solutions adopted at appraisal were those that seemed most reasonable from an economic and technical viewpoint;
- (b) new solutions were carefully analyzed and prompt action taken when problems appeared; and

^{1/} A contributing factor to the cost underrun might have been conservative estimates of construction costs at appraisal. A precise judgment on this matter would require extensive research which is outside the limits of this performance audit, but no evidence implying that the estimates were too conservative has been found.

- (c) the contractors' performance and quality of work was satisfactory. This in itself was an achievement, considering that this was the first Bank-supported highway construction project in Brazil, involving increased contractual discipline and adherence to strict construction standards and timetables.

Moreover, the changes made and the way they were discussed and approved reflect very well on the quality of supervision by the Bank engineers and the consultants.

3.07 The other component of the project, detailed engineering and construction supervision (5% of actual project costs), was completed at half the cost estimated at appraisal (Annex 6). The reasons for this cost underrun are not clear in the files, but from the very beginning of the project (June 1970) the estimated cost for these services was revised downward from US\$5.2 million to US\$2.8 million.

3.08 Construction was scheduled to be completed by September 1971, but the last contract (BR-116) was not completed until September 1972 (Annex 6). At the time of the original completion date, about 82% of the works had been completed. The reasons for the delays were: adverse weather conditions, design changes (especially on Road BR-116), and problems with the earthworks mentioned earlier (para 3.05).

3.09 DNER's submission of disbursement requests was very slow in the beginning due to unfamiliarity with Bank procedures. But once DNER was properly instructed on procedures, submissions came in regularly. Final disbursements were smaller than the allocated funds, resulting in a saving in the loan account of US\$3.15 million. Discussions took place within the Bank and between the Government and the Bank concerning the possible use of this saving for a study of highway cost interrelationships and for an integrated urban study of Sao Paulo. Agreement could not be reached during these discussions, and, as alternative proposals did not materialize, the funds remaining in the loan account were cancelled in June 1974.

3.10 The request for detailed engineering made by the Bank and the adequate supervision by the Bank and the consultants were important factors explaining the successful completion of the project. Construction supervision was done by INGEROUTE (France) for Road 381-BR in Minas Gerais and by KAMPSAX (Denmark) for the remaining roads. KAMPSAX was particularly successful in controlling costs. For supervision of the works in the three southern states, a coordination group was formed between KAMPSAX, DNER, and the three DERs, with headquarters in Porto Alegre. This group helped coordinate operations of the various entities involved, transfer knowledge, and establish control and supervision procedures.

IV. ECONOMIC JUSTIFICATION

4.01 The economic justification of the project at appraisal was based on the expected reduction in vehicle operating costs and highway maintenance costs, shortening of routes, and savings in time in the case of the urban roads. The expected rates of return on the individual road sections range from 14% (BR-476 and BR-381) to 40% (BR-468), as shown in the following table. The audit rates of return on all the road sections are satisfactory and in five out of seven are higher than the appraisal rates of return. 1/

<u>Road Section</u>	<u>Proportion of Total Actual Project Costs</u>	<u>Estimated</u>	
		<u>Economic Rate of Return Appraisal</u>	<u>Audit</u>
	----- % -----	-----	-----
BR-476	14	14	14
BR-468	9	40	740
BR-470	18	20	>20
BR-386	19	21	>21
BR-116	10	31	25
RS-4	10	34	>34
BR-381	<u>15</u>	14	>14
Total	<u>95</u>		

4.02 Several favorable factors explain the higher than expected rate of return on five of the seven road sections. First, actual traffic was higher than forecast (Annex 8). The reasons for this higher traffic growth could not be studied in detail in this performance audit, but they seem to be closely associated with the rapid growth of the Brazilian economy since the time of the appraisal. Second, vehicle operating costs (VOC) in real terms are now higher than at appraisal (Annex 9). The main reason for the difference seems to be the substantial change in the price of the VOC components, in particular fuel, during the past few years. Third, the participation of heavy trucks in total truck traffic has also been higher than forecast (Annex 8). Therefore, higher benefits than anticipated at appraisal have been obtained.

4.03 The combination of these favorable factors has more than outweighed the cost overrun on three of these five road sections (BR-470, BR-386, and RS-4), producing a rate of return at audit higher than that expected at appraisal (Annex 10). In the case of the other two sections

1/ The audit rates of return have been estimated on the basis of actual construction costs and traffic counts, their projection over the useful life of the roads, and new estimates of vehicle operating costs. When the changes in benefits and costs of each road section with respect to the appraisal estimates indicated a higher rate of return, no precise calculation of the audit rates of return were made. These calculations were made only in the cases where the audit rates of return appeared lower than the appraisal estimates.

(BR-468 and BR-381), the cost underrun has been reinforced by the three favorable factors already mentioned.

4.04 With regard to the remaining two sections (BR-476 and BR-116), BR-476 is the only one where actual traffic has been lower than forecast (Annex 8). This section, from Sao Mateus do Sul to Uniao da Vitoria, is part of a long-distance route linking the west of Santa Catarina and the northwest of Rio Grande do Sul with Curitiba and Sao Paulo. The route from Uniao da Vitoria to the south is now being constructed under the Fourth Highway Project and traffic conditions are extremely poor. A comparison of traffic forecasts at appraisal with actual traffic shows that, if long-distance traffic is deducted, actual traffic is higher than forecast. When construction is completed under the Fourth Project, traffic probably will increase over the original forecast.

4.05 The lower than forecast traffic and consequent lower benefits have been compensated by a construction cost underrun (Annex 10). Therefore, the audit rate of return is similar to the appraisal expectation of 14%.^{1/}

4.06 In the case of BR-116 (Sao Leopoldo-Novo Hamburgo), variations in costs and benefits with respect to the appraisal resulted in a decrease in the rate of return from 31% at appraisal to 25% at audit, using the most conservative assumptions (Annex 10). Nevertheless, the rate of return is probably higher than 25%. A substantial part of the construction cost increase is explained by changes made to improve traffic conditions and safety, such as provision of separate level access to Sao Leopoldo and Novo Hamburgo, side streets to give access to activity along the road, fences, and guard rails. These additional facilities were justified since this is a dual carriageway road serving heavy traffic in an area of high industrial and residential density with an extremely high incidence of accidents. The changes made originally had been considered for a second stage of improvement, and the Bank only approved their inclusion in this first stage after their economic justification was proved in a special study by consultants.

V. INSTITUTIONAL ACHIEVEMENTS

5.01 The Bank has attempted to introduce important institutional changes in the Brazilian transport sector since 1964. The instruments used were the First Highway Project and subsequent loans to the sector in the 1964-75 period. Because the First Highway Project was only one part of this process, isolation of the institutional changes directly

^{1/} This is a conservative estimate because the rate of return would increase if the traffic originally forecast is reached after 1975.

attributed to this project from those which occurred in the whole transport sector since 1964 is difficult. Therefore, the institutional changes in the period are discussed in this performance audit in a general way, without associating them to a particular project. The necessary institutional changes in the sector have been consistently examined by the Bank, and the Government has generally been receptive to the Bank's suggestions. But the two parties have not always easily agreed on the opportunity, urgency, and intensity of the different changes. The Government and the Bank have tended over time, however, to develop a close relationship. The Government has understood better the nature and convenience of the Bank's recommendations, and the Bank has improved its understanding of the limitations on possible institutional achievements imposed by the particular characteristics of Brazil.

5.02 The major institutional objectives pursued by the Bank in the Brazilian transport sector can be classified in three main groups which deal with:

- (a) institutional organization and improvement of operations;
- (b) investment planning; and
- (c) pricing, financing, and regulations.

The main objectives of each group and the achievements toward their implementation are summarized in Annex 11.

5.03 One of the main objectives concerning institutional organization was to establish an effective coordinating agency, with adequate staff and authority, to supervise and coordinate planning, budgeting, financing, and policy making in the sector. Coordination in 1964 was the joint responsibility of an understaffed planning unit in the Ministry of Transport and a National Transport Council which met irregularly, received no support, and wielded no effective power. Another objective, as far as the modal agencies were concerned, was to modify the relationship between federal and state agencies -- strengthening planning and control functions of the former and operational functions of the latter. In the case of highways, the responsibility for maintenance and construction done by DNER had to be transferred to the DERs to avoid duplication of personnel and equipment. In the case of railways, the federal system had to be consolidated into regional systems and merged with the state systems to improve coordination and implement more efficient procedures. In the case of ports, the National Port Department had to be transformed into a coordinating and policy making agency which could set up autonomous and financially viable entities to run the ports.

5.04 These changes in organization had to be implemented, together with improvements in operations and procedures. For highways, planning had

to be strengthened at all levels and procedures improved for contracting and supervising construction and maintaining the road system. For railways and ports, management had to be businesslike. Railways, in particular, had to: reduce personnel; close uneconomic lines, stations and services; and establish better management practices. Deficits in the railways were largely related to poor operations.

5.05 The objective in regard to investment planning was to establish a planning system where rational technical and economic criteria prevailed over political or other pressures. This implied preparation of modal master investment plans, taking into consideration intermodal complementarity and competition as well as feasibility and final engineering studies before projects were implemented, and rationalization of the budgeting process accordingly. Coordination of federal and state investment programs also had to be substantially improved.

5.06 The objective in the area of pricing, financing, and regulations was to develop an environment of free selection of alternative transport modes where user charges, i.e. rates and taxes, conformed to real economic costs of transport in different modes. In the case of railways and ports, rates had to reflect transport costs. This not only implied revision of existing rates but also implementation of accounting systems suitable to the identification of the actual economic cost of different services. In the case of highways, user taxes had to be revised and proper control established of the weight and type of vehicles in use. In addition, to eliminate deficits, rates had to be readjusted in accordance with inflation and costs of uneconomic services of a social or strategic nature had to be covered by the Government.

5.07 Achievements in implementation of the different policy objectives since 1964 are summarized in Annex 11. They have been substantial in the area of organization and planning and generally more limited in pricing, financing and regulation. Progress has been most significant in the highway sector, which has received the most attention from the Bank. Substantial improvements have also been achieved in the railway sector through reorganization, reduction of personnel, and elimination of unnecessary services.

5.08 The changes during the last ten years have been made together with a large expansion in transport capacity, especially in the highway sector. An important achievement is that, to a large extent, new facilities have been properly selected and evaluated as well as constructed with adequate engineering and supervision. It should, nevertheless, be recognized that some objectives have not been achieved and that important efforts are still needed to consolidate advances and correct deficiencies. Significant changes since 1964 are examined below in the light of the problems faced in achievement and the need for future action.

A. Organization and Operations

(a) GEIPOT

5.09 A quite original arrangement was chosen in 1965 to answer the need for coordinated action in the area of studies and policy implementation. An executive group, Grupo Executivo de Integracao da Politica de Transportes (GEIPOT), integrated personally by the Ministers of Planning, Finance, and Transport as well as the Head of the Joint Chiefs of Staff, was created. This group was provided with its own independent staff under the direction of a superintendent, who was an experienced engineer of proven ability and in charge of the Federal Highway Department. Main **assignments** were to supervise sector policies and provide Brazilian counterparts for the execution of the Transport Survey, together with foreign consultants. This group, which was freed from normal political pressures and had exceptionally strong backing, was given flexibility to hire good quality technicians. Its work started with the initiation of the Transport Survey, and after a year its staff numbered about 90 engineers and economists working basically on that Survey.

5.10 The first phase of the Survey was concluded in 1966; the second phase was started in 1967 and finished in 1969. During that period, GEIPOT concentrated on the studies. As a result, its staff became familiar with the problems examined and with transport analysis and planning techniques. But, as early as 1967, GEIPOT was having great problems in fulfilling its role of controlling policies and inducing the transport agencies to implement recommendations made in the Transport Survey, mainly because no clear institutional relationship existed between GEIPOT and the agencies. In addition, a change in Government had produced a change of top executives in the sector, including the superintendent of GEIPOT. The new superintendent, who was to last until 1972, did not provide adequate leadership and problems began to appear. Also, the private sector began to attract GEIPOT technicians. Consequently, as studies were completed, the new role of the institution became increasingly confused.

5.11 Political problems also arose. The extensive use of foreign consultants in the Survey and the high wages which GEIPOT had to pay to attract adequate Brazilian staff were the object of heated controversy both in Congress and in the press during 1966-67. Traditional transport managers and engineers objected to the need for foreigners and questioned their knowledge and understanding of Brazilian conditions as well as the effectiveness of the contributions they could make. Despite the fact that the subsequent evolution of Brazilian engineering, consulting, and planning techniques has shown the important contribution of the initial GEIPOT operation in this area, the debate that took place substantially weakened the image of GEIPOT among important people in key positions, thus jeopardizing implementation of its plans.

5.12 In 1969, after the conclusion of the Transport Survey, GEIPOT was established as a permanent agency under the Ministry of Transport at the same level as other transport agencies. The staff was somehow dispersed, an important part going to work in the Ministry, mainly in day-to-day policy operations, and some to DNER. The activities of the approximately 30 technicians working in the Rio headquarters were focussed mainly on studies, most of which dealt with revision of data and methodology. Very little, if any, work was done on the substantial problems of transport coordination. Despite new policy directives from the Minister of Transport, formulated in 1971 at the Bank's suggestion, the situation changed little. GEIPOT lacked the authority and probably the technical superiority over the transport agencies to successfully induce changes in their plans and policies.

5.13 The worsening situation reached bottom in 1972, as shown by the report of a transport sector review mission sent by the Bank in that year, and led to replacement of the superintendent. Under the new leadership, still in charge, important changes have taken place. To solve the administrative inflexibilities of Government agencies and to enable the hiring of good people, GEIPOT was transformed in 1973 into a Public Incorporated Enterprise. As a result, the staff has been substantially enlarged and strengthened, and its influence on the formulation of transport policy has increased. Nevertheless, the role of GEIPOT as a Central Agency for Transport Coordination is far from clearly established or institutionalized. GEIPOT is basically operating as a public consulting firm, providing services under contract to the Ministry of Transport and the federal and state transport agencies. Many of the studies and works being done, such as the analysis and projection of transport flows, the development of transport information systems, and the assistance to the Ministry of Transport, are key elements for good coordination. Nevertheless, GEIPOT lacks the tools to control or direct the preparation of plans and policy studies, to control and influence the performance of the different modes, and to obtain corrective action. The fact that GEIPOT itself has regained strength is not a clear sign that the original need for which it was created is being properly met. Many signs of poor coordination still exist.

5.14 The history of GEIPOT is quite illustrative of the problems posed by public sector personnel policies on the building up of adequate public institutions in Brazil. The original set up was largely determined by the need to provide the institution with flexibility to attract good staff. The new set up has also been determined by the same need. Efforts failed to make the institution an integral part of the Ministry of Transport with clearly defined authority over the sector, mainly as a result of the problems involved in attracting permanent high-level technicians to Government service.

(b) The Highway Sector

5.15 DNER was reorganized in 1969, following a study by consultants (Annex 11). Since then, continuous efforts and achievements have been made to improve administrative, planning, and operational procedures. Positive results have been achieved in:

- (a) bidding and contract procedures;
- (b) construction supervision;
- (c) planning, programming, and budgeting;
- (d) project analysis and preparation;
- (e) computerized accounting and other systems;
- (f) maintenance procedures; and
- (g) administrative systems.

Problems have nevertheless occurred in moving toward delegating construction and maintenance responsibilities to the DERs. Construction of federal roads has been delegated in only a few cases and to states like Minas Gerais and Rio Grande do Sul, where the state highway departments are adequate. Delegation of maintenance has progressed a little in absolute terms, but has decreased as a percentage of the total network (Annex 12).

5.16 The pace of delegation has been limited by the:

- (a) capacity of the DERs to properly maintain a larger extension of roads;
- (b) poor condition of some federal roads requiring major improvements before transfer; and
- (c) lack of sufficient funds for maintenance, making it necessary for DNER to concentrate resources on maintenance of main highways, leaving insufficient funds for the rest of the system.

5.17 Efforts have been made to improve maintenance and speed up delegation. USAID has helped several states finance new equipment and has given a great amount of technical assistance. Under the Transport Survey, consultants carried out maintenance studies in 18 states, recommended improvements in maintenance methods and operations, listed equipment needs, prepared maintenance programs, and advised on organizational

changes. To increase delegation and to improve the procedures involved, a system of pilot regions within some states was started in 1971. In each region, all federal roads were to be transferred to the state for maintenance. By September 1971, pilot regions had been established in the four states included in the First Highway Project. By 1974, regions had been set up in a total of nine states. In other regions of the states and in other states, there were also federal roads whose maintenance was delegated. A substantial part of the federal network is delegated "de facto" since DNER provides funds for only 45% of delegated paved roads and 31% of delegated unpaved ones (Annex 13). To keep pace with the increasing needs for maintenance, in 1970 DNER also started a program of contracted maintenance which, in 1974, covered 27% of the roads directly maintained by DNER.

5.18 By 1973, it became clear to the Bank that a greater effort was required to substantially improve the maintenance situation. State highway departments were not being strengthened quickly enough. In addition, the delegation of roads without the necessary funds for their proper maintenance created an untenable situation since the DERs were short of funds for maintaining their own systems. As a result, with the initiation of the Fifth Highway Project, a full-scale program for strengthening the DERs has been started. This program has begun with the DERs of Rio Grande do Sul and Minas Gerais. In future projects, other DERs probably starting with Parana, Bahia, and Pernambuco, may be included. Delegation of the entire federal network in these states in a relatively short period (five to six years), and strengthening of the technical capacity of the Maintenance Division of DNER that should conduct the program, is envisaged.

5.19 Advances in the organization and operations of the highway sector have been seriously limited by the personnel policies followed in the public sector. Most changes made have been designed and implemented by consultants with a limited participation of the agency's own staff, which in most cases have been supervising consultants' work. While the capability of some organizations has been built up this way, it is not clear that the capability of their staff has experienced a parallel growth. In several cases, it appears that when consultants leave their recommendations are not implemented, or even if they are, old routines tend to return. There has been a tendency for consultants to complete assignments with improper emphasis on the institutional build-up their work must achieve. There also has been a tendency to hire consultants to perform work that should be routine within the organization. Meanwhile there are clear and substantial problems related to attracting and retaining qualified staff within the agencies. The performance audit team's opinion is that unless this situation is corrected further progress will be difficult and advances already made may be lost. Development of

the administrative, planning, and control capacity of the Brazilian Highway Sector suggests the possibility that the application of new lending policies along the lines of "Highway Sector Lending" can be successfully implemented.

(c) Railways

5.20 Following the recommendations of the Transport Survey, the Federal Railways were reorganized in 1969. Four regions were created, with regional managers responsible for three of four of the former lines. Despite the small effective power of these managers, important advances have been obtained in implementing standard procedures throughout the network and in coordinating operations. At the same time, the planning and control capacities of the central staff of Rede Ferroviaria Federal S.A. (RFFSA) has been strengthened. The state railways of Sao Paulo have also been consolidated through the creation of a state railway corporation, FEPASA. As a result, at present, with the exception of 1,653 km of lines moving specialized traffic and operated by private or public independent companies, 30,000 km are managed and operated by two companies, RFFSA (25,000 km) and FEPASA (5,000 km). Continuous efforts to merge these companies have not succeeded, mainly due to the conflicting interests of the Federal Government and Sao Paulo state government regarding financial and administrative matters. Efforts to complete this merger still are being made.

5.21 Important achievements can be observed in certain areas of RFFSA operations. Staff has decreased by 26% between 1964 and 1973, largely as the result of policies started in 1964 (Chart 2). Uneconomic lines and stations also have been successfully closed. However, other areas of operations have not improved significantly. Despite advances in staff reduction and closing of uneconomic services, deficits have been reduced only slightly and intermittently during the last six years. Important improvements in operations and further reduction in deficits are expected under the Second Railway Project.

B. Investment Planning

5.22 Before 1964, transport planning in Brazil had been mainly a political process oriented toward identification of routes to be financed with federal money. Feasibility studies of investment projects were not made. In 1964, a national transport plan was approved after years of discussion in Congress. But the plan only identified federal connections without indicating priorities and costs. The large states had plans of their own, which sometimes included national as well as state facilities, and did not consider interrelations between modes. The result was implementation of projects of doubtful justification, dispersion of

funds for work whose implementation dragged on for years, and lack of coordination of investments in different modes by federal and state agencies.

5.23 Top priority was given in 1964 to the task of preparing a transport investment plan. Between 1965 and 1969, plans were completed for all modes, excluding aviation. But they did not cover all the country, the north being left out because of the peculiar nature of its colonization problems. The plans also did not cover all types of facilities. In highways, only important links were examined, and in ports, only the three major ports were included. The sheer size of the survey to be made and the deadlines required for timely use of the results made wider coverage impractical. The survey was generally of good technical quality. By 1969 (and partially in 1967), it provided the Government with a reasonable coverage of the transport sector.

5.24 No adequate analysis has yet been made of the degree to which the plan proposals were followed or the major deviations **justified**. Very few transport executives or technicians outside GEIPOT became truly familiar with the plan and its recommendations. The enormity of it and the delay in its translation (over two years) constituted quite a serious obstacle for its diffusion. The facts that it had been prepared by foreigners and outside the agencies which had to execute it also were disadvantages. Nevertheless, analysis of the budgets and investment plans since 1968 shows that it became the backbone for allocating funds. It also provided support for the Government and transport agencies in resisting political pressures.

5.25 The Government generally fulfilled its commitment to suspend construction of certain projects and not to initiate new projects while the plan was under preparation. In railways, work continued on agreed sections, the main exception being a rail line in Parana which was continued by the state with its own funds. In highways, lack of funds made it easy to devote resources to the conclusion of agreed projects.

5.26 The major changes with respect to the plan occurred in the highway sector. These changes, nevertheless, were related to projects that had not been included in the plans for analysis, either because the region had not been examined (Transamazonica), or because the type of project had not been considered for analysis (penetration roads, agricultural development roads, international connections, urban type facilities, etc.) due to their large social and political implications. Justification of these highway projects was not always clear, and in some cases was quite questionable, but because they were financed through special programs created by the Federal Government (PIN, PROTERRA, PRODOESTE, PROGRESS) and did not reduce normal resources of the highway sector, it was difficult for the Bank to question their implementation. In general, these programs answered legitimate needs and it was impossible to show that they were not technically or economically feasible. However, a critique of the Bank's attitude in the selection of the roads included and its subsequent effects would have required a more in depth study (para. 5.29), which is beyond the scope of this audit.

5.27 Since 1969, institutionalization of planning has advanced a great deal. Three-year investment plans have been prepared for 1969-71 and 1972-74 based on the master plans and feasibility studies. In 1971, DNER started updating the highway master plans prepared by GEIPOT, and in 1974 completed the work. DNER now considers preparation of feasibility studies and final engineering before construction as a normal procedure. In 1972, GEIPOT prepared a transport plan for the northern region, including all modes. The railways (RFFSA) also prepared a corporate plan for 1974-78, which served as the basis for discussing the Second Railway Project. Investment planning for ports apparently has been weaker. Probably more important from a long-run viewpoint is the fact that proper planning, studies, and engineering have become widely accepted and required by managers and Government executives.

5.28 Preparation of plans has also helped to achieve consistency between federal and state agencies and different modes, despite deficiencies in formal institutional coordination. This process has also been sustained by the increasing power of a new generation of transport experts familiar with the concepts and ideas developed in the Transport Survey prepared by GEIPOT. These people are now filling top positions of authority in many federal and state agencies. However, in spite of the progress made, two main problems can be observed in planning: (a) lack of clearly defined planning processes assuring continuity of the planning work; and (b) proliferation of studies, which in several instances are not properly conceived, controlled, or coordinated with previous studies or studies in related areas. These problems are largely due to the excessive reliance on consultants for planning and to the lack of sufficient staff to control studies and provide continuity.

5.29 The performance audit team considers that an evaluation of the transport planning experience of Brazil since 1965 can be useful for orienting future Bank operations in the highway sector, especially regarding new policies of "Highway Sector Lending."

C. Pricing, Financing, and Regulation

5.30 Achievements in pricing, financing, and regulation have been less impressive. Railway rates have not been properly related to costs, and advances in controlling the deficit have been modest. Road user charges have been modified but, while their level seems adequate, inefficiencies still exist in their structure. Regulation in the sector has not been significant, and weight limits on highways have not been successfully controlled. A major problem in financing is the lack of funds for highway maintenance.

5.31 Available information indicates that the deficit of the federal railways decreased 72% (US\$427 million) in real terms between 1963, when

it reached a maximum after increasing during several years, and 1968. This decrease should be carefully studied because it looks inconsistent with other information and may reflect changes in accounting procedures.^{1/} Between 1968 and 1973, the deficit in real terms decreased 14% (US\$22 million) without considering normalization of accounts and 6% (US\$7 million) with normalization. This decrease has not been continuous during the period and results mainly from an 8% increase in revenues between 1972 and 1973. This is a modest advance considering that since 1968 passenger traffic has decreased 22%, freight traffic has increased 19%, staff has decreased 10% (13,200 persons), and unprofitable lines and stations have been closed.

5.32 Rail rates have kept pace with inflation, but, as shown in a 1973 study by a Bank consultant, they are generally low and are not properly related to costs and competition. With the assistance of consultants (SOFERAIL), RFFSA revised its accounting plan in 1972. The new plan is well-suited to cost accounting purposes. The shortcomings of the rate structure probably have not been a major factor in the shift of traffic to roads. The main factor explaining this shift is the substantial improvement in the road system.

5.33 A major preoccupation of the Bank since the beginning of its operations in Brazil has been the establishment of adequate highway user charges. Lack of proper charges has sometimes been blamed as a factor explaining low rail rates and railway deficits. Several modifications in road user charges have taken place since 1964 and three detailed analyses (1966, 1969, and 1972) of the adequacy of the policy being followed have been made since 1964. At present, the general level of charges is considered adequate and, with the exception of urban areas, is not a factor of distortion in traffic allocation between transport modes. Data is lacking, however, to ascertain whether the structure of existing charges results in adequate pricing of the road network and equitable road-user charges. Under the Fifth Highway Project, the Government agreed to reexamine the problem.

5.34 It seems important to stress that no clear criteria have existed to define what can be considered a proper system of user charges. The three studies made have been guided by different concepts in this regard. The first one, finished in 1966, was based on full cost pricing principles, and allocated costs on the basis of gross ton-kilometers travelled by different types of vehicles. Costs to be charged included upgrading, replacement, expansion, and maintenance of the existing system. The second one, completed in 1969, recommended that marginal cost pricing principles be followed and capital costs of the system be recovered through taxes that had minimal influence on the use of vehicles and their

^{1/} For instance, the reduction implies a decrease of 60% in real wages of the staff, a quite unlikely figure, and is not related to increases in revenues.

marginal cost. Both the first and second study considered only earmarked taxes on highway users as charges. In the third study, a 1972 Bank report which is probably the best study of the problem, marginal cost pricing principles were applied as in the second study. In this last study, the concept of differential taxation was used to assess charges instead of the concept of earmarked taxes used before.

5.35 The first and second study concluded that diesel trucks were being subsidized because diesel taxes were lower than gasoline taxes. The first study recommended an equalization tax on diesel, but the second study considered this tax to be impractical due to its side effects and recommended instead a change in the taxation system on license plates. This change was implemented in 1970, but the approved new tax differed substantially from the originally proposed one. Its main objective was to raise revenues for the highway program. The 1972 analysis arrived at substantially different results. It concluded that on uncongested roads light vehicle trips were covering costs but heavy vehicle trips were considerably overpriced. It also concluded that through differential taxation road users were paying 29% more than known road expenditures.

5.36 Regulation in the sector is not significant; probably the most regulated modes are railways, shipping, and aviation, which require Government approval for raising the level of their tariffs. The controlling agency, CIP (Interministerial Price Committee), is more oriented by short-term economic policy requirements than by long-term problems. Highway freight transport has remained free of regulation despite efforts of interested groups to restrict entry to the sector. The Bank has played an important role in preventing undesirable developments in this area.

5.37 Control of weight limits in the highway system has been unsuccessful. A decree regulating maximum axle loads was approved in 1967, and scales have been installed. But few scales are functioning and overloading continues to be a critical problem. This program has not been successful because the transport fleet was not adapted to the new regulations imposed in 1967 making strict enforcement very difficult, especially considering the lack of capacity to move heavy freight traffic during the peak crop season and problems related to control of personnel in charge of collecting fines. Probably a long-run program of gradual implementation, with a carefully designed transition period, could have been more successful. Considering the importance of this problem, the Fifth Highway Project included finance for 95 weighbridges on federal roads and additional weighbridges in the states of Minas Gerais and Rio Grande do Sul. The Government has undertaken that enforcement will be effective.

5.38 A major problem related to the financial area is the continuous lack of funds for highway maintenance. Although DNER's expenditures for maintenance have increased 300% between 1970 and 1973, the total amount is

clearly insufficient and quite small compared with expenses in construction and maintenance. Average maintenance expenditures per kilometer are substantially below requirements, the lack of funds being a major factor in the problems observed.

VI. THE ROLE OF THE BANK

6.01 The Bank has been instrumental in producing an important transformation of the Brazilian transport sector since 1964. It has played a particularly important role in: creating GEIPOT; strengthening DNER; promoting the formulation of investment plans and the use of adequate procedures for project appraisal; and stressing the importance of adequate pricing and transport regulation policies.

6.02 Probably the most significant overall contribution of the Bank has been ensuring and promoting continuity in the objectives set for the sector. Without active Bank participation, the original definitions of 1965 regarding reorganization and policy quite likely would have been lost or substantially confused in the ten years that have elapsed. Brazil still lacks an adequate professional public service, which is the backbone of continuity in developed countries. In addition, the deficiencies of GEIPOT and the changes experienced in government (1966, 1970, and 1974), have created a situation where it has been easy to forget initial purposes, modify priorities, and change goals. Especially in areas where achievements are slow to materialize, such as reorganization of agencies or consolidation of new systems and practices (GEIPOT, highway and railway organization, planning procedures, etc.), the Bank's constant control of progress and suggestions for new action filled an important gap.

6.03 The preoccupation of the Bank in the area of transport pricing has helped create an awareness of the problems, but it seems that the Bank could have taken earlier action to help correct the situation regarding weight controls. The administrative and political aspects of weight control received less attention than the physical aspects, thus contributing to the unsuccessful control of weight limits. Only very recently, in the Fifth Highway Project, has a more comprehensive approach been adopted. This project includes not only finance for weighbridges but also a definition of the administrative measures necessary to successfully implement the system.

6.04 The advances in the institutional area have been seriously limited by the public sector policies regarding personnel. The Bank can be credited with important efforts to convince the Government of the importance of an adequate personnel policy, but its success in this area has been limited, largely because these policies are determined by objectives outside the transport sector. As a result, the leverage of the Bank in this regard is more limited than in other policy areas. Unable to tackle the salary problem in the public sector, the Bank has

emphasized the need for training programs. The Third Highway Project of 1972 provided funds for a training center in the DNER and the Transport Sector Brief of 1972 provided an occasion for preparation of a special staffing and training document. The DNER has been receptive to these suggestions, and training has received more attention. But training alone is not the solution because trained personnel are lost as a consequence of the salary differential between the public and private sectors.

6.05 The contribution of the Bank has been especially positive in the highway sector. More generally, the analysis of the Bank's involvement in the transport sector indicates an imbalance until very recently in the relative preoccupation of the Bank with the different modes. The extensive attention devoted to highways has probably been a major factor in explaining differences in the speed with which recommendations have been followed in this sector compared with the railway and, especially, port sectors. The Second Railway Project is an important change in this regard.

6.06 The performance of the Bank in the highway sector has been impressive. Not only five loans (including improvement, paving, feasibility studies, and final engineering of over 20,000 km of roads) have been processed, but works appear to have been supervised and controlled properly, as suggested by the analysis of the First Highway Project. Good control has been kept of the advances made toward the achievement of policy objectives and successful efforts have been made to obtain continuous action. Although Bank positions have been sustained strongly in negotiations and the Bank has demanded a high quality of performance, good relations with DNER staff have developed. The continuous presence since 1965 of qualified highway experts in the several projects supported by the Bank has been a major factor in the success obtained.

6.07 It should be stressed, when examining the evolution of the transport sector in the last ten years, that there were definite limits to the changes that could be made regardless of the Bank's intentions and pressures. The complexity of the tasks and the normal rigidities of tradition, attitudes, legislation, and availability of high level executives and technicians were strong limitations to rapid changes. Institutional build-up of the sector is just beginning to mature, and continued Bank efforts seem essential for its fruition.

VII. CONCLUSIONS

7.01 The Brazil First Highway Project was successfully completed in September 1972. About 82% of the works had been completed by the original completion date (September 1971) and the remainder within a year later.

The total project cost was lower than expected, US\$56.5 million versus US\$65.5 million, and the audit rate of return on six of the seven roads included is equal to or higher than the appraisal rate of return, ranging from 14% to 40%. On the remaining road, traffic was less than expected, and this produced an audit rate of return of 25% as against the 31% return expected at appraisal.

7.02 This project was one of the first attempts to introduce substantial institutional changes in the Brazilian transport sector. Achievements have been significant and progress has been made in reorganization and improvement of the major transport agencies. Planning has also substantially improved and become institutionalized, with technical and economic feasibility studies generally carried out before project implementation. Achievements in pricing, financing, and regulation have been less impressive. One major deficiency in the institutional area concerns personnel policies in the public sector. In the performance audit team's opinion, unless this problem is aggressively dealt with advances made in the past may be lost and future improvements hard to achieve.

7.03 The contribution of the Bank to the institutional build-up of the sector has been substantial, although, in retrospect, its contribution to the different modes has been rather unbalanced. The Bank has provided continuity in policy objectives and supervision of progress. Continuous participation of the Bank appears essential to consolidate the achievements and complete the objectives of the First Highway Project.

PROJECT PERFORMANCE AUDIT REPORTBRAZIL FIRST HIGHWAY PROJECT (LOAN 567-BR)Freight and Passenger Transport by Mode, 1961-73

Year	Freight (billion ton-km)					Passenger (billion pass-km)				
	Rail	Maritime	Road	Air	Total	Rail	Maritime	Road	Air	Total
1961	13.7	15.4	46.8	0.1	75.3	18.0	0.3	59.5	2.8	80.6
1962	15.0	18.1	52.7	0.1	84.1	19.3	0.3	68.1	3.1	90.8
1963	15.0	16.4	59.3	0.1	89.3	19.1	0.3	77.4	3.0	99.8
1964	15.9	14.8	66.7	0.1	97.5	18.4	0.3	89.3	2.6	110.6
1965	18.3	15.5	75.0	0.1	107.8	17.6	0.4	102.3	2.6	122.9
1966	19.0	17.7	84.1	0.1	119.2	13.6	0.3	117.4	3.0	134.3
1967	19.7	20.3	92.8	0.1	132.3	15.4	0.3	132.3	3.2	151.2
1968	21.5	21.3	102.4	0.1	145.5	13.4	0.5	150.5	3.7	168.1
1969	25.0	22.7	112.9	0.1	159.4	13.0	0.6	170.9	3.9	188.4
1970	30.3	21.4	124.5	0.1	175.4	12.3	0.6	193.8	3.3	210.0
1971	31.9	23.9	137.3	0.1	186.2	11.2	0.6	220.4	3.3	235.5
1972	33.6	21.8	152.1	0.1	207.3	11.4	0.6	250.8	3.4	266.2
1973	36.3	23.8	169.0	0.1	229.2	12.8	0.8	286.6	3.7	303.9

Source: DNER - Relatorio Anual 1973.

PROJECT PERFORMANCE AUDIT REPORT

BRAZIL FIRST HIGHWAY PROJECT (LOAN 567-BR)

Federal, State, and Municipal Highway Network, 1961-73^{/1}
(km)

	State and Municipal			Federal			Total		
	<u>Paved</u>	<u>Unpaved</u>	<u>Total</u>	<u>Paved</u>	<u>Unpaved</u>	<u>Total</u>	<u>Paved</u>	<u>Unpaved</u>	<u>Total</u>
1961	4,453 /2	71,915 /2	463,274	9,422	26,176	35,598	13,875	98,091	498,872
1962	5,553 /2	74,305 /2	487,045	10,725	25,377	36,102	16,278	99,682	523,147
1963	5,529 /2	75,639 /2	500,639	11,425	24,962	36,387	16,954	100,331	537,026
1964	5,613 /2	77,533 /2	507,571	12,157	25,719	37,876	17,770	103,252	545,447
1965	13,835 /2	81,003 /2	716,335	12,589	22,003 /3	34,592	26,424	103,006	750,927
1966	17,221	863,905	881,126	13,803	23,184	36,987	31,024	887,089	913,113
1967	20,539	921,604	942,143	14,944	23,715	38,659	35,483	945,319	980,802
1968	21,388	967,778	989,166	19,353	27,499	46,852	40,741	995,277	1,036,018
1969	23,237	1,008,197	1,031,434	22,015	28,087	50,102	45,252	1,036,284	1,081,536
1970	26,002	1,067,088	1,093,090	23,674	29,493	53,167	49,676	1,096,581	1,146,257
1971	29,236	1,132,255	1,161,491	25,896	29,563	55,459	55,132	1,161,818	1,216,950
1972	30,448	1,163,420	1,193,868	29,633	29,740	59,373	60,081	1,193,160	1,253,241
1973	33,024	1,168,866	1,201,890	35,539	32,399	67,938	68,563	1,201,265	1,269,828

/1 Preliminary data.

/2 Municipal network not included.

/3 In 1965 the federal network was readjusted.

Source: DNER, Relatório Anual 1973.

PROJECT PERFORMANCE AUDIT REPORT

BRAZIL FIRST HIGHWAY PROJECT (LOAN 567-BR)

Important Events Preceding Signature of the Loan Agreement

<u>Approximate Date</u>	<u>Event</u>
End 1964	1) Economic Mission of the Bank identifies basic transport problems. Recommends Transport Survey.
Early 1965	2) Brazilian Government requests Bank assistance for elaboration of Transport Survey.
May-June 1965	3) Bank Mission goes to Brazil to discuss terms of reference for Transport Survey. A decision is made to prepare feasibility studies for early Bank financing in states where Master Plans were to be prepared. Ten road sections are selected. For some, engineering, and earth and drainage work were to continue, to have them ready for financing the paving.
September 1966	4) Feasibility studies ready for analysis.
October 1966	5) Final engineering for roads without earthwork is contracted. Implicit understanding with Bank Mission that the cost of these studies will be included in the loan.
January 1967	6) Formal application for a highway loan is presented to the Bank by the Minister of Transport. Road sections included are the same included in Event 3. Appraisal Mission is requested for June 1967.
February 1967	7) Bank accepts appraisal only for road sections where earthwork or final engineering is ready. Agrees with Appraisal Mission in June.
April 1967	8) Following Bank condition (Event 7), Brazil limits request to the financing of 6 road sections which will have their engineering or earthworks ready by June.
June 1967	9) Bank Mission goes to Brazil to appraise the loan as agreed. Explains also need to revise bidding and contractual procedures.
July 1967	10) Plan of Action based on conclusions of Transport Survey approved by the Government.
August 1967	11) Bank Mission goes to Brazil to analyze with Government Plan of Action to be agreed as part of the loan.

<u>Approximate Date</u>	<u>Event</u>
October 1967	12) Bank Mission goes to Brazil to review port and rail aspects of the Plan of Action.
October 1967	13) The Minister of Transport requests Bank's agreement for awarding contracts before the loan is signed. He is under pressure to start work on BR-262. Bank agrees on the condition that his approval is obtained for prequalification of firms, bidding and contractual documents, and award of contracts.
October 1967	14) DNER requests presentation of prequalification documents. Closing date for presentation is December 1, 1967.
March 1968	15) Draft Appraisal Report ready and discussed within the Bank. Bank decides that a letter of understanding on transport policy should be obtained from the Government as condition for approval of loan. Draft is prepared for discussions. Institutional problem of who will be recipient of the loan examined.
March 1968	16) Bank Mission goes to Brazil to review prequalification procedures (Events 13 and 14), discovers serious errors in publication of ads in foreign newspapers. Handles and sustains preliminary discussions on draft letter of understanding.
April 1968	17) Bank requests reopening of prequalifications for roads to be financed by loan. Brazilian President orders contract for BR-262 (Event 13) to proceed. Government requests dropping this section from the loan and include 4 sections that had been originally requested (Event 3); it now has ready the earthwork or final engineering (Events 7 and 8). Bank accepts change and proposes new Appraisal Mission in May.
May 1968	18) Bank Mission goes to Brazil to appraise new sections proposed for the loan.
May-June 1968	19) Negotiations in Washington on letter of understanding (Events 15 and 16).
September 1968	20) Draft loan agreement and final Appraisal Report ready.
October 1968	21) Loan Agreement signed.

PROJECT PERFORMANCE AUDIT REPORT

BRAZIL FIRST HIGHWAY PROJECT (LOAN 567-BR)

Main Points Covered in the Letter of Intent

The Government stated its intention to undertake the following important measures in relation to the transport sector:

- (a) Recommendations for the consolidation of the railway system are to be drawn up by a special commission to merge the railways into a single organization directly responsible to the Minister of Transport;
- (b) A manpower survey by the railways aimed at reducing staff by 11,000 over the next 3 years;
- (c) The introduction of cost accounting as a basis for railway tariff reform;
- (d) A program of abandonment of uneconomic railway stations and lines to be concluded by the end of 1972;
- (e) The termination of new line construction as recommended in the Transport Survey, except for those socially and strategically required;
- (f) The reorganization of the National Highway Department in accordance with a program to be formulated early in 1969;
- (g) The formulation of proposals for the reform of the structure of road user charges;
- (h) The basing of highway construction priorities on the recommendations of the Transport Survey;
- (i) The decentralization of port administration and the representation of State and Municipal government in port authorities;
- (j) The introduction of commercial accounting in the ports of Rio de Janeiro, Santos and Recife by mid-1969; and
- (k) The use of cost accounting in the ports as a basis for assessing port charges.

The Government understood that this statement of intentions and the program proposed were of importance to the Bank and that progress towards implementation would be an important factor in the consideration of future loans in the transport sector.

Source: Appraisal Report T0-664a, Annex C.

PROJECT PERFORMANCE AUDIT REPORT

BRAZIL FIRST HIGHWAY PROJECT (LOAN 567-BR)

Details About Roads Included in Project

Ipatinga-Governador Valadares: MG-4 or BR-381 (State of Minas Gerais)

The construction of the 99 km stretch of State Highway MG-4 (National Highway BR-381) would complete the connection from National Highway BR-262 at Monlevade to National Highway BR-116 at Governador Valadares, thus providing the shortest paved connection between the northeast and the industrial centers of Belo Horizonte and Sao Paulo. The route traverses the heart of the Rio Doce valley, mainly rolling terrain, and its extension towards the east would eventually connect Belo Horizonte and the steel-producing area between Nova Era and Ipatinga with the Port of Vitoria and the beaches in the State of Espirito Santo. The design called for Class I standards and asphalt concrete surfacing. The construction cost was to be high because crushed rock for the base course would have to be brought in from widely scattered quarries with an average hauling distance of 20 km.

Tabai-Canaos: RS-13 or BR-386 (State of Rio Grande do Sul)

Highway BR-386, known as the "Kennedy Highway", connects the productive northwestern area of Rio Grande do Sul with the capital Porto Alegre. The major portion of the road was to be completed with financial assistance from USAID and was nearly completed up to the village of Tabai. However, traffic from Porto Alegre bound for the Kennedy Highway still had to use the roundabout route following Highway BR-116 via Sao Leopoldo and then Highway RS-3 to Montenegro and Tabai, a distance of about 95 km.

The proposed construction of the 54 km stretch between Tabai and Canoas was to complete the Kennedy Highway by connecting it with Highway BR-116 at Canoas and shorten the distance between Porto Alegre and Tabai by about 34 km. The route traverses rolling terrain which did not present major location difficulties, but difficult soil conditions were liable to cause embankment construction problems. The work was to comprise grading and drainage works, and construction of pavement structure and bridges. The design called for Class I standards and asphalt concrete surfacing.

Sao Leopoldo-Novu Hamburgo: BR-116 (State of Rio Grande do Sul)

The existing 12 km, paved 2-lane highway between these two cities is one of the most highly travelled routes in Brazil (Average ADT was 6,500). It was proposed to increase the capacity by improving the existing highway and by constructing two additional lanes.

The work proposed on the existing road was improvement of grade and alignment in rolling terrain, repaving, and widening or construction of drainage structures and bridges. The construction of the two additional lanes was to include grading, drainage works, paving and the construction of several bridges. The design called for Class I standards and asphalt concrete paving.

Sao Mateus do Sul-Uniao da Vitoria: PR-5 or BR-476 (State of Parana)

Highway BR-476 is a high priority road for the south of Parana. It was paved between Curitiba and Sao Mateus do Sul. Earthwork for the 85 km stretch beyond the latter point to Uniao da Vitoria had recently been finished by the State and the grade was ready for paving. The road for the most part traverses rolling country and had been built in accordance with Class I design standards. It was proposed to provide this section with an asphalt concrete paving.

Section of BR-468 from km 40 to km 83 (State of Parana)

This 43 km section is part of the high priority road between the state capitals Curitiba (State of Parana) and Florianopolis (State of Santa Catarina). The 290 km road is designated BR-468 from Curitiba to the town of Joinville in the State of Santa Catarina, and BR-101 from there to Florianopolis. It was designed in accordance with Class I design standards. Construction had been started about six years earlier and pavement of about 170 km was finished. Earthwork was nearly finished and pavement contracts were under way for the remaining 120 km, with the exception of the section between km 40 and km 83 in the State of Parana.

Earthwork in the km40-km83 section was being completed. The amount of earthwork was considerable, since the road crosses very mountainous terrain. Grade construction was expected to be finished by November 1968 at the latest, and it was proposed to pave this section and surface it with asphalt concrete.

Rio do Sul-Junction with BR-116: SC-23 or BR-470 (State of Santa Catarina)

Highway BR-470 is a high priority road for the State of Santa Catarina since it links the western part of the State with the populated coastal area and the sea. 96 km of the 140 km section between Itajai, on the coast, and Rio do Sul were paved. Pavement was under way for the remainder of this section.

The 91 km section of Highway BR-470 between Rio do Sul and the junction with BR-116 had been constructed in accordance with Class II design standards, and the grade was ready for paving. It was proposed to pave this section and surface it with asphalt concrete.

Cai-Farroupilha: RS-4 (State of Rio Grande do Sul)

This 45 km section may in the future be an alternate route for Highway BR-116 between Caxias do Sul and Vila Scharlau. The road, which in part crosses very mountainous terrain, had been designed to Class I standards.

Grade construction of 41 km had been finished and the remaining 4 km (between Sao Vendelino and Farroupilha) were to be finished by November 1968. It was proposed to pave the entire 45 km section and surface it with asphalt concrete.

PROJECT PERFORMANCE AUDIT REPORT

BRAZIL FIRST HIGHWAY PROJECT (LOAN 567-BR)

Project Costs and Delays

	Estimated and Actual Project Costs (US\$ thousands)						Estimated and Actual Completion Date		
	Appraisal Estimate			Actual Total Cost			Expected	Actual	
	Without Conting.	With Quantity Conting.	With all Contingencies	Contract Amount	Change Orders	Actual Total Cost	Completion Date	Delays in Completion of the Work (months)	
I. Road Construction									
BR-476 Sao Mateus do sul-Uniao da Victoria	8,430	9,273	10,200	7,380	702	8,082	May 1971	December 1971	7
BR-468 km 40-km 83 of Curitiba-Florianopolis Road	4,850	5,335	5,868	4,405	833	5,238	March 1971	November 1971	9
BR-470 Rio do Sul-Junction with BR-116	8,840	9,724	10,696	8,825	1,121	9,946	March 1971	March 1972	12
BR-386 Tabaí-Canas	8,060	8,866	9,753	8,355	2,308	10,663	September 1971	February 1972	5
BR-116 Sao Leopoldo-Novo Hamburgo	3,290	3,619	3,981	3,240	2,136	5,376	August 1971	September 1972	6
RS-4 Cai-Farrroupilha	4,370	4,807	5,288	4,035	1,699	5,734	September 1971	March 1972	6
BR-381 Ipatinga-Governador Valadares	11,670	12,837	14,120	8,316	453	8,769	March 1971	December 1971	7
Total	49,510	54,461	59,906	44,556	9,252	53,808			
II. Detailed Engineering and Project Supervision	5,200		5,600			2,700			
Total			65,500			56,500			86

PROJECT PERFORMANCE AUDIT REPORT

BRAZIL FIRST HIGHWAY PROJECT (LOAN 567-BR)

Reasons for Cost Increases in BR-386, RS-4, and BR-116

I. BR-386 Tabai-Canaos

- (a) On certain sections the subsoil was soft and wet, and had to be removed--this had not been provided for in the original design.
- (b) Earthworks were far in excess of what had been foreseen in the original design.
- (c) Erosion protection of cuts and fills, not foreseen in the original project, proved very costly.

II. RS-4, Sao Sebastiao do Cai-Farroupilha

- (a) The road traverses a mountainous region. The existing cuts, and especially fills, produced several big slides - caused by inadequate compaction of fills (placed prior to the project) and inadequate surface and subsurface drainage, causing softening and washing out of the soil. Remedies involving drainage works, concrete lining of ditches, cleaning up slides, complete or partial reconstruction of fills, and shifting the centerline, involving heavy cuts, were more costly than originally estimated.
- (b) The original design provided inadequate drainage. Hence, numerous additional subdrains and culverts had to be built, and surface drainage was greatly extended and improved, including an unforeseen drain trench in rock of about 5 km mostly lined with concrete.
- (c) DAER wanted more elaborate intersections than provided in the original design. These intersections resulted in better safety.

III. BR-116, Sao Leopoldo-Novo Hamburgo

- (a) The existing road was a two-lane highway with numerous direct accesses. Since the project specified the construction of a four-lane highway with only limited access at the most important intersections, it would have left many hundreds of properties, including factories, without access at all, as no lateral roads existed and none were foreseen in the project. To improve the scheme, the consultant had to prepare a completely new project for 8 km of lateral roads, which, with the Bank's consent, was included in the contract.

- (b) The original project provided for two-level intersections with signaling and ten without signaling. This was changed to provide two overpass intersections for the accesses to Sao Leopoldo and Novo Hamburgo. Earthworks and pavement of these two intersections were included in the contract.
- (c) Provision for fences, guardrails, signaling and other protection works was inadequate in the original project, and additional costs were incurred to provide them.

PROJECT PERFORMANCE AUDIT REPORT

BRAZIL FIRST HIGHWAY PROJECT (LOAN 567-BR)

Forecast and Actual Traffic, 1974

	BR-476		BR-468		BR-386		BR-386		BR-116		RS-4		BR-381	
	S. Mateus do Sul Uniao da Vitoria		Curitiba Garuva		Rio do Sul Inter- sect BR-116		Tabai Canoas		S. Leopoldo N. Hamburgo		S.S. do Cai Farrroupilha		Ipatinga Gov. Valadares	
	Forecast	Actual	Forecast	Actual	Forecast	Actual	Forecast	Actual	Forecast	Actual	Forecast	Actual	Forecast	Actual
Cars	499	408	962	2,328	543	-	1,636	2,103	12,767	15,540	952	2,182	n.a.	1,112
Buses	5	20	175	151	47	-	124	111	755	1,210	61	90	n.a.	109
Trucks	599	263	1,646	1,731	521	-	1,236	1,886	4,647	3,456	1,151	1,050	n.a.	562
Total	<u>1,103</u>	<u>691</u>	<u>2,783</u>	<u>4,210</u>	<u>1,111</u>	<u>2,610</u>	<u>2,996</u>	<u>4,100</u>	<u>18,169</u>	<u>20,206</u>	<u>2,164</u>	<u>3,321</u>	<u>n.a.</u>	<u>1,783</u>
Annual rate of growth in ADT	10.0	7.5	9.0	20.2	7.5	-	10.0	13.1	12.2	14.7/2	8.6	19.1/3	n.a.	n.a.
Cars	0	16.7	5.0	3.3	4.0	-	5.0	3.7	4.0	9.6	4.0	8.6	n.a.	n.a.
Buses	6.7	-2.6	7.0	7.6	3.0	-	7.3	12.4	4.0	0.7	6.8	5.7	n.a.	n.a.
Trucks	<u>8.0</u>	<u>2.5</u>	<u>7.5</u>	<u>12.6</u>	<u>5.0</u>	<u>16.9</u>	<u>8.6</u>	<u>12.4</u>	<u>9.1</u>	<u>10.4</u>	<u>7.5</u>	<u>12.7</u>	<u>-</u>	<u>26.0</u>
Percentage of Heavy Trucks over	23.5	63.9	26.2	70.8	24.0	-	22.6	51.3	12.7	41.8	27.6	41.2	n.a.	n.a.
Total Trucks														

ADT in 1974 ^{1/}

Total

Total

^{1/} Projected ADT considers traffic diversions and generation in the base year of the study (generally 1965) as if the road network proposed was completely constructed.

^{2/} Actual growth figures may be higher because measured ADT does not include traffic in service streets added after the project was appraised.

^{3/} Actual growth rates are probably higher due to diversity in location of existing counting stations and those used for the feasibility study.

PROJECT PERFORMANCE AUDIT REPORT

BRAZIL FIRST HIGHWAY PROJECT (LOAN 567-BR)

Vehicle Operating Cost on a Paved Level Road

(Cr\$ 1973 x 10⁻³/vehicle km)

	<u>Appraisal</u> ^{/1}	<u>Audit</u> ^{/2}
Cars	197.0	314.4
Buses	949.6	1,239.3
7 Ton Truck ^{/3}	923.3	1,315.0

/1 Appraisal Report TO-664a adjusted to 1973 price level.

/2 Based on the latest study prepared by DNER in 1975, adjusted to 1973 price levels.

/3 Diesel.

PROJECT PERFORMANCE AUDIT REPORT

BRAZIL FIRST HIGHWAY PROJECT (LOAN 567-BR)

Actual as a Percentage of Forecast Cost and Benefits

at Appraisal and Changes in the Appraisal Rate of Return

<u>Road Section</u>	<u>Actual Cost as a Percentage of Estimated Cost at Appraisal (including quantity contingency)</u>	<u>Audit Benefit as a Percentage of Estimated Benefits at Appraisal</u>	<u>Change in the Appraisal Rate of Return</u>
BR-476 Sao Mateus do Sul-Uniao da Vitoria	87	90.7	No change
BR-468 km 40-km 83 of Curitiba-Florianopolis Road	98	208.0	Increase
BR-470 Rio do Sul-Junction with BR-116	102	403.2	Increase
BR-386 Tabai-Canoas	120	244.9	Increase
BR-116 Sao Leopoldo-Novo Hamburgo	149	113.0	Decrease (25%)
RS-4 Cai-Farrroupilha	119	169.7	Increase
BR-381 Ipatinga-Governador Valadares	68	Higher than 100	Increase

PROJECT PERFORMANCE AUDIT REPORT

BRAZIL FIRST HIGHWAY PROJECT (LOAN 567-BR)

Policy Objectives, Achievements and Bank Participation in
the Transport Sector of Brazil 1965 - 1974

	Organization and Operations	Investment Planning	Financing, Pricing and Regulations
I. General	<p>Objectives:</p> <p>To establish a Central Agency for Transport Coordination.</p> <p>Achievements:</p> <p>GEIPOT created in 1965 to conduct Transport Survey. Reorganized in 1969 as agency of the Ministry of Transport. Transformed in 1973 into Public Enterprise. Adequacy of staff has varied through time, being good at present. No formal relationship exists between GEIPOT and the Ministry and transport agencies, and GEIPOT is not acting as a central agency for transport coordination. Studies are being done on contractual basis with Ministry and agencies. A proper use of GEIPOT may answer the major needs for coordination in the sector.</p> <p>Bank Participation:</p> <p>Bank participation in the creation and initial development of GEIPOT was substantial. It has also watched closely its evolution, being a major factor in changes begun in 1972. As a result of diversification of operations of the Bank, GEIPOT has lost its initial relative importance as main contact of the Bank in the sector. This has weakened its leverage as policy making and control unit.</p>	<p>Objectives:</p> <ul style="list-style-type: none"> - Coordinate modal investment plans to avoid duplication and over- or under-capacity. - Only projects with economic feasibility study and final engineering should be initiated. - Investment programs and budgets should be prepared on the basis of the planning studies. <p>Achievements:</p> <ul style="list-style-type: none"> - Transport Survey prepared, including: master plans for highways, railroad study, study of major ports and of intercoastal shipping. Intermodal relationships properly considered. Studies finished in 1969. Updating, ending in 1974, for the highway sector, considered intermodal problems. - The system of feasibility studies and final engineering has been generally established throughout the sector. - General agreement between the plans prepared and the investment programs can be observed. Nevertheless, there has been no proper control of the degree of implementation of policies and investments recommended in the studies, nor any analysis of the justification of major deviations. - GEIPOT is developing information on O/D, transport flows, and other basic planning parameters, to assure that the studies made by the modal agencies and other institutions are consistent. - Coordination among the very large number of studies being done in the sector is extremely poor, and urgently required. <p>Bank Participation:</p> <ul style="list-style-type: none"> - Executing agency of grant and loans for Transport Survey. - Bank requirements have been determinant in diffusion of feasibility studies and final engineering. - Bank has continually insisted on agreement between plans and investments. Has nevertheless overlooked some major projects of a large political content. - Has, unsuccessfully, insisted on the need to coordinate studies. 	<p>Objectives:</p> <ul style="list-style-type: none"> - Free selection of mode by users. - Rates and user charges to efficiently cover costs and price of transport services. - Eliminate transport deficits. <p>Achievements:</p> <ul style="list-style-type: none"> - Free selection exists. - Major efforts to adjust charges to costs in all modes. (See modes.) - Reduction in deficits. (See modes.) - Major problem is lack of resources for maintenance in highway sector, and remaining railway deficits. <p>Bank Participation:</p> <p>Major contribution has been the control of advances made in order to revise policies being followed and insist on corrective actions.</p>

Organization and Operations	Investment Planning	Financing, Pricing and Regulations
<p>11. <u>Highways</u></p> <p>Objectives:</p> <ul style="list-style-type: none"> - Reorganization of DNER with emphasis on improved planning, contracting and supervising, and maintenance procedures. - Gradual transfer of DNER's construction and maintenance functions to DERs. - Reorganization of DERs to improve their capacity to do maintenance and construction and receive new responsibilities for federal highways. <p>Achievements:</p> <p><u>DNER Reorganization</u></p> <ul style="list-style-type: none"> - Reorganization study completed in 1968, new organization legalized in 1969. It reduced political influence, strengthened the planning division, regrouped functions in other divisions, strengthened planning and coordinating functions of Federal Highway Districts. - Improvement in procedures through the preparation of manuals and the hiring of consultants. Main improvements in: bidding and contractual procedures, construction supervision, planning and programming, project preparation and analysis, implementation of computerized systems, implementation of systematic maintenance methods. - New reorganization in 1975, reinforcing maintenance. - Major problem has been the heavy reliance on consultants for the performance of normal DNER tasks. This has hindered the possibility of consolidating new practices. Nevertheless, it has made possible the development of increased activities with no increase in personnel. <p><u>DERs' Reorganization</u></p> <ul style="list-style-type: none"> - DERs of the main states have been reorganized. Several states have their highway departments under reorganization. Reorganization completed in Rio de Janeiro, Zoiás, Sao Paulo, Mato Grosso, Pernambuco, Rio Grande do Sul, Bahia. - USAID has helped several states to finance new equipment for maintenance and has given a great amount of technical assistance. <p><u>Maintenance</u></p> <ul style="list-style-type: none"> - Maintenance procedures have improved but maintenance is still deficient. - Maintenance delegation has increased in absolute terms but has not kept pace with increase in the network. Major problems are the condition of roads to be delegated, the capacity of DERs to absorb new responsibilities and the lack of funds. - New, corrective, action considered in Fifth Highway Loan. <p>Bank Participation:</p> <p>Effective and substantial. Reorganizations and several improved procedures suggested by Bank. Continuous emphasis on need to improve maintenance and delegate. Provision in loans for consultants to improve DNER capacity. Has assured continuity in the goals for institutional build-up of the sector.</p>	<p>Objectives:</p> <ul style="list-style-type: none"> - No initiation of new projects while plans are being prepared, or without feasibility studies and final engineering. - Strengthening of DNER planning capacity for the updating of plans and programs. - Establishment in DNER of a central investment and review mechanism for national and state projects. <p>Achievements:</p> <ul style="list-style-type: none"> - DNER has increased its budget for studies from US\$1.5 million in 1967 to US\$20.4 million in 1973. At present, even projects not subjected to international financing are being economically appraised and adequately engineered. Standardized procedures have been developed for the purpose. Political pressures for project implementation have been reduced to a minimum. - DNER, with the help of consultants, updated master plans for the whole country (except the North). Information for planning has been developed. A major problem is the lack of a clearly defined permanent planning process. Consultants have been hired to define and establish that process. - Coordination between federal and state investment programs has improved but is still deficient. <p>Bank Participation:</p> <ul style="list-style-type: none"> - The Bank has provided funds in the loans for feasibility and final engineering studies. - The Bank has provided funds for consultants in the planning area. - Bank participation has also helped to have budgets prepared in accordance with plans. Nevertheless, some major projects included in special programs not considered in the plans have been implemented. 	<p>Objectives:</p> <ul style="list-style-type: none"> - Restructuring of road user's charges. - Enforcement of weight regulations. <p>Achievements:</p> <ul style="list-style-type: none"> - The criteria and the results of studies dealing with user's charges have not been consistent through time. Three main studies have been made 1965-66, 1967-69, 1972 (by the Bank). A new study has been requested in the Fifth Highway Loan. - In 1969, following recommendations of the Transport Survey, a new Uniform Road Tax was introduced. The structure of this tax diverged from what had been originally proposed. Its main objective was to increase resources for the highway program. - In general, road user taxation is not a factor in producing distortions in intermodal allocation of traffic, excluding, probably, the large metropolitan areas. There are nevertheless likely problems with the structure of such charges. - The program of enforcement of weight regulations has been a failure. Weigh stations have been installed but very few are operated. Important corrective action is considered in the Fifth Highway Loan. - A negative but important achievement has been the avoidance of restrictive regulations in freight transport by trucks. Continuous pressures for these regulations have existed through time until today. <p>Bank Participation:</p> <ul style="list-style-type: none"> - The Bank has closely followed studies and changes made in user's taxation. This continuous preoccupation has helped create awareness of the problems. Nevertheless, there are no clear standards of what can be considered satisfactory in this regard. - The Bank could have probably taken earlier action to correct the situation regarding weight controls. This has been a continuous preoccupation of the Bank since the beginning of its operations in Brazil. The administrative and political aspects of weight controls received less attention than the physical ones. Action taken now seems adequate. - Bank preoccupation with regulations of freight transport by trucks has been a major factor in avoiding bad policies in this area.

Organization and Operations

Investment Planning

Financing, Pricing and Regulations

III. Railways

Objectives:

- Reorganize the federal railroads, consolidating them into regional systems.
- Consolidate federal and state railroads (mainly Sao Paulo).
- Establishment of commercially oriented management using modern management techniques.
- Reduction of excessive labor force.
- Closing of uneconomic lines.
- Closure of unprofitable stations.
- Installation of C C in EFCB.
- Revision of operational procedures to improve efficiency.
- Changes in labor-wages legislation.
- Modernization of accounting systems.

Achievements:

- Statutes of RFFSA were changes in 1968. Four regions created in 1969, each one grouping 3 or 4 of the former railways. Regional managers have had little effective control, but corrective action was adopted in 1974.
- FEPASA, consolidating the state railways of Sao Paulo, was created in 1971.
- The merger of FEPASA with RFFSA has been under discussion since 1968, but it has proved impossible to satisfy the conflicting interests of the federal and state governments in financial and administrative matters.
- The existing president of RFFSA is considered a good and aggressive manager.
- Labor has been continually reduced since 1965, from a level of 154,000 in 1964 to 114,000 in 1973.
- A study of uneconomic lines was started in 1966. By the end of 1974 a total of approximately 7,000 km of lines had been discontinued, almost all those planned. The ones left are justified or are being watched. Further studies are considered for the future.

Bank Participation:

Not properly examined in the audit. Apparently quite substantial. Most of the objectives were the result of the discussion between the Bank and Government, and there was close follow-up of achievements and insistence on continuous action.

Objectives:

- New lines to be constructed only if economically justified and with approval of RFFSA. For lines under construction in 1965 the results of studies made in Transport Survey will determine whether construction will continue, subject to national security and social requirements. Only 4 lines to continue.
- Preparation of investment program (1971-73) based on traffic projections and financial forecasts.
- Preparation by end 1971 of a comprehensive corporate plan for RFFSA (covering 1972-76).
- RFFSA to maintain on a permanent basis an adequately staffed planning group.

Achievements:

- Construction work on new lines was concentrated on lines that had been agreed. In other lines, funds were also expended but at a slower pace. One important project not agreed, whose construction was accelerated, was Apucarana-Ponta Grossa, but it was a Parana state project financed with state funds. In the light of increased traffic in that state the conclusion of that project may have been justified.
- RFFSA prepares a three-year investment plan annually. Five-year corporate plan was prepared in cooperation with SOFRERAIL and ENGETRAN. This plan, revised by the Bank, served as a basis for the Second Railway Loan.
- In December 1973 RFFSA amended the organizational chart, strengthening substantially the coordinating and planning functions. A new planning superintendency with three divisions is directly attached to the President.

Bank Participation:

Not properly examined in the audit. Apparently quite important. The audit team has the impression that follow-up was less intense than in highways, a factor that may have produced an imbalance in investment programs and action in the two sectors. The Second Railway Project is an important correction in this regard.

Objectives:

- Reduce railway deficits.
- Railway tariffs to be revised according to commercial principles.
- Modern cost accounting to be established.
- Tariffs to keep pace with inflation.
- Railways not to be burdened with financial loss resulting from uneconomic services required by Government. Normalization of accounts to control this problem.
- Incorporation of 10% tax on rail rates or tariffs.

Achievements:

- Deficit in real terms in RFFSA has decreased slightly between 1968 and 1973, 14% without normalization and 7% with normalization. The decrease in the operating ratio with normalization has been from 1.76 in 1968 to 1.63 in 1973; without normalization the decrease is from 2.10 to 1.85.
- Rate increases have generally kept pace with inflation. RFFSA tariff was changed in 1968. The schedule sets maximum rates, but 70% of freight traffic is carried at special contract rates generally at significant discount from maximum rates. A traffic costing study by a Bank consultant showed that in 1972:
 - Only exceptionally do passengers fares cover long-run variable costs, being in interior services from 50 to 25% of these costs.
 - Except in the Northeast and Leopoldina Division, revenues cover or approximate long-run variable cost on freight. However, there is little contribution to fixed cost. Important commodities like charcoal, gypsum and sugar were carried well below variable costs.
 - In general, rates are low, averaging about half estimated trucking costs.
- New accounting system introduced in 1972 is well suited to cost analysis purposes. Normalization has been introduced into the accounting system.
- Program of normalization based on system of specific subsidies introduced in 1968. The system compensates RFFSA for: low suburban fares and freight rates, the extra cost of employing former civil servants, and the losses on certain uneconomic services. Payment in 1973 amounted to US\$34 million.
- The 10% tax on rail rates going to the Ministry of Labor for social purposes has not been incorporated into railways income. The incorporation planned for 1970 was opposed by the Ministry of Labor who rely on these funds.

Bank Participation:

Not properly examined in the audit. Apparently quite important.

Organization and Operations

Investment Planning

Financing, Pricing and Regulations

IV. Ports	Organization and Operations	Investment Planning	Financing, Pricing and Regulations
	<p><u>Objectives:</u></p> <ul style="list-style-type: none">- Decentralization of Port Administration, reorganizing and converting DNPVN into a coordinating, policy making and supervision unit.- Setting up of autonomous and financial viable entities for the management of ports.- Operation of ports according to sound business principles.- Reorganization of accounting procedures. <p><u>Achievements:</u></p> <p>Not properly examined in the audit.</p> <ul style="list-style-type: none">- DNPVN reorganized following studies made by consultants.- Reorganization of Santos Port Management, accounting and other systems. The systems developed for Santos will be used as models for other ports. <p><u>Bank Participation:</u></p> <p>Not examined in audit.</p>	<p><u>Objectives:</u></p> <ul style="list-style-type: none">- Reorganization of DNPVN with the objective of converting it into a planning, policy-making and controlling authority. <p><u>Achievements:</u></p> <p>Not properly examined in the audit.</p> <p><u>Bank Participation:</u></p> <p>Not examined in audit.</p>	<p><u>Objectives:</u></p> <ul style="list-style-type: none">- Adoption of cost-based port charges.- Revision of tariff structure in the port of Santos. <p><u>Achievements:</u></p> <p>Not properly examined in the audit.</p> <ul style="list-style-type: none">- Consultants hired to design cost accounting in Santos (1971). New rate system based on costs. <p><u>Bank Participation:</u></p> <p>Not examined in audit.</p>

PROJECT PERFORMANCE AUDIT REPORT

BRAZIL FIRST HIGHWAY PROJECT (LOAN 567-BR)

Maintenance of the Federal Highway Network, 1971 and 1974
(km)

	1971			1974		
	Paved	Gravel Earth	Total	Paved	Gravel Earth	Total
Maintained directly by DNER	11,250	11,200	22,450	15,300	5,300	20,600
Maintained by contractors	3,850	-	3,850	5,600	-	5,600
Total maintained by DNER	15,100	11,200	26,300	20,900	5,300	26,200
Delegated to DER's						
with funds	5,300	4,000	9,300	6,000	5,200	11,200
without funds	5,800	11,200	17,000	7,300	11,800	19,100
Total maintained by DER's	11,100	15,200	26,300	13,300	17,000	30,300
Total federal network	26,200	26,400	52,600	34,200	22,300	56,500/1

/1 About 7,100 km of federal roads are under improvement or reconstruction and are not included in the total.

Source: Appraisal of a Fifth Highway Project Annex I, Attachment 2.

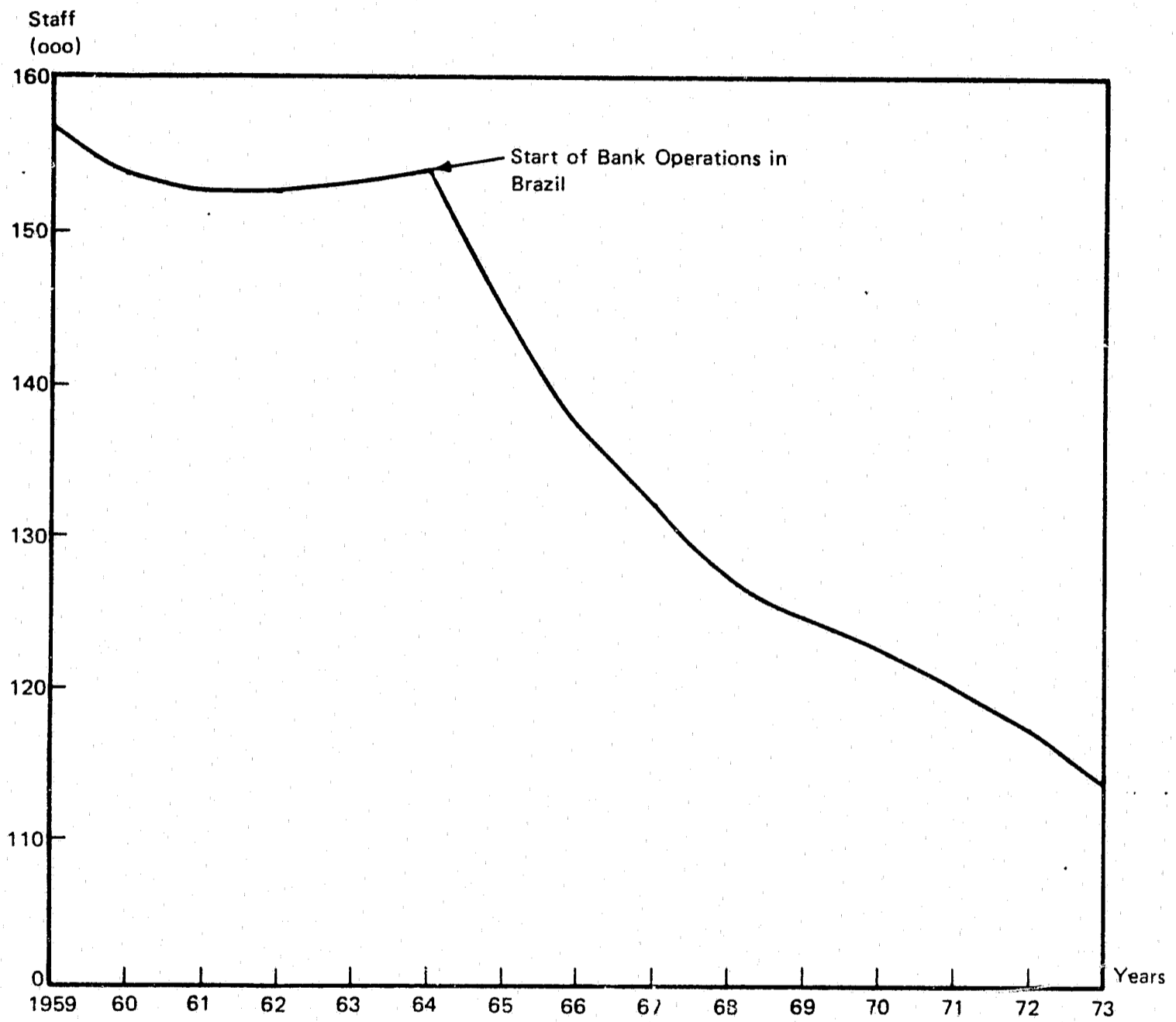
PROJECT PERFORMANCE AUDIT REPORTBRAZIL FIRST HIGHWAY PROJECT (LOAN 567-BR)Highway Maintenance Expenditures of DNER

	<u>1970</u>	<u>1971</u>	<u>1972</u>	<u>1973</u>
	(US\$ million) /1			
Direct Maintenance	3.37	2.58	2.91	1.25
Contracted Maintenance	1.31	4.81	9.39	12.71
Rio-Sao Paulo	-	-	3.61	5.14
Delegated to the Army	0.35	0.25	0.32	0.12
Delegated to DER's	<u>1.27</u>	<u>2.16</u>	<u>5.59</u>	<u>6.42</u>
Total	<u>6.31</u>	<u>9.80</u>	<u>21.82</u>	<u>25.65</u>
		%		
Total as Proportion of Expenses in Construction and Paving	3.4	2.9	6.2	9.2
Total as Proportion of Total Capital Expenditures	0.9	1.0	2.5	3.0

/1 US\$ 1 = Cr\$ 6.13 of 1973.

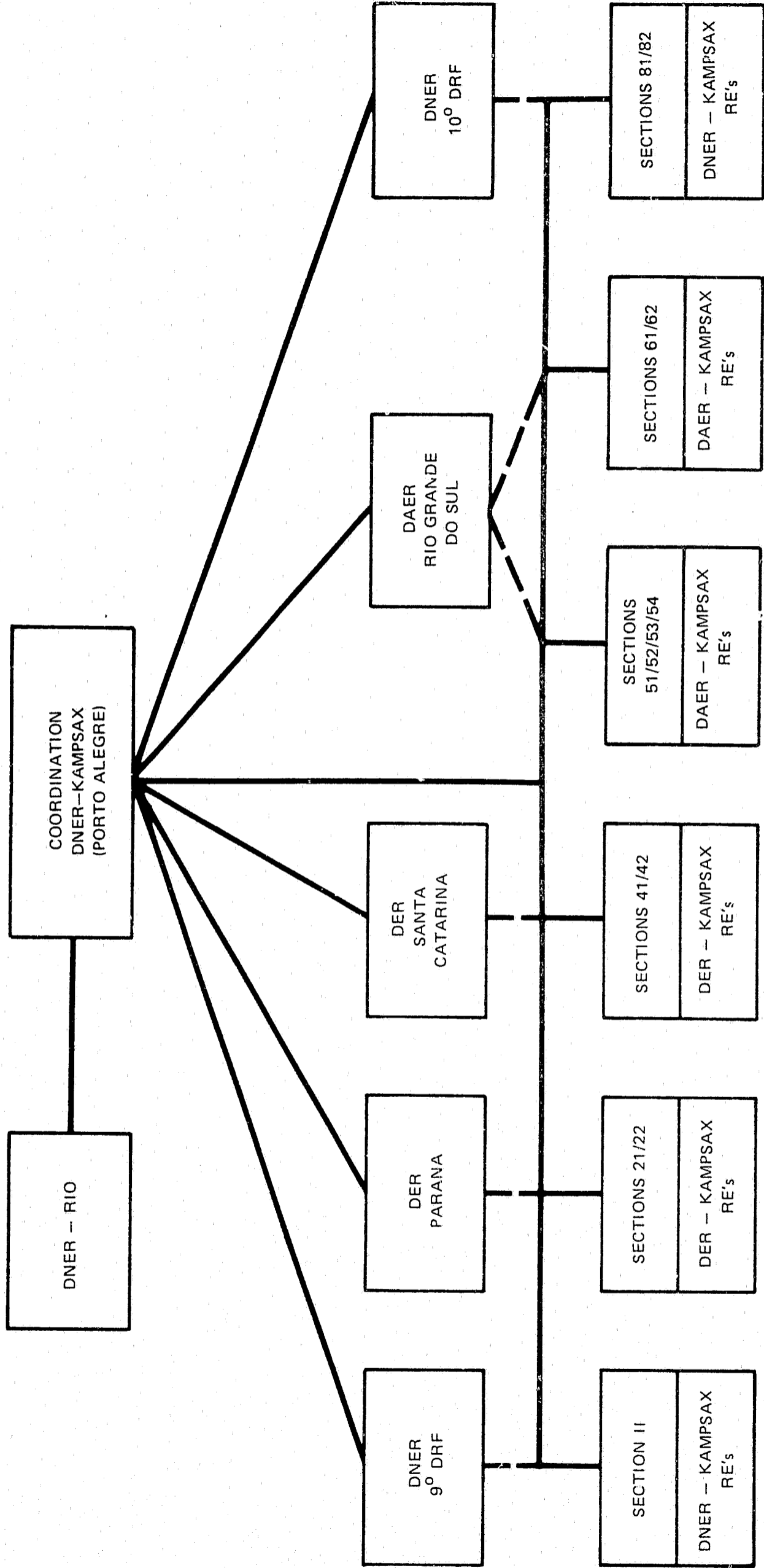
Source: Revista de Administracao Publica, Edicao Especial de Transportes,
V. Britto Pereira. Transporte Rodoviario.

PROJECT PERFORMANCE AUDIT REPORT
BRAZIL FIRST HIGHWAY PROJECT (LOAN 567-BR)
Staff Working in the Federal Railways



**PROJECT PERFORMANCE AUDIT REPORT
BRAZIL FIRST HIGHWAY PROJECT (LOAN 567-BR)**





Supervision Organization Chart

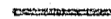






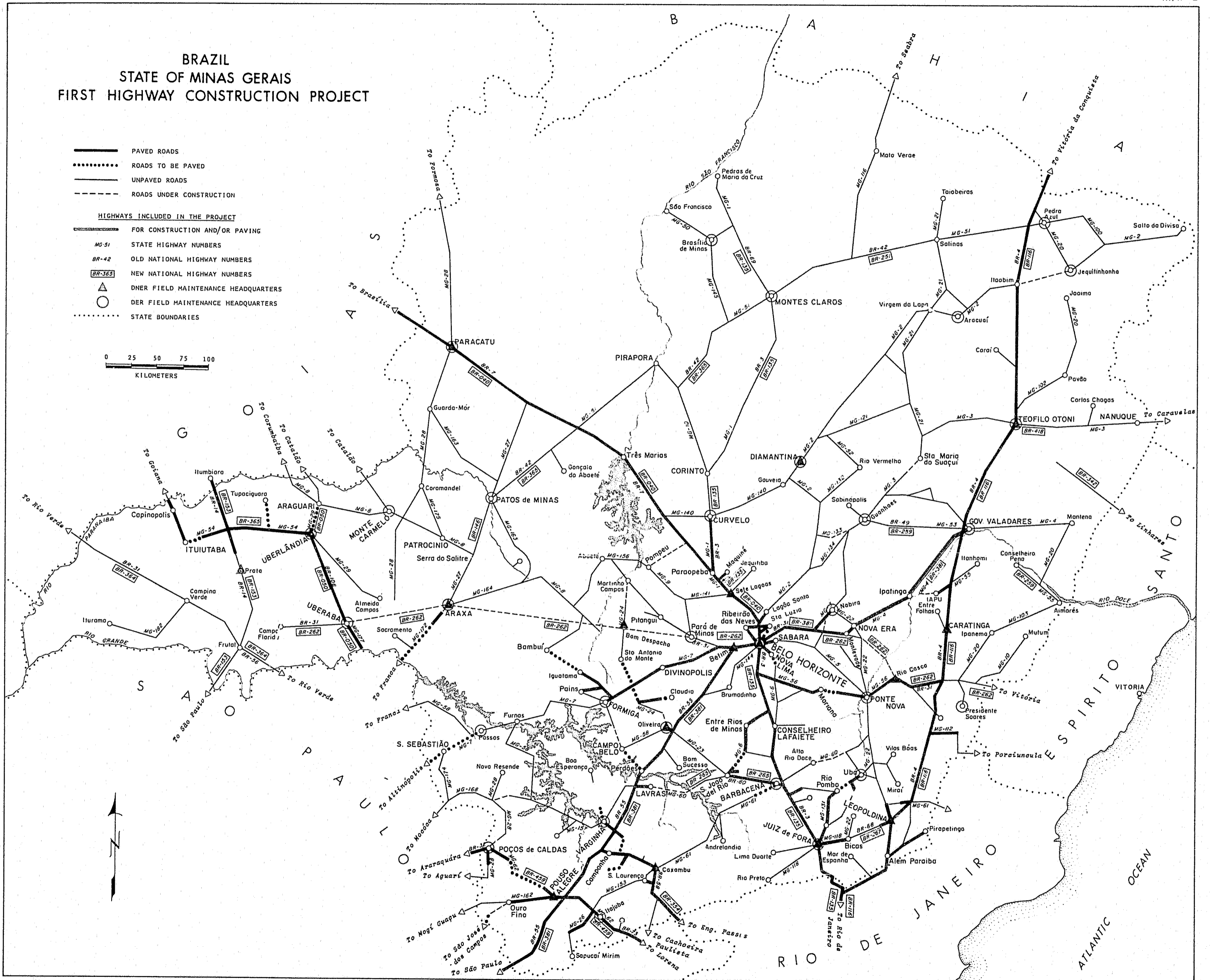
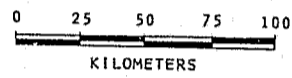


The boundaries shown on this map do not imply endorsement or acceptance by the World Bank and its affiliates.

BRAZIL STATE OF MINAS GERAIS FIRST HIGHWAY CONSTRUCTION PROJECT

-  PAVED ROADS
-  ROADS TO BE PAVED
-  UNPAVED ROADS
-  ROADS UNDER CONSTRUCTION

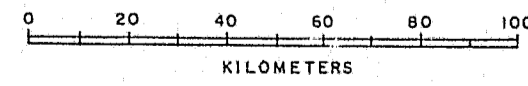
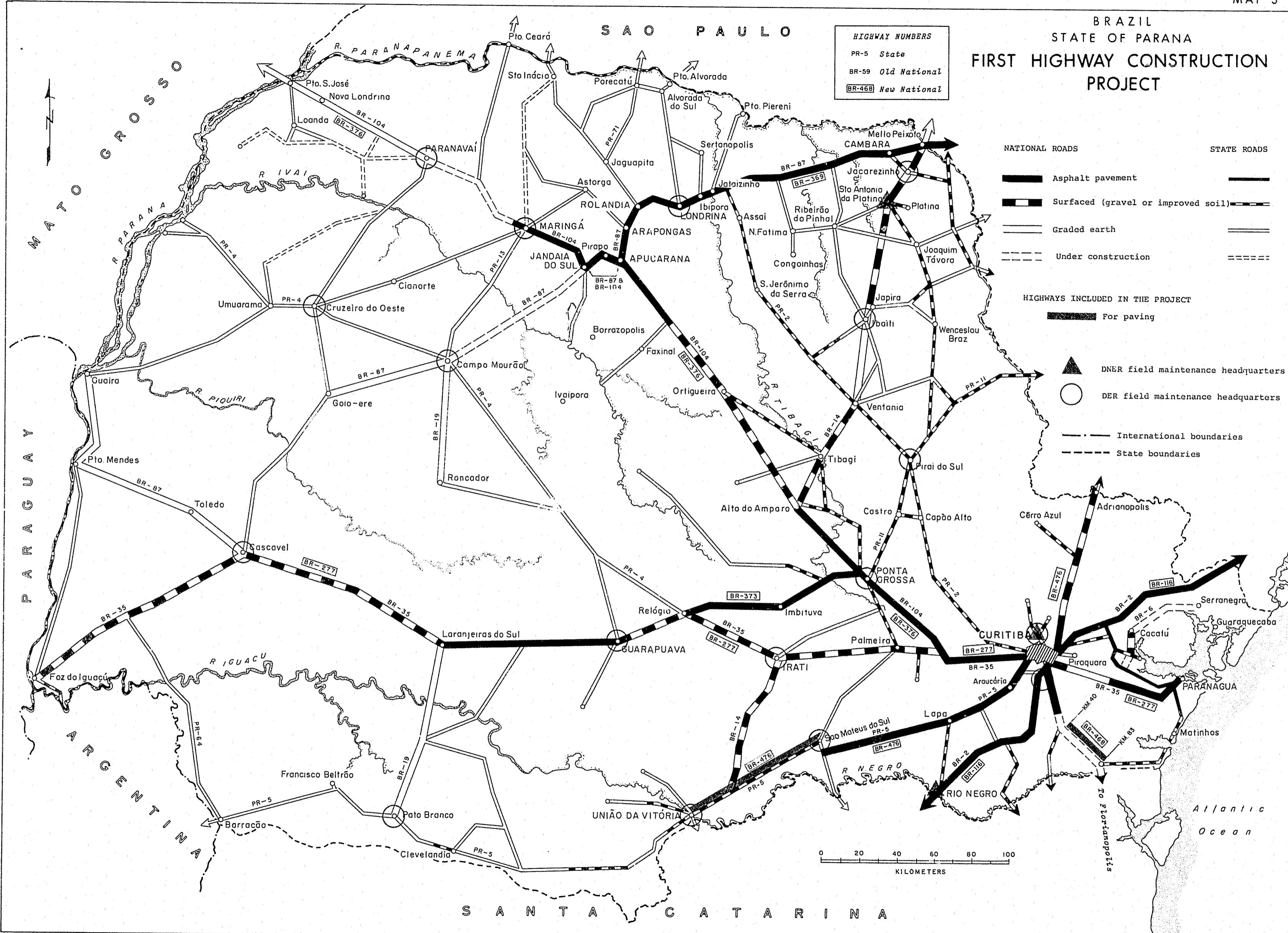
- HIGHWAYS INCLUDED IN THE PROJECT**
-  FOR CONSTRUCTION AND/OR PAVING
 - MG-51 STATE HIGHWAY NUMBERS
 - BR-42 OLD NATIONAL HIGHWAY NUMBERS
 -  NEW NATIONAL HIGHWAY NUMBERS
 -  DNER FIELD MAINTENANCE HEADQUARTERS
 -  DER FIELD MAINTENANCE HEADQUARTERS
 -  STATE BOUNDARIES

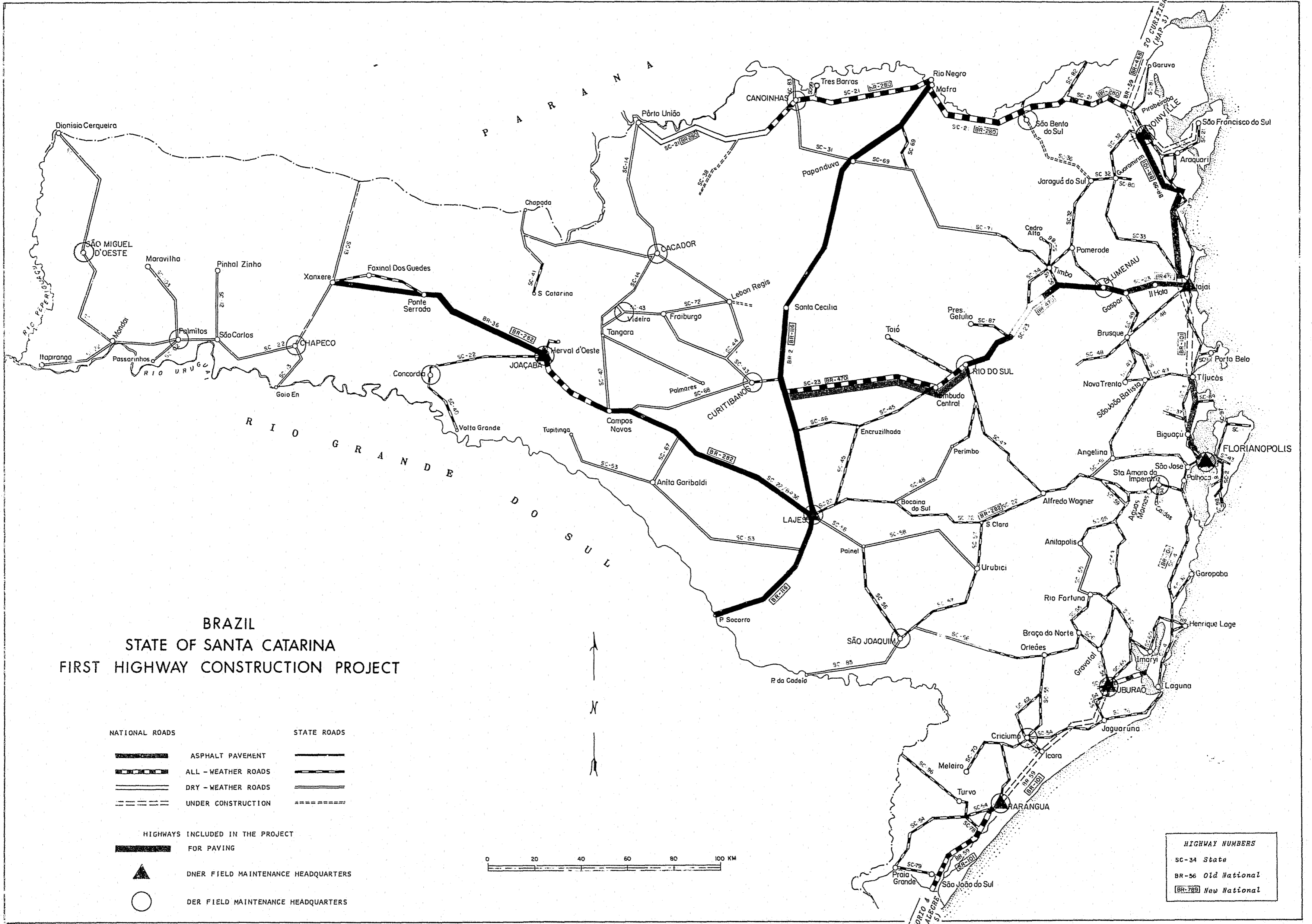


BRAZIL STATE OF PARANA FIRST HIGHWAY CONSTRUCTION PROJECT

HIGHWAY NUMBERS
 PR-5 State
 BR-59 Old National
 BR-468 New National

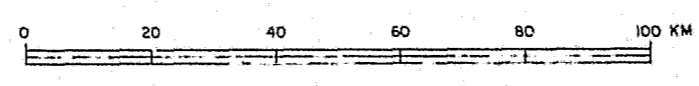
- | NATIONAL ROADS | | STATE ROADS |
|----------------|------------------------------------|-------------|
| | Asphalt pavement | |
| | Surfaced (gravel or improved soil) | |
| | Graded earth | |
| | Under construction | |
-
- HIGHWAYS INCLUDED IN THE PROJECT**
- For paving
-
- DNER field maintenance headquarters
 - DER field maintenance headquarters
 - International boundaries
 - State boundaries



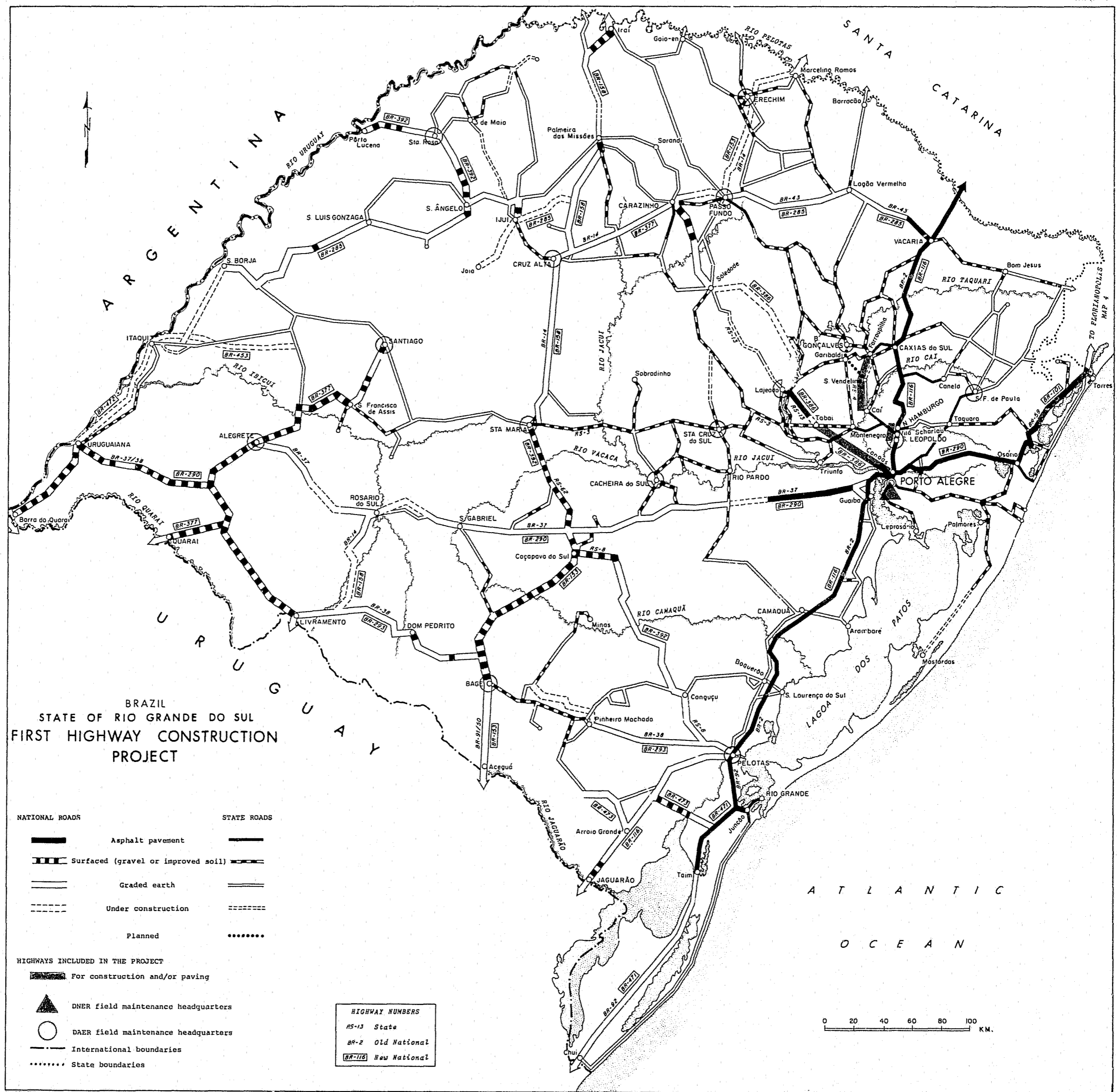


BRAZIL
STATE OF SANTA CATARINA
FIRST HIGHWAY CONSTRUCTION PROJECT

- | | | | |
|----------------------------------|-------------------------------------|-------------|--|
| NATIONAL ROADS | | STATE ROADS | |
| | ASPHALT PAVEMENT | | |
| | ALL-WEATHER ROADS | | |
| | DRY-WEATHER ROADS | | |
| | UNDER CONSTRUCTION | | |
| HIGHWAYS INCLUDED IN THE PROJECT | | | |
| | FOR PAVING | | |
| | DNER FIELD MAINTENANCE HEADQUARTERS | | |
| | DER FIELD MAINTENANCE HEADQUARTERS | | |



HIGHWAY NUMBERS
SC-34 State
BR-56 Old National
BR-789 New National



BRAZIL
STATE OF RIO GRANDE DO SUL
FIRST HIGHWAY CONSTRUCTION
PROJECT

NATIONAL ROADS	STATE ROADS
Asphalt pavement	Asphalt pavement
Surfaced (gravel or improved soil)	Surfaced (gravel or improved soil)
Graded earth	Graded earth
Under construction	Under construction
Planned	Planned

- HIGHWAYS INCLUDED IN THE PROJECT
- For construction and/or paving
 - DNER field maintenance headquarters
 - DAER field maintenance headquarters
 - International boundaries
 - State boundaries

HIGHWAY NUMBERS	
RS-13	State
BR-2	Old National
BR-116	New National

