

UNITED STATES OF AMERICA
DEPARTMENT OF AGRICULTURE
WASHINGTON, D.C. 20250

CAPITAL ASSISTANCE PAPER

Proposal and Recommendations
For the Review of the
Development Loan Committee

BRAZIL: RURAL ROAD CONSTRUCTION LOAN

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UNCLASSIFIED

DEPARTMENT OF STATE
AGENCY FOR INTERNATIONAL DEVELOPMENT
Washington, D.C. 20523

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February 11, 1971

MEMORANDUM FOR THE DEVELOPMENT LOAN COMMITTEE

SUBJECT: Brazil: Rural Road Construction Program

Attached for your review are the recommendations for authorization of a loan in amount not to exceed \$25,000,000 to the Banco Nacional de Desenvolvimento Economico (BNDE) to finance local currency costs of goods and services necessary to assist Borrower to finance the construction and improvement of rural roads, in accordance with agreed upon criteria of the BNDE and A.I.D.

This loan proposal is scheduled for consideration by the Development Loan Staff Committee at a meeting on Thursday, February 18, 1971.

Rachel R. Agee
Secretary
Development Loan Committee

Attachments:

Summary and Recommendations
Project Analysis
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CAPITAL ASSISTANCE PAPER
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* Not attached. See Cable State 209673 (copy in Official Loan File, LA/DR)

PART ONE: SUMMARY AND RECOMMENDATIONS

1. **Borrower:** The National Bank for Economic Development (BNDE), an autonomous dependency of the Ministry of Planning. The National Highway Department (DNER) will assist the BNDE technically in the execution of the subloan program with state highway departments, state agencies responsible for construction of rural roads, and consortia of municipalities. The program will be coordinated by the BNDE with the regional organizations concerned (SUDENE, SUDAM, SUDESUL, AND SUDECO). The loan will be guaranteed by the GOB.

2. **Loan:**
 - a. **Amount:** Not to exceed \$25,000,000.

 - b. **Terms:** The BNDE will repay the loan over 15 years, including a grace period of five (5) years, with an interest rate of two percent (2%) per annum for ten (10) years and three percent (3%) per annum thereafter.

 - c. **Local Cost Financing:** Inasmuch as all construction materials and related services are available in Brazil on an economic basis, the full amount of the loan will be utilized for local cost financing. Although a fuller discussion of Brazil's self help actions with respect to internal allocation of resources and its stabilization program is contained in Annex IV, it should be emphasized here that Brazil is maintaining a high rate of public savings through a very effective tax program and is efficiently allocating its expenditures within a sound stabilization program.

3. **Background:** As a result of numerous requests from the states and local governments for assistance in financing rural roads, the BNDE in 1967-68 developed a three year program of subloans to state agencies and municipal consortia for the construction of agricultural roads. As originally conceived, the BNDE proposed to lend NCr\$60 million* (approximately

* The average annual exchange rates weighted by the number of days in effect were as follows:

1966	-	US\$	=	NCr\$	2.22
1967	-	US\$	=	NCr\$	2.66
1968	-	US\$	=	NCr\$	3.39
1969	-	US\$	=	NCr\$	4.08
1970	-	US\$	=	NCr\$	4.53

Present rate January 1971 US\$ 1.00 = NCr\$ 4.92

\$15.0 million) over a three year period (1968-1970) to finance up to 60% of the costs of approved projects. At the end of the first year approximately, NCr\$48.0 million of the program's resources had been committed and the program was expanded in early 1969 to a total of NCr\$100 million (approx. \$25.0 million).

Due to the heavy demand for this financing, the entire NCr\$100 million has now been entirely committed to 12 projects. Having committed its entire budget for the three year program, the BNDE has requested AID assistance for the continuation of its program. The Bank has developed a \$83 million program, to which it is prepared to commit \$25.0 million. The remaining \$58 million is to be raised \$33 million from the states and \$25 million from AID.

Recognizing the developmental importance of rural agricultural transport, but realizing that it would be impossible for USAID to review and approve a myriad of individual agricultural road projects, USAID provided an initial assistance to the BNDE program with a PL-480 allocation of NCr\$8 million in 1967, and an additional allocation of NCr\$5 million in 1968 in the hope that the BNDE could eventually serve as a conduit for a major input of AID resources in this area. With the successful allocation of these and the BNDE's own resources, the USAID is of the opinion that it is now appropriate to provide major assistance to this program.

4. Project Description: The project consists of a program of subloans to state agencies and municipal consortia to finance (1) the construction of all-weather, secondary roads linking agricultural areas and municipalities to federal and state primary highway networks, (2) the improvement of existing earth roads, which perform the same function, to minimum design standards and all-weather status, and (3) the construction, under certain conditions, of penetration roads into areas of high agricultural potential. Indications are that the second category above will receive the bulk of the financial assistance, for the need for transportation in areas of agricultural potential has resulted in the construction or improvisation of earth roads to attend to the most basic transportation requirements.

Project proposals will be prepared by the States and the municipal consortia and presented by them to the National Highway Department (DNER) for review to assure consistency with the national plan, and with DNER engineering standards and specifications. Once DNER approval is obtained, the sub-borrower's application is subjected to an economic, technical, and financial analysis by the BNDE in accordance with BNDE/USAID mutually agreed criteria. To assist the States and municipal consortia in the preparation of their applications, the BNDE, DNER, and USAID are collaborating in the preparation of a manual covering the technical, economic, and financial requirements of the program, as well as, a detailed explanation of the methods of economic analysis to be used by the sub-borrower (or their consultants) in selecting roads for financing under the program.

For approved projects, the sub-borrowers will finance 40% of the total project costs, the remaining 60% will be financed equally by the BNDE and AID.

Field monitoring of the construction projects will be the responsibility of a local engineering consultant retained by the BNDE. Consultant personnel will inspect each project under construction as necessary to insure satisfactory state project control procedures, to give technical assistance to the sub-borrower when needed, and to certify work completion and construction payment quantities. Loan funds may be used by the BNDE to finance the costs of this technical assistance.

5. Purpose: The purpose of the loan is to assist the GOB in the further development and institutionalization of a national rural road financing program. The program will:
- a. effect more efficient and economic allocations of state and municipal resources in the rural transport sector, by requiring state and local governments to allocate their matching resources to roads which have been selected according to economic criteria reflecting agricultural transport priorities.
 - b. improve the construction of rural roads through:
 - (1) providing the responsible agencies with technical assistance in planning road investment, and in supervising road construction;
 - (2) establishing uniform and realistic engineering specifications for the design and construction of such roads.
 - c. facilitate closer coordination of federal and state transport planning and investment through (1) the review and analysis of state and local transportation programs by the DNER and the BNDE, and (2) requiring states to utilize economic and engineering criteria similar to those utilized in national transport planning.
 - d. provide resources for the construction and major improvement of 7,500 km. of high priority agricultural access roads. Although 7,500 km. represents a relatively small percentage of the total road network in Brazil, the program will have a significant impact on municipalities in which roads are built. The previous BNDE program showed that there is a large unfilled demand for roads in agricultural municipalities which cannot be met solely with the funds currently available.
6. Priority of the Project - Agricultural Development: This program should be viewed as an agricultural development program rather than a transportation investment program, for as pointed out in the report for Brookings Transport Research Project: "1/ Transport is an essential

1/ Excerpts of PPC Research Program (Economic) - ERP Summary No. 56
 Brookings Transportation Research Program as taken from AIDTO
 CIRCULAR A-1176

ingredient of almost every aspect of development and should be an integral part of investment programs in agriculture, industry, and other sectors. Viewing transport as a separate problem has resulted in costly mistakes in the choice, timing, location, and design of projects. This has often reduced the potential contribution of transport to economic and social progress".

"Transport as an input to other sectors is part of a package of things that need to be done to improve living conditions. When these other contributing factors necessary to development are present, as they sometimes are, transport alone can have an effective impact. When they are not already present, transport improvements may induce them. But very often measures to assure the success of transport undertakings will have to be specifically provided for".

With respect to the impact of transportation on agriculture, the Brookings report goes on to state:

"Raising more food once involved simply moving to new land, and most food was eaten where it was grown. The picture has now changed. The supply of new land is disappearing in most parts of the world, and the principal way to get more food is to transport fertilizer and other inputs to farms where more can be grown on land already in use. And since increasing numbers of people live in cities, surpluses have to be moved from rural areas to urban consumers".

"But agricultural productivity will not be increased to an important degree where access roads are impassable or nonexistent, where transport costs are high, and where ability to get to market is uncertain. Under these conditions there are neither the means nor the incentives to produce a surplus".

"Transport is an input to agriculture, along with fertilizer, seed, credit, and other ingredients of food production. This means planning and organizing transport programs jointly with agricultural and rural development programs, including not only roads and vehicles but fertilizer and other inputs, credit, storage, food processing, and technical services. The success of transport proposals in agricultural areas is measured in output and in the realization of community goals".

In Brazil agricultural production increases have historically been accomplished by placing additional land in production. However, due to the fact that the new lands that are available now are distant from the market and lack investment in supporting infrastructure, further gains in production can be most economically achieved through better use of land within the zone of influence of the existing transportation system.

A serious limiting factor in attaining this objective is the inadequate rural infrastructure which exist in areas of agricultural potential which are in the zones of influence of state and federal trunk roads. While much work has and is being done on the primary highway network which connects the country's major urban centers, there are still large regions which have no or inadequate access to these trunk highways and which are therefore isolated from the mainstream of economic activity and isolated from participating in and benefitting from the policies and programs which are being executed in the agricultural sector. Such rural roads as exist are mostly unimproved earth roads, usually passable only during the dry season. While the Government is investing heavily to improve and construct the trunk road system, and is putting stronger emphasis in the agricultural sector through policy, credit and investment, there are insufficient resources being applied to the rural road infrastructure which is necessary to communicate the benefits of these programs to important agricultural areas.

The program herein presented is designed to select and finance rural roads to link areas of agricultural potential to federal and state trunk road system and thus bring these areas into the economy. In the opinion of the Mission, the criteria of the program assure (1) that the return on investment in roads will at the very least equal the opportunity cost of capital in the public sector (estimated at 10%), and (2) that complementing factors necessary to the agricultural development of the areas to be served by the roads will be present, planned for execution, or will be induced by the program.

Thus, the financing under this Program of construction or improvement of rural roads in such areas of agricultural potential should result in increased agricultural production and productivity, as well as in other economic and social benefits to selected rural areas of Brazil. The following benefits are expected to accrue to the agricultural sector as a result of improving or constructing rural roads:

- a. reduction in operating costs of existing traffic, with cost savings being transmitted to the agricultural sector in the form of lower transport costs for farm inputs (resulting in higher use and higher productivity and income) and consumer goods, and lower costs of transport of produce (higher return to the farmer).
- b. economies of scale in transportation resulting from the use of heavy trucks (rather than smaller vehicles, wagons, or pack animals) thereby reducing transportation costs of both farm produce and agricultural inputs as above.

- c. increases in production resulting from reduction in risk through providing reliable all-weather access to markets and storage and processing facilities thereby (1) providing the farmer with the incentive to produce that comes from the assurance of marketing his product and (2) allowing the farmer to select his crops according to market demands rather than transportation constraints (e.g. with all weather transportation, he has the option of switching from more easily stored cereals or mandioc to vegetables or dairy products).
- d. increases in production and productivity due to reliable all-weather access to essential farm inputs such as veterinary services, fertilizers, seeds, and insecticides.
- e. increases in production resulting from access to new markets previously too distant (in terms of time) to be supplied.
- f. increases in productivity and production from providing the farmer with access to the benefits of major policies and programs (e.g. fertilizer and rural credit programs, extension services, rural assembly area storage, processing, and grading facilities, extension services minimum price programs, seed programs, etc) now being initiated in the agricultural sector.

In addition to these benefits, all of which should result in higher incomes and thus higher levels of investment and consumption, roads bring change and social benefits to the rural society. As the Brookings report states: "Nearly everywhere a by-product of improved transport for agriculture is the gradual transformation of rural society itself. Changes in the cropping pattern that raise income per acre introduce a greater variety of consumer goods, more frequent travel to the nearest town, medical and veterinary services, electricity, postal service, newspaper delivery, the extension of bus routes, the improvement of local teaching staffs, and access to more distant high schools. These transport-induced social changes all contribute to the commercialization of agriculture".

"The lesson for national planning and foreign assistance efforts is this: that programs to improve access and mobility in rural areas are essential to the modernization of agriculture. For the breakdown of isolation is essential to the introduction of new techniques and for the conduct of programs to improve health and education, and to change attitudes. Transport improvements provide the regional communications network that links the rural population with progress stemming from the urban-industrial sector".

7. Coordination with NE Agricultural Marketing Loan

A.I.D. will be commencing during FY 1971 a 3-year loan program with the BNDE for the construction of wholesale/retail and rural assembly markets in N.E. Brazil. USAID/B will impress upon the BNDE during the loan negotiations that

A.I.D. views these programs, the Rural Roads Construction Program and the NE Marketing Loan, as complimentary investments for the general improvement of agricultural marketing channels and will request the BNDE to give priority to rural road programs which will compliment agricultural marketing investment.

7.

8. Financial Plan:

<u>Funding Source</u>	<u>Amount Million US\$</u>	<u>% Contribution</u>
BNDE	25.0	30
AID	25.0	30
States and Municipalities	33.3	40
	<u>83.3</u>	<u>100</u>

9. Other Sources of Funds

- a. In its letter to AID of December 16, 1969, the IBRD stated that it had no interest in participating in this program.
- b. At a review of the project with the AID/W Liaison Group the Export-Import Bank stated that it had no interest in financing this program. See Minutes of the meeting held December 22, 1969.
- c. The IDB expressed "no interest" in this project in its letter to AID of March 24, 1970.
- d. Other efforts to obtain financing for this project from external sources were not undertaken due to the requirement for concessio-nary loan terms which are not known to be available from sources other than the above.
- e. As noted above in Background, Cr\$13.0 million of PL 480 counter-part resources from the Seventh and Eighth Wheat Agreement were allocated directly to the BNDE to assist in the initiation and expansion of the pilot Rural Road program.

Negotiations on the Tenth PL 480 Wheat Sale to Brazil are still not complete, but the Mission estimates that the future sale will be approximately Cr\$96.0 million (US\$19.0 million). However, the demand for counterpart resources for local currency financing has been substantially increased as no program lending is anti-cipated in FY 1971. Counterpart resources will again be allocated through the GOB budget (see Budget Support see "Utilization of Counterpart Resources". Annex IV Exhibit B), for high priority programs the agricultural sector including "Agricultural Credit", "Agricultural Production" and "Agricultural Marketing". In addition, a substantial portion of the generated counterpart will be used, if available, to meet a part of the local currency financial requirements of dollar loans, such as, the loan to the Instituto Brasileiro de Geografia e Estatística (IBGE 512-L-076) estimated Cr\$21.47 million through CY 1972 and the agricultural research loan to the Escritório de Pesquisas e Experimentação (EPE 512-L-077) estimated Cr\$4.0 million. These "fixed claims" of dollar loan programs on available counterpart resources combined with the

increased demand on PL 480 counterpart funding have effectively eliminated the possibility of supporting this program with counterpart resources.

10. Statutory Criteria:

All Statutory Criteria have been met. The Statutory Criteria check list is contained in Annex III.

11. Recommendations

On the basis of the conclusion of the USAID Mission that this project is technically, economically, and financially sound, it is recommended that a loan to the BNDE for an amount not to exceed \$25 million be authorized subject to the following terms and conditions:

- a. AID loan funds will be used to meet cruzeiro costs of financing the construction and improvement of rural roads (including consulting services) in accordance with BNDE/USAID mutually agreed criteria.
- b. Up to \$600,000 of the loan may be used to finance local engineering and consulting services for the BNDE.
- c. The BNDE will repay the loan over a fifteen (15) year period, including a five (5) year grace period, with an interest rate of two percent (2%) per annum for 10 years and three per cent (3%) per annum thereafter.
- d. The two-step option will be offered to the GOB with repayment schedule at forty (40) years including a ten (10) year grace period with an interest rate of two percent (2%) per annum during the grace period and three percent (3%) per annum thereafter.*
- e. Other Terms and Conditions:
 - (1) Unless A. I. D. otherwise agrees in writing, all repayments of principal and interest of A. I. D. financed subloans will be used by the BNDE for relending in its rural road construction program for such periods and under such terms as are satisfactory to A. I. D.
 - (2) A. I. D. financing will be limited to not more than 50% of any BNDE loan for eligible projects.

* The use of prepayments received by the GOB will be determined by agreement between the GOB and the USAID.

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William A. Ellis, Minister-Director

PART TWO: THE PROJECT**I. NATURE OF PROJECT****A. Project Description****1. Definition**

The purpose of the loan is to provide financial assistance to the Brazilian Government, states, and municipalities in a nationwide program of rural road construction and improvement. As outlined more fully in Section C, below, it is expected that this program will significantly increase and improve the inadequate rural infrastructural base which exists in many areas of the country and which presents a continuing obstacle to the development of the full agricultural potential of these areas. Approximately 7,500 kms of roads will be financed under the enlarged program.

The loan will be channeled through the National Development Economic Bank (BNDE) which in 1968 successfully initiated a pilot program of rural road construction and improvement. Since the funds allocated to this pilot program were recently fully committed, the A.I.D. loan will permit the BNDE to continue and substantially expand its original program. The Bank is making a matching contribution to the Program.

The expanded BNDE program will benefit from, and in part be based upon, a comprehensive survey and analysis of the transportation sector conducted during 1965 to 1969 by the GOB's "Executive Group for the Integration of Transport Policy" (GEIPOT) and under the direction of the World Bank. (See Section B, GEIPOT) The result of this study was the development of a Master Plan containing recommendations and establishing priorities for the GOB's investments in highways during 1968-1976.

Of the total construction and reconstruction needs identified in the Master Plan (estimated at \$4.7 billion), selected federal and major state highways will be financed by the World Bank under its existing and projected highway loan program in Brazil (estimated to total \$400-500 million over a 4-5 year period). These are generally federal and state highways intended to serve long-distance traffic. The proposed BNDE/AID program will focus on the secondary or feeder road system providing interconnection with these trunk roads. Thus, the AID/BNDE and IBRD/GOB construction programs will be complementary to one another, with each generating traffic for the other.

As with the original BNDE rural road construction loan program, the expanded program will provide financing to state highway agencies, municipal consortia, and other state-approved development agencies for the construction and improvement of priority all-weather rural access roads. An important qualification for eligibility will be the states' capability and record in regard to road maintenance. Roads eligible for financing under the BNDE program will generally meet the following description:

- 1) They will be state and municipal rural roads, as opposed to interstate or federal highways. An exception may be made in the case of state roads which may eventually become part of an interstate system, but where the completed system will not be constructed for some time (e.g. 10 years).
- 2) They will be built to the standards defined under this program (i.e. category III or IV, all-weather, generally gravel roads.)
- 3) They will be roads linking communities, or providing access from agricultural communities to market centers or from such communities to federal or state trunk highways. Development or penetration roads into previously unsettled areas will be eligible for financing, based on careful analysis of the area and its potential in accordance with the area and its potential in accordance with the Area Analysis Method outlined in Section II B 3 p. 69.
- 4) Except for consortium sponsored projects, roads will either be included or added to the states' Highway Plan and to the states' Highway System and identified as being of priority to the states' development, at the time the projects are developed.
- 5) Projects will be economically justified in terms of their direct and/or indirect benefits as related to the costs of construction or improvement. As will be explained more fully in other sections, the economic justification of projects will be considered established, if (a) the road is identified as being of priority in the GEIPOT studies (b) was not studied or listed in the GEIPOT studies, but can be justified on the basis of a simplified cost-benefit analysis similar to that utilized by the GEIPOT studies or (c) if the projects are presented and justified as part of an integrated area or regional development plan within the state.

The proposed program will provide year-round access from rural communities to major processing, marketing and consuming centers. The projects eligible for financing will therefore be limited to roads providing such access, plus a number of "penetration" or development roads, all built to specified geometric standards and specifications. Such projects may include the following types of work:

- a) New Construction - Construction of roads where none existed before, or on the location of an existing trail or road, where it is not feasible to use any of the existing road.
- b) Reconstruction - Upgrading of existing roadway to specified standards to make it an all-weather road, or to increase traffic capacity. Reconstruction differs from new construction, in that the existing road facility is used as a starting point, and added to as needed to bring it to the desired standard.
- c) Improvement - Spot improvement of an existing road to make it an all-weather, year-round road. Such work may consist of placing drainage structures or constructing side ditches in existing undrained areas; replacing section of roadways that have failed due to poor construction materials or inadequate original construction standards or procedures; rebuilding sections of fills that have badly eroded.
- d) Reconditioning work on an existing road to bring it up to a standard that can be maintained by standard maintenance crews. An example would be the regrading of the roadway and slope areas and adding additional gravel surface throughout the project.

As was the case under the original BNDE-DNER pilot program, bridges of appropriate specifications will be eligible for financing, where their construction can be justified in terms of the objectives of the program (e.g., replacement of a bridge which is flooded during part of the year or which does not have the structural capacity to carry the expected traffic).

On the basis of the foregoing criteria, the USAID has specifically identified eligible projects listed in the GEIPOT survey and requiring financing in the period of 1970-1976 totalling

6,098 kms, for an estimated total cost of \$67 million. This figure does not include projects such as a study by a CINTEA (a municipal consortium located in Rio Grande do Sul) totaling 3,000 kms (\$22 million), and a number of projects submitted to the BNDE or known to be in preparation (\$16 million). Eligible projects on which planning studies have been made therefore total \$105 million. Projects in five additional states are being developed which are of unknown magnitude. These needs also do not include the cost of works described under categories (c) and (d) above (improvement and reconditioning) which cannot be estimated, nor any other projects which would be eligible but on which no initiative has been taken.

It is quite obvious, therefore, that the expanded BNDE program will not come close to meeting the global investment needs for the development of the rural road network in Brazil. Such needs cannot be estimated with accuracy, but an approximate concept of their magnitude can be obtained from the size of the municipal and feeder road network which comprises 778,580 kms of the total 939,613 kms of the Brazilian road network, and which - for the most part - is unpaved and in substandard condition. Very rough estimates based on road density and on past BNDE area surveys, suggest such needs would exceed \$1 billion, including both construction and improvement of all-weather roads.

Since the country's need for rural all-weather roads clearly exceeds the resources available to the BNDE, the states, and municipalities, even as supplemented by the A.I.D. loan, it is extremely important - at this stage of the development of this road network - for the BNDE program to finance only projects which have a clear economic justification and priority in the states' development plans. An important objective of this loan is therefore to improve the planning and analysis of the rural road network both at the state level and by the DNER and BNDE. To this end, the expanded program provides for an improved methodology for economic analysis, a strengthened BNDE staff, and the retention of consultant engineering firms to provide the necessary technical assistance both to the BNDE and to the state DERs.

As under the original BNDE program, the states (or consortia or other state agencies charged with rural road construction and improvement) will finance 40% of the project costs. The BNDE and A.I.D. will share the remaining 60% on a 50-50 basis. An amount not to exceed \$600,000 is to be included in the loan to provide technical assistance to the BNDE to assist in the inspection and supervision of the construction of BNDE financed projects, to give technical assistance to the sub-borrowers during construction and to certify work completion and construction payment quantities. A local consulting firm or firms will be retained by the BNDE to provide such services. The financial plan for the 5-year disbursement period is as follows:

Financial Plan

(In US\$1,000)

<u>Funding Source</u>	<u>Amount</u>	<u>Percent</u>
States and Municipalities	\$33,300	40%
BNDE	25,000	30%
A.I.D.	<u>25,000</u>	<u>30%</u>
	\$83,300	100%

2. Operating Criteria for BNDE-USAID Program

a. Operating Procedures

As in the present BNDE program, eligible sub-borrowers, specifically state highway departments, consortia of municipalities and other state agencies charged with the construction and maintenance of rural roads, will be responsible for the preparation and presentation of loan applications to the DNER and the BNDE. Loan requests will be supported by complete technical/engineering studies, detailed information on the financial position of the sub-borrower and a complete economic study of the roads to be included for financing under the program.

The responsibility for examining the technical feasibility of the project in the first instance will continue to rest with the engineers within the Special Working Group of the DNER. They will be responsible for reviewing all plans and the design specifications for the roads to be built, the cost estimates, the method of construction to be employed and the ability of the sub-borrower to maintain the roads proposed for construction or improvement. The comments and recommendations of the DNER engineers are forwarded to the BNDE's Division of Project Analysis in Unit I of the Department of Operations.

Upon receipt of the proposal, a "work group" composed of an economist, an accountant or financial analyst, a lawyer, an engineer and a bank administrator, is assigned to review the proposal. The work group, which always makes a site inspection, is responsible for the financial and economic appraisal of the project proposal and reviews the DNER's recommendations and comments concerning the technical feasibility.

The report of this work group is the document upon which the loan is based. The report contains: (1) a detailed description and identification of each road segment; (2) an estimation of its economic benefits; (3) chronograms of the physical and financial implementation plan, and (4) a listing of the required conditions precedent to be included in the loan as well as any covenants deemed necessary under the particular circumstances.

Approval of the work group report by the director of the operations department of the bank constitutes acceptance of the project for financing. The loan agreement is signed by the (1) the BNDE, (2) the borrower, (3) the DNER and (4) a representative of the state government, usually the Governor.

In addition to the specific technical, financial and economic criteria outlined below, all projects considered for financing must be of recognized importance to agricultural development and assigned priority for financing by the state government. The criteria for the program will tend to favor the North-Central and Northeastern states where the rural infrastructure is least developed.

b. Technical Criteria

The kinds of roads to be built or improved under the program, and the types of work to be financed, are outlined in the previous section and detailed further in Section II B Technical Analysis.

Roads to be financed under the program will be built to definite design standards: the higher standards being those for Class III roads and the lower standards (Class IV) being the minimum acceptable standards. (See Annex VII B Exhibit A).

The technical/engineering studies of the roads proposed will contain complete technical descriptions (design specifications, and characteristics of base and surfacing), preliminary plans showing horizontal and vertical alignment of new roads, cost estimates and a chronogram of the construction work. In addition, the sub-borrower will be required to demonstrate to the satisfaction of the BNDE its capacity to adequately maintain the projects undertaken. Construction work will be performed by contractors, with force account work eligible in certain carefully delineated exceptional cases. (See Technical Analysis Section II B).

c. Financial Criteria

The financial contribution of the sub-borrower will be 40% of the overall cost of the project. As in the present ENI/E-DNER program, when a road to be constructed or improved coincides with the alignment of a road in the Federal Highway Plan, the DNER will finance not less than 40% of the estimated cost of the work to be done on that road.

In preparing the economic analysis of the proposed roads, the sub-borrowers may find it necessary as in the past program, to retain private consultants. The cost incurred by the sub-borrower

to retain consultants for the economic analysis will be considered as part of the sub-borrower's 40% contribution to the financing of the overall cost of approved projects.

The financial information to be presented to the BNDE will include the borrower's anticipated revenues and expenditures, a complete financial plan for the project, the borrower's budget and balance sheets for the last three years, and a list of unpaid balances of outstanding loans.

As set forth in the BNDE-DNER Agreement (see Annex VII Exhibit E) establishing the pilot rural road construction program, subloans presently accrue interest at 9.5% per annum in addition to the other fees charged by the BNDE. In theory, the unpaid balance is monetarily adjusted under criteria adopted by the BNDE, in accordance with the National Monetary Council determinations. However, under the present agreement with the DNER, the sum of all charges to the sub-borrower, including interest, fees and monetary correction may not exceed 20% per annum. (See Section II B Financial Analysis).

All loans made to state highway departments are guaranteed by the state's share of the National Highway Fund. No loans may be made which together with loans from any other source would encumber in any given year more than 60% of the state's share in the National Highway Fund. For municipal consortia, and other special state and municipal agencies, the same limitation will apply on their sources of revenue which generally include, but are not limited to, part of the municipalities' share of the National Highway Fund.

Other than the above limit applied to maximum percentage guaranty, no other subloan limitation by amount is contemplated. The grace and amortization period for each loan will be established according to the needs of the individual sub-borrower and the conditions peculiar to each project; however, they are not to be less than 7 years nor more than 15 years.

d. Economic Criteria

The economic justification of the projects must be established pursuant to one of three methods:

- (i) The road proposed for construction or improvement is specifically identified in the GEIPOT Transport Survey. Its inclusion in the GEIPOT Master Plan signifies that the project was analyzed and found economically justifiable under the methodology used for the GEIPOT studies. The principal criterion used in the survey to demonstrate the economic feasibility of any proposed road was that the economic resources used for highway investment must yield economic benefits at least as high as they would yield if committed to alternative uses. Since only direct benefits were considered, the rates of return computed by the GEIPOT consultants for such projects are considered conservative for purposes of the present program, which is expected to result in important indirect benefits as well.
- (ii) The proposed road is economically justified under a simplified version of the GEIPOT methodology. The sub-borrowers will be required to calculate benefit/cost ratios in a manner similar to the method used by the consultants in the GEIPOT Survey but certain standard data will be furnished to the sub-borrower to obviate the need of their recomputing them. This approach will be followed to justify roads which were not specifically analyzed in the Brazilian Transport Survey.
- (iii) When the direct benefits of reduction in vehicle operating costs cannot be estimated, or when the indirect benefits of a road are of considerable importance, the economic justification of projects may be based on a detailed analysis of the area influenced by the project, as well as engineering and cost alternatives, in accordance with detailed criteria and instructions to be furnished to the sub-borrowers. (See Economic Analysis and Appendix V).

B. Project Background

1. Past USAID/Brazil Construction and Maintenance Projects

Since 1964, A.I.D. has participated in the financing of: (a) highway construction (1,110 kilometers); (b) maintenance equipment for 12 states; (c) construction equipment for one state agency; and (d) construction engineering services and feasibility studies. Total amounts were as shown in the following table:

	<u>A.I.D. Highway Projects</u> (1964 - 1970)	
	<u>Dollar Loans</u> (in \$1,000)	<u>Cruzeiro Funds*</u> (NCr\$1,000)
Highway Construction	15,900	153,280
Maintenance Equipment	53,000	14,500
Construction Equipment	-	5,000
Engineering Services	2,106	-

(*) Derived from Program Loans or PL 480 Funds

In addition, A. I. D. has recently signed a loan with the state of Rio Grande do Sul to finance highway maintenance equipment and technical assistance to the state highway department, for the reorganization and improved maintenance procedures. The loan totals US\$5,500,000 and NCr\$19.0 million from counterpart funds.

Approximately 60% of the road construction projects (676 km) were in eight states (Alagoas, Maranhão, Paraíba, Pernambuco, Rio Grande do Norte, Ceará, Goiás, and Rio Grande do Sul). These state highways were constructed primarily to serve the agricultural areas of these states. In addition, portions of three federal highways were constructed. Two of these, the Paraná Coffee Road (BR 104), and BR 330 in Bahia, were primarily agriculture purpose roads. The third project was the Rio-São Paulo Highway (BR 116-264 km). Construction has been completed on all of these projects.

As can be seen in the table above, the major portion of the A.I.D. dollar loan funds in the transportation area has been assigned to highway maintenance equipment projects which are located in the states of Pará, Piauí, Maranhão, Ceará, Rio Grande do Norte, Paraíba, Pernambuco, Alagoas, Sergipe, Bahia, Minas Gerais, and São Paulo. In addition to equipment financing, the projects in all of these states included technical assistance to the state highway departments (DERs) to improve their overall highway maintenance organizations, facilities, and operating procedures. The projects are all completed except for Minas Gerais and São Paulo.

The limited financial resources and the very low level existing technical capabilities of the states at the beginning of these projects caused many problems and delays during the implementation period. However, in all but two of the states, these problems were surmounted and the states were left with a highway maintenance organization capable of adequately maintaining their roads. In Piauí and Ceará the financial problems were never fully resolved and the projects resulted in only limited success.

The financing of highway construction equipment was for the Agrarian Reform Institute of the state of Rio Grande do Sul (IGRA). This organization has been actively engaged in the agricultural development and colonization of a large region of the state. Its program includes the construction of over 1,400 kilometers of farm-to-market roads. The A.I.D. funds (from Program Loans) totalled ~~Nr~~\$5,000,000 to finance construction equipment to be used by IGRA for this purpose. At the present approximately 1,000 km of these roads have been completed.

2. GEIPOT - National Transport Survey

In 1965 the Government of Brazil agreed to a recommendation by the World Bank to launch a National Transport Survey. The survey was carried out by consultants in two stages. Phase I, covering highway transport in four states, railway transport, coastal shipping, and port operations for Brazil's three main ports, was started in 1965 and completed in 1967. Phase II, covering highway transport in fourteen states, was started early in 1967. The Phase II studies are now complete and the final draft reports are under review prior to final printing.

The Phase I studies evaluated and gave recommendations for improvements in government policies regarding the planning of new transport facilities, utilizations of old investments, regulation of transport, traffic allocation, taxation of transport industries, the establishment of user charges, and the general coordination, organization, and administration of the various transport modes. In addition, highway master plans with construction priorities were developed for four states.

The objectives of the Phase II studies were:

- a. to conduct Highway Planning Studies to prepare master plans for construction and to provide investment programs for construction, road maintenance, and maintenance and shop equipment.
- b. Conduct organization and maintenance studies for improved operation and procedures.
- c. Conduct construction feasibility studies for certain proposed projects.
- d. Coordinate the Phase II work with the completed Phase I studies to produce a complete National Master Plan.

To coordinate and supervise the Transport Survey, as well as to provide counterpart personnel and required facilities, a government agency - Grupo Executivo de Integração da Política dos Transportes (GEIPOT) - was established in 1965. The survey was performed by ten consultants groups under the control and direction of GEIPOT. These consultant groups consisted mostly of foreign firms (representing 6 countries) with a few in consortium with Brazilian firms. Foreign firms were used in order to obtain the maximum qualified personnel for the survey.

One of the important tasks of the Transport Survey was a study on highway pricing policies. The Phase II reports recently completed included recommendations for a national policy for road user charges which would be sufficient to finance the administration, maintenance and construction of the existing and proposed highway network. A shortfall of necessary revenues was projected for the period 1970-1973, which results in the necessity for external financing during this period. (See Annex IV Exhibit C.) However, the proposed user charges would provide sufficient funds beyond this period to recover the earlier external financing. The Government of Brazil has stated its intention to consider this matter this year, with a view to implementing the recommendations made in the Transport Survey.

The Transport Survey resulted in recommendations which, if adopted, would go far to ensure the movement of traffic by the most economical mode of transport. It was recommended that investments be made according to economic criteria, that there be free choice of mode of transport, that government policies should not unduly favor or discriminate between modes, and that users be charged in proportion to the resources consumed in the provision of transport services. In the highway sector, the studies concluded with the listing of priorities for investment on national and state networks for the period 1969-1976, forecasts of financial expenditures on highway investment, maintenance equipment, and maintenance and administration. They also included recommendations for the improvement of organization, maintenance procedures, and financial programs. The highway investment program recommended in the survey ranged from US\$845 million in 1970 to US\$756 million in 1973 and continuing at that level through 1976. (See Annex IV Exhibit C). The recommended program is expected to greatly improve the design and surface standards of the system. The paved roads in the national and state highway system will increase from about 20% in 1967 to 45% in 1976.

Several of the final reports of the Phase II studies are still in draft form and many of the reports have not yet been translated from English (the language used for the study) to Portuguese. However, the DNER is using the survey results for its future planning and budgeting. Also, a National Law was passed in 1969 which, in part, specified that the DNER must review and approve all state DER planning and financing. The DNER intends to use the Transport Survey as their guide in carrying out this function.

Many of the highway construction projects recommended in the Master Plan will fall within the category of roads planned for construction under this proposed USAID/BNDE loan. This survey will, therefore, be used as a guide in the selection and approval of projects financed under this loan. The survey procedures developed for the Transport Survey and the considerable inventory data collected will also be very useful to the sub-borrowers in developing their proposed projects for this loan program.

3. Origin of BNDE Program

Up to 1967 no nationwide program had been defined by the GOB for the construction and improvement of the rural secondary road system. Although a survey of the primary road network had been initiated under the auspices of GEIPOT and the IBRD, states and local municipal governments were left with the responsibility for the planning, financing, and execution of secondary roads to complement this system. Lacking coordination with the federal government, state highway departments and municipal local governments executed secondary road projects on a piecemeal basis, with little emphasis on the development of comprehensive rural transport programs.

Recognizing that states and municipalities would need long term financing to permit them to develop such programs, the BNDE and the DNER initiated a three-year pilot program in 1968 to assist states and local governments in the construction and improvement of priority rural roads. As conceived by the BNDE, the program was to be developed in three phases. In the first phase, the BNDE would assist state highway departments in the construction and improvement of intermunicipal roads which link municipal centers with state or federal trunk highways. In the second phase, the program would be expanded to include municipal highway consortia as eligible borrowers. By pooling the

financial and technical resources of member municipalities, these consortia become eligible to draw on state resources and to obtain BNDE financing, while at the same time assisting member municipalities with the execution of projects of joint interest to them. In the third phase of the program the BNDE would assist state highway departments, municipal consortia and state development institutions in the financing of development or penetration roads.

Initially, the BNDE proposed to make available for the three year program NCr\$60 million which would be used to finance up to 60% of approved construction programs. At the end of the first year (1968) approximately NCr\$48 million of BNDE's resources had been committed. In 1969, the program was enlarged to include the second and third stages and the BNDE expanded its commitment to NCr\$100 million. Due to the continued interest of the states and municipal consortia, the entire NCr\$100 million was committed in 12 projects in 12 separate states by August 1969.

The total BNDE financing to state highway departments for the construction of intermunicipal roads was NCr\$74,540,000 in 9 projects; to municipal consortia and special state agencies, NCr\$24,537,000 for 2 projects (in the states of Rio Grande do Sul and Bahia); and for the financing of development penetration roads NCr\$5,000,000 (one project in the state of Par ). Thus, total BNDE financing under the initial program was NCr\$104,077,000. This compares, with the participating state and municipal consortium contribution to the program of NCr\$64,067,000 (44.7%). A complete list of the projects appears in Annex VII.

4. Other Agency Programs

a. International Bank for Reconstruction and Development (IBRD)

During the 1960's, the World Bank has in its loan program for Brazil, attached high priority to the transportation sector. As a basis for its activities in this sector, the Bank participated in 1965 in the financing and supervision of the national Transport Survey mentioned above.

During the first phase of this survey, the IBRD identified a number of high priority roads which constituted the Bank's first Highway Construction Project. A loan of \$26 million to finance this initial phase was signed in October 1968.

Based on the second phase of the Transport Survey which was recently completed, a Second Highway Construction Project has been authorized by the Bank, which is to be financed through a loan of \$100 million. This loan would cover 40% of the total costs of a highway program comprising (a) the construction and paving of 872 kms of federal and state roads; (b) the improvement and paving of 1,267 kms of federal highways; (c) the detailed engineering and supervision of construction for the proposed works; and (d) additional consulting services for the detailed engineering and feasibility studies of selected road sections; and (e) consulting services to strengthen the planning unit of the National Highway Department (DNER) and to improve construction supervision. (See Annex IV, Exhibit C) for an analysis of impact of IBRD program on transport investment.

The lists of roads proposed for construction, detailed engineering and feasibility studies under the World Bank Program are given in Annex VII. On the basis of a review of these projects, it is apparent that the roads included in the Bank's Second Highway Construction Project are for the most part federal highways. In a few instances, primary state roads are included. As to the latter, the states will finance 60% of project costs, and the World Bank 40%. In all other instances, the Bank finances 40% and the National Highway Department 60%.

Further IBRD assistance to Brazil's transport sector is planned at approximately the same level (\$100 million per year) for the next 4 years. Such additional loans would also be based on the GEIROT studies, and presumably would continue to include financing for highway construction, engineering design and feasibility studies. World Bank and DNER representatives indicated that the Bank will continue to emphasize federal and primary state roads, which are not included in, and would not be eligible for inclusion in the BNDE/AID program.

An analysis was made of the projects identified by the IBRD and BNDE for the first phase of their respective programs, and no financial or technical difficulties are expected from the simultaneous implementation of both programs. Beyond the first year, such analysis becomes difficult, as neither lending

institution has defined its programs by projects or by states beyond the first phase. Considering the different emphases and objectives, however, as well as their principal borrowers (primarily DNER in the case of IBRD, primarily the states in the case of BNDE), no overlap or conflict is expected during the life of the proposed BNDE program. Rather, the USAID views the two programs as complements to one another, in the sense that both are necessary to provide the integrated development of the primary and secondary road networks in Brazil.

b. The Interamerican Development Bank

In the area of rural development, the IDB will be initiating in the near future a land settlement program in the northwestern section of the state of Minas Gerais. As part of this regional development program, US\$10.4 million of the IDB's US\$29.0 million loan will be used for the construction of 963 kms of penetration roads and, 630 kms of feeder roads, and for the improvement of 620 kms of feeder roads specifically in the San Francisco valley of northwest Minas Gerais.

Most of the IDB's assistance to Brazil in the sector of transportation is designed to provide improved transportation facilities between Brazil and her neighbouring countries. To this end, the IDB has approved a US\$2.5 million loan to the GOB which will assist the DNER in financing feasibility studies of the road to link Porto Velho in Rondônia to the Peruvian border. Also, the IDB has assisted Brazil with a major road link between the state of Paraná and Paraguai. Presently under study by the bank is a GOB proposal to improve the highway transportation facilities linking Rio Grande do Sul with Uruguay.

C. Project Justification

At the end of 1968, the total highway system in Brazil comprised 939,613 kms of roads, of which 46,850 kms were federal roads, 114,183 kms were state roads and 778,580 kms were municipal roads, as shown in the following table:

Table :Brazil Road System (1968)
(in kilometers)

	<u>Total</u>	<u>Paved</u>	<u>%</u> <u>Total</u>	<u>Unpaved</u>	<u>%</u> <u>Total</u>
Federal roads	46,850	19,352	41.3%	27,498	58.7%
State roads ^{1/}	114,183	19,274	16.9%	94,909	83.1%
Municipal roads	778,580	3,752	0.5%	774,828	99.5%

^{1/} For breakdown by state see Exhibit G , Appendix VII
Source: DNER as reproduced in GEIPOT studies

The table shows that of the municipal road system, 99.5% was unpaved as of the end of 1968. Of the remaining 0.5% (3,752 km) which is paved, about 3,000 km are in the highly developed São Paulo area. Of the 99.5% of these roads which are unpaved, only about 6,000 kms, or less than 1% have an improved gravel surface. The remaining roads, totalling some 768,000 kms or over 98% of the municipal roads, and some of the state roads, are low standard earth roads, most of which are usable only during part of the year. A World Bank study described them as mostly old roads and tracks, frequently only passable by four-wheel drive vehicles, less than 10% in good condition and at times closed completely, as in the rainy season.

The BNDE program is intended to alleviate these conditions in carefully selected priority situations, where the construction or improvement of all-weather access roads is expected to contribute to or substantially expedite the development of Brazil's rural areas. This section is intended to describe the developmental effects (agricultural as well as other socio-economic effects) anticipated for the program. Other parts of this paper deal with the methods of analyzing and measuring such benefits.

1. Agricultural Development

Transport improvement should be viewed, not as a development objective in itself, but in terms of its contribution to investment programs in agriculture, industry and other sectors. As the recently completed Brookings Institute Transport Research Project concluded:

"The lesson for national planning and foreign assistance efforts is this: that programs to improve access and mobility in rural areas are essential to the modernization of agriculture. For the breakdown of isolation is essential to the introduction of new techniques and for the conduct of programs to improve health and education, and to change attitudes. Transport improvements provide the regional communications network that links the rural population with progress stemming from the urban industrial sector." See Summary of Report in AIDTO Circ A-1176, dated 5/22/1970.

The proposed expansion of the BNDE's road construction program is justified, as an integral part of Brazil's agricultural development. The program supports high GOB priorities, and complements important aspects of AID's agricultural program. The relationship to proposed marketing improvement loans is direct and the relationship to agricultural education, research, seed improvement, and other programs also can be shown.

The relation between agricultural development and transportation has been demonstrated in many parts of the world. In countries such as Brazil, where a basic primary road network already exists (except in certain limited areas such as the Northeast and frontier areas) it is generally recognized that additional productivity gains will have to be achieved through a more efficient utilization of areas already under cultivation. Studies have concluded that the full agricultural development of such areas depends on the existence of an adequate internal network of rural access roads, connecting centers of production with storage and processing facilities, and eventually with the principal markets and consuming centers. As the above mentioned Brookings Institute study stated:

"(Agricultural productivity will not be increased to an important degree where access roads are impassable or non-existent, where transport costs are high, and where ability to get to the market is uncertain. Under these conditions there are neither the means nor the incentives to produce a surplus.)"

More specifically, with respect to the Northeast of Brazil, a study of market process in that region concluded:

"Much remains to be done on constructing and maintaining the roads linking small market villages with each other and to major convergence centers. First priority should be given to improving those roads which can effectively link villages into the regional economy"^{1/}.

^{1/} Michigan State University, "Market Processes in the Recife Area of Northeast Brazil".

The World Bank's "Agricultural Sector Survey" of Brazil, conducted by a 21-man team from mid-October to mid-December 1969, likewise noted that among other inputs, "massive investments in transportation will be required to break the physical isolation of the Northeast and other undeveloped regions to reduce investments costs and provide cheaper access to markets" (Summary, p. 1). Specifically, with respect to rural roads, the Report stated:

"There is need for more attention to local transport problems: roads connecting farms with primary assembly points and markets, and roads connecting small country markets with main trunk roads. A start has been made on programs for community roads (Programa Nacional de Estradas Vicinais)... Expanded effort at this level has to overcome numerous difficulties. Municipios lack resources and technical competence for planning and supervising road projects. Methodology for studying and selecting rural road projects is not well developed. Allegations that funds transferred from the National Road Fund have been used at times for purposes unrelated to transportation are unlikely to lead to generosity in such transfers....."

"Apart from improving transport services to areas already developed agriculturally, Brazil needs roads for the new areas being brought into cultivation in the frontier states. Some settlement is taking place along the network of main highways that is being extended across the interior of Brazil, but the more concentrated areas of new settlement in Mato Grosso, Goiás and Maranhão will require road building programs similar to the one in Paraná of the past several decades. Increased investment in rural roads is essential if the interior of Brazil is to be occupied in an economically meaningful way, and not merely traversed by the new trunk roads. The Mission believes that improving the national transportation system is a priority claimang of the first order on funds available for support of the agricultural sector." (emphasis added) IBRD "Agricultural Sector Survey" Report, p. 26-27.

The construction and improvement of rural roads under the BNDE and construction program to the level of all-weather, gravel surface roads is expected to promote the agricultural development of these areas in a number of important respects:

- a. Year round access to agricultural communities facilities and regularizes delivery of vital supplies such as fertilizers, insecticides.
- b. Improved access also increases rural contact and services from government agencies and from business, including the extension service, veterinary coverage, assistance to marketing cooperatives, credit agencies, equipment repairmen, and others.
- c. Economies of scale resulting from use of trucks (greater capacity, reduced transit time, larger area coverage) reduce transportation costs, and can result in lower prices of agriculture inputs to the farmer, and reduced prices of food products to urban consumers.
- d. Year-round access to previously inaccessible storage and processing facilities provides farmers with outlets for seasonal crops, such as

rice, which are normally harvested at the end of the rainy season and which otherwise could not be moved, or would be stored under adverse conditions with resultant losses due to spoilage, rodent attack, Year-round access from agricultural areas to storage facilities and markets also provides price certainty and price stability.

- e. Farm land previously too far removed from the urban centers may, with improved transport facilities, be used for the production of perishable products, such as vegetables, fruits, milk and eggs, which depend on rapid access to the market to avoid spoilage. Livestock production too is particularly sensitive to transport facilities, as weight losses are far higher for on-the-hoof travel than they are for truck transport.
- f. Studies have shown that much of the available farm land, especially in the Northeast region, is undercultivated. The cause is frequently the inability of farmers to process and/or market more than a limited amount of produce via available transport facilities. Once all-weather transportation out of their area is available, farmers can increase production beyond the volumes required for on-the-farm and local consumption, and increase production in accordance with demand existing in more distant markets which have become accessible. For example, the consultants retained for the GEIPOP studies to cover the fertile Agreste area concluded that: "given proper market facilities to sell the produce a farm-to-market road program in the Agreste could bring into production an additional 190,000 hectares".

2. Effect on Coffee and Sugar Diversification

Programs to establish diversified agriculture in sugar and coffee areas also benefit to a moderate extent from improved road conditions and transport facilities. Improved roads in the areas of intended diversification (and in other areas to which released workers may move) will clearly aid the development and success of new agricultural enterprises. Improved roads will also help to provide alternate employment opportunities for laid-off workers.

The economic criteria employed in the GEIPOP studies and recommended for further studies do not separate out or emphasize coffee-sugar diversification. Therefore, the effect on these problems is expected to be indirect and generally comparable to the effect in other areas and for other areas and for other agricultural products.

In general, however, the coffee producing zones already have basic road systems which are considerably better than those of other agricultural areas. Thus the economic criteria selected for this road program will result in relatively few roads within coffee production areas.

In the case of the sugar industry of the Northeast, improved roads would facilitate the consolidation of marginal usinas (sugar mills) by reducing distances and time growers must travel to reach other mills. Road building

and improvement already is included as a possible element in modernization plans for segments of the sugar industry, and eligible for financing with funds derived from sugar export taxes.

3. Agro-Industry and Services

Transport infrastructure traditionally precedes commercialization. By providing year-round access from urban centers to rural communities, and from such communities to the major markets and consuming centers, a variety of industries will be stimulated. To meet the demand for agricultural and food products in the newly accessible markets, farmers will have to make improved and increased use of fertilizer and other agricultural inputs, the use of which is still extremely low as compared to developed countries. These industries will be stimulated accordingly. The trucking and transport companies usually rise in size and in number proportionally with the opportunities presented by road building programs. The same can be said of agro-industry in the regions included in the program (e.g. storage, processing). These effects were dramatically illustrated in South and Central Brazil, where the road network was doubled between 1956 and 1967, resulting in the growth of the food processing, packaging and trucking industries in that region. The output increases and productivity gains in agriculture stimulated by improved roads should aid the urban centers in three ways:

1. Expanded demand for fertilizer and other agricultural inputs supplied by manufacturing industries.
2. New markets in rural areas for consumer goods emanating from the urban industrial centers.
3. Sustained or expanded markets for consumer goods within urban areas, by avoiding diversion of larger proportions of income for purchase of foods, which might result from rising food prices if agricultural development is not aided.

4. Municipal and Rural Development

The BNDE road construction program will continue to provide the vital linkage between rural municipalities and the large urban centers. The municipalities expected to be reached with this program are mostly those with less than 30,000 and more than 5,000 inhabitants. This group in 1963 comprised almost 40 million people or about 45% of Brazil's population, and

their growth rates equal, and in some areas exceed by far, the national rate of growth. Therefore, both absolute numbers and population growth make this type of rural community a most important target for development.

By providing reliable, year-round access to and from such municipalities they can be effectively integrated into the national economy. As noted above, new outlets and markets stimulate increased and diversified agricultural production, agro-industry and services, generating new employment in the rural regions.

An improved road network in the nation's rural regions will expedite municipal development in social respects as well. Studies have shown that public utility, health and other social services improve dramatically in a given area once ready access is provided. Improved education facilities become accessible to children once bus transportation becomes feasible. These and other socio-economic benefits were surveyed and documented in a study of an extensive rural road construction program executed in the Phillipines. ^{1/}

The need for rural transportation was confirmed by another survey conducted recently in Brazil by the Brazilian Institute of Municipal Administration (IBAM) to determine the major problems of the Brazilian municipalities. Questionnaires were sent to 3,701 municipalities. Answers received from the representatives of 788 of the municipalities indicated that the problems of transport and communications ranked only behind lack of water, sewerage, and energy in importance. Forty-five percent of those responding listed the lack of road access as one the major problems of their municipality.

The BNDE program will also promote colonization of previously unsettled areas with substantial but unutilized agricultural potential. This will be accomplished by means of the construction of selected "penetration", or development roads. Projects of this type executed in the past (though not studied scientif-

^{1/} P.S. Villanueva, "The Value of Rural Roads", published by University of Phillipines Community Development Research Council (1968)

ically) appear to have yielded impressive results, in terms of newly generated economic activity and settlement of such areas.

5. Economic Justification

As the foregoing sections attempted to illustrate, the overall economic justification for the proposed BNDE program rests on the fact that vast areas in the interior of the country are in the early stages of their development. The demand for low cost roads to connect these new areas to existing marketing and distribution centers far exceeds the ability of the GOB to build them. In the more developed eastern states there is a continuing need to connect municipalities to large urban areas in which they will find opportunities for expanding both domestic and foreign sales.

The economic justification of the majority of roads to be financed under the BNDE program will be in conformity with the proposition central to cost-benefit analysis; namely, that the cost of the economic resources used for the required investment will yield economic benefits at least as high as they would yield if committed to alternative uses. The opportunity cost of capital, taken to be 10% in Brazil, reflects the yield of alternative investments. These projects to be financed under the program will be justified by a methodology which will yield direct benefits exceeding 10%. One can safely assume, moreover, that the construction of these roads will yield large, if non-quantifiable, indirect benefits which further justify the program. In the case of development or penetration roads where the quantification of direct benefits is impossible, the economic analysis of these roads will focus on the indirect benefits the road is expected to yield. The methodology to be employed in the examination of these roads is explained in Section II B below.

6. Institution Building Aspects

The very availability of financing from the BNDE, against future allocations of federal highway

fund allocations will permit the state DERs to plan and execute medium-large scale area projects which otherwise could not have been undertaken.

Secondly, the BNDE program will have the effect of encouraging the formation of municipal consortia. As described in Section IB above, these provide a means for individual communities to pool their financial and technical resources in order to draw upon state and BNDE financing for projects of joint interest. Several of these consortia were formed, others are expected to arise under the program as it continues.

Under the new program, the proposed modifications which are intended to assure the best possible allocation of A.I.D. loan funds will, at the same time, improve the allocation of DNER, BNDE, state and municipal funds to the program.

At the national level, DNER's participation in the review and supervision of the program is expected to be gradually strengthened. The BNDE is interested in participating with the training of selected DNER personnel to this end. Also, for the first time in the program, the National Transport Survey will be relied upon, both in assuring consistency of the proposed BNDE projects with the national plans and priorities, and in the utilization of the GEIPOT method of technical and economic analysis, and of the data and information collected during the survey.

At the state and municipal levels, sub-borrowers will be required under the revised technical and economic criteria to improve the planning and presentation of their applications. Although provision is made for the continued use of consultants to assist in this task where the sub-borrowers so desire, the effect of the improved methodology and criteria will be to strengthen the sub-borrowers' planning and administrative capabilities.

The BNDE, in turn, has agreed to strengthen its administration of the program by increasing its technical and economic analysis staff. In addition, it has concurred to retain consultants, with loan funds, to assist the Bank with the technical monitoring of the sub-projects which will include field inspections, provision of technical assistance to the sub-borrower and certification of work completion and construction payment quantities.

D. Place of Project in GOB Development Program

(1) GOB Priority

As demonstrated in the preceding sections, the principal objectives and anticipated results of the expanded BNDE program lie in the expected development of agricultural areas included in the program. The importance of agriculture to the Brazilian economy needs little elaboration beyond the citation of a few basic facts:

- agricultural activity accounts for the employment of about one-half of the nation's economically active population;
- agriculture directly contributes between 15% and 20% to the nation's gross national product;
- 80% of Brazil's exports are agricultural products.

The GOB has included agricultural development as one of its three top priorities in its current plans and programs (the other two sectors being education and health). In a recent speech to the nation, the President of Brazil cited these same sectors for emphasis during his administration.

The GOB's Strategic Development Plan for 1968-1970, the last completed long-range plan, emphasized the objectives of (1) increasing production and productivity through the use of modern inputs and (2) overcoming bottlenecks in the structure of food marketing and distribution (Chapter I, page 9). This Plan was based on the Carta de Brasilia of 1967 which cited among its General Directives for Economic and Social Development: "The construction of highways of strategic significance for supply of large urban centers and of secondary roads in the principal agricultural areas".

A new GOB multiannual Plan, covering the period of 1970-1973, also provides expressly for infrastructure improvements, both in the primary highway network in accordance with the national master plan, and in the secondary network, to complement the primary system.

The 1968 Strategic Plan set a goal of a 5-6% composite average annual growth rate for agricultural production for the period of 1968-1972 (compared with actual growth levels estimated at 6.1% for 1969, and 7% for 1970). With these goals in mind, it appears that the GOB has given appropriate emphasis to the development of the agricultural sector. Public spending increased substantially both in absolute terms, and as a share of total public spending in recent years. As a share of GNP, its level fluctuates around 1% for the years 1961-1969. Government credit to agriculture has more than doubled from 1961-1968.

The Government has adopted a number of policies and enacted a variety of incentives recently which are considered appropriate to expedite development in this sector.

For example:

- increased availability of credit for agricultural loans by permitting use of 10% of commercial banks' legal reserves for this purpose
- created FUNFERTIL, to provide financial incentives in the purchase of fertilizers, soil correctives and mineral supplements (1966)
- exempted fertilizers, insecticides (1966) seeds and livestock for improved breeding (1968) from import tax
- provided for exemption from the ICM value added tax on the sale of tractors and agricultural machinery (1970)
- created a technical commission and a special fund to promote agricultural research (1970)
- created COBAL in 1970 (Companhia Brasileira de Alimentação) which will participate with the BNDE and external financing in the GOB's current program of wholesale market center construction.

In addition to the foregoing measures already taken, the GOB is studying a variety of proposals in the areas of agrarian reform, extension service improvement, warehousing and storage, improved inspection system, etc. which have not yet come to fruition.

(2) Place in USAID Program

USAID/Brazil has endorsed the GOB priorities of agriculture, health and education. Specific mention of agricultural objectives, and specifically of the need to improve the rural agricultural infrastructure is contained in the CASP and CFS for FY 71, page 37 41.

USAID/Brazil recognizes that improved transportation alone is not sufficient to assure agricultural development. A comprehensive approach is essential. An integral agriculture development program in Brazil would have to provide for adequate credit and credit supervision; machinery, equipment and tools; fertilizers, insecticides and other supplies; improved seeds; as well as assuring storage, processing, adequate prices markets and distribution. As the previous sections demonstrate, however, most or all of these factors depend to a considerable extent upon the improvement of the existing rural infrastructure in agricultural regions.

(3) Consistency with CIAP Review

The loan proposal is consistent with the findings and recommendations of the Interamerican Committee for the Alliance for Progress, which conducted its most recent Brazil review in December 1969. The Committee concluded that Brazil would require increased external financing, of the global and sectoral type, and on concessional terms. (Secretariat's Report, page 123). As for its analysis of the agricultural sector, the Report notes the continuing cost-price squeeze, due principally to the fact that the level of prices received by farmers have risen less rapidly than the general price index. As stated above, the construction of roads in agricultural regions is expected to lower production costs to the farmer thereby increasing his income. At the same time, lower prices (due to the reduction in cost of transporting products to markets) will improve the competitiveness of such products in the world markets. Increased exports of agricultural products are also cited as an objective in the CIAP report (page 134).

II - ANALYSIS OF PROJECT

A. Administering and Participating Agencies

1. Administrating Agency - BNDE

a. Background and Relation to GOB

In December 1950, the GOB and the Government of the United States entered into an agreement to establish a joint commission to examine the problems of economic development in Brazil. In addition to the reports presented, the commission formulated recommendations for the institutionalization of a long-range program to accelerate the expansion and modernization of many sectors of the Brazilian economy. Recognized by the commission was the fact that the shortage of foreign exchange had frustrated the Brazilian program of expansion and modernization in the two basic sectors of electric power and transportation.

Subsequently, in September 1951, the World Bank and the EXIMBANK agreed to supply foreign currency (approximately US\$750 million in credits) required to carry out a program to be approved by the joint commission. To raise the local currency resources necessary to finance the newly established Economic Reequipment Program, the GOB levied a special income tax surcharge. The revenues from this assessment were to cover the local currency expenditures of projects under the Economic Reequipment Program.

To act as its agent in the administration of the Economic Reequipment Program, the GOB in June 1952 created the National Bank for Economic Development (Law 1628). The BNDE was established as a public corporation or decentralized organ of the Ministry of Finance and was empowered to act, whenever necessary, as the agent of the National Treasury, in any financial operation for the modernization and development of the national economy. By Presidential Decree No. 200 of February 1967 the BNDE maintained its status as a public corporation but was placed under the Ministry of Planning.

b. Capitalization and Sources of Funds

The resources made available to the BNDE since its inception in 1952 have come largely from special federal revenues or federal budget support. The initial capitalization of the BNDE in 1952, came from an income tax surcharge and certain compulsory deposits from federal savings banks, insurance and trust companies and a

percentage of the annual resources of social security agencies. In 1956, the compulsory deposit for social security revenues was abolished. Starting in 1965, the GOB replaced the tax surcharge with 20% of the total receipts from the collection of federal income tax. In 1967 this budget allocation was reduced to 10% of the income tax payments and the BNDE received a new source of income arising from the Financial Operations Tax (See Source and Application of Funds Statement in Annex VI) which the bank continues to receive. The set percentage of federal income tax receipts allocated to the BNDE was eliminated in 1968 and the bank now receives federal budget support on the basis of the Bank's annual investment budget approved by the Ministry of Planning.

c. Financial Structure and Operations

The BNDE, acting as the GOB's major development-lending institution, is responsible for channeling federal resources made available to the bank into the economic sectors accorded priority by the GOB and for stimulating additional investment in these sectors by affording investment guarantees to investors. In 1969 direct assistance by the bank to borrowers in the form of long term loans totalled US\$310,067,000 and collateral guarantees provided by the Bank in 1969 totalled US\$111,821,000. The direct financial assistance provided by the BNDE, as well as, the total amount of guarantees extended by the bank from 1960 to 1969 are shown in Exhibit B of Annex VI.

In providing direct financial assistance to borrowers, the BNDE utilizes not only the Economic Reequipment Fund which represents the greater part of the resources administered by the bank, but also employs a number of special funds which are also administered directly by the Bank. The special funds, each with a specific purpose, complement the designated responsibilities of the Bank. They are:

FUNTEC (Scientific Research and Development)
 FUDEPRO (Productivity Studies)
 FIPEME (Loans to Small Business)
 FINAME (Credit for Purchase of Equipment)
 FUNESP (Technical Feasibility Studies)
 FUNGIRO (Industrial and Commercial Working Capital Financing).

The primary responsibilities of the BNDE, as delineated in its enabling legislation (Law 1628/52) as amplified in 1956 (Law 2937/56) were to provide loan financing for purposes of "reequipment" (modernization and expansion) and other specific development activities. Listed in order of their overall priorities, these were:

1. reequipment and expansion of harbor and other transport facilities;
2. construction and expansion of the electrical power system;
3. installation and expansion of basic industries;
4. construction and expansion of warehouses, silos, meat packing plants and slaughter-houses;
5. development of agricultural and rural electrification; and
6. other sectors of infrastructure development.

In the first years of operation, the BNDE concentrated its limited resources in the fields of railroad transportation and electrical power. In the late 50's, as the bank expanded into new fields, the emphasis shifted from transport investments to investments in heavy industries, such as steel, and medium-sized manufacturing enterprises, such as chemicals, electronics, paper and textiles. From 1967 through 1969, the BNDE shifted from the financing of the steel and electric power industries towards increased financing of transport, telecommunications, and agriculture. Loans in the transport sector increased from 0.3% of the total BNDE lending in 1967 to 26.8% in 1968. In 1969 transport lending represented 20% of the BNDE total lending.

Allocation of BNDE Cruzeiros Financing
1967-69 (in NCr\$1,000)
Source: BNDE

Sector	1967(NCr\$1967)	1968(NCr\$1968)	1969(NCr\$1969)
Electric Power	183,700	88,563	40,848
Transport	1,944	265,291	263,302
Telecommunications	-	56,000	99,500
Mining	-	18,794	4,000
Steel	272,954	57,038	137,000
Other Manufacturing	231,908	405,704	644,225
Agriculture	18,444	45,122	82,500
Education and Research	43,737	31,416	47,637
All other	-	22,461	29,783
Total	752,687	990,389	1,348,795

The amounts of BNDE financing in the transport sector for 1968 and 1969 are detailed in Exhibit A, Annex VI.

For the two year period 1968-69 the Bank provided approximately NCr\$2,338 million (US\$600 million) in direct financial assistance in the form of long terms loans. The rural roads construction program executed during this two year span represented approximately 4.4% of the total of direct financial assistance.

During 1968 and 1969 NCr\$130,200,000 from the Economic Reequipment Fund were applied to road construction programs. Of this amount, NCr\$104,077,000 (80%) were committed to the 12 projects financed under the pilot program (See Annex VII Exhibit D).

d. Financial Position

The BNDE's overall financial condition appears satisfactory. Comparative year-end Balance Sheets for 1965 through 1969 appear in Annex VI Exhibit C. In 1968 and 1969 the real value of the cruzeiro-financing operations approved by the BNDE increased by 6% and 12% respectively. An average growth rate of 15.5% per annum is projected over the next 3 years. The BNDE portfolio has grown from the equivalent of US\$278 million in 1965 to US\$749 million in 1969 for a compound annual growth rate of 14% - Capital and Reserves during the same period grew from US\$135 million to US\$632 million, a compound annual rate of 38%. This rapid growth rate is the result of the BNDE policy of capitalizing total earnings less the provision for portfolio losses each year and of the increases in the annual GOB contributions to the BNDE through the Monetary Reserve Fund and the Federal Budget (see notes 1 and 2 to the Proforma Source and Applications of Funds Statements in Annex VI Exhibit E) which are not repayable. Consequently, the BNDE Debt/Equity Ratio has been reduced from 2:1 in 1965 to the 1969 low of 0.45:1 (debt determined on the basis of total liabilities). Despite the indicated net growth in Capital and Reserves, the BNDE since 1952 has incurred a gross capital outflow of the approximate equivalent of US\$530 million. This capital loss, while more than offset each year by the large GOB contributions, has resulted from the BNDE loan terms which have failed to maintain the real value of its portfolio under inflation. In 1969, new loan contracts began to carry monetary correction though at less than the full rate in the case of some programs.

The BNDE Comparative Operating Statements for 1968 and 1969 appear in Annex VI Exhibit D. Gross annual income from the portfolio as a percent of the average portfolio was 7.2% in 1969, 11.2% in 1968 and 17.6% in 1967. The decline in 1968 was due to the loss of income from the BNDE loan to the National Steel Company which was rescheduled during that period at a reduced interest rate. This loan represented a considerable portion of the BNDE portfolio revenue in 1967. In 1969, the BNDE changed its accounting procedure to apply monetary correction directly to the capital accounts rather than through the income statement which explains the revenue decline from the previous year (see Comparative Income Statements for 1968 and 1969 in Annex VI Exhibit D). Gross income as a percent of average total assets showed this same pattern, 5.6% in 1969, 8.4% in 1968 and 13.0% in 1967.

Total expenses were 1.8% of average total assets in 1969, 2.1% in 1968 and 2.3% in 1967. Administrative Expenses decreased 11.1% in real terms in 1968 and another 4.6% in 1969.

The BNDE has shown an acceptable level of profitability over the past 3 years. Profits after adjustments for portfolio losses were 4.0% of average total assets in 1969, 9.3% in 1968 and 11.5% in 1967. This decrease in profitability resulted from the decrease in income discussed above. Portfolio losses were .03% of the average portfolio in 1969, .05% in 1968, and .04% in 1967.

Lacking private deposits, the BNDE has no official reserve requirements. However, as a provision for liquidity, the BNDE has established a Minimum Cash Reserve below which the sum of cash and near-cash items is not allowed to fall. This Minimum Cash Reserve is a contingency fund calculated quarterly and based on projected cash flows and anticipated projects overruns which may require additional BNDE financing (see note B to Proforma Source and Application of Funds Statements in Annex VI Exhibit E).

The BNDE has no rediscount lines available to it. The BNDE legislation provides, however, that the Bank may make supplementary budgetary requests through the Ministry of Planning under appropriate circumstances.

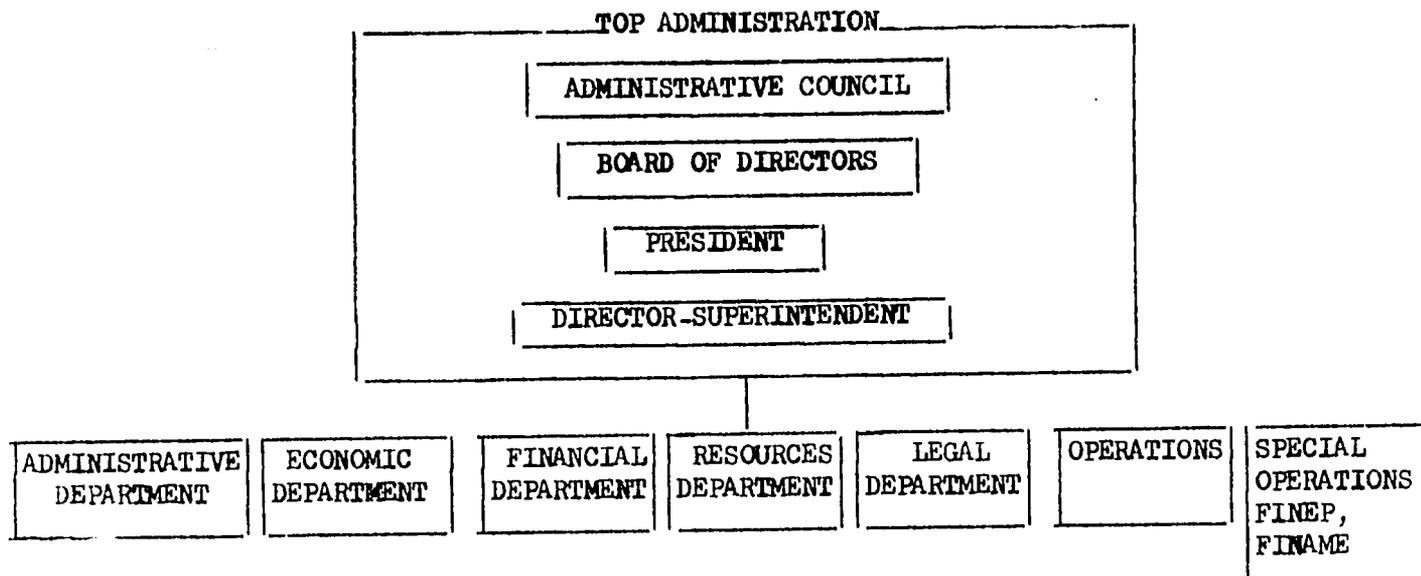
The Capital of the BNDE amounted to the equivalent of US\$220 million in December 31, 1969. This Capital has not been issued in the form of shares but is based in the original GOB contribution contained in the BNDE enabling legislation of 1952 (Law 1628/52). The BNDE Capital is owned entirely by the GOB which is represented by the Minister of Planning.

To complement its lending program, the BNDE provides guarantees for foreign credits as agents for the National Treasury and for its own account. In 1969, foreign credit guarantees were made in the equivalent of US\$111 million. No provision is made by the BNDE for guarantees administered by the BNDE but executed by the National Treasury for the latter's account. The BNDE provides for its own guarantee exposure through its Reserve for Portfolio losses which amounts to 5% of the BNDE loans and guarantees outstanding. At the end of 1969 the BNDE had a guarantee exposure equivalent to US\$ 3¹/₄ million.

c. Organization

The administration of the Bank consists of the Administrative Council and the Board of Directors. The Administrative Council is composed of six members and the President of the Bank who is chairman. The Administrative Council establishes the general policy guidelines to be followed by the Board of Directors and makes decisions on all questions pertaining to the Bank's internal regulations. The Board of Directors consists of six members, namely, the President of the Bank, the Director Superintendent and four Directors. The primary function of the Board of Directors is that of executive management of the Bank.

The BNDE has established seven organization division within the Bank: Administrative, Economic, Financial, Legal, Resources, Special Operations (concerned with the Special Funds) and Operations. The Bank's organizational chart is as follows:

BNDE - ORGANIZATION CHART

The Rural Road Construction Program is handled as an integral part of the Operations Department and the overall responsibility for the supervision and implementation of the program rests with the BNDE Director responsible for that Department. The Operations Department is divided by economic sectors into three separate units (núcleos) each of which is the responsibility of an "assessor" of the director (see Exhibit below). The areas of responsibility for each "núcleo" are:

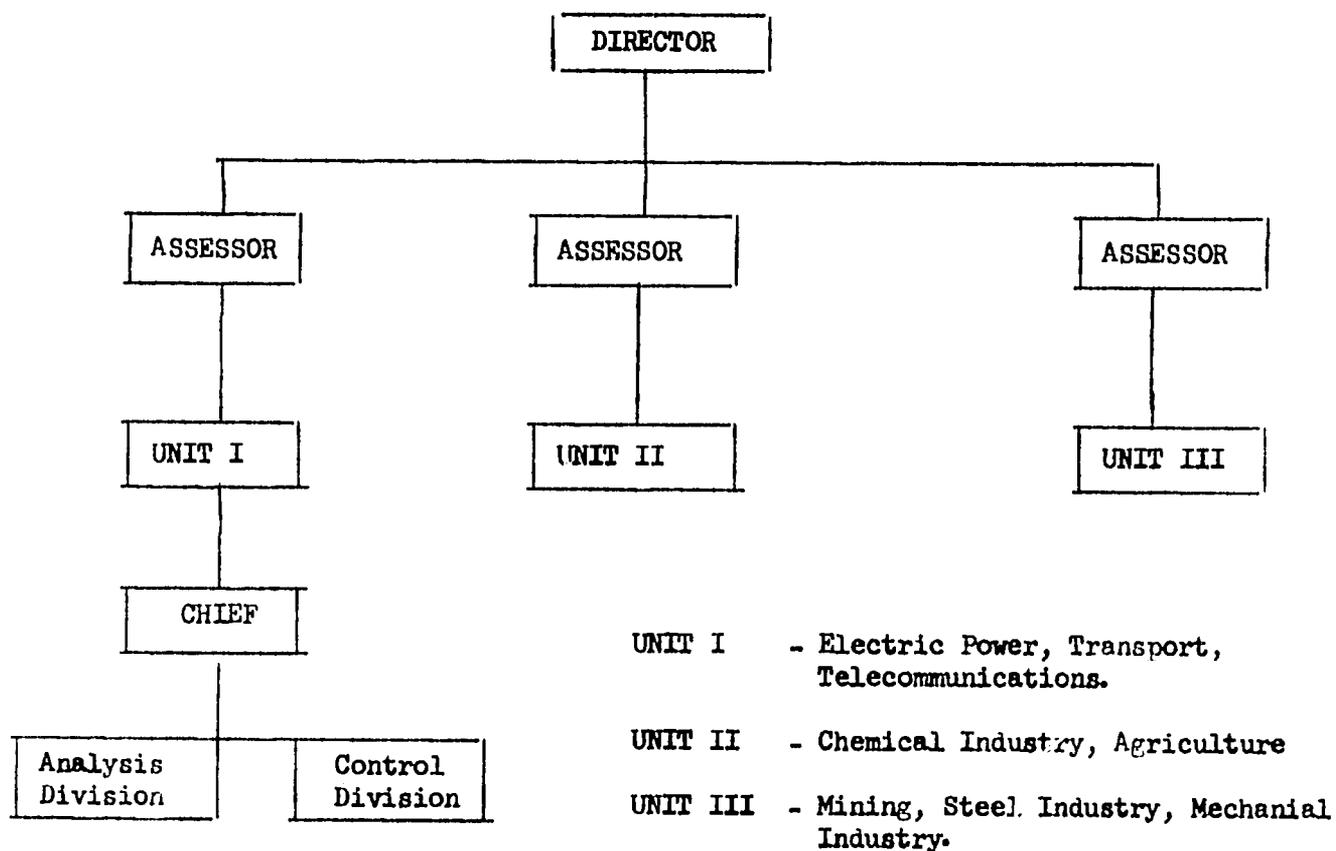
Unit I - electric power sector, telecommunications and transportation

Unit II - agriculture production, agricultural processing, fertilizers, chemical industry

Unit III- mining, steel, other manufacturing industries

Unit I, which is responsible for the administration of the rural roads construction program, is further divided into two divisions: the Division of Project Analysis and the Division for Project Control. The Intensive Review of the BNDE's previous rural roads program included a complete examination of the responsibilities of each of these divisions. The professional staff which both of these divisions draw upon is competent and well trained. It consists of five engineers, four financial analysts, one economist and two attorneys.

Exhibit: ORGANIZATION CHART OF THE
DEPARTMENT OF OPERATIONS



The educational qualifications of the key personnel are as follows:

Director of Unit I - Civil Engineer - Major field: Highway and Railway Engineering, Post Graduate Training in Economics.

Assistant Director for Project Analysis - Civil Engineer Major field; Highway Engineering with Post Graduate Training in Economics.

Assistant Director for Project Control: Civil Engineer

Chief, Financial Analysis - Economist with Post-Graduate Training.

It is anticipated in the expanded BNDE/USAID program that the average size of projects undertaken will be in the same range as in the past program. In the present program, the 12 participating states are undertaking NCr\$170,323,000 (approximately US\$38 million) worth of construction programs. The average project cost has been approximately NCr\$14 million (US\$3.1 million). Assuming the same average cost per project, the expanded program of US\$83 million will be used in approximately 26 projects over the 3 year period of the loan, or 8 to 9 projects a year. The BNDE in its original program committed its resources in 12 projects over a two year period, or 6 projects a year. To administer the expanded program, the Division of Project Analysis will have to be expanded, specifically in economic analysis, and the Division of Project Control will require assistance to monitor and inspect the on-going construction projects. These needs have been discussed with the BNDE and it has been mutually agreed that:

- 1) The BNDE will increase the staff of Unit I as needed to assist in the analysis of economic sections of the loan presentation; this will be accomplished either by the formation of a special work group in charge of the rural road program, or by an overall increase in the staff of Unit I. The extent and timing of this increase will also depend on program needs;
- 2) local consultants will be retained by the BNDE, the cost of which will be financed from loan funds, to assist the Division of Project Control with the on-the-job supervision and monitoring of construction projects. The consultant engineers will inspect projects under construction as necessary to check (1) the control of the work (2) the materials test results, and (3) the method and computations of payment quantities. The consultants will also certify, to the BNDE, the quantities of work performed for payment by the BNDE. (See Technical Analysis Section II B).

2. DNER - Departamento Nacional de Estradas de Rodagem (National Highway Department)

The DNER was organized in 1945 as an integral part of the Ministry of Transportation, with administrative and financial autonomy to execute and finance all technical and administrative services concerning the study, plans, specifications, budgeting, construction, reconstruction, and improvement of all highways included in the Federal Highway System. The DNER receives a portion (79.5%) of the yearly revenues from the Unitary Fuel Tax which is the sole source for the National Highway Fund and is responsible for passing to the state highway departments and the municipalities their share of this fund. By law the DNER receives 39.5% of the yearly receipts from the Unitary Fuel Tax, all state highway departments receive in total 32%, and municipalities 8%.

The DNER is administered by the Administrative Council; a Director General, an Attorney General and the Directors of Administration, Planning, Construction, and Operations. The Administrative Council consists of the Director-General as President, the Vice-Director General, the four chiefs of the Directorates, and the Attorney General. This Council acts as a "Board of Directors" for the total operation of the DNER. (See organizational chart, Annex VII).

In August 1967 the DNER established a Special Working Group to coordinate the planning and execution of road construction projects arising from agreements made between the DNER and other federal government institutions such as the BNDE or the IBC (the Brazilian Coffee Institute) and state government agencies, such as IGRA (the Institute for Agrarian Reform of Rio Grande do Sul). Initially, the Special Working Group consisted of two engineers however at this time there is only one engineer.

Under the agreement (See Exhibit E of Annex VII) signed with the BNDE in December of 1967 for the execution of the Bank's rural roads construction program, the DNER is responsible for: (1) receiving the project proposals from the states and examining the technical specifications of the roads proposed for financing under the program; (2) coordinating and inspecting the execution of the work on each project; and (3) earmarking resources from the states' portion of the National Highway Fund necessary to meet the amortization schedule of the subloans. Such deductions are made by the DNER central accounting offices in Rio.

These DNER responsibilities were assigned to the Special Working Group referred to above. The technical elements of the project proposals are checked by an engineer and passed with his comments to the BNDE. The

responsibility for supervision and inspection of the projects during construction has been delegated to the DNER District Offices which conduct periodic inspections of the projects. Since the DNER is concerned primarily with projects on the interstate construction program (the Federal Highway System), the District Offices' inspection of construction on other programs is largely limited to fiscal control.

In the expanded BNDE/USAID Program, the DNER Central Offices and DNER District Offices will continue to receive and review the requests submitted by the states and municipalities for proposed construction projects. They will give recommendations regarding the technical aspects and selection of proposed projects. They will also continue their present functions of periodic overall inspections of construction work on Federal Roads and inspections of fiscal control over other projects. As noted in the preceding section however, the inspection of on-going BNDE Projects will be supplemented and significantly strengthened to ensure adequate supervision of all aspects of the Bank's program.

3. Regional Development Organizations

An increasingly important planning and implementation role is being played in Brazil by regional development organizations. Below is a description of these organizations and a description of their role in the Rural Road Construction Program.

To decentralize and, at the same time, elicit development planning more consiscent with local conditions, the GOB has divided Brazil into four regions and created a development agency for each. The first created was SUDENE (Superintendency for Development of the Northeast) in 1959, for all of Northeast Brazil. The most recent has been SUDECO responsible for Central and West Brazil. Each has a main office set up at one of the major state capitals in the area for which it is responsible. All of these agencies are dependencies of the Ministry of Interior which coordinates planning at the federal level with the Planning Ministry.

Budget allocations are made directly to these regional organizations as part of the Ministry of Interior budget. Following is a list of the four regional organizations with their geographic coverage:

- 1) SUDENE: Maranhão (part), Piauí, Ceará, Rio Grande do Norte, Paraíba, Pernambuco, Alagoas, Sergipe, Bahia and a portion of Northeast Minas Gerais.

- 2) SUDAM: Amazonas, Pará, Maranhão (part), Amapá and Roraima
- 3) SUDESUL: Paraná, Santa Catarina and Rio Grande do Sul
- 4) SUDECO: Rondônia, Mato Grosso, Goiás, Minas Gerais, São Paulo, Rio de Janeiro and Espírito Santo.

The responsibilities of each of these organizations generally encompass the following:

- 1) Analyze and propose courses of action for the economic and social development of the region for which is responsible.
- 2) Supervise, coordinate, and control the elaboration and execution of development projects under the responsibility of other federal government entities working within the region.
- 3) Take direct responsibility for the execution of development projects under contracts or agreements entered into with other GOB agencies or international agencies.
- 4) Coordinate programs of technical assistance provided under national or international agreements.

The BNDE coordinates its lending operations with the regional development organizations and with state and regional development banks. To formalize this interrelation "Agreements of Cooperation" have been signed with the regional development organizations and with a number of state development banks creating permanent working groups. Composed of members of each participating institution, these groups meet bi-monthly to coordinate the examination of new projects or programs, to plan the financing of development programs and to review development projects in execution. As the enabling legislation of SUDENE and other regional organizations provides that their approval is to be given to any external financing secured in their respective regions, the BNDE will review with the appropriate organizations in the bi-monthly meetings the rural road projects of direct concern to their region.

4. State Highway Departments

The State Highway Departments (DERs) are responsible for the construction and maintenance of the state highway network. The departments execute or cooperate with state planning agencies in the preparation of the state highway plans and are solely responsible for performing all technical services required to construct the highways for the planned network. In addition, the state departments regulate public transportation services, police the use of highways, and assume responsibility (construction, maintenance, policing) for municipal or federal roads in the state that have been delegated to the state department by the National Highway Department or a municipal government.

The organizational framework of the highway departments are essentially similar. The detailed elements of each department vary slightly from state to state, however, as a result of the organizational studies made under the National Transport Survey (GEIPOT) and the recent emphasis on more efficient organizations, many state highway departments have been reorganized along the following lines:

1. With the exception of the few autonomous state highway departments which are directly responsible to the state governor, the DERs are integral sections of the states' Departments of Public Works or of the Secretary of Transportation.
2. The governing council of the state highway departments, known as the Highway Council, is composed of the director of the highway department, a representative of the department of public works or the Secretary of Transportation, a representative of the state engineering association and headed by an independent engineer appointed by the governor. The Highway Council is responsible for approving the policy, the programs and the budget of the state highway department.
3. The Executive Council is the board of directors for the state highway department. It is composed of the director of the DER acting as chairman and all of the division directors of the DER: planning department, operations division, engineering division and legal council.

Financially, the state highway departments are dependent upon annual allotments from the state budget and revenue from the National Highway Fund which is administered by the National Highway Department (DNER). The revenues of the National Highway Fund are derived from a single national tax on fuels and lubricants. At present 32% of the proceeds of this tax are apportioned to the states on the basis of their fuel consumption, population and area.

5. Special State Agencies

Due to the limited technical and financial resources of individual municipalities* several states (Rio Grande do Sul, Bahia and Goiás) have assisted the municipalities by the formation of consortia of municipalities or special agencies to plan and execute the construction and maintenance of local municipal roads. These consortia and special agencies are incorporated as companies by State law. Their primary purpose is to enable the construction of an integrated municipal road system by encouraging the necessary regional planning, providing financial resources and assuring proper maintenance of the completed road system. Their financial resources come from contributions from the state governments, private investors, and from municipalities in cases where they are shareholders.

In Rio Grande do Sul the special body is an actual consortium of a group of municipalities. The consortium is organized as a company (CINTEA), with all shares held by the State and the participating municipalities. In Bahia the agency is organized under State law as a "mixed economy" company with 51% ownership by the State and 49% by private investors. In this state the costs of work performed in each municipality is on a loan basis. The municipality is responsible for repayment of 80% of the project costs over a 5-year period with a total interest rate and monetary correction charge of 18% beginning when the roads are completed. The remaining 20%, which include the agencies' administration fee, is obtained by the agency from other sources of funds made available to them (state allocations, interest on previous loans.) Both of the above organizations work with the municipality on the necessary planning and engineering services of a project. They then award and manage the contracts for construction work.

(*) The approximately 4,000 municipalities in Brazil receive approximately 8% of the revenues from the Unitary Fuel Tax.

In Goiás a "mixed economy" corporation (CRISA) was formed under State law, with 51% state ownership and 49% ownership by private and municipal investors. This agency operates as a public engineering and construction company. It plans, designs, finances and builds the intermunicipal road system. The municipalities pay the cost of construction over a 5-year period from their share of the National Highway Fund. The agency charges no interest or management fees. Their sole source of income is from contract charges **which are generally less than those** paid to commercial contractors in the area.

The **consortia** and agencies also aid in the maintenance of municipal roads by setting maintenance standards and providing financing assistance for the purchase of maintenance equipment by the municipalities. The **consortia** and agencies are all concerned with adequate maintenance of the roads. In the case of Bahia, for example, the agency specifies in its agreement with the municipality that if the latter does not properly maintain the roads, the agency can have it done by contract and deduct the cost from that municipality's share of the National Highway Fund.

The present program will continue to encourage the formation of such publicly controlled bodies, which promote joint planning, execution and maintenance of municipal road projects.

B. ANALYSIS OF BNDE/USAID RURAL ROADS CONSTRUCTION PROGRAM

1. Technical Analysis

The BNDE requires that all projects be supported by complete technical/engineering studies. Technical studies, prepared by the state highway departments and municipal consortia under the present BNDE program have been reviewed by the Project Committee and were found to be adequately prepared in accordance with accepted engineering practice.

The technical studies and information required by the BNDE include:

- a. a map of the location of the existing or planned federal, state and municipal roads.
- b. A technical description of the existing road, if the existing road is to be upgraded or improved.
- c. A preliminary plan showing the horizontal and vertical alignment of the new road, as well as the characteristics of the base and surfacing.
- d. Complete cost estimates and the financial plan for the project.
- e. A chronogram of construction work.
- f. The recommended method of construction (contract vs. force account)
- g. A description of the sub-borrower's capability to maintain the projects proposed for construction or improvement.

The above data is submitted by the prospective sub-borrower to the Special Working Group in the DNER. An engineer reviews the material for technical adequacy, adherence to established design standards and instructions, and reasonableness of the cost estimates and submits the entire project proposal including his comments and recommendations to the BNDE for final action.

In the present BNDE program, the bank requires the sub-borrowers to design and construct roads up to the geometric standards

of a Class III road as defined by the DNER. The majority of roads constructed under the present program are of Class III standards, while some have been constructed to slightly inferior specifications. To clarify the design standards acceptable under the program, the BNDE and USAID have established definite geometric standards for two classes of road: the higher standards being those for Class III road and the lower standards (Class IV) being the minimum acceptable standards. (See Annex VII Exhibit A).

Roads with an estimated traffic volume in 10 years of 200 ADT (average daily traffic) or less should be constructed to the minimum (Class IV) standards, otherwise, the Class III standards will be used. The Class IV standards would also be used for penetration or development roads.

The ultimate purpose of this proposed program is to provide year-round access to and from rural communities. The projects defined in this program will be limited to roads providing this service, plus a limited number of development roads, all built to the above established geometric standards and specifications. **Such projects can include new construction, reconstruction, improvement or reconditioning, as these terms are defined in Section I, page 12.**

In order to assure high quality projects, the **sub-borrowers will be** required to develop more detailed construction specifications for projects under this program. These specifications will establish limits on the types of material that could be used to provide the all-weather surface. **Also minimum compaction requirements will** be established at no less than 90% maximum dry density (standard Proctor test) for fills on roads not expected to be paved within 2 years and at 95% maximum dry density for the all-weather surface layer and for fills on roads expected to be paved in the near future.

The design plans for proposed projects will be developed in two stages. The first stage will consist of the typical roadway cross-section and the horizontal and vertical alignment and estimated drainage structures based on available air photography, or topographic maps. **From these plans, rough cost estimates will be developed for use in the economic analysis of the projects and this data, as well as, the plans will be submitted to the DNER and BNDE for their examination. After preliminary project approval, more detailed plans will be**

made for contract purposes. These plans will be based on a survey of actual field conditions. They will include profiles of the existing ground and the proposed roadway, locations and size of drainage structures, existing soils conditions, and availability of local material to be used for grading and surfacing. These final plans will be reviewed and approved by the BNDE prior to the BNDE authorization to proceed with the project. All State Highway Departments and municipal consortia have the capabilities to develop these plans, either within their own departments or through the use of local engineering firms.

The initial BNDE program provided for the construction of 6,400 kilometers of roads (see Annex VII for complete list of projects financed). The average cost per kilometer in the program has been US\$6,259. However, it should be noted that nearly two-thirds of the roads financed are located in the three states with the lowest construction cost per km. (\$3,018-3,974/km). The wide range of costs between states is due mostly to the type of terrain and the availability of adequate construction materials. On the basis of the present BNDE projects and discussions with BNDE and DNER engineers, it appears that the nationwide average for construction of projects under this program should be approximately \$11,000 per kilometer.

In the execution of the present program the BNDE and the DNER strongly encourage all work to be done by contract rather than by the sub-borrower on "force account" so as not to tie up personnel and equipment needed for highway maintenance work. In the proposed USAID/BNDE program, force account work by the sub-borrowers forces will not be approved unless the sub-borrower can satisfactorily demonstrate that it is not feasible to construct the project by contract and that the use of his forces would not result in any decrease in the roadway maintenance operations. Unless the sub-borrower can clearly demonstrate, by recent experience, that there would be no response from contractors to a call for bids on a project, then all projects should be advertised for contract by public bidding. If there is no response, or if the bids are unreasonably high, it will be the responsibility of the sub-borrower to satisfy the BNDE that it has the capability to do the work without reducing any maintenance effort. In isolated areas where there are no contractors, sub-borrowers will be encouraged to group the projects

into as large a contract as possible in order to attract outside bidders. On projects involving spot improvement or reconditioning, where it is often difficult to establish definite quantities for contract items of work, contracts based on payment for equipment rental and man-hours of work will be encouraged. On this type of contract, the material could be provided by the **sub-borrower**.

In the present BNDE program general limits have been established which specify that, subject to special consideration for individual projects, the projects will include no one road over 30 kms in length and the total length of all roads proposed for construction in a project will be at least 60 kms. These limits were established to guide the states toward submissions of projects based on integrated area studies. With the project development criteria established under this proposed AID/BNDE program, it is not necessary to retain these limits.

Project approval is given by BNDE, based on the recommendations of the DNER work group, a review of the engineering, economic and financial plans for the project, and the **sub-borrowers' road-way maintenance capabilities and practices**. In the proposed program the DNER review will be continued, with particular emphasis on the **sub-borrower's maintenance capabilities and past maintenance experience**. In the Northeast region, where maintenance is especially critical due to the limited financial resources of some of the states, the recommendations of SUDENE will be relied upon since they presently evaluate roadway maintenance.

The initial BNDE program was in a sense a pilot program, intended to encourage the states and municipalities to take the initiative in the area of rural development. Thus, the original requirements for project development and implementation were left relatively simple. As a result, the project monitoring and construction control was weak in some areas. The control in those projects consists chiefly of fiscal control. The project control in the expanded AID/BNDE program will extend beyond fiscal control and into the area of conformity to the established geometric standards, specifications, and good engineering and construction practices. The state DERs presently have the capability to perform this added construction supervision.

However, due to their limited personnel, it will be necessary for

the BNDE to increase its staff to provide adequate review and analysis of project proposals and project monitoring. The BNDE has agreed also to retain a local engineering consultant to assist in carrying out the Bank's construction supervision responsibilities. This consultant will provide engineers to cover the project areas, inspecting each project under construction as necessary to insure that the states' project control procedures are satisfactory, to give technical assistance to DER personnel when needed, and to certify construction payment quantities and construction work completed. The consultant personnel will also make periodic inspections of the maintenance conditions on completed projects financed under the BNDE program. It is estimated that 6-8 engineers will be needed for this purpose. It is estimated that a total of 300 man months of professional services will be required for a total cost of approximately US\$600,000 which can be financed by the BNDE from loan resources. There are competent local consulting engineering firms capable of supplying this service.

a. Roadway Maintenance

As previously noted above, the BNDE and the DNER will continue to review the States' maintenance capabilities and past performance of roadway maintenance. If they determine that the State's record or capability in regard to maintenance is unsatisfactory, BNDE approval of the construction financing of projects proposed under the program will be dependent upon appropriate remedial action being taken. If the proposed sub-borrowers cannot feasibly develop adequate maintenance capabilities by the time the proposed projects are constructed the project approval will either be denied or deferred. Part of the loan agreement between the state DER and the BNDE will consist of a pledge by the DER to maintain the roads at the level defined by the specifications of the new improved road. Estimate of the minimum allocation of equipment and man hours required to maintain the roads at these standards will be spelled out by the DER in the loan agreement.

In order that the BNDE may be kept informed of the maintenance conditions and problems on the projects completed under their program, personnel from the consultant group referred to above will periodically inspect and report on these conditions. These inspections and reports will cover all items of normal roadway maintenance and will note any work required to bring the road up to acceptable standards. Maintenance standards and procedures established in existing DNER and DER maintenance manuals and instructions will be used as the guidelines for these inspections. The maintenance conditions found during these inspections, and the State DER's actions in correcting any deficiencies, will be a factor in determining the sub-borrowers' eligibility for any further BNDE financed projects.

BNDE action on a proposed project recently submitted by the State of Espirito Santo demonstrates the Bank's concern and procedures regarding maintenance capabilities. This project was developed after the initiation of discussions for the proposed USAID loan and in accordance with many of the procedures discussed and proposed during the development of this paper. As condition for the consideration of this proposed project, the BNDE has required the State Highway Department to reorganize its Maintenance Department to comply with the recommendations made by the Brazilian Transport Survey. The State is now in the process of reorganizing its entire department, in accordance with the Transport Survey recommendations.

The sub-borrower for the present BNDE financed project in the State of Bahia is a Municipal Consortium, wherein the individual municipalities are responsible for the maintenance of the completed projects. In this instance the regulations established by the consortium specify that if any municipality within the consortium fails to adequately maintain the roads, the consortium can have the maintenance work done by contract, with the payment thereof to be taken from that municipality's share of the National Road Fund.

To aid the states in maintenance capacity, the BNDE has made arrangements for outside financing for imported highway maintenance equipment, as well as, for financing of locally fabricated equipment through the FINAME program (see page 39). The arrangement for imported equipment was made through a commitment from Caterpillar to lend up to \$15 million to BNDE for subloans to the various states for highway maintenance equipment. The financing is for Caterpillar equipment imported from the U.S. As of this date, nine subloans have been committed for approximately \$7 million. The subloans are guaranteed by assignments of the states' share of the federal highway fund, in the same manner as for the BNDE construction loans.

The question of future equipment needs has been discussed with the BNDE and equipment representatives, and the general concensus is that the Bank's expanded rural roads construction program may generate the need for an additional \$5 million worth of imported equipment each year for at least the next three years. Outside financing for this equipment is considered available through equipment manufacturers similar to the existing Caterpillar loan. Therefore, the proposed loan will not include highway maintenance equipment financing.

b. Availability of Contractors

The availability of Brazilian construction and engineering firms capable of performing the work proposed under this loan agreement has been checked. The DNER maintains a list of registered prequalified firms determined to be capable of performing highway construction engineering work. As of June 30, 1970 there were 244 prequalified highway construction firms and 56 engineering firms. Following is a breakdown, by area and capital, of the number of construction firms with a registered capital over NCr\$100,000,00:

<u>Area</u>	<u>Capital in NCr\$ (million)</u>		
	<u>0.1 - 1</u>	<u>1.0 - 10.0</u>	<u>Over 10.0</u>
N. E. Region (9 states)	12	20	1
Pará	2	2	-
Mato Grosso	1	-	-
Goiás	1	1	1
Minas Gerais	15	20	9
Espírito Santo, R. J. & Guanabara	24	43	9
São Paulo	3	23	8
3 Southern States	5	18	1
	<u>63</u>	<u>127</u>	<u>29</u>

The prequalification of these firms was based on the following data, submitted to the DNER by each firm:

A. Technical

1. Detailed list of all highway projects performed during the past 5 years.
2. List of all contracts presently underway and current status of each.
3. Detailed list and condition of all construction equipment owned.
4. "Curriculum Vitae" of all personnel from the Director down to the level of foreman.

B. Financial

1. Detailed accounting balances for the past three years, including profits and losses. The accounting statements must be in accordance with Brazilian laws and signed by a Registered Accountant.
2. Formal statement from at least two banks operating in Brazil, assuming the responsibility of guaranteeing the firm for contractual purposes.
3. Certificate issued by register offices of states wherever the firm is located indicating whether or not any action regarding claims, mortgages, or other obligations have been filed against the firm.

These prequalified firms are fully capable of performing the added highway work proposed under this loan project. As can be seen above, the number of firms located in the frontier area of Pará, Mato Grosso, and Goiás are limited. However, many of the larger firms are capable of working anywhere in the country and could move crews to these areas for construction projects. There may be a few isolated cases in which no constructor would be available. In such cases the work could be performed by DER forces under the conditions previously noted in this paper.

C. Availability and Readiness of Projects for Financing

The project committee made a review of the planning in the area of rural road development to determine the availability of existing studies ready for financing under this program. The GEIPOT Master Plan for highway construction, developed in the Brazilian Transport Survey, included a number of such projects. These roads were recommended on the basis of valid economic justifications and many could be approved for financing immediately. A list of these projects appears in Annex VII Exhibit C.

The DNER for its own transport program and in reviewing state transport programs is presently using the GEIPOT Transport Survey as a guide for its construction program. It will be noted that the list of GEIPOT roads eligible under this program includes some projects to be constructed to a Class II level. This was due in some cases to the fact that the consultant group performing

the Transport Survey did not recommend construction of any project lower than Class II, regardless of the projected traffic on the road. The location of the road and the projected traffic were the determining factors in listing the projects in the Annex. The project committee feels that a detailed analysis of some of the projects proposed for the latter part of the program (1975-1976) may indicate that their construction would be feasible on a staged construction basis within the present program. Such an analysis would be based on stage construction of the road at an earlier date, lower costs for a lower category road (Class III or IV) and the possibility of increased benefits since the entire network would not be completed.

A municipal consortium in the state of Rio Grande do Sul (CINTEA) has completed a regional planning study which recommended construction of 5,000 kms of rural roads. The existing BNDE program included 1,968 kilometers are ready for construction. In addition, six states have developed proposed projects which are awaiting financial assistance.

Following is a list of the projects on which planning studies have been made:

1. GEIPOT Survey	6,098 kms	estimated cost	US\$ 67,000,000
2. CINTEA Study	3,000 kms	estimated cost	22,000,000
3. Maranhão (DER)		estimated cost	3,000,000
4. Paraná		estimated cost	1,000,000
5. Pará (DER)		estimated cost	6,000,000
6. Bahia		estimated cost	1,000,000
7. Piauí		estimated cost	1,000,000
8. Espírito Santo		estimated cost	4,000,000
		Total	US\$105,000,000

Some of the above projects will require additional study in order to meet the economic justification requirement established for this program. However, with the studies already made and the data available, the additional requirements could be met on many projects within short time. It is estimated that at least 30% of the above projects could be ready for BNDE action within one month.

Conclusion

The technical criteria established and the procedures used by the BNDE in their present programs, and strengthened as noted above, will adequately cover the technical aspects of projects approved for construction under the USAID/BNDE program.

2. FINANCIAL ANALYSIS

The BNDE has developed an expanded 3-year (CY 1971-73), nationwide program for the construction and improvement of rural roads. As in the BNDE-DNER pilot program, sub-borrowers (state highway departments, municipal consortia and special state agencies charged with the responsibility of construction of rural roads) will be required to contribute 40% of the cost of each approved project. Of the total \$83 million program, US\$33 million of the expanded program will be financed directly by the sub-borrowers, with the balance of the program being funded equally by the BNDE (NCR\$ equivalent of US\$25.0 million) and by USAID (NCR\$ equivalent of US\$25.0 million). Therefore, the proposed financial plan is as follows (in US\$ million):

<u>Source</u>	<u>Amount</u>	<u>Percentage</u>
A.I.D.	25	30%
BNDE	25	30%
Sub-Borrowers	33.3	40%
	<u>83.3</u>	<u>100%</u>

The resources made available from the USAID loan, as well as the Bank's own resources will be utilized during the 3-year program in the financing of eligible projects throughout Brazil. Due to the BNDE's 18-24 months disbursement schedule for subloans (see Section IIB.5), the final disbursement of USAID funds under the program is expected to be made before the end of CY 1975.

The projected disbursement schedule for the expanded rural roads program is included in Annex VI . It is the intention of the BNDE to apply repayments from the present pilot program to the expanded program and to apply repayments of subloans made under the expanded program to the continuation of the program beyond 1973. The Bank has also indicated its intention to support the rural roads program from the reapplication of resources and additional BNDE resources through 1976 at a level at least equal to the highest reached under the joint BNDE-USAID program. These commitments, however, were given informally, since the BNDE's policy and practice is not to formally commit its funds in advance to any program beyond a 3-year period, and even within that time frame, rebudgeting is very common. The projected disbursement schedule for

1971-76 contained in Annex VI demonstrates the funding level of the program for 1971-73 during USAID assistance, and shows what inputs will be necessary by the BNDE (from its own resources or new loans) to attain similar funding levels from 1974-1976.

As in the present program, sub-borrowers will be responsible for financing 40% of total project costs. The costs of consultants retained by the sub-borrower to assist with the economic analysis of projects may be considered as part of the sub-borrowers' 40% contribution. If a road to be improved or constructed by the sub-borrower coincides with the alignment of a federal road, the DNER will finance not less than 40% of the estimated cost of the work to be done on that road, the remaining 60% to be financed from resources available under the BNDE program and repaid by the sub-borrowers.

For the financial analysis of subprojects, the BNDE requests sub-borrowers to present: (1) the complete financial plan for the project, (2) their budgets (operational budget and investment budget) and balance sheets for the past three years, (3) their anticipated revenues and expenditures and (4) information on all outstanding loans and the guarantees offered on the loans.

The financial analysis of the sub-borrower by the BNDE Work Group focuses on the financial ability of the borrower to support the program without impairing the borrowers' maintenance capabilities during project execution and secondly, the ability of the borrower to repay the loan financing, including the type of guaranty offered by the borrower.

The BNDE requires that all loans to state highway departments be guaranteed by the states' share of the National Highway Fund (see Section II A2 for discussion of National Highway Fund). As the DNER is responsible for approving the allocation of National Highway Fund resources to the states and municipalities and since the DNER is always a signatory to the loan agreements under the rural roads program, the loan agreement is in effect the power of attorney for the Bank to collect the amount of the state debt to the Bank before the DNER releases the State's share. Loans to municipal consortia and other special agencies are guaranteed by the municipalities' share of the National Highway Fund or the consortia's or special agency's other sources of income. For example, in the state of Bahia the loan was guaranteed with royalties owed to the state government by the federal oil company for pumping oil in the state.

In accordance with the limits imposed by the Bank in the past program, no loans will be made under the program which together with loans from all other sources would encumber in any given year more than 60% of the sub-borrower's share of the National Highway Fund (in the case of state highway departments) or other sources of income (in the case of municipal consortia) and special state agencies).

The terms for subloans under the pilot BNDE-DNER program were established specifically for the rural road program and incorporated in the BNDE-DNER Agreement. The interest charge on all subloans was set at 9.5% per annum in addition to the other fees charged by the BNDE specifically:

1. Opening Commission - collected at the rate of 1% of the amount of credit granted.
2. Supervision Charge - collected at the rate of 0.5% during grace period and 0.25% during the amortization period of the loan.
3. Commitment Fee - collected at the rate of 1% per annum on the undisbursed balance of the loan if the borrower fails to achieve planned goals and therefore is unable to draw-down the loan as programmed. The fee is collected for the late period of each planned draw-down.
4. Late Payment Charge - collected at the rate of 1% per month of the amount of any payment overdue.

The unpaid balance is monetarily adjusted under the criteria adopted by the BNDE (in accordance with National Monetary Fund determination), however, under the terms of the BNDE-DNER Agreement the sum of all charges to the sub-borrower including interest, fees, and monetary correction cannot exceed 20% per annum. As the official rate for monetary correction during 1968 and 1969 was 25% and 18.9% respectively, the Bank has in fact been subsidizing loans under the rural roads program. For the expanded program the Bank's president has indicated his intention to preserve the 20% maximum overall charge to its borrowers, which the Bank's experience suggests is the highest rate acceptable to the borrowers considering the objectives of the program. The Bank may, however, reexamine the allocation, within the 20% limit, of the interest, fee and monetary correction charges. (See Annex II, Exhibit D).

In any event, subloan charges under the new program will be subject to A.I.D.'s approval if the loan is authorized.

The grace and amortization period for each loan will be established according to the needs of the individual sub-borrower and the conditions peculiar to each project, however, they are not to be less than 7 years nor more than 15 years, as under the original BNDE program.

3. ECONOMIC ANALYSIS

As was true of the original BNDE program, the projects to be financed by the Bank under its expanded road construction program are basically secondary, rural access roads, linking municipalities with each other, or connecting them with the primary federal and state highways. The program is intended to promote the development of agricultural municipalities and agricultural areas which lack connection with the trunk highway system, and are therefore isolated from supply sources and from processing or marketing centers.

The section on "Project Justification" outlined in some detail the kinds of economic and social benefits to be expected from the construction and improvement of such roads in rural regions. This section is concerned with the measurement, or quantification of such effects. The objective of this quantification is to provide an economic justification for the program, and to permit the selection of projects by the BNDE on economic grounds. Under the existing system, this justification depends on (1) the economic analysis contained in the borrowers' application for financing and (2) the economic analysis performed by the Bank's own staff.

The criteria adopted by the BNDE and followed since the inception of its present program in 1968 took into account a number of limitations which derive from the objectives and definition of the program. These considerations, which continue to be applicable for the expanded program, include the following:

- (1) Since the program contemplates continued planning, presentation, and analysis by the state DERs and municipal consortia the economic methodology utilized should be sufficiently simple to be applied by such borrowers. For example, the required use of computers by the state DERs at this time would be unrealistic in all but one or two states. The methodology proposed should be sufficiently flexible to provide the basic economic analysis and justification from all participating states, while at the same time permitting a more sophisticated analysis wherever it can be provided.
- (2) The analysis required should take account of the fact that in most states the available data and statistical information is very limited. The objec-

tive is, first, to utilize the available data from all accessible sources (including DER, DNER, IBGE, GEIPOT, etc.) and second, to develop the **sub-borrower's capacity to gather the necessary data, to facilitate the analysis for future projects.**

- (3) Unlike the heavily travelled primary state and federal highways, the roads built or improved under the BNDE program will often have a low existing traffic level, and in some cases - where there is no existing road no traffic at all to start with.
- (4) The most important benefits expected for the BNDE projects are the "indirect benefits" which normally result from area development (such as increased and diversified agricultural and industrial production, increased rural employment, improved educational and health facilities, etc.) which are difficult to quantify, as distinguished from the so-called "direct benefits", of reduced vehicle operating costs. Since only some of the indirect benefits are reflected in increased traffic volume, any methodology based exclusively or primarily on measurement of the direct benefits, by ignoring the paramount indirect benefits, would understate the overall benefits anticipated under the program.
- (5) Finally, the costs of construction and especially of upgrading or improving the kinds of roads to be included in this program, are relatively low. Therefore, the methodology used for the economic analysis should not be so complex and costly as to be out of line with the estimated costs of executing the project.

With these considerations in mind, the BNDE and DNER in the first phase of the program adopted a simplified approach to the economic analysis of the projects presented for financing.

Under this initial phase of the BNDE program the states were required to provide in their proposals (a) an economic description of the area in which the project was to be executed (b) production statistics on each municipality for a 5-year period (c) a description of the present road network (d) traffic statistics if available (e) estimated transportation costs and (f) a discussion of the direct and indirect benefits anticipated from the proposed investment. The quality of the analysis submitted by the states in accordance with these guidelines varied widely, since many DERs do not have even one economist on their staffs, while others retained consultant firms to prepare their applications.

Upon receiving a proposal by a state DER, the BNDE sent a working group out into the field for a 4-5 day visit to analyze the project. This working group included the one and only economist from the BNDE who had the responsibility of working on all the projects. As a result of these limiting factors, the final report and recommendations submitted on each project by the BNDE working group contained a rather perfunctory section on economic justification. The economic section of the report normally contained the relevant data, e.g., production data by crop, number of months the present road system was impassable because of rain, etc., but these data were not analyzed by the use of even an elementary economic model. In sum, the economic justification was based on an analysis of the characteristics of the area, location of markets, and general limitations imposed on the area because of the inadequacy of the existing transportation system. This justification, relied on the perceived agricultural potential of the region.

As stated in the Section I of this paper, the present program is intended to expand and improve upon this existing system for economic justification. This will be accomplished by providing the sub-borrowers with a simple methodology to be used in evaluating projects. The states will receive assistance in the form of guidelines, incorporated in a manual, to assist them (or their consultants) in the preparation of **applications**. Likewise, the BNDE will increase its staff as needed, to provide the necessary strength to analyze and evaluate the economic presentations.

The remainder of this section briefly describes the economic analysis to be used by the BNDE under its new and expanded road construction program. Additional technical detail and information supporting this method of analysis are contained in Appendix V. For ease of reference, the three methods used by the states and the BNDE to determine the economic justification of the projects will be called

- (a) GEIPOT
- (b) GEIPOT (simplified)
- (c) Area Analysis

(a) GEIPOT Methodology

This refers to the method of analysis used in the Brazilian Transport Survey to determine the priority highways included in the GEIPOT Master Plan. This methodology is considered adequate considering existing conditions and available data in Brazil. It is also considered to be a conservative estimate of the total benefits since it does not consider indirect benefits resulting from the program. This analysis will therefore be accepted and relied upon to support the economic justification of any BNDE projects which were specifically analyzed in the GEIPOT studies and included as priority roads in the Master Plan, provided the benefit/cost ratio is equal to or greater than unity, utilizing a discount rate of 10%. The fundamental criterion for determining investment priorities and programs under the GEIPOT survey was that any highway constructed or improved should in its opening year yield benefits equal to or greater than the rate of the opportunity cost of capital times the capital invested. The calculation of benefits to be derived from a project considered only direct benefits, including reduced vehicle operating costs (VOC), reduction in breakage and spoilage, increase in average size of trucks and reduced maintenance costs. VOC's for existing and proposed roads were calculated by a method explained fully in Appendix V. Briefly, however, the consultants determined the operating costs for different types of vehicles for each type of road classification and characteristic. VOC's were taken to be a function of road surfaces, gradients, and terrain. The direct benefit of any proposed road improvement was calculated by using these standard, nationwide VOC's in combination with estimates of changes in traffic patterns in order to estimate savings in VOC's.

Future traffic growth was estimated separately for passenger cars, buses, local truck traffic and long distance truck traffic. Each state was divided into traffic generating zones, generally embracing only one junction of the future highway system, and insofar as possible homogeneous with reference to production and development

projects. Each zone was analyzed as to agricultural and industrial potential (surplus or deficit), existing routes of transport, and per capita income trends to arrive at forecast rate of growth in demand for transport between pairs of zones. These computations were made for 1976 and compared with the base year of 1967.

The GEIPOT study has identified approximately 6098 kilometers of agricultural roads which if constructed will yield a benefit/cost ratio equal to or greater than unity utilizing a discount rate of 10%. Thus these roads will be eligible for financing under the program without additional economic justification.

(b) Simplified GEIPOT Methodology

In the case of project proposals which were not analyzed in the GEIPOT Transport Survey, BNDE applicants will have the option to provide such justification pursuant to a simplified analysis. This method is expected to yield a similar degree of accuracy in estimating economic benefits and costs, since it relies heavily on both the methodology used and data collected by the GEIPOT studies. For example, the States will be furnished VOCs for different classes of traffic and different regions of the country, with appropriate instructions for their use. The DERs will also have access to the GEIPOT estimates for product movements between traffic zones. Should the states wish to update these growth rates in the light of information that became available since the GEIPOT survey was conducted, they will be encouraged to make the necessary revisions.

The sub-borrowers will be required to conduct origin and destination surveys, supplemented with routine traffic counts where necessary. They will also be required to survey the existing vehicle fleet, data for which are readily available. With the information thus obtained, they can quantify the direct benefits of the roads by relating the cost surveys described to the estimated traffic on the new road.

The simplification of the analysis lies in the method of estimating future generated traffic. The GEIPOT consultants conducted a thorough examination of each traffic zone in order to arrive at the estimate for this class of traffic. The sub-borrowers will use one of three options

- a) use GEIPOT figures, if they are still applicable, for the area to be influenced by the new road; or
- b) undertake a similar study of their own; or
- c) assume a unitary elasticity in demand for transportation, as is commonly done both in Brazil and in other developed countries. See Annex V.

The use of the GEIPOT methodology by the sub-borrowers will also be simplified by the fact that the GEIPOT study developed standardized values of the following for each type of terrain and for each region of the country:

- (1) savings in vehicle operating costs resulting from the improvement or construction of different classifications of roads;
- (2) savings in road maintenance costs resulting from improvement or construction of different classifications of roads;
- (3) other types of savings (savings in breakage and spoilage, from traffic accidents) resulting from improvement or construction of roads.

Thus, once the sub-borrowers have established existing traffic and projected traffic, they can utilize these pre-established values rather than undertake special studies to establish the values.

The comparison of cost and benefits will be the traditional method of constructing the ratio of the stream of future benefits and costs. A 10% discount rate will be utilized in this calculation.

In the absence of GEIPOT identification of the road in question, it is anticipated that the sub-borrower will utilize this methodology to analyze projects where existing vehicle traffic in the zone of influence of the proposed roads can be quantified.

(c) Area Analysis Method

As noted above the original and simplified GEIPOT methodologies are based primarily on direct benefits, i.e., the economic justification of a given project depends on the reduced VOC and other user cost savings, the magnitude of which is directly related to the volume of normal, diverted and generated traffic that will utilize a new road. There are two important drawbacks to this approach as it applies to the BNDE program.

First, it is expected that some projects presented to the BNDE will include proposals to build roads where no previous road, and therefore no traffic, presently exists. This will be true in the case of so-called penetration or development roads into previously undeveloped areas. In such cases, even the simplified GEIPOT methodology cannot be utilized.

A second drawback lies in the fact that the GEIPOT studies excluded any consideration of the indirect benefits that might result from construction projects, on the ground that such effects are difficult to identify and quantify, and that the necessary complementary investments would have to be considered also. Projects were therefore included or excluded in the Master Plan purely on the basis of direct benefits (and such limited indirect effects as might eventually be reflected in traffic flow increases). While some projects proposed for inclusion in the present program may be and will be justified on the basis of their direct benefits alone, others may be excluded unless their expected indirect benefits are considered also.

The BNDE has in the past financed projects which it considered justified in terms of such indirect benefits (e.g., developed agricultural production, increased employment, increased levels of income, improved educational facilities and health services). USAID/Brazil agrees that such beneficial effects are of special interest and importance to the BNDE program and therefore concurs that such projects should continue to be eligible for financing. In such cases the economic analysis will be performed following essentially the following outline.

- 1) Analysis and description of the area of influence of the proposed road project. This analysis will describe the area in all relevant aspects and show how the absence of adequate transportation facilities is hampering or delaying economic development.
- 2) Description of the plan of development for the area and place of proposed project in such plan. The direct and indirect benefits expected to flow from the execution of the project should be described and quantified wherever possible, including expected effects on agricultural production, diversification, storage, distribution and marketing. This analysis should focus also on entrepreneurial and anticipated industrial activity in the area. Non-economic and social benefits (such as access to improved educational facilities or health services) should also be covered.
- 3) Estimated cost of project, based upon preliminary line and grade plans made by the use of air photos or topographic maps. Likewise, a description of all complementary investments required to attain the development objectives cited under (2) above, and description of how, when and by whom such investments will be made.
- 4) The analysis will include an estimate of the total cost of road construction, maintenance, and all other complementary investments associated with the development of the region over time. Anticipated sources of financing for each investment project will also be identified.

- 5) A description of the engineering alternatives available to achieve the objectives, and a rationale for the alternatives presented for financing. This analysis will describe alternate standards of construction (e.g. Class III or Class IV), specifications based on type of traffic expected, and relate the different cost estimates to the incremental benefits expected from each alternative. The BNDE has agreed that prior to disbursing AID loan funds for projects justified on the basis of indirect economic benefits (i.e., not based on the GEIPOT methodology of direct benefit analysis) the manual, describing the form and content of the sub-borrower's presentation and analysis of projects, will be completed for use by the sub-borrowers.

USAID is confident that there are a sufficient number of qualified economists in Brazil to conduct the analysis described above. In addition to government economists, there are 72 consulting firms registered at the National Highway Department (DNER), any of which could be used by the sub-borrower in drawing up their proposals. As an indication of the availability of qualified Brazilian economists, we note that both the IBRD and the IDB no longer require foreign consulting firms to work on IBRD or IDB financed projects in Brazil.

Conclusion

Any of the three methods (GEIPOT, Simplified GEIPOT, and Area Analysis) described above will enable the joint USAID/BNDE program to allocate its funds in the most efficient manner, both with reference to alternative road projects as well as to alternative investments in other sectors of the economy. The methods, moreover, are sufficiently straight forward to allow the sub-borrowers to plan and coordinate their own future highway building programs.

4. Project Review and Monitoring Procedures

Technical reviews will be conducted by the BNDE during every phase of each project: feasibility study, preparation of plans and specifications, preparation of contract documents and bidding procedures. Construction supervision will be provided by the DNER and private consultants. In all cases the BNDE will hold the responsibility for final approval. The BNDE will be guided by the reviews and recommendation of DNER, and in some areas by regional development organization (e.g. SUDAM, SUDENE) for their final selection of projects for financing. The detailed construction plans, specifications and cost estimates will be reviewed and approved, with reliance on DNER evaluation, prior to the construction of any project.

As a part of the preconstruction reviews by the BNDE, the sub-borrowers' procedures and requirements for public bidding, contractor qualifications, performance bonding, bid reviews, and method of awarding contracts will be reviewed. In the event of any deviation from the approved procedures, the sub-borrower will obtain BNDE approval before awarding a contract or discarding the bids.

Once a project moves into the construction phase the sub-borrower will provide full time construction supervision and the BNDE will monitor the projects through the use of a private consulting firm, with periodic visits from its own staff. The consulting firm will provide area engineers to monitor the sub-borrowers' supervision practices, check the materials test results and perform their own tests, review the methods and computations of payment quantities, and certify to the BNDE the quantities of work performed for payment. This certification will be used by the BNDE as the basis for payments to the sub-borrowers. The consultant firm will also make periodic maintenance inspections of the completed projects during the period of the loan program, to check the sub-borrowers' maintenance practices and to assure continued maintenance.

5. BNDE Disbursement Procedures

Included in the BNDE's loan agreements are the complete schedules for the technical and financial implementation of the project. These schedules computed on a quarterly basis set forth the financial contribution of the sub-borrower and the bank, as well as estimates for the work to be completed in each quarter. The loan is disbursed directly by the bank to the sub-borrower in accordance with these schedules provided the sub-borrower has made its required contribution and that a percentage completion of the work has been accomplished as estimated. Sub-borrowers will submit reports on a quarterly basis

on the physical completion of the project and the application of resources. The consultants retained by the BNDE for project monitoring will certify (1) the amount of work performed in accordance with the approved plans and specifications and (2) the payments made by the sub-borrower for the project. As in the present program, variations from the quarterly schedule will be allowed for individual portions of the project as long as the completion percentages planned are achieved for the project as a whole. If the sub-borrower has not performed as planned, the next quarterly release is not made until performance equals planning. A financial penalty is assessed against the borrower for failure to draw the quarterly funding in a timely manner. The penalty is assessed in the amount of 1% per annum on the undisbursed balance for each day of delay beyond the quarterly period in which the tranche release was to have been made. The Bank will continue to make periodic inspections and audits of the quarterly reports. The reviews are usually carried out prior to the first two and last two releases. The first two inspections verify the reporting accuracy and clarify questions of reporting and calculation of allowable costs. The last two audits verify the total project records and physical completion of the projects under the loan. Final release of funds is not made to the sub-borrower until all work is physically complete.

For reimbursement from USAID, the BNDE will submit monthly requests as described in Section

6. Conclusion

The USAID technical analysis of the BNDE program included (1) discussions with BNDE personnel and intensive reviews of project evaluation and implementation procedures, (2) reviews of project analysis and contracts, and (3) inspections of several projects under construction including spot checks of sub-borrower implementing procedures and compliance with BNDE requirements (see Annex VII Exhibit 1 for reports of field inspection). USAID/B concludes from its analysis that the BNDE is capable of executing the program in a technically, economically and financially sound manner.

SECTION III - A. I. D. LOAN ADMINISTRATION

A. Implementation Plan Negotiations

1. Loan Agreement

It is estimated that between 60 days and 90 days will be required for loan negotiations once a draft has been prepared by USAID and presented to the BNDE for review. The BNDE is familiar with A. I. D. loan provisions so no unusual delays are expected.

Implementation Letter No. 1 will be prepared with the loan agreement and discussed with the BNDE as part of loan negotiations.

2. Implementation Plan

Approximately 90-120 days should be required for the BNDE to meet Conditions Precedent following loan agreement signing. In addition to the standard Conditions Precedent, the following will be expected prior to the first loan disbursement.

- (a) An executed agreement between DNER and BNDE providing for DNER review and monitoring of the projects, and setting subloan interest rates and repayment terms.
- (b) Arrangement by the BNDE for technical services from one or more consulting firms to provide for on-the-job inspection of BNDE project construction.
- (c) Prior to financing projects justified by the modified GEIPOT or area analysis method, completion of the manual covering the technical, economic and financial requirements of the program, as well as, providing guidelines for the preparation of the sub-borrower's proposals.

In addition, the BNDE will covenant to create a Special Work Group to administer the program or will make other arrangements satisfactory to A. I. D. for increasing the staff charged with administration of the rural road construction program.

3. Procurement

Procurement by the sub-borrowers will be from local sources as there is a sufficient number of qualified engineering consultants and construction contractors available in Brazil. Procurement of contractors for construction work will be carried out under the competitive bidding procedures required by Brazilian law. Brazilian law also requires that

procurement of professional engineering services be accomplished through invitations to interested firms in a manner similar to A. I. D. standard procedures.

B. USAID Disbursements

USAID will reimburse the BNDE an amount equal to 50% (fifty percent) of the total of periodic disbursements made by the BNDE to sub-borrowers for approved projects under this program. Reimbursement will be made by USAID to the BNDE on the basis of an itemized claim prepared by the BNDE listing the amounts paid out on sub-projects during the preceding month (identifying the projects by name and voucher number) and showing the total amount to be paid by USAID. Claim for reimbursement shall not be submitted more often than monthly.

C. USAID Monitoring

1. The project committee will undertake selected reviews of BNDE project analysis and contracts to verify adherence to the mutually agreed criteria and procedures.

2. On-Site Inspections

USAID Capital Development, Engineering, and Controller personnel will make periodic visits to projects to observe progress and verify compliance with the terms of the loan agreement and implementation letters.

3. Reports

For each project approved for financing under the program, the BNDE will provide USAID with copies of:

- (a) the work group report prepared by the BNDE staff;
- (b) the executed contract between the borrower and the BNDE;
- (c) the schedule for project execution; and
- (d) the financial plan including the quarterly disbursement schedule for the loan.

In addition, the BNDE will submit quarterly progress reports to USAID giving such information as: progress achieved on the AID-financed program, summary information of disbursements by all contributors to the sub-projects; descriptions of any difficulties or problems encountered in implementing the program and proposed solutions; and physical inspection reports of subprojects by the BNDE staff and its consultants.

4. Audits

Audits will be made periodically as considered necessary by the office of the Auditor General for Latin America.

LOAN AUTHORIZATION (DRAFT)

Provided from: Alliance for Progress Loan Funds
 BRAZIL: Rural Road Construction Loan - Capital Assistance

Pursuant to the authority vested in the Administrator, Agency for International Development ("A.I.D.") by the Foreign Assistance Act of 1961, as amended, and the delegations of authority issued thereunder, I hereby authorize the establishment of a loan ("Loan") pursuant to Part I, Chapter 2, Title VI, Alliance for Progress, of such Act to the Banco Nacional de Desenvolvimento Economico (BNDE) ("Borrower") of not to exceed twenty five million United States dollars (\$25,000,000) to finance loan currency costs of goods and services necessary to assist Borrower to finance the construction and improvement of rural roads, in accordance with agreed upon criteria of the BNDE and A.I.D.; not to exceed six hundred thousand United States dollars (\$600,000) of the loan may be used to finance technical assistance to BNDE. The loan shall be subject to the following terms and conditions:

- 1(a) Interest and Terms of Repayment: Borrower shall repay the loan to A.I.D. in United States dollars within fifteen (15) years from the first disbursement under the loan, including a grace period of not to exceed five (5) years. Borrower shall pay to A.I.D. in United States dollars, on the outstanding balance of the loan, interest at the rate of two (2) percent per annum for ten (10) years, and three (3) percent thereafter.
- (b) If prior to the date the first interest payment is due, the Government of Brazil ("Government") so elects, Borrower shall fulfill its obligation under the loan by paying to Government in the currency of Brazil the equivalent, determined as of the time and in a manner satisfactory to A.I.D. under (a) above and in such event the Government shall pay to A.I.D.:
 - (1) the equivalent in United States dollars, determined as of the time and in a manner calculated to obtain repayment of all dollars disbursed plus interest, of all amounts paid to Government as follows:
 - (a) all interest immediately upon receipt, subject to Government's right to retain all payments in excess of two percent (2%) per annum during a grace period of not to exceed ten (10) years from the first disbursement under the loan (Government grace period) and all payments in excess of three (3%) percent per annum thereafter;

- (b) principal within forth (40) years, including the Government grace period; and
- (ii) interest in United States dollars of two percent (2%) per annum during the Government grace period and three (3%) percent per annum thereafter on all amounts of outstanding principal paid by Borrower to Government from the respective dates of such payment of principal.

2. Other Terms and Conditions

- (a) Goods and services financed under the loan shall have their source and origin in Brazil and countries included in Code 941 of the A.I.D. Geographic Code Book.
- (b) United States dollars utilized under the Loan to finance local currency costs shall be made available pursuant to procedures satisfactory to A.I.D.
- (c) Unless A.I.D. otherwise agrees in writing all repayments of principal and interest of A.I.D.-financed subloans will be used by the BNDE for re-lending in its rural road construction program for such periods and under such terms as are satisfactory to A.I.D.
- (d) A.I.D. financing will be limited to not more than fifty percent (50%) of any single BNDE loan for eligible projects.
- (e) The loan shall be subject to such other terms and conditions as A.I.D. may deem advisable.

Administrator

Date

TRANSLATION

Minister WILLIAM A. Ellis
Director, USAID/Brazil

June 1, 1970

Dear Minister:

I have the pleasure to write to you concerning the program for expansion of the transportation system in Brazil.

2. As you know, there have been understandings between the representatives of the BNDE and USAID concerning the possibility of USAID financial assistance to the BNDE for the continuation of the nationwide rural roads construction and maintenance program.

3. Since 1967 the Government of Brazil, through the BNDE, has apportioned the following resources into the rural roads construction program:

	Cr\$ millions
1967	60.0
1968	40.0
1969	48.0
Total	148.0

4. Based on a technical, economic and financial analysis of the program for the expansion of the road system of Class III roads - which constitute branches and sub-branches of federal and state highways of major importance for the transport of primary products in the areas served - the BNDE has decided, in accord with certain plans, to continue their close collaboration with the USAID for the execution of the program.

5. The Government of Brazil attaches high priority to projects which have as their objective the construction of rural roads which are intended to overcome the present deficiencies of the transportation system which have limited the productivity of inland agriculture in trunk highways. These high priority rural roads, of economic importance, from the stand point of primary production, will be part of economically justifiable agricultural development plans and will have high benefit/cost ratios.



UNITED STATES AGENCY FOR INTERNATIONAL DEVELOPMENT
AGÊNCIA NORTE-AMERICANA PARA O DESENVOLVIMENTO INTERNACIONAL

USAID/BRASIL

AID-DIG/P-949
ANNEX II - Pg 1 of 4
Exhibit A - Page 1 of 1



RUA MELVIN JONES N.º 5 - RIO DE JANEIRO - TEL: 31.820

CERTIFICATION PURSUANT TO SECTION 611 (e)
OF THE FOREIGN ASSISTANCE ACT OF 1961, AS
AMENDED.

Subject: BRAZIL - Capital Assistance - Rural Road Construction Loan

Having taken into account, among other things, the maintenance and utilization of projects in Brazil previously financed or assisted by the United States, I certify that in my judgment Brazil has the financial capability and the human resources to effectively maintain and utilize the proposed Rural Road Construction Loan.

This judgment is based primarily on the facts developed in the Capital Assistance Paper for the proposed loan of \$25 million, which discusses in detail the capabilities of the Banco Nacional do Desenvolvimento Econômico (BNDE) and the technical competence of the Departamento Nacional de Estradas de Rodagem (DNER), and various state, municipal and regional entities and governments, and finds that they will possess adequate financial and human resource capability (supported by technical assistance and training where appropriate) to effectively maintain and utilize the project. The BNDE in particular is quite competent to implement the project and act for the Government of Brazil as its Executing Agency. The relationship between the proposed loan and prior U.S. assistance to the Brazilian rural road construction sector is discussed in considerable detail in the Capital Assistance Paper.



Director

Date : 

2.

6. In order to carry out the above program, I propose that USAID examine the possibility of granting a loan in the amount of US\$ 25 millions which will be totally applied in local cost financing.

7. According to preliminary estimates, the resources necessary for the realization of the rural roads construction program during the period 1970-75 amounts to US\$ 85 million of which the ENDE proposes to participate with 30%. The sub-borrowers (States, Municipalities and others) shall participate, as in the previous program with 40%. Under these conditions, the US\$25 million of AID financing would cover the remaining 30%.

8. The commitment of AID and ENDE resources and the disbursement schedule would be as follows:

	<u>US\$ million</u>	
	<u>Commitment</u>	<u>Disbursement</u>
1970/71	16.6	8.0
1972	16.6	16.6
1973	16.6	16.6
1974		6.0
1975		2.6

9. The Government of Brazil recognizes the necessity to provide the Federal and state agencies participating in the program with technical assistance, in special courses in Brazil, not only for the development of project proposals, but also for the execution and inspection of projects. Consequently, part of the resources for the overall program could be used to this end.

Please accept the assured cooperation of my Highness royal and civil

João Paulo das Lajes Veloso
Minister of Planning

BANCO NACIONAL DO DESENVOLVIMENTO ECONOMICO

ANNEX II - Pg 4 of 4
Exhibit D - Pg 1 of 1

CABINETE DO PRESIDENTE

Letter P- /70

Rio de Janeiro, May 20, 1970.

Mr. Dwight B. Johnson
Assistant Director-USAID
for Capital Development and Industry
Rio de Janeiro - 611

Dear Mr. Johnson:

Regarding the informal document submitted to me resulting from the contacts, at a technical level, between BNDE and USAID concerning a possible USAID loan to BNDE in the amount of US\$ 25 million for the feed roads program, please be advised that in principle I agree with the items included in the above document in connection with which I would like to make the following comments:

- a) In a letter of 5/11/70 it would be advisable that BNDE/AD should finance up to 60% since in some cases the Federations may cover up to 40%.
- b) possibilities for loan for operations charges of 90% w/c could be taken as a basis, leaving a balance between interest and maintenance to be settled later on.
- c) payment of property - I think it is logical that BNDE should receive the resources in the program until 1975, after which time forward to be made in mutual agreement between BNDE/AD.
- d) payment of interest - in the program of being extended up to 10% the proposed rate.
- e) yield of funds - The term of the Term of Reference of 60 months will be reduced by 10% due to the need, the execution of a special working program by the country; likewise, if required BNDE will consider the contracting of local engineering consultants with experience under the program and the drawing up of budgets - as well, it could be principally used in cooperation with BNDE the selection of technicians to cooperate in the carrying out of the program by working jointly with BNDE and AID.

Sincerely yours,



CHECKLIST OF STATUTORY CRITERIA

(Alliance for Progress)

The following abbreviations are used:

FAA - Foreign Assistance Act of 1961, as amended by the Foreign Assistance Act of 1971.

App. - Foreign Assistance and Related Agencies Appropriations Act, 1971.

MMA. Merchant Marine Act of 1936, as amended.

COUNTRY PERFORMANCE

Progress Towards Country Goals

1. FAA §. 208; §. 251 (b)

A. Describe extent to which country is:

1. Making appropriate efforts to increase food production and improve means for food storage and distribution.

Expanding food production and improving the means for food storage and distribution is one of the major goals of Brazil and a great many steps have been taken to achieve this goal. For further details see CIAP/377, especially pages 124-142.

2. Creating a favorable climate for foreign and domestic private enterprise and investments.

Brazil has done a great deal to encourage private enterprise, both domestic and foreign and has not in general placed any special obstacles in the way of foreign investors except in a few "national security" areas. For specifics see IERD Report WH-195-a, December 19, 1969, "Industrial Policies and the Manufacturing Industries in Brazil," and IERD Report WH-203, November 4, 1970.

3. Increasing the public's role in the developmental process.

Brazil has encouraged an increased public role in the developmental process by its very successful tax incentive programs to encourage private savings and investment.

4. a. Allocating available budgetary resources to development.

Brazil is allocating large amounts of budget resources to development.

b. Diverting such resources for unnecessary military expenditure and intervention in affairs of other free and independent nations. (See also Item No. 16).

Brazil is spending about 2.4 percent of its GNP for defense. In 1970 this was about \$1 billion. This is a substantial amount but not excessive in view of the special defense burdens created by long borders (4,600 miles coast and 8,700 miles of land frontier) and a vast sparsely populated interior. Defense Agency budgets include expenditures of a non-military nature for such things as subsidies to civilian airlines, civilian airport construction, maintenance of flight control and communications and mail delivery to remote areas. Identifiable items of this kind approach 10 percent of defense agency budgets. Brazil is not intervening in the affairs of other nations.

5. Willing to contribute funds to the project or program.

See the Financial Analysis section of the paper for a discussion of Brazil's contribution.

6. Making economic, social, and political reforms such as tax collection improvements and changes in land tenure arrangements, and

making progress toward respect for the rule of law, freedom of expression and of the press, and recognizing the importance of individual freedom, initiative, and private enterprise.

Although progress toward a return to democratic government still is hindered by the military's determination to hold on to Revolutionary leadership, state legislature elected Governors from among candidates either selected or approved by the President. Elections for the national Congress and Senate were held in November after preliminary screening process. Cassations, the stripping of political rights for ten years and the firing from government jobs or deprivation of elected office, continue sporadically. All the State legislatures have been reopened, membership altered, of course, by cassations. Municipal elections continue to be held. In October 1969 the Federal Congress reopened after having been closed by Former President Costa e Silva for ten months. At the same time the Constitution was amended, with Congressional ratification, to strengthen the President's powers. Although censorship still exists and new laws precensoring for pornography have been issued, a certain latitude in the press and in expression is allowed insofar as fundamental concepts of the Revolution are not challenged nor articles published which lend support to subversives. On the other hand, there has been a growing incidence of police intimidation of individual journalists.

The last 6 months have seen continued allegations of brutal treatment and tortures of accused subversives by GOB security officials. The GOB continues to deny the incidence of officially sanctioned torture.

The GOB appears convinced that private enterprise with government assistance will keep the economy growing at the same rapid rate of the last two years. Outside the government there is some concern expressed at the extent of U.S. investment in certain sectors and at the amount of foreign profit remittances.

7. Adhering to the principles of the Act of Bogota and Charter of Punta del Este.

Brazil is adhering to these principles

8. Attempting to repatriate capital invested in other countries by its own citizens.

Brazil's efforts to encourage investment, promote rapid economic growth and reduce the rate of inflation contribute to the return of capital invested in other countries by its citizens.

9. Otherwise responding to the vital economic, political, and social concerns of its people, and demonstrating a clear determination to take effective self-help measures.

Since assuming power President Medici has voiced concern for the disequilibrium in standards of living among Brazilians of different regions and classes. The GOB has undertaken to build 600,000 houses for workers and is placing increased emphasis on strengthening its educational system. It has not yet embarked significantly on needed land reform. With most political power concentrated at the top, there is political apathy on the part of the vast majority and the danger of continued isolated acts of terrorism on the part of extreme-left elements. (See 6, supra).

B. Are above factors taken into account in the furnishing of the subject assistance?

The above factors have been taken into account in recommending approval of this loan.

Treatment of U.S. Citizens

2. FAA §. 620 (c). If assistance is to government, is the government liable as debtor or unconditional guarantor on any debt to a U.S. citizen for goods or services furnished or ordered where (a) such citizen has exhausted available legal remedies and (b) debt is not denied or contested by such government?

Brazil is not known to be so indebted.

3. FAA §. 620 (e) (1). If assistance is to a government, has it (including government agencies or subdivisions) taken any action which has the effect of nationalizing, expropriating, or otherwise seizing-ownership or control of entities beneficially owned by them without taking steps to discharge its obligations toward such citizens or entities?

No such action has been taken.

4. FAA §. 620 (o); Fishermen's Protective Act. §. 5. If country has seized, or imposed any penalty or sanction against, any U.S. fishing vessel on account of its fishing activities in international waters.

No case of seizure, penalty or sanction against U.S. fishing vessel is known to exist.

- a. has any deduction required by Fishermen's Protective Act been made?

Not applicable.

- b. has complete denial of assistance been considered by A.I.D. Administrator?

Not applicable.

Relations with U.S. Government and Other Nations

5. FAA §. 620 (d). If assistance is for any productive enterprise which will compete in the U.S. with U.S. enterprise, is there an agreement by the recipient country to prevent export to the U.S. of more than 20% of the enterprise's annual production during the life of the loan?

Not applicable.

6. FAA §. 620 (j). Has the country permitted, or failed to take adequate measures to prevent, the damage or destruction by mob action, of U.S. property?

Brazil has not permitted such acts.

7. FAA §. 620 (l). If the country has failed to institute the investment guaranty program for the specific risks of expropriation, in convertibility or confiscation, has the A.I.D. administration within the past year considered denying assistance to such government for this reason?

Brazil has actively instituted a guaranty program.

8. FAA §. 620 (q). Is the government of the recipient country in default on interest or principal of any A.I.D. loan to the country?

No such default exists.

9. FAA §. 620 (t). Has the country severed diplomatic relations with U.S.? If so, have they been resumed and have new bilateral assistance agreements been negotiated and entered into since such resumption?

Brazil has not severed relations with the U.S.

10. FAA §. 620 (u). What is the payment status of the country's U.N. obligations? If the country is in arrears, were such arrearage taken into account by the A.I.D. Administrator in determining the current A.I.D. Operating Year Budget?

Brazil is meeting its U.N. obligations.

11. FAA §. 620 (a). Does recipient country furnish assistance to Cuba or fail to take appropriate steps to prevent ships or aircraft under its flag from carrying cargoes to or from Cuba?

Brazil does not furnish assistance to the present Government of Cuba. Brazil has taken appropriate steps to prevent ships or aircraft under its registry from engaging in any Cuban trade.

12. FAA §. 620 (b). If assistance is to a government, has Secretary of State determined that it is not controlled by the International Communist movement.

The Secretary of State has determined that Brazil is not controlled by the International Communist movement.

13. FAA §. 620 (f). App. §. 109. Is recipient country a communist country?

No.

14. FAA §. 620 (i). Is recipient country in any way involved in (a) subversion of, or military aggression against, the U. S. or any country receiving U. S. assistance, or (b) the planning of such subversion or aggression.

No.

15. FAA §. 620 (n). Does recipient country furnish goods to North Viet-Nam or permit ships or aircraft under its flag to carry cargoes to or from North Viet-Nam?

Brazil does not traffic or knowingly permit trafficking with North Viet-Nam.

Military Expenditures

16. FAA §. 620(a). What percentage of country budget is for military expenditures? How much of foreign exchange resources spent on military equipment? How much spent for the purchase of sophisticated weapons systems? (Consideration of these points to be coordinated with PPC/MAS).

Expenditures for military purposes are about 18 percent of total central government or about 9 percent of total public sector expenditures including states and municipal governments.

Brazil's foreign exchange disbursements for military equipment are projected to increase from \$20 million in 1967 to \$58 million in 1973. These expenditures would range from 1.19% of total imports (defined as goods plus net services) in 1967 to 1.85% in 1973. Brazil's foreign exchange reserves were at about \$510 million at the end of 1969. For about 10 years (1955-1965) Brazil bought little military equipment. A re-equipment and modernization program now underway to improve efficiency in the defense establishment by replacing aged and obsolete equipment will increase expenditures for equipment, but will increase overall military expenditures only slightly.

CONDITIONS OF THE LOAN

General Soundness

17. FAA §. 201 (d). Information and conclusion on reasonableness and legality (under laws of country and U.S.) of lending and rolending terms of the loan.

The terms of the proposed loan are legal under both U.S. and Brazilian laws, and are considered reasonable.

18. FAA §. 251 (b); §. 251 (e).

Information and conclusion on activity's economic and technical soundness. If loan is not made pursuant to a multi-lateral plan, and the amount of the loan exceeds \$100,000, has country submitted to A.I.D. an application for such funds together with assurances to indicate that funds will be used in an economically and technically sound manner.

The project is considered economically and technically sound. See Technical and Financial Analysis, Section II B 1 and 2. USAID/Brazil has received the GOB loan application prepared by the Ministry of Planning and the BNDE and it is attached as Exhibit C of Annex II of this paper. Assurances have been given by the BNDE indicating that the funds will be used in an economically and technically sound manner.

19. FAA §. 251 (b). Information and conclusion on capacity of the country to repay the loan, including reasonableness of repayment prospects.

Brazil is considered able to repay the proposed loan. All sub-projects will be self-liquidating.

20. FAA §. 611 (a) (1). Prior to signing of loan will there be (a) engineering, financial, and other plans necessary to carry out the assistance and (b) a reasonably firm estimate of the cost to the U.S. of the assistance?

Since this loan is to an entity of the GOB acting as an intermediate credit institution, the necessary technical and financial planning and the detailed engineering for the individual projects will be done during the implementation of the loan. Requirements and procedures for the planning have been established in the loan paper and agreed to by BNDE to which will assure adequate engineering and financial plans prior to individual project approvals. A reasonably firm estimate of the overall cost of the loan project is presented in the technical analysis of this paper (Section II B).

21. FAA §. 611 (a) (2). If further legislative action is required within recipient country, what is basis for reasonable expectation that such action will be completed in time to permit orderly accomplishment of purposes of loan?

Additional legislation is not required.

22. FAA §. 611 (e). If loan is for capital assistance, and all U.S. assistance to project now exceeds \$1 million, has Mission Director certified the country's capability effectively to maintain and utilize the project?

Yes. See Director's Certification in Annex II Exhibit A

23. FAA §. 251 (b). Information and conclusion on availability of financing from other free-world sources, including private sources within the United States.

IBRD, IDB and EXIMBANK have all expressed no interest in financing this project. Since concessional lending terms are required for the project, other sources are not known to exist.

Loan's Relationship to Achievement
of Country and Regional Goals

24. FAA §. 207: §. 251 (a). Extent to which assistance reflects appropriate emphasis on; (a) encouraging development of democratic economic, political, and social institutions; (b) self-help in meeting the country's food needs; (c) improving availability of trained manpower in the country; (d) programs designed to meet the country's health needs, or (e) other important areas of economic, political, and social development, including industry; free labor unions, cooperatives, and voluntary agencies; transportation and communications; planning and public administration; urban development; and modernization of existing laws.

- (a) The program is expected to strengthen both the public and private sectors at the municipal level in rural agricultural regions. See Section I C. 4.
- (b) The Program will make a substantial contribution to meeting the country's food needs, both by encouraging increased and diversified agricultural production, and by providing improved access for food produce to the processing marketing and consuming centers.
- (c) Not applicable.
- (d) The program is expected to facilitate health programs in Brazil's rural areas. See Section I C.4.
- (e) Other aspects of economic, political and social development expected to result from the program are discussed in Section I C.

25. FAA §. 209. Is project susceptible of execution as part of regional project? If so why is project not so executed?

No.

26. FAA §. 251 (b) (3). Information and conclusion on activity's relationship to, and consistency with, other development activities, and its contribution to realizable long-range objectives.

This activity has a basic significance for all Borrower's development activities, and will play an essential part in the realization of long-range objectives in agricultural, industrial and municipal development.

27. FAA §. 251 (b) (7). Information and conclusion of whether or not the activity to be financed will contribute to the achievement of self-sustaining growth.

The program will contribute to the Country's self sustaining growth by providing the integration of rural agricultural areas into the national economy. See Section I C.

28. FAA §. 281 (a). Describe extent to which the loan will contribute to the objective of assuring maximum participation in the task of economic development on the part of the people of the country, through the encouragement of democratic, private, and local governmental institutions.

See Sections I C. 4.6 and II A.5.

29. FAA §. 281 (b). Describe extent to which program recognizes the particular needs, desires, and capacities of the people of the country; utilizes the country's intellectual resources to encourage institutional development; and supports civic education and training in skills required for effective participation in governmental and political processes essential to self-government.

The program is intended to make a major contribution to Brazil's priority agricultural development objectives, specifically, to the more rapid development of rural areas with the greatest agricultural potential. This objective will be pursued through the active participation of states and municipalities in the planning and execution of the projects. For institution building aspects see Section I C. 6.

30. FAA §. 601 (a). Information and conclusions whether loan will encourage efforts of the country to: (a) increase the flow of international trade; (b) foster private initiative and competition; (c) encourage development and use of cooperatives, credit unions, and savings and loan associations; (d) discourage monopolistic practices; (e) improve technical efficiency of industry, agriculture, and commerce; and (f) strengthen free labor unions.

- a. The improvement of the rural infrastructure in Brazil will facilitate the movement of agricultural produce not only to domestic markets, but also to the ports from which such products can be exported.
 - b. Private initiative and competition will be encouraged in the municipalities benefitting under this program, by virtue of the stimulus to the agricultural and industrial production, and to the transport and other services, which the program is expected to create. Increased competition means that opportunities for monopolistic practices will be fewer and less profitable in these areas.
 - c. Cooperatives, credit unions and savings and loans associations are expected to arise in proportion to the needs and opportunities resulting from the development of rural municipalities under this program.
 - d. See (b)
 - e. The technical efficiency of agricultural and industrial production and commerce is expected to benefit significantly from the improved lower-cost transport facilities to be provided under this program. See Section I C.3.
31. FAA §. 619. If assistance is for newly independent country; is it furnished through multilateral organizations or plans to the maximum extent appropriate?

Not applicable.

32. FAA §. 251 (h). Information and conclusion on whether the activity is consistent with the findings and recommendations of the Inter-American Committee for the Alliance for Progress in its annual review of national development activities.

The loan is consistent with the findings and recommendations of the Inter-American Committee for the Alliance for Progress in its latest annual review. See Section I. D.3., page 37.

33. FAA §. 251 (g). Information and conclusion on use of loan to assist in promoting the cooperative movement in Latin America.

The program is not specifically intended to promote the cooperative movement in Latin America. However, the improvement of the rural infrastructure in Brazil is expected to benefit existing cooperatives by providing lower cost agricultural inputs, reduced transportation costs, and increased accessibility of processing and marketing centers.

34. FAA §. 209; §. 251 (b) (8). Information and conclusion whether assistance will encourage regional development programs, and contribute to the economic and political integration of Latin America.

Not applicable.

Loan's Effect on U.S. and A.I.D. Program

35. FAA §. 251 (b) (4); §. 102. Information and conclusion on possible effects of loan on U.S. economy, with special reference to areas of substantial labor surplus, and extent to which U.S. commodities and assistance are furnished in a manner consistent with improving the U.S. balance of payments position.

This loan will have no unfavorable impact on the U.S. economy.

36. FAA §. 601 (b). Information and conclusion on how the loan will encourage U.S. private trade and investment abroad and how it will encourage private U.S. participation in foreign assistance programs (including use of private trade channels and the services of U.S. private enterprise).

Dollars expended under this loan to purchase local currency are expected to return in large part to the U.S. in payment for U.S. exports to Brazil.

37. FAA §. 601 (d). If a capital project, are engineering and professional services of U.S. firms and their affiliates used to the maximum extent consistent with the national interest?

U.S. engineering firms will not be needed for the project. Competent Brazilian firms are available to execute the construction and improvement projects financed under this loan. Most of the technical services required in connection with the BNDE program are also available in Brazil. To the extent they are not, the services of U.S. firms or firms in other eligible countries may be utilized and financed under the loan.

38. FAA §. 602. Information and conclusion whether U.S. small business will participate equitably in the furnishing of goods and services financed by the loan.

Not applicable.

39. FAA §. 620 (h). Will the loan promote or assist the foreign aid projects or activities of the Communist-Bloc countries?

No.

40. FAA §. 621. If technical assistance is financed by the loan, information and conclusion whether such assistance will be furnished to the fullest extent practicable as goods and professional and other services from private enterprise on a contract basis. If the facilities of other Federal agencies will be utilized, information and conclusion on whether they are particularly suitable, are not competitive with private enterprise, and can be made available without undue interference with domestic programs.

Technical assistance for the project will come from Brazil's private sector on a contract basis. No use of federal agencies to provide technical services is contemplated.

41. FAA §. 252 (a). Total amount of money under loan which is going directly to private enterprise, is going to intermediate credit institutions or other borrowers for use by private enterprise, is being used to finance imports from private sources, or is otherwise being used to finance procurements from private sources.

The entire amount of local currency obtained for the loan expected to be consumed by the private sector of Brazil, pursuant to contracts let by the states and consortia or municipalities receiving loan funds from the intermediate credit institution.

Loan's Compliance with Specific Requirements

42. FAA §. 201 (d). Is interest rate of loan at least 2% per annum during grace period and at least 3% per annum thereafter?

Yes.

43. FAA §. 603 (a). Information on measures to be taken to utilize U.S. Government excess personal property in lieu of the procurement of new items.

Not applicable.

44. FAA §. 604 (a); App. §. 108. Will all commodity procurement financed under the loan be from U.S. except as otherwise determined by the President?

Yes.

45. FAA §. 604 (b). What provision is made to prevent financing commodity procurement in bulk at prices higher than adjusted U.S. market price?
- Not applicable.
46. FAA §. 604 (d). If the host country discriminates against U.S. marine insurance companies, will loan agreement require that marine insurance be placed in the U.S. on commodities financed by the loan?
- Yes.
47. FAA §. 604 (e). If off-shore procurement of agricultural commodity or product is to be financed, is there provision against such procurement when the domestic price of such commodity is less than parity?
- Not applicable.
48. FAA §. 611 (b); App. §. 101. If loan finances water or water-related land resource construction project or program, is there a benefit-cost computation made, insofar as practicable, in accordance with the procedures set forth in the memorandum of the President dated May 15, 1962?
- Not applicable.
49. FAA §. 611 (c). If contracts for construction are to be financed, what provision will be made that they be let on a competitive basis to maximum extent practicable?

Brazilian law so requires.

50. FAA §. 620 (g). What provision is there against use of subject assistance to compensate owners for expropriated or nationalized property?

The loan agreement will not permit such use.

51. FAA §. 612 (b); §. 636 (h). Describe steps taken to assure that, to the maximum extent possible, the country is contributing local currencies to meet the cost of contractual and other services, and foreign currencies owned by the U.S. are utilized to meet the cost of contractual and other services.

For discussion of the Brazilian contribution see Section II B. 2. No excess foreign currency is available.

52. App. §. 104. Will any loan funds be used to pay pensions for military personnel?

No.

53. App. §. 106. If loan is for capital project, is there provision for A.I.D. approval of all contractors and contract terms?

The BNDE will approve contracts on behalf of A.I.D. because this is in effect a loan to an intermediate credit institution. A.I.D. will approve a standard contract and procedures and criteria for contractor selection.

54. App. §. 108. Will any loan funds be used to pay U.S. assessments?

No.

55. App. §. 109. Compliance with regulations on employment of U.S. and local personnel for funds obligated after April 30, 1964 (Regulation 7).

Not applicable.

56. FAA §. 636 (1). Will any loan funds be used to finance purchase, long-term lease, or exchange of motor vehicle manufactured outside the United States, or any guaranty of such a transaction?

No.

57. App. §. 401. Will any loan funds be used for publicity or propaganda purposes within U.S. not authorized by the Congress?

No.

58. FAA §. 620 (k). If construction of productive enterprise, will aggregate value of assistance to be furnished by U.S. exceed \$100 million?

No.

59. FAA §. 612 (d). Does the U.S. own excess foreign currency and, if so, what arrangements have been made for its release?

No.

60. MMA § 901.b. Compliance with requirement that at least 50 per cent~~um~~ of the gross tonnage of commodities (computed separately for dry bulk carriers, dry cargo liners, and tankers) financed with funds made available under this loan shall be transported on privately owned U.S. flag commercial vessels to the extent that such vessels are available at fair and reasonable rates.

Not applicable. The loan will not finance the transportation of any commodities.

INTERNAL ALLOCATION OF RESOURCES IN BRAZIL

While there are no widely agreed upon or universally applicable criteria for evaluating a country's allocation of resources, one can judge proper allocation by its results in growth, stabilization, and distribution of welfare. In these terms, Brazil's past record and stated future intentions are encouraging.

In many important respects Brazil's recent economic record has been excellent. The growth of GDP recovered in 1966 and 1967 from the economic crisis of the early 60's, when growth dipped below 2% and per capita GDP actually declined. The 1966/67 expansion was largely a result of the reform policies of the revolutionary government and accelerated in 1968 and 1969, when GDP grew at an estimated 8-9% rate. Exports have risen very rapidly since 1964, especially during the past two years when the GOB's new system of mini-devaluations of the cruzeiro enabled Brazil to benefit greatly from the boom in world trade. The rate of inflation, although still high, was reduced sharply in the period 1964-67 from a former peak of over 80%, and further gradual progress has been achieved the last two years as the relative weight of priority in national economic policy has shifted from stabilization back to growth. The government deficit has been gradually but decisively reduced from a very inflationary level to only about 0.5% of GDP.

-- Federal tax receipts grew from 7.8% of GNP in 1961 to 10% in 1969. Recently an IMF study ranked Brazil first in tax effort among the developing countries. The overall tax rate in Brazil is a very high 24% of GNP.

-- A system of fiscal incentives for rebating income tax receipts for private investment in special areas or sectors including agro-industry has been remarkably successful particularly in promoting industrial expansion in the poor Northeast.

-- Total savings and investment have recovered from a low of 14.2% of GNP in 1963 to 16.8% in 1969.

An important question is whether the recent economic growth has resulted in increased welfare for the average Brazilian. At least for the non-agricultural work force this appears to be the case. During the 1960's, although the official real minimum wage

declined, average earnings increased. Of the non-agricultural work force, workers who earned less than half the minimum wage dropped from 37% to 22% of the work force and those earning at or above the minimum wage increased from 45% to 59% of the work force. Furthermore, the non-agriculture work-force grew at close to 5% a year.

Thus, the internal allocation of resources has been high enough and sufficiently effective to promote overall rapid economic growth and a somewhat better distribution of income. The GOB's stated priority for education, health and agriculture has been generally well reflected in resource allocations and policy measures affecting those sectors, which also are AID's priorities.

-- The agricultural sector has benefited from a wide number of programs encouraging modernization. Recently tax incentives have been created to promote investment. Exemptions from the value-added tax have ended previous disincentives to use modern inputs and to sell in the export market. Government spending on agriculture is a less significant indicator but it also increased 31% from 1961 to 1969.

Public expenditures on education jumped 11% a year during the 1960's. The Government plans for a continued rapid increase and ultimately the attainment of universal primary education. From 1966 to 1970, enrollments increased at the annual rates of 6% at the primary level and 14% at the secondary level. Educational opportunities are rapidly widening for the average urban and small town Brazilian.

Public spending in health and sanitation grew at close to 10% a year in the 1960's with major emphasis on campaigns against malaria, tuberculosis and other specific debilitating diseases.

The Government of Brazil has said its goals for the early 1970's will be an increase in GNP between 7% and 9% per year. The major emphasis in the public sector will continue to be on expanding educational and health services. Within a macro-economic policy framework aimed at rapid growth, continued gradual reduction in the rate of inflation, and a continued rapid rise in exports, the GOB's private sector development priorities will continue to feature the modernization of agriculture.

UTILIZATION OF COUNTERPART RESOURCES FROM
 IS AND WHEAT SALES AGREEMENT FROM 1966 TO
 PRESENT (VI, VII, VIII, AND IX WHEAT
 AGREEMENTS)

(Figures in parenthesis are non-additive)
 Cr\$ Millions

	VI WHEAT AGREEMENT APRIL 1966	VII WHEAT AGREEMENT OCTOBER 1967	VIII WHEAT AGREEMENT DECEMBER 1969	IX WHEAT AGREEMENT MAY 1970 (programmed)
1) Rio-São Paulo Road	50.0	-	-	-
2) Southern States Highway Maintenance Loan Supplement	16.6 ^{1/}	-	-	-
3) Agricultural Research (EFE)	-	4.0	8.1	-
4) Meteorological Service	-	0.4	1.0	-
5) National Research Council (CNPq)	-	0.6	2.0	-
6) SUMAB	-	3.0	4.0	-
7) FUMFERTIL	-	4.0	-	-
8) APCAR	-	3.0	-	-
9) Cooperatives	-	16.0	-	-
10) Credit: Agriculture - (21.5) } Fertilizer - (17.6) }	-	39.1	-	-
11) Seeds	-	3.5	-	-
12) SUVALE	-	3.7	6.0	-
13) Agricultural Marketing: Roads - (8.0) } Supply Centers - (7.2) } Milk Plants - (0.5) }	-	15.5	-	-
14) Irrigation - Ministry of Interior	-	-	6.4	-
15) IBGE Foundation	-	-	7.1	-
16) ETA - Mogiana	-	-	0.9	-
17) GERAN	-	-	2.2	-
18) Budget Support: (many of separate items listed above now included under general categories below)	-	-	67.62	75.15
a. Agricultural credit	-	-	(24.92)	(32.50)
b. Agricultural Production	-	-	(6.55)	(16.15)
c. Agricultural Marketing	-	-	(17.35)	(18.15)
d. Rural Roads	-	-	(9.0)	(8.5)
e. Agricultural Research (of which EFE received Cr\$4.2 and CNPq Cr\$ million)	-	-	-	(7.50)
TOTALS	64.6	91.5	86.22	75.15

^{1/} Central Bank transferred "temporarily" to DNER on instruction of Ministry of Finance, 9-12-63.

1. Public Sector Transport Investment in Brazil

Government investment in the transport sector (all modes) represents approximately one-tenth of the total annual expenditures made by the federal, state, and municipal governments. During the period for which data is readily available, transport expenditures amounted to 12.4% of the total governmental expenditures in 1965 and declined to 10.6% of the total expenditures in 1968. As Table I below indicates, nearly two-thirds of the annual expenditure in transportation is made at the federal level. However, it must be noted that federal transport expenditures include major investments in all modes of transport: in highway construction and maintenance (by the DNER), in railroads (by the DNEF and RFFSA), in ports and shipping, and in air transport (transfers to private airlines). As noted in Table I and II a substantial, although declining, portion of state expenditures in transportation (1965-68) is for highway construction; overall state expenditures for highway maintenance have increased significantly during the same period (see Table B).

A breakdown of state and federal highway revenues and expenditures is not available for the last two years 1969-70, however, it has been estimated by the DNER that the combined federal and state highway revenues were approximately US\$650 million (equivalent) in 1969 and US\$700 million in 1970. In 1969 the National Highway Fund accounted for US\$375 million (58%) of this revenue and approximately US\$390 million (55%) in 1970.

In December 1969 the IBRD and GEIPOT developed a comprehensive forecast of annual federal and state investment expenditures and revenue from 1970 to 1973. These summary studies, based on the individual regional surveys, are attached as Table III and IV. Table III, Forecast of Annual Investment Expenditures for Federal and State Road Construction and/or Paving Works gives a detailed forecast of annual investment in each state; Table IV, Tentative Financing Plan for Federal and State Highways (1970-73), outlines the forecasted state and federal revenues and expenditures through 1973.

It is demonstrated in Table IV that for the 4 year period 1970-73, US\$997 million (equivalent) will be required in addition to regular federal and state government revenues to execute the investment program recommended by the Transport Survey. In response to these deficiencies, the World Bank will provide approximately US\$100 million (equivalent) to the GOB on an annual basis for the 4 year period. The joint BNDE/USAID Rural Roads Construction Program will over the same time span provide an additional US\$50 million (BNDE-\$25.0 million and AID \$25.0) in supplementary resources to mostly state and a few municipal sub-borrowers.

TABLE I

TOTAL FEDERAL, STATE, AND MUNICIPAL EXPENDITURES
 IN TRANSPORTATION AND TRANSPORTATION EXPENDITURES
 AND HIGHWAY CONSTRUCTION EXPENDITURES AS % OF
 TOTAL GOVERNMENT EXPENDITURES 1965-68
 (in millions current DC-\$)

	1965				1966				1967				1968			
	FED	STATE	MUN	TOTAL	FED	STATE	MUN	TOTAL	FED	STATE	MUN	TOTAL	FED	STATE	MUN	TOTAL
Estimated Total Government Expenditures in all Sectors (1)	8,213	3,804	518	12,535	11,962	5,248	1,138	17,948	15,794	7,627	2,061	25,482	20,039	11,019	3,428	34,506
Transportation Expenditures (all modes) (1)	1,069	421	42	1,552	1,544	577	93	2,214	1,999	829	177	3,006	2,112	1,245	295	3,652
Total Transport Expenditures as % total Gov't Expenditures	13%	11.0	8.1	12.4	13.4	10.9	8.1	12.3	12.7	10.8	8.6	11.8	10.5	11.3	8.6	10.6
Estimated Expenditures for Highway Construction (2)	227	395	NA	NA	297	389	NA	NA	574	343	NA	NA	755	714	NA	NA
Estimated State and Federal Highway Const Expenditures as % of total of Fed and state budgets	2.7%	10.4	-	-	2.6	7.4	-	-	3.6	7.2	-	-	3.7	6.5	-	-

(1) Source: Functional Breakdown of Government Expenditures, NOAAID A622 July 7, 1970 Note: "Omitted from "Estimated Total Government Expenditures" in all sectors are coffee accounts outside IDC, agricultural credit, several steel companies, shipping companies, all state power plants and the BME (Housing Bank) programs outside of housing, thus altering the percentage composition in any one year. However, the trends cited above would still be valid if somewhat dampened".

(2) SOURCE: GRIPOT

REVENUE AND STATE HIGHWAY EXPENDITURE AND INTERESTS 1965-1967
(In millions 1967\$ and millions 1970 equivalent\$)

YEAR		SOURCE OF REVENUE			TOTAL EXPENDITURE	EXPENDITURE			TOTAL EXPENDITURE	BALANCING ITEM (2)
		NATIONAL ROAD FUND	OTHER SOURCES	(1) NET CREDIT OPERATIONS		CONSTRUCTION	EQUIPMENT	MAINTENANCE & OTHER EXPENDITURES		
1965	Federal	416.2 \$170.0	24.9 \$ 4.6	16.5 \$ 3.1	457.6 \$177.7	475.7 \$175.4	13.4 \$ 4.2	212.0 \$ 56.0	767.9 \$175.4	-210.3 \$-76.4
	State	409.4 \$146.0	452.7 \$171.0	96.7 \$20.4	1,058.8 \$177.0	674.3 \$171.7	24.4 \$ 6.0	304.0 \$ 55.0	1,002.7 \$171.5	5.1 \$ 2.8
	Total	825.6 \$216.0	477.6 \$175.6	113.2 \$23.5	1,475.4 \$177.7	1,149.9 \$177.1	37.8 \$ 10.2	516.0 \$111.0	1,577.6 \$176.9	-102.2 \$-32.6
1966	Federal	792.4 \$225.6	1.3 \$ 2.6	25.1 \$ 4.7	818.8 \$232.9	446.1 \$176.4	10.0 \$ 3.1	176.5 \$ 51.1	632.7 \$232.7	-216.7 \$-67.7
	State	473.2 \$174.7	417.2 \$170.4	1.7 \$ 2.7	892.1 \$177.8	561.0 \$177.7	25.9 \$11.1	252.0 \$110.1	848.9 \$178.9	-96.8 \$-29.0
	Total	1,265.6 \$200.3	418.5 \$173.0	26.8 \$ 7.4	1,717.9 \$210.7	1,007.1 \$174.1	35.9 \$14.2	428.5 \$161.2	1,381.7 \$179.8	-368.8 \$-96.7
1967	Federal	447.3 \$131.0	197.7 \$ 61.7	86.0 \$25.6	730.9 \$218.3	374.6 \$174.3	4.0 \$ 1.1	134.5 \$ 42.0	713.1 \$217.4	23.8 \$ 8.7
	State	271.0 \$ 84.9	474.0 \$148.3	24.3 \$ 8.5	769.3 \$241.7	343.7 \$164.6	13.4 \$ 4.9	471.7 \$184.5	1,098.8 \$254.0	-232.5 \$-72.6
	Total	718.3 \$215.9	671.7 \$210.0	110.3 \$34.1	1,510.3 \$260.0	718.3 \$178.9	17.4 \$ 6.0	606.2 \$226.5	1,712.1 \$261.4	-211.8 \$-63.9

NOTE: (1) The term "net credit operations" is used to describe the difference between new loans received and loan repayments recorded in the financial statements of the highway departments in any year. A positive figure indicates new loans in excess of repayments of outstanding debt, and a negative indicates repayments greater than new loans.

(2) The last column in the table is headed "balancing item". This is a purely formal balancing figure introduced to show the net difference between expenditures and revenues shown in the table. Expenditures in the table are actual payments for highway investment, maintenance, and other purposes, brought to account in a given year, regardless of whether they are paid for out of revenues or from short- or long-term loans or from other sources of funds. Revenues in the table are National Road Fund receipts, other revenues - mainly budget contributions - and net credit operations as defined above brought to account in the same year. The balancing item does not represent the difference between actual receipts and total expenditures incurred in any year, as work completed in a particular year is often not paid for in that year, but is deferred for payment in the following year. Expenditures incurred may be carried forward from year to year in this way, hence real deficits in any year and actual liabilities at the end of any year are hidden.

SOURCE: CEIPOT: Transport Survey Phase I and II

**FORECASTS OF ANNUAL INVESTMENT EXPENDITURES FOR FEDERAL AND
STATE ROAD CONSTRUCTION AND/OR PAVING WORKS**
(in NCr68\$ millions US\$1 = NCr\$4.10)

<u>Region</u>	<u>State</u>	<u>1970</u>	<u>1971</u>	<u>1972</u>	<u>1973</u>
<u>Northeast</u>					
	Maranhão	121.1	66.3	84.2	51.3
	Piauí	34.0	45.4	51.8	113.5
	Ceará	64.7	113.2	117.0	89.4
	Rio Grande do Norte	57.1	55.9	50.5	50.1
	Pernambuco	72.6	75.9	79.4	94.3
	Pernambuco	287.8	110.5	101.4	93.5
	Alagoas	70.1	40.4	50.5	54.0
	Sergipe	68.6	40.5	42.6	20.8
	Bahia	599.0	481.8	468.1	213.7
<u>Center-East</u>					
	Minas Gerais	259.0	284.2	301.3	267.9
	Espírito Santo	77.1	119.3	38.7	22.0
	Rio de Janeiro	160.4	158.8	67.1	30.0
<u>Center-South</u> (1)					
	São Paulo	428.5	467.4	508.5	553.8
<u>Center-West</u>					
	Mato Grosso	61.3	73.6	88.3	106.3
	Goiás	42.5	71.2	94.1	199.6
<u>Far South</u>					
	Paraná	435.2	535.7	547.4	468.4
	Santa Catarina	171.2	214.0	232.5	195.5
	Rio Grande do Sul	237.6	296.0	298.3	273.1
	Sub Total	3,247.8	3,250.1	3,221.7	2,897.2
	Other States (1)	227.3	227.5	225.5	202.8
	Total	<u>3,475.1</u>	<u>3,477.6</u>	<u>3,447.2</u>	<u>3,100.0</u>

(1) Investment expenditure forecasts are based on the Transport Survey recommended investment programs. The states and territories not covered by the Survey are:

Amazon Region - Rondonia, Acre, Amazonas, Roraima, Pará, Amapá
Center South - Guanabara
Center West - Federal District (Brasília)

Investment expenditures in states not covered by the survey have been taken as seven percent of the amounts for States studied.

SOURCE: Transport Survey Phase I and II

TENTATIVE FINANCING PLAN FOR FEDERAL AND STATE HIGHWAYS**(1970-1973)**
(in NCr68\$ millions)

<u>Revenues</u>	<u>1970</u>	<u>1971</u>	<u>1972</u>	<u>1973</u>	<u>1970/1973</u>
National Highway Fund	1,571	1,723	2,120	2,292	7,706
Other Revenues (1)	<u>1,199</u>	<u>1,275</u>	<u>1,351</u>	<u>1,427</u>	<u>5,252</u>
Total	2,770	2,998	3,471	3,719	12,958
 <u>Expenditures</u>					
Investments (2)	3,475	3,478	3,447	3,100	13,500
Maintenance Equipment (States Covered (by Transport Survey Other States)	132	48	41	74	295
	<u>9</u>	<u>3</u>	<u>3</u>	<u>4</u>	<u>19</u>
Sub Total	3,616	3,529	3,491	3,178	13,814
Maintenance and Administration (DNER and States Covered (by Transport Survey Other States)	736	744	763	797	3,040
	<u>45</u>	<u>47</u>	<u>48</u>	<u>50</u>	<u>190</u>
Sub Total	<u>781</u>	<u>791</u>	<u>811</u>	<u>847</u>	<u>3,230</u>
Total	4,397	4,320	4,302	4,025	17,044
Surplus (Deficit)	(1,627)	(1,322)	(831)	(306)	(4,086)
U.S. \$ Equivalent (millions)	(397)	(322)	(203)	(75)	(997)

Average Annual Deficits US\$249 million (1970-1973)

(1) Proceeds of taxes earmarked for highway use and budget appropriations

(2) See Table III

SOURCE: Transport Survey Phase I and II

December, 1969

2. Impact of Sub-Loan Project on State

As discussed in Section II.A.1 page 45, it is anticipated that the average project cost will be approximately NCr\$14.0 million (US\$3.1 million), as was the case in the original BNDE program. Estimating an average construction cost of \$11,000 per/km, as discussed in Section II.B.1 page 54, a typical project will involve the construction of nearly 300 km of roads. An idea of the order of magnitude of the proposed assistance to the states can be obtained by comparing a number of projects undertaken in the BNDE's initial program with the individual state's highway budget. The Table below shows the BNDE financing provided as a percentage of the state's investment budget and the BNDE road construction program as a percentage of the state's existing road network.

NCr\$ IN MILLIONS 1969

	MINAS GERAIS	PIAUI	SANTA CATARINA	MARANHÃO	MATO GROSSO
1. Total State Highway Budget 1969	NCr\$205.0	NCr\$17	NCr\$42.0	NCr\$41.0	N. A.
1a. (for construction "investment")	NCr\$130.0	NCr\$10.2	NCr\$20.5	NCr\$23.2	N. A.
1b. Total FRN to State	NCr\$ 68.0	NCr\$ 8.9	NCr\$14.6	NCr\$17.1	NCr\$27.5
2. Rural Road Program	NCr\$ 20.1	NCr\$ 9.4	NCr\$ 8.6	NCr\$13.3	NCr\$23.8
2a. BNDE Loan	10.7	NCr\$ 5.6	NCr\$ 4.5	NCr\$ 8.0	NCr\$13.0
2b. BNDE Loan as % Annual investment in construction	8.2	54.9%	21.9%	34.5	N. A.
3. Total State Road Network	16,608 km	1695	5443	889	8860
3a. Total Km Constructed BNDE Project	413.9	361.	96	282	1,414
3b. BNDE Project as % of existing State road network	2.5%	21.3%	1.76%	31.7%	16.0

In a large comparatively "developed" state such as Minas Gerais, which has the second largest state highway budget in Brazil, the rural road construction project represented but a fraction of the annual "investment" expenditures of the state.

However, with the exception of the states of Minas Gerais and São Paulo (whose combined state transportation budgets nearly equal the combined transportation budgets of the remaining states) the rural road construction projects have provided significant financial assistance to the states and, in many instances, substantially expanded the state's road network. This is clearly demonstrated in the Table above for the Northeastern states of Piauí and Maranhão. As can be noted in the Table the National Highway Funds apportioned to each state represent a large portion of the state's annual transportation budget. As discussed in the text of the Capital Assistance Paper these resources will be used by the state for the repayment of the sub-loans.

APPENDIX

ECONOMIC METHODOLOGY FOR JUSTIFICATION OF SUB-PROJECTS

This appendix gives a detailed description of the three types of operating criteria or methodology which will be utilized to determine the economic justification for the construction of specific roads. For convenience, the three methods will be called:

1. GEIPOP
2. GEIPOP (Simplified)
3. Area Approach

1. GEIPOP

This is the methodology utilized in the GEIPOP Brazilian Transport Survey to quantify and evaluate the benefits and costs of all roads listed in the Highway Master Plan. The approach used by the consultants was, in our opinion the best possible method for ensuring that Brazil's limited capital resources be used in the most productive investments, not only in the transportation sector, but for the economy as a whole. The fundamental criteria for determining investment priorities and programs was that any built or improved highway link should in its opening year yield benefits equal to or greater than the rate of opportunity cost of capital to the rest of the economy, taken to be 10%, times the capital invested. The following is a summary of GEIPOP's evaluation and determination of: (a) economic benefits; (b) economic costs; and (c) analysis of data and comparison of benefits and costs.

a. Economic Benefits

In general, the economic benefits derived from new or improved highways can be categorized as follows:

- (1) Direct benefits to vehicle operators such as reduced vehicle operating costs (VOC) and time savings;
- (2) Other direct benefits related more to the general economy than to the vehicle owner, such as reduced breakage and spoilage, fewer traffic accidents, and reduced road maintenance costs;
- (3) Indirect benefits.

(1) Direct Benefits: The primary direct benefit calculated by the GEIPOT consultants was the savings derived as a result of the reduction in vehicle operation costs (VOC) caused by the improvement of the road. The method employed to determine the difference between present and future VOC on any specific highway section is called the \triangle \perp method. This method was used in the following manner:

(a) Data was gathered on the characteristics of the existing highway. These characteristics include length of the road, type of surface, gradients, curves, etc. In other words, all factors which influence the costs of driving a vehicle across any given road were inventoried.

(b) Data was derived for the characteristics of the new or improved highway. Since the reduction in VOC are a function of the changes in characteristics of the road, the GEIPOT consultants developed a general method for relating, in a quantifiable way, changes in these characteristics to changes in VOC. This general method is call " \triangle \perp ". Under this method, the VOC per kilometer were derived, by type of vehicle, for travel on a road with no impediments (i.e. a flat, paved, straight, Class I road). Each main factor which departs from the characteristics of such a road is converted into an additional length to the "ideal road" (paved Class I highway in flat terrain). Adding all the additional lengths derived from each of the main conversion factors to the actual length of the road gives the total length of a flat, paved, Class I highway on which VOC's would be equal to those on the highway in question. The total additional length necessary to equate costs is called \triangle \perp . Supplement I attached to this Appendix gives a detailed description of how these numbers were derived, as well as the numbers themselves. Supplement II presents an example of how this method was used for a specific road.

(2) Other Direct Benefits: Three benefits from a long list of possible "other direct benefits" were included in the GEIPOT analysis:

- (a) Reduction in breakage and spoilage;
- (b) Increase in the average size of trucks (making economies of scale possible);
- (c) Reduction in maintenance costs.

Other possible benefits, such as value of time saving and reduction in traffic accidents were not included in the analysis because statistics were considered incomplete.

(3) Indirect Benefits: Indirect benefits were ignored on the basis of the argument that "comparable indirect benefits arise from most investments". From the standpoint of the BNDE program, this is an unfortunate deficiency since - as noted in the text, these indirect benefits are most relevant for the types of roads to be constructed under this program. While it is not necessary to consider indirect

benefits in the case of projects already justifiable in terms of their direct benefits, the overall effects may be understated as a result of disregarding indirect benefits. The latter type of benefits will however, be considered in the case of the area methodology discussed below.

In summary, the calculation of benefits in the GEIPOT methodology depended primarily on the calculation of the reduction in vehicle operating costs. In order to determine the total future benefits to be derived from a specific road, this reduction in VOC's was multiplied by the amount of traffic expected to use the new road. Traffic projections were based on the method described below.

Traffic Growth Patterns

Rates of growth of traffic vary according to vehicle class, type of traffic and the location of the section of the highway under investigation. Variation in relation to location is caused by differences in the rates of growth of population, production, and income. Variation according to vehicle class has been important because of the different factors determining growth of passenger cars, bus and truck traffic.

For these reasons, estimates of average annual traffic growth rates were made for each pair of traffic zones for passenger cars, buses, local truck traffic and long-distance truck traffic separately.

Traffic Zones

Each state studied, was divided into traffic generating zones. Each zone generally embraced only one junction of the future highway system. Almost each zone, moreover, was homogeneous with reference to production and development projects. An attempt was made to draw the border lines of each zone so that they coincided with the borders of administrative units.

In order to analyze traffic generating sources, the following steps were taken:

1. Estimation and forecast of the tonnages of principal agricultural and industrial products in surplus and deficits by zone.
2. Determination of the existing routes and methods of transport by which surpluses are evacuated and deficits are supplied.
3. Estimates of the rates of growth in zonal per capita income. In other words, the growth rates found from studies of economic activities in the relevant areas constitute the basis for estimating traffic growth rates.

Data and forecasts for Brazil as a whole and by states were estimated concerning:

- urban, rural, and total population
- agricultural production
- industrial, mineral and forestry production
- urban, rural, and total human consumption of agricultural production
- income

Forecasts were made for the years 1971-76.

Surpluses and deficits of agricultural products, present and future, were analyzed on the basis of information collected and estimates made by "zones" - These estimates were based on all relevant factors influencing present production and future production potentials. In other words, the forecasting procedure went beyond simple extrapolation of identified historical trends.

The following outline is presented as an illustration of how this method was used to estimate the annual average traffic growth rates for trucks:

1. determination of product movements between zones in 1967 (the base year) based on estimated production surpluses and deficits by zones and other data available. The 1967 average daily traffic on all national and state highways in the study area were established by actual traffic counts. Additional information regarding the vehicles and the products moved were obtained by Origin-Destination Surveys.
2. collection of data on capacity and load of trucks from the traffic studies;
3. calculation of products movements between zones in 1976 from product surpluses and deficit by zones forecast for 1976, and from anticipated changes in locations of processing plants and distribution patterns;
4. product movements in 1976 compared with those of 1967 to arrive the forecast rate of growth in demand for transport between pairs of zones. This forecast combined with the data on truck capacity yields the annual average traffic growth rate for trucks along the road in question.

b. Economic Costs

The calculation of economic costs were, for the most part, based on an estimate of the financial expenditures required to construct and maintain the proposed road. The only difference between financial expenditures and economic costs were indirect taxes. Indirect taxes were deducted from financial expenditures at market prices to give economic costs because indirect taxes do not represent economic resources used in the investment. In Brazil, indirect taxes are applied at all levels of government to the supplies and services used in transport investment. They should, consequently, be deducted from financial expenditure in order to get an accurate estimate of the economic costs of the project.

The financial expenditures required to construct the roads proposed in the GEIPOP studies were computed on the basis of a fairly detailed road inventory and an analysis of unit construction costs. This analysis of unit costs considered the cost of construction equipment, equipment operation, and labor production. Different unit prices were developed for the various types of terrain and soils classifications. The total quantities of earthwork, grading, and paving items were computed on the basis of the inventory data and standard roadway cross-sections developed for three types of terrain (flat, rolling, and mountainous). The developed unit prices were then applied to these quantities. A fixed price, per kilometer was then added for drainage items, retaining walls, roadway sub-drains, and right-of-way. The total project costs thus arrived at were then increased 25% for contractor's overhead, risk, and profit; 10% for DER engineering, supervision and administration; and 15 to 25% for a foreign exchange complement.

C. Analysis of Data and Comparison of Costs

The benefit cost criterion used by the GEIPOT consultants to determine whether or not any specific road should be included in the Brazilian Master Plan was that the projected return on the investment should be at least as high as the returns available on alternative uses of these investment resources in any sector of the economy. The theoretical concept traditionally employed to ascertain the real rates of return, and therefore the true costs of using capital in any specific activity, is the opportunity cost of capital.

USAID/B recommends that the BNDE also utilize the concept of the opportunity cost of capital in their program. We also recommend that the BNDE use the same numerical estimate of the opportunity cost of capital as that adopted by the GEIPOT consultants and the IBRD. A detailed explanation of why we find both the concept and numerical value of the opportunity cost of capital relevant in the present loan is discussed below.

It must be kept in mind that cost-benefit analysis is nothing more than a way of organizing and analyzing the factors which could be taken into account in making certain economic choices. It is most applicable in choosing among several competing projects. If each alternative project is worthwhile (i.e.) the benefits exceed the costs, it would be desirable to finance all the projects. When the total costs of all projects exceeds the available financing, which is true in the present case, only the most worthwhile projects should be financed. Theoretically, the optimum allocation of the available capital would be attained if a price is inputted for the available capital which ensures that all capital is employed and that the last investment made yields a return equal to or higher than the return on any alternative investment.

In the case of the loan under discussion, once the loan is made, the BNDE will be faced with the problem of allocating \$83 million among current and future rural road construction projects, the total demand for which far exceeds \$83 million (see estimate of total demand in Section I A 1). If the costs and benefits for all projects which will be proposed were known, it would be a simple arithmetic exercise to choose a rate of return high enough to insure that the BNDE would allocate the available \$83 million to the best projects.

The information on prospective rates of return for all projects to be submitted to the BNDE is neither available now, nor will it ever be completely available at any specific time in the future. A certain amount of time will elapse between the submission of projects. In order to implement the program in a reasonable period of time, each project must be analyzed and the decision

of whether or not to fund it must be made by the BNDE as the projects are submitted. Consequently, the BNDE must make its decisions on the basis of whether the proposed project has a rate of return which exceeds some minimum established rate.

Since the BNDE is only charged with the responsibility of properly allocating \$83 million among alternative rural road construction on projects, the appropriate minimum rate of return should be based on rates of return generated by previously constructed rural roads in Brazil. A systematic economic analysis of the benefits and costs of existing rural roads has never been done in Brazil. Consequently, this method of deriving the appropriate minimum rate of return is not feasible.

An alternative method of finding an acceptable minimum rate of return is to calculate the opportunity cost of capital in Brazil. This method is much more relevant for any A. I. D. financed project, since A. I. D. is concerned with making the best possible use of its capital, not only in the transportation sector, but in the Brazilian economy as a whole. A brief discussion of the theoretical characteristics of the opportunity cost of capital will both clarify the problems of estimating its actual value and to illustrate how the BNDE's reliance on the opportunity cost of capital will enhance the BNDE's ability to allocate its resources properly.

It is a central objective of planning policy to use capital in such a way that the return to its employment in any one investment is at least as high as the return which might be obtained from its employment in any alternative investment which may be available and would otherwise not be taken up. The return on capital which might be obtained by its employment in such alternative use is the opportunity cost of capital.

High rates of return indicate a relative scarcity of capital, and low rates of return, a relative abundance of capital. But the demand schedule for capital must be set against the corresponding supply schedule of capital or the propensity to save. This in turn is determined, to some degree, by the anticipated return on savings.

Theoretically, the optimum allocation of capital will be attained if a price is charged for capital which ensures that all capital is employed and that the last investment made yields a return equal to or higher than the return on any alternative investment. And the optimum supply of capital will be obtained if the return obtained by capital is sufficient to draw from the economy just enough real savings to provide for all the investment opportunities which will yield a return equal to or higher than the price charged for capital. The price for capital which would equate real savings with investment opportunities is the equilibrium price for capital. It is also the opportunity cost for capital under conditions of general equilibrium.

The theoretical propositions advanced above to define the opportunity cost of capital under conditions of general equilibrium ignore the complexities, rigidities, risk and liquidity factors and official intervention which are characteristic of almost all capital markets. They also ignore the great variety of possible investments in both the public and private sectors - investments which differ in scale, risk, life expectancy, purposes, and their contribution to the economy.

Nevertheless, it is necessary to make some estimate of the opportunity cost of capital that would apply under conditions approaching equilibrium in order to ensure that public investments are selected in a way which takes account of the return to capital in the private sector and the capacity of the economy to provide for capital formation.

There are two possible approaches to estimating the opportunity cost of capital as defined above. The first is by general models of economic growth. Research into the use of models of economic growth in estimating the cost of capital has been undertaken by many economists. The conclusion of a member of the staff of the Economics Department of the International Bank of Reconstruction and Development is most relevant in this regard:

"For the future, estimating the cost of capital by means of formulas derived from simple growth models holds out hope, if their most unrealistic features can be overcome; for planning purposes such estimates have the great advantage, in principle, of being geared to the envisaged economic developments. For the present, however, attempts along these lines do not appear to offer a satisfactory and practicable solution". 1/

The second approach is to examine the interest rates, returns on capital and yields on investment actually prevailing in the economy, and the effect of risk, liquidity preference, inflation, institutional rigidities and government intervention on the observed rates. The material obtained and the analyses performed provides the basis for an empirical estimate of the opportunity cost of capital. In order to determine the opportunity cost of capital in this manner, two questions must be answered: 1) What portion of the resources required to undertake public investment come from the private investment sector? 2) What is the present value to the nation of the stream of benefits that displaced private investment would generate?

1/ Revised draft (with special reference to developing countries) prepared by Jochen K. Schmedtje ON ESTIMATING THE ECONOMIC COST OF CAPITAL - Economics Department, International Bank for Reconstruction and Development.

The portion of the resources required to undertake public investment which does not come out of private investment can come out of private or public consumption, or out of unemployed resources. For simplicity, let us assume that full employment exists and that public investment will not be financed by a change in the distribution of public funds between consumption and investment. Then, the opportunity cost per dollar of public investment is given by:

$$(1) \quad a = \theta \frac{p}{r} + (1 - \theta)$$

where

θ = amount of private investment displaced by each dollar of public investment

p = marginal productivity, or marginal rate of return of private investment

r = marginal social rate of discount

Since p/r represents the social present value per dollar of private investment, $\theta (p/r)$ represents the loss from displacement of private investment for each dollar of public investment.

Expression (1) defines the minimum present value that the marginal dollar of public investment must earn to qualify for inclusion in a public investment program designed to maximize the present value, at the marginal social rate of discount, of the stream of benefits to society from investment in both the public and private sector.

The advantage of using the formulation given by (1) for measuring the cost of capital is that published data on the parameters "p" and "r" normally reflect distortions associated with inflation and risks. Since "p" and "r" appear in ratio form, however, these distortions should cancel each other out. Consequently, "a" does not have a factor for either risk or inflation built in, thereby accurately representing the "real" cost of capital used for public investment.

The only known attempt to employ this method of measuring the opportunity cost of capital was used by Krutilla and Eckstein to estimate the cost of Federal capital in the United States.^{2/} They found that in the late 1950's, Federal capital had an opportunity cost of 5-6%.

^{2/} J.V. Krutilla and Otto Eckstein, Multiple Purpose River Development. (Baltimore: John Hopkins Press, 1958).

Anyone familiar with the data limitations which exist in Brazil will easily recognize the difficulties which would be encountered in any similar attempt to estimate the key parameters in (1) above. Under present circumstances, extensive research into the rates of return prevailing in the capital markets of Brazil is unlikely to produce any results useful for the purpose of estimating the opportunity cost of capital. Recent inquiries by USAID/B into this question has confirmed that existing interest rates range, after allowance is made for inflation, from negative rates on liquid funds (a nominal rate of 16% for the new treasury bonds, with no monetary correction) to very high rates of return on investment in industries enjoying heavily protected status (e.g., the automobile and spare parts industry which is reported to have enjoyed a 63% rate of return on the book value of its capital in real terms in 1963). The latest estimates of rates of return on private investment have been reported by the Getulio Vargas Foundation for 1967 and 1968. The data, which is less than completely reliable, shows that rates of return varied from 9.3% to 17.7% in the private sector. The variation is explained by different methods of calculating rates of return.

Because of the poor data situation, the World Bank decided to estimate Brazil's opportunity cost of capital by examining rates in other countries at a similar stage in the development process. Earlier World Bank studies indicated that the opportunity cost of capital varied from 6% to 12%.

While neither the World Bank studies of other countries, nor any of the other data presented above, provide us the opportunity to make definitive statements concerning the actual cost of capital in Brazil, we feel that the numbers reported above do indicate that 10% is realistic estimate. There cannot, of course, be any final agreement by all parties on any specific number. This should not, however, be surprising. Examining the records of the US Bureau of Public Roads shows that even in the U.S. there is no agreement on this issue. Reports by individual state highway departments in the U.S. have used estimates ranging from 3% to 14%. We propose to adopt what appears to be the most advantageous practical solution to this problem ourselves either in the U.S. or Brazil; namely, that all states and the BPR agree to use the same number (10%) in their calculations.

In addition to recommending a specific cost of capital, we are also recommending that the BPR accept or reject state proposed projects on the basis of the following decision rule:

The ratio of the present value of the stream of benefits over the present value of the stream of costs must exceed unity. The time period during which benefits and costs must be estimated is 20 years. The interest rate to be used for discounting future values is 10%.

There are, of course, other decision rules which could be employed. The CIPOT consultants,

for example, used the first year benefit (FYB) method for comparing benefits and costs. The decision rule incorporated by this method is:

Any project should be approved whenever the benefits in the first year of the operation of that project exceeds or is equal to the cost of the capital invested times the rate of the opportunity cost of capital.

A First Year Benefit (FYB) of ten percent gives Internal Rates of Return higher than ten percent and Benefit-Cost ratios higher than one for the rates of growth of benefits expected for the highway investments in the Master Plan. This is illustrated by the following table which shows the internal rates of return and Benefit-Cost ratios for projects with a FYB of ten percent and varying rates of growth of benefits.

Rate of Growth of Benefits Percent Per Annum	LIFE OF PROJECT			
	20 Years Internal Rate of Return	Benefit- Cost Ratio*	25 Years Benefit- Cost Ratio*	30 Years Benefit- Cost Ratio*
5	12.4	1.21	1.37	1.50
7	14.4	1.42	1.66	1.88
10	17.2	1.82	2.27	2.64
15	21.9	2.87	4.08	5.59

* Calculated with a discount rate of ten percent.

It should be noted that the time horizon set by GEIPOT for the detailed estimation of benefits and costs relating to a particular highway investment was 20 years from the year of completion of the investment. Benefits beyond 20 years were not considered as they are probably less, when discounted, than the possible error in the calculation of discounted benefits up to 20 years.

It should also be borne in mind that the FYB method can only be used when benefits are not expected to decrease after the date of opening

for an indefinite period, i.e., for at least 20 years. This condition probably did apply to all roads investigated by GEIPOT. Where it did not apply, the optimum year for opening will not necessarily be changed, but it would be necessary to make a full benefit-cost investigation to determine whether or not the highway should be built at all as designed.

The primary reason that GEIPOT used the FYB method was that the consultants were charged with the responsibility of determining which roads should be built and the optimum order of their construction, assuming that all economically viable roads would be constructed. Since they did not have to choose among mutually exclusive alternatives dictated by a finite budget with insufficient funds to finance all worthwhile projects, they merely had to confront the timing question, since all roads could not be built in any one year. It must be kept in mind that GEIPOT was created to design a transportation plan which did not have to be implemented in any specified period of time.

Since the BNDE program will not operate within this same milieu, USAID/B recommends that the more traditional method of deriving benefit-cost ratios be employed to allocate the 83 million dollars of the program.

The GEIPOT consultants, fortunately, also calculated the B/C ratios for all the roads they recommended. The states can, consequently, submit GEIPOT identified roads with the accompanying B/C ratios, thereby enabling the BNDE to use the decision rule proposed by USAID/B.

2. GEIPOT Methodology (Simplified Version)

As indicated in the text of this paper, the proposed USAID/BNDE program may include rural roads projects which, although not analyzed in the Brazilian Transport Survey, meet the same economic criteria established by GEIPOT. In such cases, a simplified methodology will be utilized by the state department of roads (DER) and submitted by them as part of their request for financing.

The simplified analysis which will be utilized in such cases should yield a similar degree of accuracy in estimating the economic benefits and costs for investment in roads because it relies heavily on both the methodology used and data collected by the GEIPOT studies. For example, the estimates made for product movements between traffic zones are available and can be readily used by the states, thereby relieving them of the enormous tasks of making the projections themselves as the GEIPOT consultants were required to do. Should, however, the state DERs find these estimated growth rates to be inaccurate in light of what has actually transpired between the time that the GEIPOT consultants made their forecasts and the time at which the state is preparing its proposal, they will be encouraged to make their own estimates.

Each state DER will be furnished specific instructions on how to carry out the analysis. The instruction will also include actual data for the ΔL values discussed above as well as for the VOCs by vehicle which are applicable for their region. The latter figures will be derived by the BNDE with the possible assistance of an outside consultant. Although the actual figures should approximate those utilized in the GEIPOT studies, we feel that they should be updated and re-estimated. We also feel that the VOCs should reflect the different characteristics which prevail in the coastal and interior regions of Brazil.

It should prove to be a relatively simple engineering task to determine the gradients, curves, bridges, side friction and surface characteristics of the proposed road. These factors, combined with the values for ΔL and operating costs, can then be converted to derive the reduction in VOCs/km brought about by the new or improved road.

In order to estimate the future average annual traffic, the state DERs will be required to conduct origin and destination surveys of the existing traffic, and to supplement this with routine traffic counts when necessary. They will also be required to survey the existing vehicle fleet, data for which are readily available. The origin and destination surveys combined with the survey of the existing vehicle fleet will enable the state DER to make a reasonable forecast of the nature of the future vehicle fleet.

At this point in the analysis, the state DERs can quantify the direct benefits of the proposed road by relating the cost savings described above to the traffic estimated to use the new road.

The three classes of traffic distinguished for this purpose are as follows:

- a. Normal or Existing Traffic: These figures will be collected by the origin - destination surveys and represent the traffic forecast to use the transport route whether or not the investment is made. VOC's multiplied by the estimated traffic in this class yields the benefits to be derived.
- b. Diverted Traffic: This is traffic diverted to the new or improved transport facility either from other modes of transport (e.g. rivers) or from other routes of the same mode. In order to estimate the growth of this class of traffic, it will be necessary to conduct an inventory of the modes of transportation in the entire area which will be influenced by the new road. This inventory should include an estimate of the VOCs on these modes of transportation. The growth of this class of traffic must be multiplied by the difference in VOCs between the old and new transport route in order to yield the direct benefits attributable to the investment.
- c. Generated Traffic: This is traffic arising from production that would not have taken place or that would not have been transported if the investment had not been made. The GEIPOT consultants conducted a thorough examination of each traffic zone in order to arrive at the estimate for this class of traffic. If the GEIPOT studies are still applicable for the area to be influenced by the new road, the state DERs will be encouraged to use them. If the GEIPOT studies are either not available or not applicable, the state DERs will use one of two methods:
 1. Undertake a similar study of their own, or
 2. Assume that the total amount of money spent on transportation will remain constant. Therefore, since the reduction in VOC

has been determined, the traffic volume in classes (a) and (c) combined can be determined. This volume can then be multiplied by the reduction in VOCs to derive direct benefits. This assumption of unitary elasticity of demand for transportation has been used widely both in Brazil and in other developed and undeveloped countries.

Another benefit to be included will be reduction in maintenance costs resulting from road construction or improvement (e.g. improving an earth road to an all weather gravel road). GEIPOT has developed standard reductions in maintenance costs for various improvements on all classes of roads for all regions of the country. Once the specifications of the proposed project have been established, sub-borrowers can apply the appropriate values derived by GEIPOT to the project to determine this benefit.

In addition to determining direct benefits in the manner described above, the USAID/BNDE program will encourage, but not require, state DERs to calculate the other direct benefits to be derived from the construction of an all-weather road. If a known portion of crops which are produced cannot be marketed because the harvesting season coincides with the time of the year when the existing road is impassable (rainy season), state DERs would be encouraged to include the reduction in this loss as a benefit. This type of benefit can be extremely important when the area to be influenced by the road is an agricultural production area located near a major marketing area. The amount of the benefit would be calculated by multiplying the amount of produce lost or spoiled times the market price of this product minus transportation and marketing costs. This latter figure would then be added to the estimate of savings from the reduction in VOCs to derive the total benefits attributable to the investment.

Economic Costs will be derived by determining the actual right-of-way and construction costs (including construction engineering) and deducting all indirect taxes. The construction costs will be determined by computing estimated quantities based on preliminary roadway alignment and grades and existing air photos and/or topographic maps. These quantities will then be applied to unit prices from the existing DER table of prices (or state DER prices if they exist), with the necessary total price adjustments to bring them into conformity with recent bid prices paid for similar work.

Benefits and costs will be compared and priorities will be selected on the basis of the decision rule discussed in the previous section. The rule is that the ratio of the present values of benefits over costs must be greater than one.

3. Area Analysis Methodology

In some situations, such as projects to be executed where no road existed before, the GEIPOT method of analysis described above will either be impracticable, or if used, would grossly understate the potential benefits to be derived from the execution of the project. For, as the text of this paper notes, the principal benefits to be expected from such roads are often the indirect benefits, economic and social, which, for the most part, are not readily quantifiable. Since the BNDE wishes to continue financing such projects, the following methodology will be utilized to determine the economic merits of a project, when its justification by the simplified GEIPOT methodology is either not feasible, or not appropriate.

The analysis will be composed of two basic parts:

- a. Analysis of the agricultural development potential of the area to be influenced by the new road. This analysis will have to show that the development of the region is inhibited or delayed by the inadequacy of the existing transportation structure. In this first part, in other words, the state DER should show that the area needs improved transportation, without at this stage specifying the exact nature of the new system.

The appropriateness of any investment in transportation should, of course, be determined by the volume and characteristics of the traffic which ultimately uses the facility. Therefore, an economic survey of the area in which transportation improvements are contemplated should be made. The survey should encompass three broad elements:

- (1) Survey of productive potential, viz is it possible to increase the output of the region and by how much?
- (2) Survey of market potential, viz will it be possible to profitably sell this increased output in the market (s) which will now be more accessible to the farms located in the region because of the construction/improvement of the new road?
- (3) Survey of entrepreneurial potential, i.e. estimate of the nature of investment plans in the area as well as existing productive enterprises.

To aid the state DERs in conducting this survey, the BNDE will prepare a manual listing the factors to be considered by each DER and giving appropriate instructions on how to perform the survey. Among others, the list will require DERs to appraise such anticipated effects or benefits as:

- increased or diversified agricultural and industrial production in the area
- increased use of storage facilities
- improved access to processing centers or markets

- increased use of modern agricultural inputs
- improved coverage by extension service

In addition to indirect economic benefits, improvements in the transportation system can have important non-economic benefits. State DERs will be encouraged to include a brief discussion of these "other indirect benefits" when they submit their proposals. Among these could be included such benefits as the resulting access to improved health or educational facilities, or improved social and medical coverage for the municipality.

It should be emphasized at this point that the state DER's will be required to provide as analytical a study of the region effected as is possible, given the restraints imposed on them. The four primary constraints on conducting such an analysis by states in Brazil are:

- (1) The limited analytical abilities of the personnel working in many of the state DER's.
- (2) The development of economic methodology for analyzing penetration or development roads does not provide any rigorous model which can be relied upon. The main difficulty of isolating the impact or payoff from investments in transportation from that of the many complementary investments which must be made to insure the success of any road project.
- (3) The unreliability, and often complete unavailability, of data required to make reasonably accurate predictions.
- (4) Many of the economic benefits are both indirect and non-quantifiable.

The overall effect of these constraints precludes the derivation of a benefit/cost ratio. To help the state DER's provide the BNDE with the best possible justification for proposed projects, USAID/B will hire a Brazilian consulting firm to draw up a manual which will, among other things, provide the state DER's with detailed directions on how to conduct their analysis. This manual will assume the character of a "cook's book" in the sense that detailed procedures will be outlined for the state DER's to follow in analyzing the importance of the factors briefly described above. Emphasis will be given not only to the costs and benefits of the proposed investment in transportation, but also to the complementary investments required to insure the success of the new transportation network, namely, the economic development of the region. The costs and sources of financing will be identified for investments in such areas as improved storage facilities, processing plants, marketing facilities, etc.

- b. The second part of the analysis consists of the engineering alternatives which are open to the DER or other borrower, and a rationale for the alternatives presented for financing. This analysis will describe alternate standards of construction (e.g. Class III or Class IV), specifications based on type of traffic expected, and relate the different cost estimates to the incremental benefits expected from each alternative.

SUPPLEMENT I: DISCUSSION OF THE Δ | \perp METHOD OF
DETERMINING VEHICLE OPERATING COSTS

a. Definition of Δ | \perp Value

All principal road characteristics that influence the vehicle operating cost shall be evaluated in terms of additional length to the "ideal road", i.e. a paved Class I road in flat terrain, subsequently referred to as "flat paved road".

The additional distance on flat paved road which, in terms of vehicle operating cost, would equal the extra cost caused by a particular road characteristic is termed the Δ | \perp - value for that characteristic.

b. Outline of the Applied Method for Calculating the Δ | \perp - values

Information about vehicle operating costs on different types of surfaces and about the effect on such costs caused by gradients and by slowing down and stopping has been extracted from various sources. These costs were then compared with operating costs on flat paved road and the corresponding additional lengths calculated.

For each road characteristic the main sources of information are indicated in the following.

c. Type of Surface

The relationship between operating costs on different types of surface was obtained from data collected by the GEIPOT consultants. The relationship does not vary significantly under different sets of assumptions for speed.

By interpolation and extrapolation relative figures were prepared for trucks from 1 to 25 tons. Similar figures were prepared for a bus, assuming the same operating costs as for a corresponding truck but higher time costs.

The resulting correction coefficients are shown in Table I (attached to the end of this Section) and the corresponding ΔL -values are indicated in the following table:

ΔL -VALUES FOR DIFFERENT TYPES OF ROAD SURFACE
(additional meters per km)

Road Type		Paved road	Gravel road	Improved earth-road	Earth road
		m	m	m	m
Vehicle category					
<u>Passenger car</u>		-	300	500	700
<u>Trucks</u>					
Gasoline	1.0 t	-	300	600	900
	2.7 t	-	400	800	1170
	6.0 t	-	470	950	1360
Diesel	6.5 t	-	480	960	1380
	7.0 t	-	490	970	1390
	10.0 t	-	510	1010	1470
	15.0 t	-	550	1100	1600
	20.0 t	-	620	1260	1930
	25.0 t	-	690	1410	2250
<u>Bus</u>		-	470	740	1070

From this table average ΔL -values can be found according to a given truck fleet composition.

d. Gradients (Rate of Rise and Fall)

Index Fuel - The following calculations were made on the data collected:

1. average speed for different vehicles on paved roads with different rates of rise and fall.
2. fuel consumption at the calculated speed for different vehicles on paved road with different rates of rise and fall.

The results of these calculations provide the data for calculating the ratio between fuel consumption on a paved road with a certain Rate of Rise and Fall and fuel consumption on a flat paved road. This ratio is termed Index Fuel.

Various studies show that a rather close correlation exists between fuel consumption and costs of vehicle maintenance. High fuel consumption can be regarded as an indication of great wear and tear of the vehicle.

In the calculation of Δ \square -values for rise and fall, Index Fuel accounts for cost of fuel, oil, lubrication, tires and maintenance.

Index Time - In addition to Index Fuel Table II figures for Index Time. This index is defined as the ratio between the assumed speed for a certain vehicle type on flat paved road and the speed of the same vehicle type on a paved road with given Rates of Rise and Fall. Thus, Index Time is calculated as follows:

- L - length of the road segment
 V_o - speed on flat road
 t_o - time spent in driving over segment in question

$$t_o = \frac{L}{V_o}$$

On a road with a Rate of Rise and Fall of say λ we have:

$$t_\lambda = \frac{L}{V_\lambda}$$

and hence:

$$\text{Index Time} = \frac{t_\lambda}{t_o} = \frac{\frac{L}{V_\lambda}}{\frac{L}{V_o}} = \frac{V_o}{V_\lambda}$$

The effect of gradients is primarily a reduction of the average speed. In relation to the time factor this means - particularly in the case of trucks and buses - that more vehicles are needed in order to cope with a given volume of transport. Again, the number of vehicles is indicative for cost factors such as wages, interest and overhead (i). Consequently, Index Time has been used in the calculation of ΔL -values for trucks and buses to account, not only for the time cost, but also for direct and indirect wages, interest and overhead costs.

The same arguments are not equally valid for passenger cars. It seems logical to assume that in the majority of cases a better vertical alignment of a road section will not influence the actual number of passenger cars. Therefore, in this case Index Time has only been used in relation to the time cost for the passengers, but not to account for other cost factors.

If depreciation of the vehicles were related exclusively to mileage and not influenced by road gradients, then it would not vary with the Rate of Rise and Fall. In the calculation of the ΔL -values shown in the following table it has been assumed that the depreciation of trucks and buses, but not that of passenger cars, is related to the road gradients. Therefore, the Index Time has been taken into account also in the calculation of the depreciation of trucks and buses, whereas the depreciation of passenger cars is kept constant irrespective of Rates of Rise and Fall.

The methodology described above has been used to calculate the conversion factors given in the following table.

(i) If the fleet of a trucking company decreases overhead costs should also decrease. Profit should decrease in the same proportion, if equal conditions of competition are assumed.

△ L-VALUES FOR DIFFERENT RATES OF RISE AND FALL
(additional meters per km)

Vehicle Category	Rate of Rise and Fall			
	0 (0-3)	4 (3-5)	6 (5-7)	8 (7 and more)
<u>Passenger car</u>	m -	m 40	m 100	m 250
<u>Trucks</u>				
Gasoline 1.0 t	-	140	260	510
2.7 t	-	120	310	500
6.0 t	-	200	520	950
Diesel 6.5 t	-	230	580	1080
7.0 t	-	260	620	1140
10.0 t	-	400	990	1730
15.0 t	-	760	1640	2420
20.0 t	-	1020	1790	2470
25.0 t	-	1250	1890	2510
<u>Bus</u>	-	140	400	730

These △ L-values apply actually to paved roads. Similar values should strictly speaking be calculated also for roads with other surfaces. The only known source of information on the subject contains figures for passenger cars only; furthermore, the empirical basis seems to be weak.

The speed on a flat road with gravel or earth surface is lower than on flat paved road. The relative speed reduction because of different Rates and Fall would therefore normally be lower on gravel and earth roads than on a flat paved road, as it is mainly the steepness of the hill that governs the speed. Index Time based on paved road would therefore tend to be too high for gravel and earth roads. It is on the other hand, possible that Index Fuel based on paved road is too low for gravel and earth roads.

The two tendencies may be assumed to equalize each other, and so lacking more exact information, the ΔL -values calculated for paved roads and shown in the above table should also be applied to gravel, improved earth and earth roads.

e. f. g. Sharp Curves, Narrow Bridges and Side Friction

These road characteristics increase operating costs by reducing the speed of the vehicle or by causing them to stop. The following tables show the effects of these characteristics in terms of additional distance:

EFFECT OF SLOW DOWNS AND STOPS EXPRESSED
IN TERMS OF ADDITIONAL DISTANCE
(meters per slow down or stop)

Slowing down to	Normal driving speed km/h				
	40	50	60	70	80
0 km/h	m 100	m 150	m 200	m 240	m 240
30 km/h	40	100	150	190	200
40 km/h	-	50	100	140	150
50 km/h	-	-	50	100	125
60 km/h	-	-	-	60	90

On the basis of this table Δ L-values are calculated to correspond with the different assumptions on speed reduction indicated in Sections B e, f and g above.

Δ L-VALUES FOR CURVATURE; BRIDGES AND SIDE FRICTION
(additional meters)

Road type	Paved road	Gravel road	Improved earth road	Earth road
Vehicle category				
	m	m	m	m
<u>Sharp curves:</u>				
Passenger cars	100	100	100	100
Trucks and buses	40	40	40	40
<u>Narrow bridges:</u>				
Passenger cars	100	150	130	130
Trucks and buses	50	50	50	50
<u>Side friction:</u>				
Light - all vehicles	100	100	100	100
Medium " "	180	180	180	180
Heavy " "	320	320	320	320

THE USE OF THE Δ L-VALUES

It is recognized that the Δ L-values as prepared and presented in the tables above are not exact and would change if assumptions different from those were used.

However, the obvious need for uniformity makes it necessary that similar criteria be applied in all Regions. The Δ L-values contained in this Guidelines should, therefore, be used generally; only in specific cases where unusual conditions call for deviations, should changes be introduced.

It must be borne in mind, when applying the Δ L-values to existing road conditions, that two or more of the road characteristics considered in this Guidelines may occur simultaneously on a given stretch of a road section. The Δ L-values corresponding to each of these characteristics should not simply be added in such cases. Where such coincidences occur the Δ L-values should be applied as indicated below.

Assume that the speed over a certain section is reduced from 50 km/h to 30 km/h because of side friction. Within this section there are also narrow bridges and/or sharp curves. Under such circumstances Δ L-values should be considered for side friction only, as normally the bridges and curves will cause no additional reduction in speed.

A similar way of calculating should be applied if the speed is reduced because of a steep hill and there are also obstacles such as bridges and curves.

Generally speaking a Δ L-value should be applied only to the factor that causes the highest reduction in speed.

This way of calculating implies that it is necessary to make a rough estimate of the speed when approaching a certain obstacle from either side.

CALCULATING OPERATING COSTS FOR DIFFERENT ROAD SECTIONS

The length of the road section plus the corresponding Δ L-values give the length of flat paved road which is equivalent in operating costs to the road section under study for each category of vehicles.

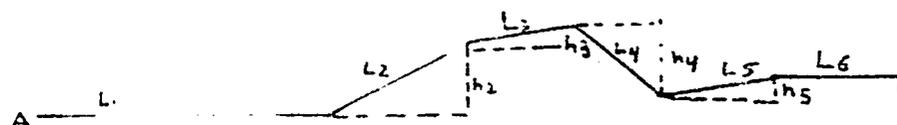
This length factor multiplied by the vehicle operating costs on flat paved road estimated for each vehicle category produces the vehicle operating costs for the different types of vehicles to be applied to that road section.

As operating costs for a given vehicle category, e.g. trucks, are not the same for all classes of vehicles within that category weighted average operating costs must be calculated for each category. It will be necessary to take this into account not only for the existing vehicle fleet but also for the fleet expected to be operating on the roads in 1976 because a change in the composition of the vehicle fleet, e.g. towards using trucks with a bigger loading capacity may per se bring about quite substantial additional benefits.

EXAMPLE OF RATE OF RISE AND FALL CALCULATIONS

TABLE I
CORRECTION COEFFICIENTS FOR OPERATING AND TIME
COSTS ON DIFFERENT TYPES OF FLAT ROADS

	Paved Road	Gravel Road	Improved Earth Road	Earth Road
AVERAGE PASSENGER CAR	1,00	1,30	1,50	1,70
TRUCKS - EMPIRICAL DATA				
Fuel type	Gross capacity			
Gasoline	1 t	1,00	1,30	1,60
Gasoline	3,5 t	1,00	1,45	1,90
Diesel	15 t	1,00	1,55	2,10
Diesel	18 t	1,00	1,60	2,20
TRUCKS - DERIVED DATA				
Gasoline	1 t	1,00	1,30	1,60
Gasoline	2,7 t	1,00	1,40	1,60
Gasoline	5 t	1,00	1,47	1,95
Diesel	6,5 t	1,00	1,48	1,96
Diesel	7 t	1,00	1,49	1,97
Diesel	10 t	1,00	1,51	2,01
Diesel	15 t	1,00	1,55	2,10
Diesel	20 t	1,00	1,60	2,20
Diesel	25 t	1,00	1,69	2,41
BUS	1,00	1,2	1,74	2,07



- L_1 = 0% Rise (Not to be considered)
- L_2, L_3 and L_4 More than 3% rise
- L_5 = Less than 3% rise (not to be considered)
- L_6 = 0% Rise (not to be considered)

$$R = \frac{\sum_{i=2}^n H_i}{L} = \frac{\sum_{i=2}^n X_i L_i}{L}$$

TABLE II
SPEED AND FUEL CONSUMPTION ON PAVED ROADS WITH DIFFERENT RATE OF RISE AND FALL

RATE OF RISE AND FALL																
	0				4				6							
	Speed	Fuel Con-	Index	Index	Speed	Fuel Con-	Index	Index	Speed	Fuel Con-	Index	Index	Speed	Fuel Con-	Index	Index
	V_0	sumption	Time	Fuel	V_4	sumption	Time	Fuel	V_6	sumption	Time	Fuel	V_8	sumption	Time	Fuel
km/h	1/1000 km	$\frac{V_0}{V_0}$	$\frac{C_0}{C_0}$	km/h	1/1000 km	$\frac{V_4}{V_4}$	$\frac{C_4}{C_0}$	km/h	1/1000 km	$\frac{V_6}{V_6}$	$\frac{C_6}{C_0}$	km/h	1/1000 km	$\frac{V_8}{V_8}$	$\frac{C_8}{C_0}$	
Average passenger car	80	91,7	1	1	74,4	92,4	1,08	1,01	68,8	100,4	1,16	1,09	61,6	25,0	1,29	1,34
Truck I Gasol. 1 t	72	128,0	1	1	61,1	133,3	1,17	1,04	56,2	154,1	1,28	1,20	48,2	199,5	1,49	1,56
Truck II Gasol. 3.5 t	72	232,4	1	1	62,2	244,5	1,15	1,05	50,4	275,1	1,42	1,18	41,8	337,0	1,72	1,45
Truck III Diesel 15 t	64	293,9	1	1	37,1	530,0	1,73	1,80	25,6	853,4	2,50	2,84	18,6	1.000,0	3,44	3,40
Truck IV Diesel 18 t	64	250,8	1	1	37,1	537,7	1,73	2,14	25,6	760,8	2,50	3,03	18,6	875,0	3,44	3,40

SUPPLEMENT II: NUMERICAL EXAMPLE OF THE USE OF THE Δ \perp METHOD

Benefits and Priorities

This supplement contains a detailed description of the calculation of benefits by the Δ \perp method as used by one of the GEIPOT consultants. It should be noted at the outset that the numbers used in this supplement were derived by the GEIPOT consultants on the basis of the methodology described above. Since the purpose of this supplement is to help the reader understand the use of the Δ \perp method by presenting a numerical example, the derivation of the actual numbers used is not explained in detail.

The First Year Benefit method of determining highway construction priorities was also used. This method is based on minimizing the aggregate of construction or improvement costs, highway maintenance costs, and highway, and consequently its priority for construction or improvement, is shown in this example to be the year in which benefits equal construction or improvement costs multiplied by the opportunity cost of capital. This Supplement describes how these benefits are calculated and how priorities are determined from the benefit and cost data.

Sections A through E below give an example of benefit calculations; the example concerns benefits obtained from improving an earth road to a paved road.

Section F shows total benefits and how the optimal year for the improvement is found.

Section G deals with the problem of establishing priorities.

A. BENEFITS FROM REDUCED VEHICLE OPERATING COSTS

Operating costs on a flat paved road and various Δ \perp values necessary for calculating benefits are given in Supplement I above.

a. Operating Costs on Flat Paved Roads

For passenger cars, operating costs on flat paved roads in a region should be calculated as the weighted average of 3 types of vehicles. The weights should be according to the fleet composition in the region. To the operating cost should be added time cost, assuming a speed of 80 km per hour. ^{1/}

<u>Example:</u>	<u>Percent of Fleet</u>
Volkswagen	48
Rural Willys	35
Aero Willys	17
	Total 100
Operating Cost ^{2/}	$48 \times .059 + (35) \times .078 + (17) \times .105 = .074$ NCr\$/km
Time Cost	$\frac{4.70 \text{ NCr}\$/\text{km}}{80 \text{ km/hr}} = 0.059$ NCr\$/km
Operating and Time Cost	NCr\$0.133 per km

^{1/} Time savings have been omitted in regions outside urban areas.

^{2/} Costs in NCr67\$ unless otherwise specified. The numbers used in the example for operating and time costs have been calculated by the GEIPOT consultants.

For buses, the time cost is calculated on the basis of NCr67\$8.40 per hour assuming a speed of 70 km/hr:

Operating cost : 0.323
 Time cost : 0.120
 Total cost : 0.443 per km

Calculations concerning truck operating costs on flat paved roads are more complicated. The method used in the example 3/ is as follows:

The truck fleet is assumed to be divided in two main categories, medium trucks, i.e. trucks with less than 7 tons load capacity, and heavy trucks, i.e. with 7 tons or more load capacity. For these two main types, operating costs and time costs on flat paved roads may be calculated according to the composition on various types of roads. The assumption in this case is that calculated at NCr67\$ 0.290 per kilometer, and for heavy trucks at NCr67\$ 0.450 per kilometer.

Further assumptions about the truck fleet composition used in the calculation are as follows:

Local traffic:	Medium trucks	85%
	Heavy trucks	15%
Long distance traffic:	Medium trucks	67%
	Heavy trucks	33%

But truck operating costs per vehicle per km for local and long-distance traffic are not calculated as they are not used directly (see below) in calculating the benefits from reduced vehicle operating costs.

3/ The example shows how the calculations are made using the assumptions on truck fleet composition that are specified. Different treatment of truck fleet composition will require corresponding changes in the calculations.

b. Savings in Vehicle Operating Costs

The saving, measured in ΔL kilometers, by driving on the new road instead of the old, is shown in Table A for passenger cars, trucks and buses.

Table A

Savings by Using New Road (ΔL - kms)

	Assumed ΔL -values				
	Length of Road(L) Km	Passenger car km	Medium Truck(MT) km	Heavy Truck(HT) km	Bus km
Old road	80	60	100	128	88
New road	70	15	20	25	15
Difference in distance	10	-	-	-	-
Difference in ΔL -Value	-	45	80	103	73
Total saving	-	55	90	113	83

The saving for passenger cars and buses per vehicle per trip is the saving in ΔL -kilometers shown in Table A above multiplied by the operating and time costs per vehicle per km on flat paved road.

Passenger cars: $55 \times 0.133 = 7.3$
Buses : $83 \times 0.443 = 36.77$

For trucks, it is necessary to use the data on the truck fleet composition together with the data on operating costs on flat paved roads and on saving in ΔL -kilometers to calculate the saving in vehicle operating costs. The calculations are as follows:

Local Traffic : Saving per vehicle

$$\frac{85}{100} \times 0.290 \times 90 + \frac{15}{100} \times 0.450 \times 113 = 29.81$$

Long-distance traffic: Saving per vehicle

$$\frac{67}{100} \times 0.290 \times 90 + \frac{33}{100} \times 0.450 \times 113 = 34.27$$

Estimated Average Daily Traffic (EADT) figures used for the calculation of total savings per day and the total benefits for all cars per year.

Total benefits are calculated in this way for the two years 1967 and 1976. These benefits are later (see Table E) added to benefits from other sources.

In these calculations it is assumed that the average size of trucks is the same in the two years, 1967 and 1976. The benefits from an increase in the average size of trucks are discussed in Section D below.

B. BENEFITS FROM REDUCTION OF BREAKAGE AND SPOILAGE

By improving roads in bad condition, especially earth roads and improved earth roads, there will normally be benefits from reduced breakage and spoilage.

Examples of saving in spoilage in long-distance transport due to improvement of bad roads are shown below.

Hogs:

Value of cargo: 30 hogs x NCr67\$ 70 = NCr67\$ 2,100
 Spoilage reduced from 12% to 6% = NCr67\$ 126

Live Cattle:

Value of cargo: 12 heads x NCr67\$ 300 = NCr67\$ 3,600
 Spoilage reduced from 10% to 5% = NCr67\$ 180

Bananas:

Value of cargo: 8 tons x NCr67\$ 100 = NCr67\$ 800
 Spoilage reduced from 10% to 2% = NCr67\$ 64

Calculations as above can be used to estimate benefits from reductions in breakage and spoilage.

It will be necessary to estimate the percentage of long-distance traffic that will get benefit from reduction in breakage and spoilage, as well as the saving per truck. An example is shown in Table B below.

Table B BENEFITS FROM SPOILAGE REDUCTION

		1967	1976
Long-distance traffic EADT	(x)	31	48
Total per year, (y) = 365 (x)	(y)	11,315	17,520
Percentage of trips with saving	(p)	5	5
Assumed saving per trip NCr67\$	(a)	180	180
BENEFITS = NCr67\$ $\frac{(y) \times (p) \times (a)}{100} \times 10^3$		102	158

C. BENEFITS FROM INCREASE IN THE AVERAGE SIZE OF TRUCKS

If a substantial part of a highway network is improved and strengthened, it will be possible to use bigger trucks. As these trucks have lower cost per ton km, a benefit will accrue from an increase in the size of trucks.

This benefit was not considered when the calculation of benefits from truck traffic was made, as it was assumed that the composition of trucks would be the same in 1967 and 1976.

The benefit from an increase in the size of trucks is an "overhead benefit" that is not specifically related to a particular small road section, but will only be obtained if adjacent sections are also improved.

Moreover, increase in average truck size is caused not only by improving the highway network, but also by other factors such as increasing labour costs, growth in demand for transport, expansion of transport, industry capacity and increasing capital available for investment in transport equipment.

For calculating this benefit, a table giving the number of trucks of different sizes, the average load on them and the average distance driven in 1965, and 1976 must be used. The estimates for 1965 and the prognosis for 1976 were taken from another part of the study.

Operating cost for different classes of trucks have been estimated from figures for flat paved roads. They can be used in this calculation, as the objective is to estimate the relative decrease in cost per ton-km. Previous analysis has shown that cost per ton-kilometer will decrease by nearly 50 percent because of an increase in truck size and an increase in the average km driven by heavy trucks (cost per ton-km 1965 = 100, cost per ton-km 1976 = 70.5).

As explained above, part of the total decrease in cost is caused by factors other than road improvement. Moreover, as also stated above, this benefit is an "overhead" benefit that is not specifically related to a particular road section. Nevertheless, the benefit from an increase in truck size is an important benefit arising from road improvements and should be taken into account in benefit-cost calculations.

It will be taken into account by adding to the benefits described above, an additional benefit for 1976 equal to 20 percent of the operating costs on the unimproved road of long-distance truck traffic estimated for 1976. Table C shows how this benefit is calculated.

Table C - BENEFITS FROM INCREASE IN AVERAGE SIZE OF TRUCKS

Operating costs, long-distance, old road (1) - NCr67\$ (z)	65.86	65.86
Total long-distance truck traffic (2)	(y) 11,315	17,520
Total operating cost NCr67\$10 ³ (z) x (y)	(u) 745	1,154
Reduction because of bigger trucks	(v) -	20%
Total Benefit from Change in Truck Size - NCr67\$10 ³ - $\frac{(v)}{100} \times (u)$	-	231

(1) assuming fleet composition, distance and Δ L-values as indicated in Table A and relevant text:

$$\frac{67}{100} \times 0.290 \times (80 + 100) + \frac{33}{100} \times 0.450 \times (80 + 128) = 65.86$$

(2) as calculated in Table B

D. BENEFIT FROM REDUCTION IN MAINTENANCE COST OF THE ROAD

Standard Maintenance costs per kilometer for roads with various surface and various traffic volumes were calculated by the GEIPOT Consultants.

Maintenance cost per kilometer for earth roads (all weather) and paved roads for the ADTs used were derived in the basis of these calculations. Maintenance costs for the two roads and benefits from savings in maintenance costs are calculated in Table D.

In this case maintenance costs produce a positive benefit. Under certain circumstances, depending on the relevant surfaces, distances and traffic volumes, this benefit may be negative.

Table D. BENEFITS FROM SAVING IN ROAD MAINTENANCE COSTS

	1967	1976
Total traffic (ADTs, /1)	379	779
Maintenance costs per km. NCr67\$		
Old road (ac)	3,000	4,500
New road (ap)	2,200	2,300
Length, old road-km (Lc)	80	80
Length, new road-km (Lp)	70	70
Total Maintenance costs - NCr67\$ 10 ³		
Old road, (ac) x (Lc)	240	360
New road, (ap) x (Lp)	154	161
BENEFITS from Maintenance Savings	86	199

E. TOTAL BENEFIT - THE OPTIMAL YEAR FOR CONSTRUCTION

Table E is a summary of the total benefits for the years 1967 and 1976. The growth factor for benefit should be calculated as shown below that table. The corresponding compound growth can be read from any compound interest table.

Table E. TOTAL BENEFITS

	<u>1967</u>	<u>1976</u>
Source of Benefits	Ncr67\$10 ³	Ncr67\$ 10 ³
Reduced Vehicle Operating Cost	1,861	3,489
Reduced Breakage and Spoilage	102	158
Road Maintenance	86	199
Increase in Size of Trucks	-	231
	2,049	4,077

The ratio of 1967 benefits to 1976 benefits is:

$$\frac{4077}{2049} = 1.99$$

Compound interest tables shows that the corresponding compound growth rate over a 9 year period is 8%.

Construction cost is assumed to be:

Ncr67\$ 10³ 27,000

of which 10% (opportunity cost of capital) is:

$$\text{Ncr67\$ } 10^3 \quad 2,700$$

The optimum year for construction "n" can be found from the equation:

$$B_{67} \times (1 + 0.08)^n = 2,700$$

where B₆₇ = Total Benefits in 1967

Therefore $2,049 \times (1 + 0.08)^n = 2,700$

or $(1 + 0.08)^n = \frac{2700}{2049} = 1.32$

The corresponding value of n, which give the optimum year for construction, is 4. Hence, the optimum year for construction is 4 years from 1967, or the year 1971.

F. PRIORITIES

By means of calculations as described above, it is possible to establish priorities for investment for each year of the period 1968-1976.

On the other hand, it is clear that for highways with very high levels of first year benefit, investment should be made as soon as possible. For the remaining investment projects it will only be possible to indicate those which should probably be constructed in the period 1972-76.

A problem arises when it is not possible to construct all the roads indicated by the FYB method in the optimum year. The reasons for this may be a general shortage of capital for the whole period up to 1976, shortage of capital in certain years when many investments should be made or shortage of design or construction capacity. In such cases, some projects must be deferred.

Table _____ BNDE Transportation Financing (1968)
 (in NCr\$1,000)

Activity	Total	Economic Reequipment Fund	FINAME ^{1/}	FUNESP ^{2/}
Port and Navigation	51,318	50,400	20	898
Railroads	89,567	89,567	-	-
Roads	124,406	67,423	56,983	-
Total	256,291	207,390	57,003	898

Source: BNDE

- 1/ Credit for sale and purchase of equipment
 2/ Financing for feasibility studies

Table _____ BNDE Transport Financing (1969)
 (in NCr\$1,000)

Activity	Total	Economic Reequipment Fund	FINAME ^{1/}	FUNESP ^{2/}
Ports and Navigation	36,500	36,500	-	-
Railroads	110,320	110,320	-	-
Roads	116,482	62,777	43,817	9,888
Total	263,302	209,597	43,817	9,888

Source: BNDE

- 1/ Credit for sale and purchase of equipment
 2/ Financing for feasibility studies.

BNDE Approved Financial Assistance for 1960-69 (US\$ Thousands)

<u>Year</u>	<u>Direct Assistant</u>	<u>Provision of Guarantee</u>	<u>Total</u>
1960	94,025	50,169	144,194
1961	116,934	62,836	179,770
1962	79,270	67,533	146,803
1963	76,167	10,755	86,922
1964	94,610	2,481	97,091
1965	206,882	55,423	262,305
1966	222,931	44,268	267,199
1967	245,667	44,442	290,109
1968	260,629	89,666	350,295
1969	310,067	111,821	421,888

BNDE Balance Sheets - US\$ Thousands

	END OF YEAR				
	1965	1966	1967	1968	1969
<u>Assets</u>					
Cash	17,228	6,465	13,860	23,207	23,022
Current Assets	108,395	170,443	169,922	146,120	132,270
Long Term Assets	278,453	425,147	562,425	555,208	748,840
Accrued Income	6	48	2,493	11,591	16,437
Fixed Assets	3,409	3,744	6,000	5,868	5,326
Total Assets	407,491	605,847	754,700	741,994	925,895
<u>Liabilities</u>					
Current Liabilities	59,204	57,346	83,546	76,453	73,627
Long Term Liabilities	209,775	232,368	215,655	186,355	204,428
Unearned Income	1,863	2,692	43,490	22,112	15,021
Total Liabilities	270,842	292,406	342,691	284,920	293,076
<u>Capital</u>					
Provision- Special Funds	1,207	891	626	1,198	907
Capital and Reserves	135,442	312,550	411,383	455,876	631,912
Total Capital	136,649	313,441	412,009	457,074	632,819

Source: BNDE

BANCO NACIONAL DO DESENVOLVIMENTO ECONOMICO - (BNDE)

Operating Statements - 1968 and 1969

(US\$ Thousands)

<u>Current Operating Income</u>	<u>1968</u>	<u>1969</u>
Interest Earned	\$10,992	\$16,212
Late Payment Interest	982	399
Operating Commission	703	1,212
Inspection Fee	1,468	2,259
Commitment Fee	98	161
Guarantor's Fee	52	380
Service Charges	193	148
Miscellaneous Fund Income	28	607
Miscellaneous Loans Income	267	125
BNDE/Central Bank Agreement	-	626
Monetary Correction Earned	17,037	
 <u>Non Current Income</u>		
Interest Earned - Deposits and Securities	595	147
Dividends and Real Estate Income	1,161	142
Other Income	<u>9,724</u>	<u>213</u>
Total Income	43,300	22,631
 <u>Current Operating Expenses</u>		
Salaries	1,960	3,211
Supplies	24	23
Contractual Services	530	201
Economic Reequipment Fund Expenses	630	371
Fipeme, Fundepro and Funtec Expenses	2,497	1,894
Interest Expenses	8	6
Interest on Borrowed Money	530	970
Depreciation	151	194
Other Current Operating Expenses	<u>633</u>	<u>775</u>
Total Expenses	6,963	7,645
 Net Profit	<u>36,337</u>	<u>14,986</u>
Net Additions to Capital	<u>(36,337)</u>	<u>(14,986)</u>

BNDE - NATIONAL BANK FOR ECONOMIC DEVELOPMENT
PROJECTED SOURCE AND APPLICATION OF FUNDS
(IN US\$ MILLION)

ANNEX VI - Page 5 of 9
Exhibit E, Page 1 of 4

	1970	1971	1972	1973	1974	TOTAL
A. SOURCES						
I. BNDE'S OWN SOURCES	<u>330.2</u>	<u>392.6</u>	<u>458.0</u>	<u>515.2</u>	<u>584.2</u>	<u>2,280.2</u>
1. Balance Available for Investment	12.0	5.4	6.6	8.1	11.3	43.4
2. Federal Budget Support	93.9	122.0	142.1	135.5	178.4	631.9
3. Monetary Reserve Allocation	127.9	158.8	193.4	240.0	288.5	1,008.6
4. Return on Bank's Operation	36.6	56.4	63.6	71.9	80.5	309.0
5. Operational Balance	43.5	45.6	48.0	55.0	60.8	252.9
6. Miscellaneous	16.3	4.4	4.3	4.7	4.7	34.4
II. FOREIGN LOANS	<u>37.7</u>	<u>33.2</u>	<u>31.6</u>	<u>35.2</u>	<u>35.2</u>	<u>172.7</u>
1. Existing Loans	<u>37.7</u>	<u>16.5</u>	<u>15.2</u>			<u>69.4</u>
IDB	9.6					9.6
KFW	8.2					8.2
AID 7th sales PI-480	3.8					3.8
8th sales PI-480 ^{1/}	0.9					0.9
Denmark	0.3					0.3
Continental Illinois	0.3					0.3
Recycled revenue from foreign loans	15.5	16.5	15.2			47.2
2. Loans under Negotiation		<u>16.5</u>	<u>16.4</u>			<u>32.9</u>
IDB		11.8	11.8			23.6
KFW		3.8	3.8			7.6
EXISTENK		.9	.8			1.7
AID- Markets		4.0	5.0	5.0		14.0
AID- Rural Road ^{2/}		4.0	8.3	8.3	3.3	23.9
3. Loans to be negotiated				<u>35.2</u>	<u>35.2</u>	<u>70.4</u>
TOTAL FUNDS AVAILABLE	<u>368.8</u>	<u>433.6</u>	<u>502.9</u>	<u>563.7</u>	<u>622.7</u>	<u>2,491.7</u>
B. APPLICATION						
1. Debt Service	4.3	5.7	6.0	6.2	7.9	30.1
2. Minimum Cash Reserve	5.4	6.6	8.1	11.3	15.5	46.9
3. Application of free resources						
a. Public Industries	123.9	175.4	205.9	230.8	258.5	934.5
b. Mining and Mineral research	8.2	16.8	19.0	22.0	23.9	89.9
c. Agriculture, cattle raising Food production and distribution system (AID Ag. markets)	23.7	25.1	30.8	34.8	32.4	146.0
d. Public Services - power, transportation and telecommunications (AID Rural Roads)	92.8	95.5	97.5	103.1	115.0	515.9
4. Special Programs						
PIFES	50.2	53.0	61.0	64.1	76.3	304.6
FUNESP	4.8	5.0	5.4	6.0	6.8	28.0
FUNDEPRO	2.7	4.7	4.7	5.1	5.8	23.0
FUNDEC	10.6	10.6	10.6	11.8	13.2	56.8
FIAPIS	18.8	18.8	30.5	34.1	39.1	140.3
FUNGRO	16.4	16.4	23.4	26.2	29.3	111.7
TOTAL FUND APPLICATION	<u>368.8</u>	<u>433.6</u>	<u>502.9</u>	<u>563.7</u>	<u>622.7</u>	<u>2,491.7</u>

1/ PI-480 monies from the 8th wheat sales agreement programmed for rural roads (1970)
2/ Planned expenditure of \$1.1 million in 1975 increase the AID Rural Road loan value to \$25.0 million

**FOOTNOTES TO THE PROJECTED SOURCE AND APPLICATION OF
FUNDS STATEMENT**

The projections for the first three years (1970-1972) of the five year projection were made by the BNDE on the basis on their three year plan. The projections for 1973-1974 were based on the BNDE's estimates of their sources and application of funds during those years. The sources of BNDE funds are:

- 1) Monetary Reserve Allocation which represents 95% of the proceeds of the Financial Operations tax collected by the Central Bank of Brazil. The proceeds from the Financial Operations tax, which is imposed on all financial transactions, are deposited in the Central Bank and constitute the Monetary Reserve of the Republic. Of this amount, 5% is apportioned to the Central Bank and 95% is transferred to the BNDE upon approval by the Ministry of Planning of the BNDE's Annual Investment Budget.
- 2) Federal Budget Support. If the Monetary Reserve Allocation is insufficient to meet the requirements of the BNDE's Annual Investment Budget as approved by the Ministry of Planning, the balance required is included in the annual federal budget.
- 3) Proceeds from past lending operations are broken into two categories:
 - a) "Operational Balance" represents the receipts from interest, fees, and penalty payments less the expenses incurred for operations.
 - b) "Return on Banks Operations" represents the gross receipts of the BNDE from loans granted minus payments made by the bank on behalf of a borrower for whom the bank is guarantor.
- 4) Balance Available for Investment represents the minimum cash reserve of the prior year.
- 5) Miscellaneous Receipts are all other cash receipts not otherwise identified as to source.
- 6) Foreign Loans - on the projected source and application statement, the estimated drawdowns of present loans are

shown, as well as pending loans with reasonable prospects of being signed. For 1973 and 1974 the bank estimates that foreign loans to the bank will approximate the 70-72 levels.

a) Resources from existing foreign loans to the BNDE to be disbursed during 1970 include:

1. IDB - US\$ 9.6 million (NCr\$40.7 million) of which NCr\$11.6 million will go to FUNESP for financing of technical feasibility studies and the remaining to FIPEME (loans to small and medium sized enterprises)
2. Kreditanstalt für Wiederaufbau - US\$8.2 million all of which will go to FIPEME.
3. A.I.D. - NCr\$15.5 million (US\$3.8 million) from the VII Wheat Agreement (PL 480) for rural roads (NCr\$8.0 million) agricultural supply centers (NCr\$7.2 million) and milk plants (NCr\$0.3 million) NCr\$4.0 million (US\$0.9 million) from VIII Wheat Agreement (PL 480) for rural roads.
4. Danish government loan - US\$0.3 million for industrial credit.
5. Continental Bank of Illinois - US\$0.3 million for FUNTEC

b) Foreign loans under negotiations are:

1. Kreditanstalt für Wiederaufbau
Amount: DM27,084,000.00
Terms: 30 years with 7 years grace period
Purpose: Capital goods import
Degree of Firmness: 100% Pending signature of agreement between Brazil and Germany.
2. Interamerican Development Bank
Amount: US\$22,000,000.00
Terms: 15 years with 3 years grace period
Purpose: Capital goods import and attendant local currency costs
Degree of Firmness: This will be the 4th similar loan to be signed with IDB. BNDE foresees no problem.

3) Export Import Bank of the United States

Amount: US\$1,500,000.00

Terms: 6 years with 1 year grace period

Purpose: For additional capitalization of FIPEME
and for import of capital goods

Degree of Firmness: Loan Agreement ready to be signed.

Applications:

- A) Debt Service - Interest and Principal due on foreign loans
- B) Minimum Cash Reserve - The minimum cash reserve estimated to be required by the BNDE to meet contingencies known or anticipated during the year. For example, under the Rural Road program initiated in 1968, the bank has signed loan agreements in the amount of NCr\$104,077,000. However, the bank has established a gross contingency of NCr\$4,000,000 to meet overrun cost which, if justified by the project, the bank may chose to finance on a 60% basis.
- C) The remaining applications relate to program sectors and special fund programs of the BNDE.

PROJECTED DISBURSEMENTS FOR RURAL ROAD CONSTRUCTION PROGRAM (1971-76)
(IN US\$ MILLION)

	1971	1972	1973	1974	1975	1976	TOTAL
USAID	4.0	8.33	8.33	3.34	1.00		25.0
ENDE ^{1/}	4.0	8.33	8.33	12.56	12.10	10.30	55.62
Reinvestment of subloan repayments from ENDE=USAID program				9.0	3.70	6.50	11.10
State and Municipal Consortiums Financial Contribution	5.30	11.10	11.10	11.2	11.2	11.2	61.10
TOTAL	13.30	27.76	27.76	28.00	28.00	28.0	152.82

^{1/} includes reinvestments of subloan repayments from ENDE program (1968-70) which amount to US\$2.6 in 1972, US\$2.6 in 1973, US\$3.2 in 1974, US\$3.3 in 1975, and US\$3.5 in 1976.

Geometric Design Specifications for Class III and Class IV Roads

		<u>Class III</u>	<u>Class IV</u>
	<u>Terrain</u>		
Design Speed (km/hour)	flat	60	60
	rolling	40	40
	mountainous	30	30
Horizontal Radius (meters, minimum)	flat	110	110
	rolling	50	50
	mountainous	30	30
Percentage Gradients (maximum)	flat	4	6
	rolling	5	8
	mountainous	7	12*
Graded width of roadway area, including shoulders (minimum)		8 meters	7 meters
Width of all-weather surface (minimum)		7 meters	6 meters

(*) Any gradient above 9% will be limited to 300 meters in length.

**IBRD-DNER HIGHWAY
CONSTRUCTION PROGRAM**

BRAZIL
SECOND HIGHWAY CONSTRUCTION PROJECT
List of Roads for Construction and/or Paving

Line	Contract Number		Finn. Agency	Road Section	(1) (2) (3)			(4) Type of Surfacing and Class of Road	(5) Type of Work	(6) Int'l Paving Km	(7) Total Cost (Million US\$)	(8) Total Cost (Million US\$)
	1971	1972			Flat %	Type of Terrain						
						Rolling %	Mountainous %					
001	81-227		DNER	Piripiri-Sobrel	-	15	85	DST-I	-	122.7	33.2	15.2
002	81-226		DNER	Salvador-Feira de Santana (I)	75	25	-	AC-0	32.5	-	46.7	11.7
003	81-225		DNER	Salvador-Feira de Santana (II)	65	30	5	AC-I	-	72.5	14.4	2.9
004	81-224		DNER	Junction BR 324 - Rio Preto	-	95	5	AC-I	-	183.7	56.6	11.7
005	81-223		DNER	Rio Preto - Rio Pardo	-	25	75	AC-I	-	215.6	71.6	12.6
006	81-222		DNER	Rio Pardo - Itamaraju	15	15	70	AC-I	271.4	-	27.2	23.2
007	81-221		DNER	Itamaraju-Pedro Canário	40	30	30	AC-I	160.4	-	72.1	16.2
008	81-220		DNER	Pedro Canário-Linhares	20	50	30	AC-I	-	134.6	37.4	7.2
009	81-219		DNER	Rio Bonito-Fazenda dos Quaranta	15	85	-	AC-I	-	116.2	57.4	14.2
010	81-218	(81-1)	DNER/D	Corinto-Bocaiuva	-	100	-	DST-I	-	167.3	34.2	6.2
011	81-217	(81-5)	DNER/D	Ituitaba-Canal São Simão	10	55	35	DST-I	-	114.5	12.1	4.7
012	81-216		DNER	Lagoa Formosa-Junction BR 262	33	33	34	DST-II	110.7	-	24.3	5.4
013	81-215		DNER	Itumbiara-Rio Verde	50	50	-	DST-I	181.0	-	51.2	12.5
014	81-214	(81-3)	DNER/D	Campo Novo-Junction BR 116	40	35	25	AC-I	90.6	-	43.7	10.7
015	81-213		DNER	Santa Maria-Julio de Castilhos	50	35	15	AC-I	-	62.3	27.1	6.1
016	81-212	(81-4)	DNER/D	Crucero de Jul-Mucuna	-	50	50	AC-I	117.1	-	39.4	9.6
017	81-211	(81-2)	DNER/D	Porto Velante-Santa Cruz do Sul	-	40	20	AC-I	57.1	-	10.2	2.8
								Total	971.6	1,277.2	271.7	173.2
								Grant Total	2,110.4			

- (1) (Column)
- D - Double Lane Treatment
- A - Asphalt Concrete
- C - Class 0 (see Tables 1-10)
- I - Class I (see Tables 1-10)
- II - Class II (see Tables 1-10)

SOURCE: IBRD

TABLE

SECOND HIGHWAY CONSTRUCTION PROJECT

List of Roads for Detailed Engineering

State	Road Number		Section	(1) Length km	Type of Work		(4) Estimated Construction Costs NCR Millions	(5) US Millions	(6) Estimated Cost of Detailed Engineering		(8) Preparatory Studies/ Consultants
	Federal	State			Existing	Proposed			N.R. Millions	U.S. Millions	
PR/PS	BR 104		C. Grande-Caruaru	129	IX-IV	DST-I					
PR/AL	BR 104		Carraru-U. Palmares	118	IX-IV	DST-I	57.0	13.9	2.30	.56	PS-Asstop
AL	BR 104	AL 504	U. Palmares - Junction BR 316	60	IX-IV	DST-I	62.7	15.3	2.50	.61	"
PR/PE	BR 316/232		Picos-Parauapebas-Calgreiro	302	IX-IV	DST-I	29.1	7.1	1.15	.28	"
BA	BR 324		Salvador Northern Access	4	-	AC-0	138.2	33.7	5.55	1.36	PS-Technometal/Sodie
ES		ES 37/36	Nova Venecia-Sao Domingos	69	IX-IV	AC-II	16.4	4.0	.65	.16	PS-Doroch
RJ		RJ 133	Pedra do Sino-Junction BR 116	50	IX-IV	AC-II	23.4	5.7	.95	.23	HP-Morconsult
RJ		RJ 82	Passo-Bia Sucesso	60	IX-II	AC-II	26.2	6.4	1.05	.26	HP-Morconsult
MS	BR 354		Junction BR 162-Bambui	34	0-II/IX	DST-I	19.3	4.7	.80	.19	HP-Morconsult
MS	BR 354	MS 25	Parauapebas-Perdoma	94	0-II	DST-I	8.6	2.1	.35	.08	PS-Fronge/Lase/Stepa
MS		MS174/168/29	S.Seb. Peralta-Pocos de Caldas	128	IX-IV	DST-I/II	18.9	4.6	.73	.18	"
MS	BR 267	MS 157	Pocos de Caldas-Paraguacu	101	IX-IV	DST-II	61.1	14.9	2.45	.60	PS-CEB/MS
GO	BR 153		Ceres-Parangata	254	0-I	AC-I	26.2	6.4	1.05	.26	"
GO	BR 060		Guapo-Jatai	274	0-I/II	AC-I	75.8	18.5	3.00	.74	PS-Ridgeway
MT	BR 163		Sacramento-Campo Grande	71	0-I/II	AC-I	80.4	19.6	3.20	.78	HP-Parsons and FR./LL and Kelsey/Lynne
PR		PR 12	Camp. Pucos - Congonhas	14	IX-III	AC-I	20.5	5.0	.85	.20	"
PR/SC/RS	BR 153		Duque de Gliceria-Brechje	241	IX	AC-I	27.5	6.7	1.10	.27	HP-Kaplan
RS/SC	BR 306/153	RS 57/55 172	Sarandi-Trat-Campopora	163	IX-IV	AC-I	139.4	34.0	5.60	1.37	PS-Stein
RS		RS 19	Taquara-Doctranga	25	0-II	AC-I	96.4	23.5	3.85	.94	"
			TOTAL	2,290			11.9	2.9	.50	.12	HP-Kaplan
							937.0	229.0	37.3	9.2	

Column 7 and 8

- IX: Improved Earth
- VI: Non Existing
- DST: Double Surface Treatment
- AC: Asphalt Concrete
- 0: Class 0 (See Tables 9 and 10)
- I: Class I (See Tables 9 and 10)
- II: Class II (See Tables 9 and 10)
- III: Class III (See Tables 9 and 10)
- IV: No Class

Column 8

- MP: Master Plan

SOURCE: IBRD

POSSIBLE RURAL ROAD PROJECTS FOR USAID-ENDE PROGRAM
FROM DRAFT MASTER PLAN OF BRAZIL TRANSPORT SURVEY

(Class of Roads show as 1, 2 or 3 in accordance with DNER Standards and e. for earth; i.e. for improved earth; gr for gravel; DST for double surface treatment; AP - asphalt concrete surface)

Highway No.	Location	Existing Road	Proposed Road	Length (km)	1976 Traffic (ADT)	Year of Opening	E/C Ratio (Discounted)
MARANHAO							
New	Caxias-Pastos Bons	None	3 i.e.	240	85	1974	1.65
BR-226	Imperatriz-Grajaú-Pres. Dutra	None	3 i.e.	375	76	1976	1.13
BR-308	Pinheiro-Bomfim-Vit. do Mearim	None	3 i.e.	122	190	1971	2.67
BR-308	Chapadinha-Suriti-Piauí border	None	3 i.e.	74	77	1976	1.03
MA-11	Rosapolis-S. Quiteria-Suriti	None	3 i.e.	176	77	1976	1.03
	T O T A L			1187			
CEARA							
Link N9 from Report							
CE-55	Crato-Farias Brito	None	2 gr.	50	205	1976	1.22
BR-226	Pedra Branca	3 e.	2 i.e.	36	101	1972	2.05
CE-1	Aracatiaba-Ponte do Piranga	None	3 gr.	40	263	1973	1.88
	T O T A L			126			
PIAUI							
New	Maranhao Border-Esperantina	None	3 i.e.	95	59	1976	1
New	Batalha-Piripiri	None	3 i.e.	45	226	1971	2.47
BR-308	Piripiri-Crateus	None	3 i.e.	190	194	1974	1.60
P-05	Floriano-S. Raimundo Nonato	None	3 i.e.	270	202	1975	1.17
	T O T A L			600			
RIO GRANDE DO NORTE							
RN-25	BR-206 to Guarabira	2 e.	2 gr.	41	520	1976	-
RN-14	BR-227 at Caico-N. 24 Km	Feeder	2 DST	24	540	1973	-
	T O T A L			65			
PAPAIEA							
PB-6	Caja to Itabaiana	None	2 DST	24.0	686	1970-73	-
PE-3	Rio Tinto to Sapo	3 i.e.	2 DST	43.1	368	1970-72	-
PE-5	BR-230 North 24 Km	3 e.	2 DST	24.0	685	1970	-
PE-9	PE-5 North to Guarabira	2 i.e.	2 DST	29.9	276	1975	-
PE-3/N-C	Pemissao to Coelho	3 i.e.	2 DST	9.4	403	1975	-
PE-2	BR-230 South to Pedra de Forno	3 i.e.	2 DST	25.1	241	1972	-
PE-3/N-C	Guarabira North	2 e.	2 gr.	55.2	547	1976	-
PE-1	Km 0 to 73.5	2 e.	2 DST	14.5	671	1970	-
PE-1	Km 0 - 33	2 e.	2 DST	33	548	1972	-
PE-20	Km 0 - 42	3 i.e.	2 DST	42	749	1973	-
	T O T A L			300			

Highway No.	Location	Existing Road	Proposed Road	Leng (km)	1976 Traffic (ADT)	Year Of Opening	B/C Ratio (Discounted)
PERNAMBUCO							
PE-1	Rio Formoso to South Alagoas	New	2 DST	29	385	1970	-
PE-2	Catende to Maraial	i.e.	2 DST	35.8	540	1970	-
PE-5	Vertentes to Toritama	New	1 DST	15.0	468	1970	-
PE-61	Timbauba to N. E. to Condado (with connection to Paraíba Rds)	New	2 DST	67.0	670-1000	1970	-
PE-61	Bom Jardim to Timbauba	i.e.	2 DST	84.0	374	1976	-
PE-69	Cupira to PE-91	3 i.e.	2 DST	29.2	537	1970	-
PE-78	Tupanatinga to Alagoas	New	2 DST	41.0	408	1970	-
PE-82-ext.	Sta. Maria da Boa Vista to BR-122	New	1 DST	56.0	169	1970	-
PE-90	Brejo da Madre de Deus to BR-104	Feeder	2 DST	44.7	494	1974	-
PE-5	Link 4197-4626	New	1 DST	15.0	261	1970	-
PE-22	Link 4632-4645	New	2 DST	34.6	681	1970	-
PE-64	Link 4637-4642	3 i.e.	2 gr.	28.7	650	1970	-
T O T A L				480			
ALAGOAS							
AL-10	Pôrto Calvo to Pernambuco (PE-1)	New	2 DST	26.0	385	1970	-
AL-10	S. Luiz Quitunde to Pôrto Calvo	e.	2 DST	60.5	414	1970-73	-
AL-102	S. Sebastião to Arapiraca	2 gr.	2 DST	31.3	407	1973	-
AL-105	BR-316 N. to Pernambuco (PE-78)	e.	2 DST	24.5	421	1975	-
AL-104/309	Batalha to Santana do Iparama (BR-316)	i.e.	2 gr.	46.3	500	1976	-
AL-201	União dos Palmares to Santana do Mundau	Feeder	2 DST	32.7	470	1970	-
AL-202	Arapiraca to Batalha	i.e.	2 gr.	58.7	423	1975	-
AL-303	Nicosa to Cajueiro	Feeder	2 DST	15.7	516	1970	-
AL-307	Arapiraca to Jirau do Ponciano	Feeder	2 DST	28.5	494	1970	-
AL-418	Camacari North to BR-101	i.e.	2 gr.	29.1	307	1971	-
AL-409	Cajueiro to BR-316	i.e.	2 DST	10.0	516	1970	-
AL-406	Link 4280 to 4286	Earth	1 DST	29.0	582	1970	-
T O T A L				392			

Highway No.	Location	Existing Road	Proposed Road	Length (Km)	1976 Traffic (ADT)	Year of Opening	B/C Ratio (Discounted)
SERGIPE							
SE-250	Moita Bonita-Divina Pastora	New	2 DST	24.0	258	1971	2.1
SE-002/208	Riachuelo-Areia Branca	i.e.	2 DST	17.1	328	1972	2.1
SE-306	Maruim-Santo Amaro das Brotas	i.e.	2 DST	7.0	252	1972	2.0
SE-005	Maruim-ER 101	2 i.e.	2 DST	3.6	184	1972	0.8
SE-003	Feira Nova-Siriri-Divina Pastora	3 i.e.	2 DST	63.8	210	1973	1.5
SE-001	Tobias Barreto-SE102-Riachão dos Dantas	3 i.e.	2 DST	34.5	277	1973	1.6
SE-211	Riachuelo	3 i.e.	2 DST	26.2	298	1973	1.7
SE-212	Capela-M.S. das Dóres	3 i.e.	2 DST	17.1	167	1973	1.7
SE-219	ER-101-SE-220-Neopolis	3 i.e.	2 DST	42.2	277	1973	1.6
SE-210	Itabaiana-Ferreira do Brito	3 i.e.	2 DST	9.1	225	1974	1.8
SE-224	Lacarto-Ferreira do Brito	New	2 DST	30.0	178	1974	1.7
SE-225	Siriri-SE-212	New	2 DST	12.0	229	1974	1.5
SE-214	Capela-São João	3 i.e.	2 DST	12.6	140	1974	1.6
SE-214	ER-101 - São João	New	2 DST	2.7	140	1974	0.8
SE-209	Itabaiana-SE-211	i.e.	2 DST	8.9	272	1974	1.9
SE-C03	Feira Nova - M.S. da Gloria	3 i.e.	2 DST	17.8	177	1976	1.6
SE-103	Bahia Border - São Dias	3 i.e.	2 DST	9.2	310	1976	0.8
SE-206	São Dias	3 i.e.	2 DST	33.3	202	1976	2.2
SE-310/004	Pirambu - ER-101	3 i.e.	2 DST	24.5	232	1976	1.8
T O T A L				396			

Highway No.	Location	Existing Road	Proposed Road	Length (km)	1976 Traffic(ADT)	Year of Opening	B/C Ratio (Discounted)
BAHIA							
BA-290	BR-101 - St. Antonio de Barcelona	New	2 DST	50.0	181	1971	1.9
BA-290	St. Antonio de Barcelona-Madeiras Neto	2 i.e.	2 DST	21.0	180	1971	1.5
BA-529	BR-524 - Teodoro Sampaio	New	2 DST	24.0	184	1971	2.0
BA-290	BA-CO1 - Alcebaga	2 i.e.	2 DST	6.0	202	1970	1.6
BA-538	São Francisco do Conde-BA-CO1	New	2 AP	8.0	253	1970	1.6
BA-052	Irecê-Xique-Xique	2 i.e.	2 AP	113.5	195	1970	2.1
BA-130	Capim Grosso-Baixa Grande	i.e.	2 DST	75.0	303	1973	2.3
BA-084	Irara-BR 101	3 e.	2 DST	25.0	491	1973	15.4
BA-571	Caetite-Mondicou	e.	2 DST	28.4	294	1973	1.8
BA-545	BR-101 - Valença	3 i.e.	2 DST	34.0	314	1973	4.2
BA-556	Camaçari-Monte Gordo	e.	2 DST	22.0	366	1973	2.2
BA-172	Santa Maria de Vitoria-Coribe	New	2 DST	70.0	189	1975	7.6
Total				477			

MATO GROSSO

BR-262	Terenos-Aquidauana		3 i.e.	116.0	66		
MT-428	Paranitiba-Cassilandia		2 gr.	97.0	134	1970	1.2
BR-163	Dourados-MT 044		2 gr.	49.0	249	-	2.2
MT-734	Maracaju - MT-736		3 gr.	86.0	179	-	1.5
BR-463	Dourados - MT-642		3 gr.	110.0	281	-	2.2
BR-463	MT-642 - Pontaporã		2 gr.	13.0	278	-	2.2
MT-644	Ponta Curva - BR-163		2 gr.	121.0	385	-	2.5
BR-419	Nicoama - Aquidauana		3 gr.	89.0	143	-	1.3
MT-736	MT-734 - BR-419		3 gr.	107.0	281	-	1.4
S/N	Porto Tabuado - Caracido do Tabuado		2 gr.	12.0	217	-	1.1
MT-743	Itapora - BR-207		3 gr.	66.0	265	1970	2.1
Total				873			

Highway	Location	Proposed Road	Length (km)	1976 Traffic (ADT)	Year of Opening	B/C Ratio (Discounted)
GO-12	Montes Belos - Montes Belos	3 gr.	65.0	191	-	1.5
GO-13	Montes Belos - Montes Belos	2 gr.	142.0	252	-	1.9
GO-14	Montes Belos - Montes Belos	2 DST	45.0	279	-	2.6
GO-15	Montes Belos - Montes Belos	2 DST	47.0	287	-	2.1
RSN 1/6	Montes Belos - Montes Belos	2 DST	41.0	240	-	2.9
GO-30	Montes Belos - Montes Belos	3 gr.	60.0	186	-	1.7
GO-15	Montes Belos - Montes Belos	2 DST	33.0	301	-	2.1
GO-32	Montes Belos - Montes Belos	2 gr.	87.0	156	-	1.5
GO-19/RSNI	Jardim - Jardim	2 gr.	124.0	200	-	1.6
GO-13	Piras do Rio - Igarari	2 DST	63.0	285	-	1.9
GO-65	ER-153 - S. M. do Araguaia	3 gr.	125.0	290	-	2.2
GO-19	Jardim - RR-060	2 gr.	23.0	294	-	1.5
GO-25	Caras - ER-153	2 gr.	4.0	381	-	4.1
TOTAL			867.0			

Highway No.	Location	Existing Road	Proposed Road	Length (km)	1976 Traffic(ADT)	Year of Opening	B/C Ratio (Discounted)
RIO DE JANEIRO							
-	Class 4	Class 4	-	-	-	-	-
RJ-6	Trilhan to RJ-69	4 l.e.	7 l.e.	10.6	102	1970	-
RJ-69	Fac. de Macaé to Fazenda 40	4 l.e.	3 l.e.	9.0	127	1970	-
RJ-27	RJ-1 to RJ-79	4 l.e.	3 l.e.	15.2	1,000	1970	-
RJ-123	Minas Gerais to B. do Pirai	4 l.e.	3 l.e.	14.2	438	1970	-
RJ-100	BR-040 - Verrão e Sai	4 l.e.	3 l.e.	56.8	282	1970	-
RJ-71	BR-101 to Encruzilhada	4 l.e.	3 gr.	37.9	1,264	1971	-
RJ-2	Itaperuna to BR-397	4 e.	3 gr.	16.8	424	1971	-
RJ-2	Sto. Eduardo to BR-040	4 e.	3 gr.	15.2	472	1973	-
	T O T A L			286	361	1976	-
ESPIRITO SANTO							
New Road	Sta. Teresa to BR-101	None	3 l.e.	20.7	60	1970	-
ES-4	Cach. Itaperunim to BR-262	4 l.e.	3 l.e.	82.2	112	1970	-
ES-10	Guaçuí to M.G. Border	4 l.e.	3 gr.	29.1	322	1970	-
ES-13	ES-45 to Nova Venécia	4 l.e.	3 gr.	7.0	369	1971	-
New Road	Montanha to ES-37	-	3 gr.	25.0	260	1973	-
ES-30	Aracruz to BR-101	4 e.	2 AP	9.7	481	1973	-
	T O T A L			175			-

EXISTING ENDE RURAL ROAD PROGRAM

STATE	PROJECT	LENGTH (KM)	TOTAL VALUE Ncr\$ MIL	ENDE PARTICIPATION	LOCAL PARTICIPATION
<u>Rio de Janeiro</u>	Conceição do Castelo - BR-262	5,0	410,2		
	Itauna - BR-262	11,3	776,4		
	Muniz Freixo - BR-262	34,0	3.450,7		
	Afonso Claudio - BR-262	50,0	3.905,1		
	Castelo - Venda Nova (BR-262)	39,0	3.194,5		
	Cachoeira de Itapemirim (BR-262)	93,4	7.791,0		
	Total (construction)	232,7	19.527,9		
	Other Costs		255,0		
	Total Costs		19.782,9	11.800,0	7.982,9
<u>Minas Gerais</u>	Brasilândia - Pirapora	43,8			
	Bonfinópolis-Entroncamento BR-251	45,5			
	Pirapora - São Romão	129,5			
	Carmópolis - Desterro	44,0			
	Estrada do Leite	98,0			
	Arinos - Urucuia	54,1			
	Obras de Arte Especiais	390 m			
Total (construction)	413,9	18.010,2			
	Other Costs		2.033,8		
	Total Costs		20.044,0	10.700,0	7.310,2
	Rural Minas (Development Area)				2.033,8
<u>Maranhão</u>	Pinheiro - Alcantara	106	4.285,0		
	Pinheiro - Santa Helena	41	1.303,0		
	MA-22 - São Bento	32	1.456,0		
	BR-316 - Pinheiro	103	4.016,0		
	Obras de Arte Especiais	130 m			
	Osório Neto - Caxias	71,3	2.227,0		
	Total (construction)	282	13.287,0		
	Other Costs		429,0		
	Total Costs		13.716,0	8.000,0	5.716,0

Source: Ministry of Transportation, Inflation, and Administration

STATE	PROJECT	LENGTH	TOTAL VALUE	BNDE PARTICIPATION	TOTAL PARTICIPATION
Rio Grande do Sul	Região Alvorada	244,5 km	3.060,3		
	Região Alto Taquari	373,9 km	6.068,6		
	Região Valeiro do Rio Grande	357,3 km	5.164,1		
	Região Zona da Produção	402,3 km	6.371,8		
	Região Alto Uruguai	375,2 km	4.075,9		
	Região Taquari	214 km	2.922,4		
	Total (construction)	1.967,7 km	27.663,1		
	Other Costs		1.447,5		
	Total Costs		<u>29.110,6</u>	<u>17.800,0</u>	<u>11.310,6</u> ^{1/}
Bahia	Nazaré-Sodoma	8,1 km	340,7		
	Sodoma-São Felipe	18,9 km	443,2		
	São Felipe-Craipe	11,0 km	214,3		
	Caraípe-Cruz das Almas	13,8 km	219,5		
	Muniz Ferreira-Sodoma	9,0 km	430,1		
	Dr. Macedo Costa-Muniz Ferreira	15,3 km	387,1		
	Dr. Macedo Costa-Jacaranda-Sapatui	13,7 km	305,7		
	Nazaré-Engenho de Dentro	5,3 km	179,2		
	Leoni-Cacoti	3,3 km	49,6		
	BR-242 - Capanema	4,0 km	31,2		
	São Bernardo-Cunhagi	18,0 km	531,7		
	Mar Grande-Pôrto de Santos-Itaparica	13,2 km	752,9		
	Guapira-Maragogipe	17,4 km	765,9		
	Barra do Paraguaçu-Sala da Margarida	9,0 km	310,6		
	Sala da Margarida - Est. do Ferry Boat	26,9 km	765,4		
	BR-242 - Piedade-Santana-Guapira	11,8 km	278,6		
	São Felipe - Santana	4,7 km	174,9		
	Cuteiro Redondo-ent. S. Felix-Coqueiros	8,0 km	529,6		
	Gov. Mangabeira-Incruzo-Cab. Paraguaçu	18,4 km	268,3		
	Incruzo-Tanar-Geolândia	7,0 km	91,7		
Sapeaçu-Paixa da Palmeira-Petin	30,4 km	1.225,0			
Sítio do Meio-Pau Cedro- BR-101					
Petin - BR-101	10,9 km	370,8			
Centro Alvorada-Tabuleiro-Centro-Vazado	25,8 km	880,7			
Tab. Santana-Santana-Tabuleiro - BR-101	15,8 km	362,1			
Total (construction)	318,9 km	9.857,8			
			1.265,2		
			<u>11.123,0</u>	<u>4.571,0</u>	<u>4.771,0</u>

STATE	PROJECT	LENGTH	TOTAL VALUE	BNDE PARTICIPATION	LOCAL PARTICIPATION
<u>Mato Grosso</u>	Região de Cáceres	395,6 km	8.248,0		
	Região de Miranda	151,9 km	2.794,3		
	Região do Paranaíba	162,1 km	2.254,8		
	Região de Dourados	261,5 km	4.024,4		
	Região de Rondonópolis	127,8 km	2.390,1		
	Região de Três Lagoas	116,0 km	1.077,1		
	Região de Campo Grande	<u>199,3 km</u>	<u>3.099,9</u>		
	Total (construction)	1.414,0 km	23.888,6		
	Other Costs		<u>1.614,4</u>		
	Total Costs		<u>25.500,0</u>	<u>13.000,0</u>	<u>12.500,0</u>
<u>Paraná</u>	Umbuzeiro - Queimados	50,4 km	3.153,0		
	Princesa Isabel - Água Branca	49,3 km	2.117,0		
	Programa de Ponte	<u>1.280 m</u>	<u>3.840,0</u>		
	Total (construction)	99,7 km	9.110,0		
	Other Costs		<u>2.420,0</u>		
	Total Costs		<u>11.530,0</u>	<u>6.000,0</u>	<u>5.530,0</u>
<u>Pará</u>	PA-70	134 km	8.140,0		
	PA-28	90 km	2.980,0		
	PA-81	<u>26 km</u>	<u>655,0</u>		
	Total (construction)	250 km	11.775,0		
	Other Costs		<u>2.076,0</u>		
	Total Costs		<u>13.851,0</u>	<u>5.000,0</u>	<u>8.851,0</u>
<u>Rio de Janeiro</u>	Silva Cunha - Saguiba	46,6 km	3.396,0		
	Natividade - Varre Sai	82,2 km	2.136,0		
	Bom Jardim-S. J. de Ribeirão-M. de Moraes	73,0 km	3.940,0		
	St. Clara - Maratiba	<u>70,0 km</u>	<u>4.130,0</u>		
	Total (construction)	271,8 km	13.602,0		
	Other Costs		<u>1.950,0</u>		
	Total Costs		<u>15.552,0</u>	<u>9.200,0</u>	<u>6.352,0</u>

STATE	PROJECT	LENGTH	TOTAL VALUE	BNDE PARTICIPATION	LOCAL PARTICIPATION
<u>Santa Catarina</u>	Brusque - Ribeirão do Ouro	38,0 km	2.800,0		
	Joaçaba - Volta Grande	58,5 km	4.500,0		
	Total (construction)	96,5 km	7.300,0		
	Other Costs		1.330,0		
	Total Costs		8.630,0	4.500,0	4.130,0
<u>Goiás</u>	Região do Vale do Rio Araguaia	413,9 km	5.623,8		
	Região Nordeste	217,0 km	2.668,0		
	Região Central	34,7 km	352,0		
	Região Sudoeste	29,0 km	266,6		
	Total (construction)	694,6 km	8.910,4		
	Other Costs		667,3		
Total Costs		9.577,7	5.700,0	3.867,7	
<u>Piauí</u>	Miguel Leão - BR-316	17 km	326,4		
	Agricolândia - BR-316-PI-4	6 km	115,2		
	Hugo Napoleão - BR-316	20 km	384,0		
	Prata do Piauí - BR-316	34 km	652,8		
	S. Felix do Piauí - BR-316	20 km	384,0		
	Francinópolis - BR-316	30 km	576,0		
	Arcazes - BR-316	27 km	518,3		
	Pimenteiras - BR-316 (PI-22)	30 km	576,0		
	Novo Oriente do Piauí - BR-316	20 km	384,0		
	Dom Expedito Lopes - BR-316-BR-230	3 km	57,6		
	São José do Piauí - BR-316 - BR-230	23 km	441,5		
	Santa Cruz do Piauí - BR-316 - BR-230	28 km	537,4		
	Bocaina - BR-316 - BR-230	22 km	422,3		
	Santo Antônio de Lisboa - BR-316-BR-230 (BR-011)	22 km	422,3		
	Francisco Santos - BR-316 - BR-230	20 km	384,0		
	Monsenhor Hipólito - BR-316-BR-230	18 km	345,5		
	São Julião - BR-230	5 km	94,9		
	Palmeiras - BR-316	16 km	307,2		
	Alto do Piauí - BR-316	22 km	422,3		
		361 km	7.551,7		
		2.045,1			
		5.506,6	5.340,0	3.756,8	

SUMMARY - EXISTING ENDE RURAL ROAD PROGRAM

STATE	LENGTH (KM)	ESTIMATED CONSTRUCTION COST (MIL NCR)	ENDE PARTICIPATION	AVERAGE COST PER KM (NCR)
ESPÍRITO SANTO	232.7	19,527.9	11,800	NCr\$83,919 US\$ 19,746
MINAS GERAIS	413.9	18,010.2	10,700	NCr\$43,513 US\$ 10,238
MARANHÃO	282.0	13,257.0	8,000	NCr\$47,117 US\$ 11,086
RIO GRANDE DO SUL	1,967.7	27,663.1	17,800	NCr\$14,059 US\$ 3,308
BAHIA	318.9	9,897.8	6,737	NCr\$31,037 US\$ 7,303
MATO GROSSO	1,414.0	23,888.6	13,000	NCr\$16,894 US\$ 3,975 (No Bridges)
PARAÍBA	99.7	5,270.0 (not incl. Bridges) 9,110.0 (incl. Bridges)	6,000	NCr\$91,374 (52,859) US\$ 21,500 (12,437)
PARÁ	250	11,775.0	5,000	NCr\$47,100 US\$ 11,082
RIO DE JANEIRO	271.8	13,602.0	9,200	NCr\$50,044 US\$ 11,775
SANTA CATARINA	96.5	7,300.0	4,500	NCr\$75,648 US\$ 17,800
	69.4	8,910.	5,700	NCr\$12,528 US\$ 3,018
			5,640	NCr\$20,364 US\$ 4,792
			104,077	NCr\$26,601 US\$ 6,357

**Terms of the Agreement between the
NATIONAL ECONOMIC DEVELOPMENT BANK
BNDE - and the NATIONAL HIGHWAY
DEPARTMENT - DNER - initiating the
Rural Roads Construction Program
(1968-1970).**

The National Economic Development Bank, a federal autarchy, instituted by Law Nº 1628 of June 20, 1952, hereafter called the Bank, through its legal representatives, and

The National Highway Department, a federal autarchy, instituted by Decree-Law Nº 8463, of December 27, 1945, hereafter called DNER, represented by its Director General, duly authorized by the Minister of Transport, hereby ratify this instrument.

CONSIDERING

- a) The great economic significance of the national network of rural roads, feeding the trunk highways, federal and state;
- b) the deficiencies of this system of secondary roads, in the case of Brazil, limiting the productivity of the investments made to the highways trunks;
- c) that such deficiencies result, on the one hand, from the insufficiency of financial resources intended for the construction and betterment of those roads and, on the other hand, from the lack of technical resources on the part of the municipal administrations charged with these responsibilities;
- d) the disposition of BNDE and DNER to contribute with financial and technical resources to assist the development of the mentioned road system.

AGREE, in the following clauses that:

ONE

This agreement has as its objective the initiation of a pioneer program, of national scope, for the construction and betterment of rural highways feeding the Federal and State trunk highways. The financial participation of the States and interested counties, and, eventually other agencies and private persons directly benefitting is anticipated. The program will be developed according to the priorities established in clause three.

TWO

(Value)

- 2.1. The participation of the Bank in the program resulting from this agreement will be NCr\$60 million new cruzeiros to be applied over the period of 3 (three) years, or, in the three year period 1968/1970.
- 2.2. The Bank may, at its discretion, raise the amount of the overall resources foreseen in this clause, if the volume of the requests and the economic results obtained should so justify it.
- 2.3. DNER will try to obtain, in due time, legal authorization to allocate resources from its quota of the National Highway Fund to the program.

THREE

(Eligibility and Priority of Projects)

- 3.1. Road eligible for financing under the program must be rural roads with a maximum length of 30 km and with technical characteristics equal to or inferior to those corresponding to Class III of the Technical Norms of DNER, for construction of which the States, Counties interested or the participating private agencies will contribute 40% of the total cost of the project.
- 3.2. Whenever the road to be constructed or bettered coincides with the alignment of a federal road (i.e. figuring in plans defined by federal highway legislation in force), the DNER will contribute financially with a portion not less than 40% of the estimated cost of the job.
- 3.3. In the cases where an individual road exceeds 30 km, in order to obtain specific justification for inclusion of that road in the program, a specific justification will be required.
- 3.4. Priority will be given, in the selection of the requests for financing under this Agreement, to projects having the following characteristics:

- a) roads which provide access between Federal or State highways and zones of important agricultural production;
- b) roads forming part of integrated plans for agrarian development, economically justifiable;

Higher priority will always be assigned to the projects in which the financial participation of the State, the interested Counties and the private interests exceed 40%.

IV UR (Implementation)

- 4.1. Projects approved under this agreement will be executed by means of loan agreements between BNDE and DNER, or BNDE, States and Counties interested, having, in those cases, DNER as intervenient.
- 4.2. DNER will form a Special Working Group to receive the requests for financing and make a preliminary selection of them, in accordance with the criteria mentioned in clause Three, forwarding to the Bank the projects selected. At any time, DNER may disband the Working Group mentioned and establish a Special Committee with the same responsibilities.
- 4.3. The projects submitted for analysis by BNDE should be of importance to a well characterized economic region and include highways sections the lengths of which add up to at least 60 km.
- 4.4. The execution of the work corresponding to each project approved by the Bank will be inspected by DNER, through the Special Working Group, (road specifications and the quality of the work). The Bank will be responsible to the Bank for the good application of the resources.

FIVE (Conditions)

- 5.1. In principle, the total commitment by the Bank, sixty million cruzeiros, will be committed over a three year period: twenty million new cruzeiros in 1968, twenty million new cruzeiros in 1969 and twenty million new cruzeiros in 1970.

- 5.2. The Bank resources utilized under the terms of this agreement will carry interest at a maximum of 9.5% (nine and one half percent) per annum, in addition to the regular charges of the Bank. The value of the debt or of the debit balance will be corrected monetarily, in accordance with the criterion adopted by the Bank for its operations, the determinations of the National Monetary Council being respected.
- 5.3. The sum of the financial charges deriving from this agreement, including monetary correction, will not surpass 20% (twenty percent) per annum.
- 5.4. The grace period and the term for amortization of each project will be fixed in accordance with peculiarities of each project: the minimum terms for amortization, including grace period, being 7 (seven) years.

SIX (Operation)

- 6.1. The projects should be presented to the Bank in 3 (three) copies. Analysis will be performed by a Working Group formed from Bank technicians which will be advised, whenever necessary, by technicians from DNER specially designated for such purpose.
- 6.2. The President of the Special Working Group formed by DNER, referred to in clause Four (4.2.) and the Director of the Bank responsible for the Transport Sector will jointly supervise work pursuant to this Agreement.
- 6.3. The application of project resources will be examined by the Bank in accordance with the norms ruling at this Institution, the necessary information being supplied by the Special Working Group referred to in clause Four (4.2.) of this agreement, to whom will fall the task of coordinating the technical and financial inspection of the jobs.

SEVEN (Guarantee)

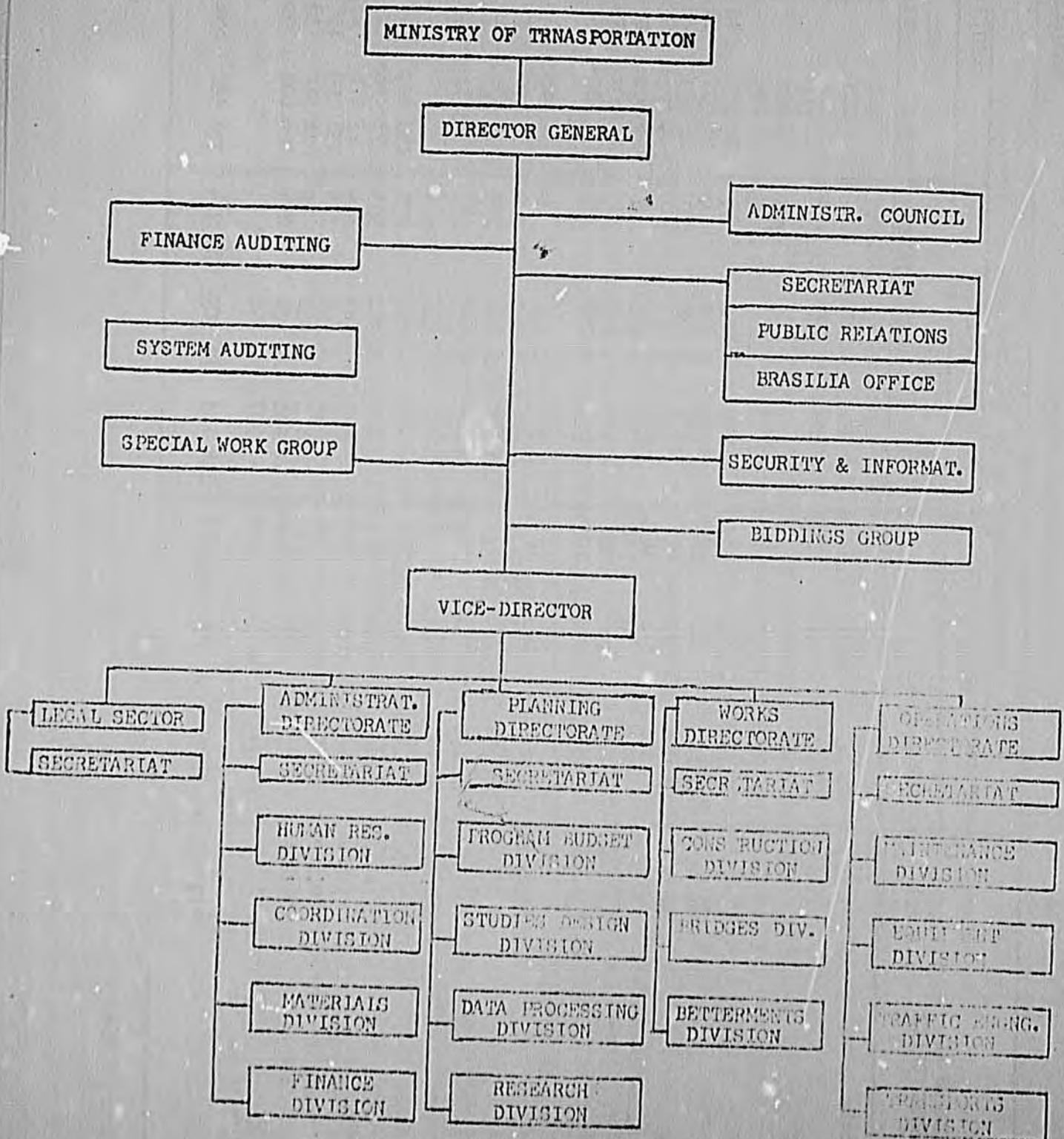
- 7.1. DNER will obtain from the borrowers, in favor of the Bank, from the account of the National Highway Fund, the earmarking of the necessary resources to meet the payment of the amortizations and remaining charges of the specific contracts deriving from this agreement.

SIGNED

BHDE

DNER

ORGANIZATIONAL CHART FOR NATIONAL
 HIGHWAY DEPARTMENT (DNER)



BRAZILIAN HIGHWAY SYSTEM

ANNEX VII
EXHIBIT G

STATES AND TERRITORIES	TOTAL ALL SYSTEMS	HIGHWAY SYSTEM AS OF DECEMBER 1968 (IN KMS.)								
		FEDERAL			STATE			MUNICIPAL		
		TOTAL	NOT PAVED	PAVED	TOTAL	NOT PAVED	PAVED	TOTAL	NOT PAVED	PAVED
Rondonia	1 314	1 007	1 007	-	61	61	-	246	246	-
Acre	453	304	304	-	44	44	-	105	105	-
Amazonas	1 918	508	491	17	539	399	140	871	850	21
Roraima	465	325	325	-	-	-	-	140	140	-
Pará	17 931	599	444	155	7 652	6 914	738	9 680	9 583	97
Amapá	977	494	494	-	-	-	-	483	475	8
Maranhão	23 371	1 645	1 479	166	889	846	43	20 837	20 813	24
Piauí	21 817	1 166	980	186	1 695	1 686	9	18 956	18 956	-
Ceará	47 462	2 076	1 403	673	3 747	2 866	881	41 639	41 551	88
Rio Grande do Norte	9 300	668	341	327	2 455	2 329	126	6 177	6 177	-
Paraíba	23 907	886	550	336	3 021	2 980	41	20 000	20 000	-
Pernambuco	17 129	1 896	1 172	724	2 233	1 846	387	13 000	13 000	-
Alagoas	11 264	591	396	195	2 273	2 200	73	8 400	8 400	-
Fernando de Noronha	40	-	-	-	40	40	-	-	-	-
Sergipe	4 845	315	129	186	1 281	1 271	10	3 249	3 249	-
Bahia	64 045	4 090	2 832	1 258	6 055	4 843	1 212	53 900	53 884	1
Minas Gerais	133 618	6 678	2 366	4 312	16 608	14 268	2 340	110 332	110 156	176
Espírito Santo	16 393	1 175	811	364	3 231	3 136	95	11 987	11 987	-
Rio de Janeiro	19 234	1 494	294	1 200	4 423	2 994	1 429	13 317	13 160	157
Guanabara	1 115	109	-	109	1 006	443	563	-	-	-
São Paulo	168 866	4 784	539	4 245	14 082	5 024	9 058	150 000	147 000	3 000
Paraná	83 771	2 481	668	1 813	7 844	6 911	933	73 446	73 396	50
Santa Catarina	31 954	1 467	869	598	5 443	5 243	200	25 044	25 044	-
Rio Grande do Sul	170 872	3 001	1 475	1 526	9 612	8 899	713	158 259	158 156	103
Mato Grosso	33 091	5 719	5 441	278	8 860	8 831	29	18 512	18 500	12
Goiás	33 952	3 260	2 688	572	10 692	10 438	254	20 000	20 000	-
Federal District	509	112	-	112	397	397	-	-	-	-
BRAZIL	939 613	16 850	27 498	19 352	114 183	94 909	19 274	778 580	774 828	3 752

SOURCE: DNER

GAO's Report "Review of the Transportation Sector in Latin America" Findings and Relation to the Proposed Rural Road Construction Program.

The GAO examined AID programs in the transport sector in Brazil and reported their findings in their 1970 report. Their comments and specific findings listed below have been reexamined in light of the development of the proposed Rural Road Construction program.

A. GAO Finding Number 1:

"Because Brazil has no overall country-wide transportation plan, the priority of the projects selected for financing could not be determined".

The National Transportation Program (see Section I. B. 2, GEIPOT) a comprehensive survey and analysis of nationwide transport needs and priorities has now been completed by the GOB. The proposed AID loan program fits within the strategy of this national program as the joint BNDE/AID Rural Road Program will: finance roads identified in the national program, utilize the economic and technical methodology of project analysis developed and utilized in the national program and complement investments by the GOB, IBRD and IDB in accordance with the recommendations of the national program.

B. GAO Finding Number 2:

"AID financed highways because of the \$131 million two-year investment commitment to Northeast Brazil; the lack of well-defined projects in other sectors; and the relatively high dollar component in highway construction and maintenance equipment projects".

This finding has no relationship with the proposed Rural Road Program which has been developed specifically in response to needs for investment in the rural agricultural sector.

C. GAO Finding Number 3:

"Loan funds were authorized before there was complete agreement as to how projects were to be implemented".

As set forth in the Capital Assistance Letter, complete agreement exists between the BNDE and USAID as to the manner in which the project will be implemented. Furthermore, with the exception of changes in economic methodology and inclusion of more rigorous inspection of construction, the program is identical to the on-going program which is being successfully implemented by the BNDE.

D. GAO Finding Number 4:

"Local currency financing for road projects was provided without adequate feasibility and engineering studies and without adequate assurance as to availability of funds".

As set forth in the Capital Assistance Paper, adequate criteria and procedures have been developed to assure that adequate feasibility and engineering studies will be presented and evaluated prior to the commitment of funds to sub-loans. Furthermore, procedures exist for the implementation of these projects and agreement has been reached with the BNDE for an even more effective project monitoring system.

FILES - Proposed Rural Roads Project

March 31, 1970

John A. Richard
EMRI

Trip Report

During the week of March 15-21 I accompanied R. Bloem, CDLS and K. Fodor, DPEC and Hansen, Aluísio Togo and Tabaco of the EIDE on a trip to the three States of Para, Maranhão and Piauí to discuss the EIDE rural roads program with the Highway Department and to look at some of the projects completed and underway. Following is a detailed report of the discussions and inspections during this trip.

Below Para - Meetings with DER - March 16, 1970

- A.M. : Dr. Aluísio Sales Oliveira, Director-General/DER
- Eng. Hélio Cabral, Assessor Técnico do Diretor
- Eng. João Custódio, Diretor Técnico DER
- Eng. Olyveira Vieira, Project Engineer PA-70 (UNEP Financed Project)
- Eng. Aluísio Togo Pinto Souza - EIDE
- Dr. Tabaco, EIDE Economist
- R. Bloem, K. Fodor and J. Richard, USAID

Reviewed and discussed the DER organization. The present organization was established by Decree of State Highway Council on December 22, 1968 and was set up to provide a well organized, progressive DER. The organization is similar to that of the central facilities and controls that we have found in the States of Maranhão and São Paulo. Basically the organization consists of the following: (1) the central office with the offices of the various divisions - one of which is the central office for the control of the municipalities. The budget there is divided into three sections: Administration, Technical, and Operations and the... (2) the Municipal Councils.

Dr. Aluísio Sales, Director-General, presented a "white" paper on the... these... and... that the... (2) the Municipal Councils.

In the... (2) the Municipal Councils.

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On March 18th R. Bloco, K Feder, Dr. Aluizio Togo and I accompanied Dr. Jose Rainaldo Carneiro Tavares, Director General of the DER, to the Pinheiro area to inspect RDE projects underway and completed. The first project checked was the access to Itama. This project was underway by DER forces and was nearly complete. At the time we were there the DER was placing drainage pipes in the low sections and repairing erosion and slide areas. Considerable maintenance was being performed on the road - the necessity for this work is increased at this time due to the rainy season. Good material was available (lateritic) and had been used for gravel surfacing. However, the material being used for maintenance work was not so good. I visited the borrow pit and saw good material available, but the maintenance crews were hauling from a poor area of the pit.

We next checked the roads from Pinheiro toward Cacimulândia and between Pinheiro and São Bento. Both of these roads have been completed approximately one year and were constructed with a good surfacing material. Both roads have required considerable maintenance due to erosion and slides on the fill areas. The roads were to be constructed with a 15 cm gravel surface, however I noticed one area on the Pinheiro-São Bento road that had been opened up to place a pipe and the surface course appeared to be less than 10 cm.

Dr. Tavares said that the average cost of road construction in the State is R\$ 23,60,000 per Km. The Santa-Elizete-Santa Helena road (01.12) was constructed at an average cost of R\$ 61,000 per Km. The average cost of the roads constructed under the FINE financial program is R\$ 23,000 per Km.

While in Pinheiro we talked to one of the local state engineers regarding benefits of the newly constructed roads. He reported that prior to the construction of the Santa-Elizete-Pinheiro road there had been a 40% increase in road trips at a cost of R\$ 2,00 per Km. The transportation cost was now R\$ 6.50 per Km. He also reported that, when construction of the road to Cacimulândia had been started to serve São Paulo and Santa Helena, the road from there would now come to Pinheiro to stop for distribution.

Two Inp, 1124 - March 1964

On Thursday morning we drove from São João to Teresopolis on the BR-116 and BR-116 highway.

In Teresopolis we met with Eng. Carlos de Azevedo, Chief Engineer of the DER. He showed us a plan developed by a local consultant for the road network. The plan indicates a road network which would be completed to serve the district and to connect the district to the main road network. The plan also indicates the roads to be constructed by the DER.

The State of Brazil has 19 rural road projects for 1964. 12 of these are complete and the remainder are under construction. 11 of these projects are being constructed by contract and the remainder by the DER.

6.

The other project inspected was the Prata do Bical road. The road is presently under construction by contract. Most of the grading on this road was being performed by dozers - fills were constructed by doing material side of the road. One pass was being used to haul for the higher fills. There was no compaction effort at all on the fills being constructed. Dr. Wagner says that it is not necessary; that adequate compaction is obtained by the construction equipment traveling over the fills. It is noted that this equipment was using the center portion of the graded width only, leaving the outer edges completely uncompacted and, thus, subject to more erosion and slides. There was a rubber tired roller on the project, which is used for compacting the gravel surface layer only.

While on this trip Dr. Wagner stated that their usual procedure for making partial monthly payments for contract work is to use estimated quantities of work for 2 months and then computing measured quantities every third month.

Dr. Wagner also stated that the FWA is presently negotiating a loan with Caterpillar for equipment for 3 maintenance crews to maintain the roads constructed under this program. Each crew will have the following equipment:

- 1 D-6 Tractor
- 1 G7 12 motor grader
- 1 Motor Grader
- 6 Trucks

The District General also stated that the average cost of all types of equipment under this program has been about 25,000.00 per year.

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Observations Based on This Trip

1. The State of Para appears to have a very well organized and operating DMR and good project control. However, I note that this opinion is based on what I saw and was told in the DMR Headquarters. It was not possible to inspect any of their actual field activities. The other two States both seem weak in contractual practices and construction control.
2. There appears to be quite a wide range in average construction cost from State to State. I hope to get further information on this from the BND and DMR.
3. It appears that most of the project control by the States (and also possibly BND) during construction is merely fiscal control. Further investigation of this aspect will be made at the BND.
4. On the basis of information found on this trip I would have to make a preliminary recommendation that during the implementation of a USAID financed project in this area we should either forget engineering control and handle the project as merely "bank financing" or get not deeply involved in engineering control than originally anticipated. The improvement of contract and construction procedures and project control could be an "institution building" aspect of a AID project. But, to do this would require the services of several engineers during the period of the project. A more definite recommendation can be made regarding this after further discussions with BND and the DMR.

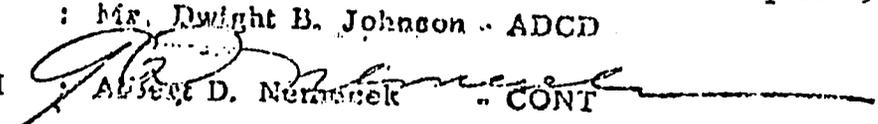
Distribution:

MEMO - Mr. Myron K. Stone
CSCG - Mr. R. Blean
BND:

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April 29, 1970

TO : Mr. Dwight B. Johnson - ADGD

FROM :  Alfred D. Nemzek - CONT

SUBJECT: Proposed Rural Road Construction Loan

1. We have completed a review of the effectiveness of management procedures and financial controls applied to rural road construction programs in the States of Bahia and Golan. The review included a preliminary survey of BINDE procedural requirements imposed upon states which participate in the rural road financing program and field reviews of the effectiveness of the procedures applied by the two selected states.

2. I believe you will find the attached report self explanatory. The Financial Analysts who completed the review found that the state organizations responsible for the road construction program generally employ adequate management and accounting procedures and controls.

3. We will be pleased to discuss the report or answer any questions you may have.

DISTRIBUTION:

Messers.	Beldman	-	LCS
	K Van Kester	-	ADGD
	R Blosser	-	CDLS
	R Feder	-	ADDT
	A Lico	-	ADTR
	W Hedger	-	ALDO
	K Cornwell	-	ADTR
	L Brown	-	
	Borou	-	ADTR

TM:nic

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Proposed Rural Road Construction Loan

**Report on Review of State Management
and Financial Procedures**

Office of the Comptroller - 12/10/2011

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The Banco Nacional do Desenvolvimento Economico (BNDE) has requested a \$25 million loan from AID to support the rural road program which the Bank began financing in early 1968. By February 1970 the BNDE had signed agreements fully committing the equivalent of approximately 300 million to finance 80% of proposals submitted by the state highway departments. The Bank, based on its experience to date, desires to continue this program but has found the demand to be greater than its resources can support.

The BNDE is an administratively autonomous public corporation wholly owned by the Government of Brazil and created by law in June 1952; it is currently operating under the jurisdiction of the Ministry of Planning and General Coordination.

The Bank receives all road construction proposals through the National Highway Department whose responsibility it is to review technical specifications and the needs of the project as related to national goals. Financial requirements are evaluated by the Bank after which the project may be approved and an agreement signed. Disbursements are based upon a chronogram of the financial and physical program to be completed throughout the project. Each tranche release is made only after the borrower has achieved its progress goals and has contributed its 20% share of funds to date. The Bank evaluates implementation through reports of physical progress and expenditures. To monitor the project from beginning to completion, the BNDE appoints a "special work group". Members of this group make field visits to verify the accuracy and correctness of all reports and procedures used by the Borrower.

SCOPE

This review has been conducted in two of the twelve states that are to be included in the program funded by the BNDE. The review of the other states is limited because the implementation of the program is still in its early stages.

In addition to the general focus of the evaluation and the specific components included: (a) an examination of the construction of the road network; (b) the system of maintenance of the road network; and (c) the degree of maintenance of the road network.

of completed roads, provision for maintenance

The purpose of this review was to verify the effectiveness of the BNDE controls which are a part of each loan package. Our introduction at the state level was arranged by the BNDE. The review was made with the state agency concerned.

BAHIA

The State of Bahia secured a loan from BNDE in the amount of NCr\$3,737,000.00 to be disbursed in 4 quarterly releases for building 313 km. of intermunicipal rural roads. The total cost of the project is estimated at NCr\$11,463,000.00. The responsible state agency is the Consorcio Redevidario Intermunicipal da Bahia created under State Law 10 2697 of May 27, 1969 which also allocated a regular flow of revenues into a Special Municipal Roads Fund (FERMUN) to be administered by the Consortium.

THE FUND

FERMUN (Fundo Especial de Redevioa Municipalis), a fund created by Law 2697, derives its revenue from 5 sources as follows:

- 1) 10% of the state receipts of oil well pumping royalties paid by PETROBRAS under Law No 2004 which incorporates royalties on production;
- 2) Dividends paid on PETROBRAS stocks owned by the state of Bahia and subscribed by the state of Bahia. Law 10 2697 was amended;
- 3) Budget allocations from the state of Bahia to the Consortium from state of Bahia funds;
- 4) Loans or grants from a donor or international organization;
- 5) Receipts on operations.

exercised by the state agency; and (d) the provision for maintenance of completed roads.

The purpose of this review was to verify the effectiveness of the BNDE controls which are a part of each loan package. Our introduction at the state level was arranged by the BNDE. The review was made with the state agency concerned.

The State of Bahia secured a loan from BNDE in the amount of NCr\$6,737,000.00 to be disbursed in 4 quarterly releases for building 313 kms. of intermunicipal rural roads. The total cost of the project is estimated at NCr\$11,463,000.00. The responsible state agency is the Consorcio Rodoviaro Intermunicipal da Bahia created under State Law 19 2697 of May 27, 1969 which also allocated a regular flow of revenues into a Special Municipal Roads Fund (FERMUN) to be administered by the Consortium.

THE FUND

FERMUN (Fundo Especial de Rodovias Municipais), a fund created by Law 2697, derives its revenue from 5 sources as follows:

- 1) 10% of the state receipts of oil well pumping royalties paid by PETROBRAS under Law 19 2004 which incorporate the oil companies;
- 2) Dividends paid on PETROBRAS stocks owned by the State of Bahia and subscribed by the state at the time Law 19 2697 was enacted;
- 3) Budget allocations from Federal Government and from State of Bahia municipalities;
- 4) Loans or grants from National or International financial institutions;
- 5) Net income on operations.

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ACCOUNTING SYSTEM

The accounting records in general are relatively simple. All construction costs are charged to FERMUN. Likewise, all repayments made by municipalities are credited to FERMUN.

Consortium costs are principally salaries, travel expense and rental of office space. All records were current and well maintained. Charges for salaries, travel, rent and miscellaneous expenses did not appear to be excessive. Since there are only 27 employees, including field representatives the volume of entries is not large.

An example of the method by which management fees and FERMUN obligations are computed follows:

Contract award price	NCr\$900,000
Consortium Management Fee (NCr\$900,000 x 90%)	100,000
Total obligation (project cost) to FERMUN	NCr\$1,000,000

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Monthly, during construction, the responsible engineer physically measures the work accomplished by the contractor and computes the amount payable under the contract. This amount payable by FERMUN is increased, as shown above, for the Consortium management service. Two drafts are then prepared by FERMUN; one to the contractor and one to the Consortium.

This 10% of project cost is the revenue from which the Consortium must meet all its operating expenses. The estimated minimum revenue required to support the organization is NCr\$20,000,000 per month, indicating that FERMUN must disburse NCr\$2,240,000 per year to contractors and a related NCr\$360,000 to the Consortium if the needs of the Consortium are to be met.

The 10% management fee to the Consortium plus an additional 10% of the project cost is paid by FERMUN from its resources. The remaining 80% is financed by FERMUN under repayment agreements with benefiting municipalities. The guarantee of repayment by the municipalities is the fund is a power of attorney against the municipality's portion of the national road fund.

Repayment terms to the municipality are:

- a) interest at 10% per annum beginning on the date the road is completed;
- b) 20% of the municipal share to be repaid within a period equal to twice the length of construction time;
- c) _____ to be paid within 5 years after construction is completed.

MAINTENANCE

As a part of the contract between the municipalities and the Consortium (acting in behalf of FERMON), the municipality is obligated to maintain the roads. In the event the municipality fails to do so, the Consortium has the right to contract for the maintenance services and collect state appropriations which would otherwise be made available to the municipality.

-97-

GOIAS

The State of Goias secured a loan from BNDE in the amount of NCr\$5,700,000.00 to construct 694.6 km. of rural roads. The total cost of the project is estimated at NCr\$8,910,400.00. The loan is to be disbursed in 5 quarterly amounts with the total period of construction estimated to be 18 months. The agency responsible for executing this project is the State Highway Department (DERGO). The security pledged for the loan is a portion of the state's share in the national highway fund. There are two organizations within the state authorized and operating an highway construction, planning and maintenance groups; the State Highway Department, DERGO, and a mixed economy corporation, CRISA. The functions of these organizations are explained in the remainder of the report.

DERGO

DERGO has a work force of 2,025 employees of which 54 are highway engineers. They perform maintenance and a small amount of construction in approximately 3/5 of the area of the state. During the past three years DERGO has been reorganized and is rapidly becoming primarily a planning and engineering organization. They operate a minimum of equipment, mainly for road maintenance. Almost all new construction is contracted to private companies or to the state controlled mixed economy corporation known as CRISA.

CONTRACTING PROCEDURE

The request for bids specified by Decree Law N9 200 is followed for all major purchases as well as for contract awards. We reviewed the files on all 6 contracts to private companies. One contractor selected by DERGO was subsequently unable to qualify and the job had been rebid. All files appeared complete and were adequate to assure us that competition had taken place. All preliminary estimates of construction cost are based on a table of relative costs published for the guidance of state DER's by the national highway department (DNPE) in 1965. Cost factors given in this table are then multiplied by an inflation factor to determine current cost. Of the 10 roads included on the BNDE project, 6 were awarded to private corporations, 3 to CRISA and 1 was undertaken by the DERGO labor force.

ACCOUNTING SYSTEM

Good financial control of payments to contractors is exercised, but no accurate cost can be determined for work performed by the DERGO. DERGO does not maintain a cost accounting system and merely estimates the cost of work performed on the basis of the cost of their most recent contract awards. In our judgment, this record-keeping deficiency should be discussed with the BNDE but is not so significant as to require corrective action prior to AID participation in the Rural Roads program. The balance of the accounting system used by DERGO is of the governmental type. The budget approved each year is of the line item variety, and charges must be approved by the government. Our tests indicated that perpetual inventory records of spares and other equipment maintenance records are timely and adequate.

MAINTENANCE

Highway maintenance is scheduled according to monthly reports of inspection. Highways travelled during our visit appeared to be properly maintained, but we did not attempt to evaluate the adequacy of the overall maintenance program.

CRISA

CRISA was organized in 1961 under State Law 3397 and was originally capitalized at NCr\$1,000,000.00. It is a mixed economy corporation 51% owned by the state of Goiás and 49% by private and municipal investors. The consortium does not have an established source of income and relies primarily on contract work from DERGO. CRISA has primary responsibility for two defined areas of the state equaling approximately 2/5 of the total. Because its principal source of income is DERGO and since CRISA received contracts to construct 3 of the roads built under the BNDE loan, we also reviewed their organization and facilities. CRISA has a work force equivalent to about 1/3 that of DERGO and maintains a small but efficient cost and general accounting section. Cost records are good and allocations are revised monthly in accordance with the work being performed. Perpetual inventory spares records are maintained and equipment maintenance records are up to date. The principal maintenance shop is located in Goiás and appears to be well equipped and maintained.

Maintenance and construction contracts received by CRISA from DERGO are priced at a factor less than the commercial contracts being awarded by DERGO. However, CRISA consistently shows a profit from these contracts and uses these profits to finance intermunicipal roads of the Category III type. These are roads in addition to the current year state highway plan but are within the state's overall program. Intermunicipal roads are planned, designed, financed and built by CRISA. The municipality, however, ultimately pays the cost of construction over a 5 year period from their proportionate share of the national highway fund. No interest is charged by CRISA for financing the road nor do they charge a management fee. This method of financing and constructing additional Category III roads satisfies obvious local needs that were not put into the annual state plan and could not be constructed directly by the state without securing a budget revision.

The relationship of the DERGO and CRISA is controlled by the Governor and the Director of the state Highway Department. If the present reorganization effort of DERGO continues toward a planning and engineering function, CRISA will become the operating arm of the Highway Department. At the present time, and for the past 3 years, DERGO and CRISA have maintained an effective working relationship. Both organizations are financially sound and appear to fulfill useful functions.

COMMENTS AND CONCLUSIONS

The BNDE program was heartily endorsed by the states we visited. The system of control established by the Bank appears adequate. The Bank has invested a great deal of time to initiate the system of reports and controls required of individual states. Bank representatives have verified all significant procedures and actually helped prepare some reports at borrower's offices and field locations. The required reporting matches in large measure those systems in use by the various states and has not created an additional recordkeeping burden.

In our judgment the rural roads program financed in part by the BNDE and carried out in the States of Bahia and Goian is properly administered in accordance with guidelines and controls established by the BNDE. We believe that these two States are representative of other States participating in the program and therefore conclude that the procedures established by the BNDE are effectively practical at the State level.

UNITED STATES GOVERNMENT

Memorandum

ANNEX VII - Page 41 of 51
Exhibit I-C - Page 1 of 11

UNCLASSIFIED

TO : The Files

DATE: April 13, 1970

FROM : Richard Bloom
CDES

R. Bloom

SUBJECT: Rural Road Construction Loan;
Trip Report March 13 - March 21

A detailed memorandum of conversation for the March 13 meeting with SUDENE is being prepared by the USAID-NE office. In addition, Mr. Richard of ENRI is preparing a report, basically of engineering observations, covering our visits to Belém, São Luiz and Teresina.

Friday, March 13, 1970 - Recife

The morning was spent at the SUDENE where Mr. Smith had arranged a meeting for us with the Department of Transport. Accompanied by Mr. Jorge Smolianoff of USAID/NE we met with Mr. Inacio Fonten Teixeira and during the course of our conversations met a number of the chiefs of various sub-divisions. The basic aspects of the rural road construction proposal were discussed, as was the present ENDE program. SUDENE apparently had had little or no contact with the ENDE on this specific program but was aware that the DNRR did review the state's technical plans for projects to be financed by the ENDE.

Concerning on the proposed program, I expressed USAID's interest in knowing what SUDENE thought of the basic proposal (the IRR). All agreed that the area of agricultural transportation was in need of increased investment in the NE but they sought clarification on the type of road to be financed and the role of SUDENE within this program. The confusion on the type of road arose because "rural road" meant to SUDENE a small municipal dirt road, but it was explained that USAID hoped to work with the ENDE to assist states finance state roads (built to Class III standard) which the municipalities (farm areas) into major state or federal trunk highways. Concerning SUDENE's participation in the program, I suggested that in examining the present program what would be of greatest benefit would be direct assistance by SUDENE to the states for the delineation and preparation of project requests to the ENDE. The present state proposals to the ENDE are generally quite complete on the financial and technical aspects of the

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project but the states could use assistance in the preparation of the economic analysis. A number of possible ways in which SUDENE could help the states were suggested: first by providing information related to the economic analysis (agricultural production statistics, agricultural production projections, soil surveys, traffic counts, commodity prices, etc.) secondly, by assisting the states outline important agricultural areas where investments in roads would be beneficial and thirdly by providing technical assistance to states to build up their planning and evaluation divisions (e.g. economists from SUDENE could work directly with State DERs to plan and evaluate proposals to be submitted to the ENDE). Dr. Fontan Pereira noted that most agricultural data available to SUDENE comes directly from the municipios and is available to state organizations. Traffic counts were being conducted by SUDENE (tied to GELIOT work) but were limited to large federal and state highways in the NE. In regard to the other types of data, SUDENE has what was referred to as "global data" which states could avail themselves of but it was not presented on a municipio to municipio basis. Concerning the suggestion that SUDENE assist states with technical assistance (e.g. economists), it was stated quite clearly that SUDENE, because of its work load, could not supply economists or engineers to the states for this work. However, SUDENE was very interested or concerned that the sub-projects within the ENDE program in the NE be examined or reviewed by SUDENE. In the initial discussion of this matter, it was suggested by Mr. Fontan Pereira that SUDENE be entirely responsible for the program in the NE. I mentioned that in view of all the work that SUDENE and especially the Department of Transport had on the planning and engineering on federal and state trunk highways, that it would not be recommendable to duplicate in SUDENE the work already being done by the DNER and the ENDE in the present program. There was a general agreement to this as far as the detailed analysis (technical, financial and economic) were concerned, but LAW 3692 of 15 December 1959 and LAW 4869/65 article 4 (also Portaria No. 487/69 article 123) were quoted by Mr. Fontan Pereira in making his point that foreign assistance to the NE, which was not included in the "Plano Diretor", has to be approved by SUDENE. In the present ENDE program SUDENE does not examine proposals or the projects themselves but an agreement would have to be reached between the ENDE and SUDENE on this matter.

Discussion continued on the type of benefit/cost analysis which SUDENE employs on the study of federal and state roads. SUDENE uses basically the same methodology as GELIOT, that is, direct user benefits and traffic counts projections. Asked what method of analysis they would recommend on State rural access roads, they replied that more consideration would have to be given to indirect benefits.

At the conclusion of the meeting Mr. Fontan Pereira noted that detailed answers to many of the questions presented would require additional time and that SUDENE would forward to USAID/B and the DNDE their opinion as to the overall project and information relating to:

1. sources and types of information presently available to states which could be used in economic analysis of state rural road projects.
2. SUDENE's recommendations as to the method of analysis states should use in examining road projects.
3. SUDENE's recommendations as to their role in the future program.

Monday, March 16, 1970 - Belém, Pará

Meeting with the Departamento de Estradas de Rodagem of Pará

Present: Dr. Alirio Sales Oliveira - Diretor Geral/DER
Eng. João Caetano - DER/PA
Eng. Maluf Gabriel - DER/PA
Eng. Aluzio Togo Pinto Moura - DNDE
Dr. Danilo Rardal Coimbra Tabosa - DNDE
K. Feder, A. Richard and R. Bloom - USAID

After a brief tour of the central facilities, all of the above met in Dr. Oliveira's conference room. As an introduction Eng. Togo of the DNDE and I explained the purpose of our visit, describing in detail our desire to discuss the economic and technical aspects of the present DNDE/DER/PARÁ program. Dr. Oliveira set up meetings for us that afternoon with his staff and the rest of the morning meeting was directed towards a general discussion of PARÁ and the state's and the DER/PARÁ priorities for transportation. I have summarized below the information presented and issues raised during both the morning and the afternoon meetings.

1. State transportation priorities - 50% of the population of PARÁ is concentrated in or around Belém and this area contains 70% of all the roads in the state. However, this area is characterized as "minifundo" and does not have the greatest agricultural potential. Studies have been conducted on various regions of the state (by Instituto de Desenvolvimento Econômico-Social do Pará) and have shown that three areas in particular have great potential: Alencar-Monte Alegre and Ilha de Marajó in the north Amazon and the area southwest of Belém. Dr. Oliveira strongly recommended that the future DNDE program be sufficiently flexible to allow the financing of penetration or pioneer roads. The

state's priority road project is the state road Southwest from Marabá (PARÁ-70) and Dr. Oliveira was confident that it would be justified economically if factors other than present production and present population were considered. He commented that if only these considerations were taken into account the DER/PARA would have to limit the ENDE financed program to the already developed areas around Belém.

2. Suggestions as to economic analysis to be required for joint ENDE-USAID program - In line with Pará priorities, Dr. Oliveira recommended that economic studies include (for penetration type roads):

- a. studies of area potential;
- b. considerations of additional investments to complement transport investment;
- c. alternative costs for other modes of transportation;
- d. information on the social effects of road construction (e.g. rural integration).

All the following suggestions were given to us using PARÁ-70 as the example - the Marabá area has been studied by IDEP (see below), SUDAM has approved US\$ 100 million of new investments in the area (area is cattle producing region), cattle are flown out at great expense and river traffic is only seasonal, and PARÁ-70 forms a most important link with the Brasília-Belém highway and is itself (to the best of my knowledge) part of the Trans-Amazônica highway recently publicized by the federal government.

3. Present ENDE program - Dr. Oliveira had nothing but praise of the present ENDE program, but he was concerned that pioneer roads would be difficult to analyze hence difficult to receive financing for under the ENDE program.

- a. the present DER/PARA loan with the ENDE only "ties up" 4% of the States yearly resources from the National Highway Fund.
- b. PARÁ is anxious to participate in new program (other projects besides PARÁ-70 were mentioned along this line).
- c. the DNER checks the technical specifications and there is no problem with this procedure.

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- d. SUDAM approval on BNDE projects is not necessary, only on federal highway projects.
 - e. the DER/PARÁ has done some preliminary evaluation of projects executed to date. Some traffic counts are being taken on projects recently completed and the example used was PARÁ-78 (not within the present BNDE program) where traffic has greatly increased over the past year. The BNDE financed projects now being completed will be studied (traffic counts) upon completion.
4. Availability of statistical data:
- a. IEGE - agricultural production figures directly from municípios but data is incomplete from Amazon communities.
 - b. GEIPOT - survey data on existing roads (type, class, etc.).
 - c. SUDAM - some regional studies but little emphasis placed on transportation infrastructure.
 - d. Instituto de Desenvolvimento Econômico-Social do Pará (IDEP) - good areas studies (agricultural production statistics, projection, prices, etc.).
 - e. DNER - little data collection, mostly technical information.
 - f. DER/PARÁ - some traffic counts; depend upon IDEP for collection of data.
5. Maintenance on State roads - Dr. Oliveira stated that the DER/PARÁ will not build more roads at one time than they adequately maintain. He explained in detail the numerous considerations and planning necessary to insure this (e.g. new machinery, shops, personnel etc.). Due to our short stay, we were unable to visit the projects or inspect the residences.

Tuesday, March 17 - São Luiz, Maranhão

Present: Eng. Juiz Augusto Mattos Figueira - Chief of the Division of Planning
Eng. Eduardo Palluz - Assistant Chief of Division of Construction
Eng. Togo - BNDE
Dr. Tabosa - BNDE
Messrs. Fedor, Richard and Bloch - USAID

The director-general of the DER/Maranhão was accompanying the Minister of Transportation Mr. Mário B. Andreazza on the official opening of BR-135 and BR-316 to Teresina and in his place we met with Eng. Luiz Augusto Mattre Figueira.

The present BNDE program in Maranhão consists of 288 km of category III roads built across the bay from São Luís. The main group of roads radiate from the town of Pinheiro in the municipio of the same name. The project was roughly delineated by the DER/MA but for the presentation of the BNDE the DER/MA used a private consulting firm to do the economic evaluation. The consulting firm has a blanket contract with the DER/MA and has worked on numerous projects. In addition, the DER/MA uses the state planning agency as its source of data related to specific project proposals. [Most of the data used in the various project proposals came from the IEGE - agricultural statistics.] Eng. Figueira commented that the only other sources of data are SUDAM, SUDENE (some traffic counts) and the IENR, but that the information was more of a general state-wide nature.

Eng. Figueira's comments on the present BNDE program were similar to those of Dr. Oliveira in Belém. The coordination with the IENR on the technical specifications presented no problem nor did the method of financing (i.e. tying the repayment of the loan to the states share of the national highway fund). He mentioned that the two most important advantages of the program were, first, that it provided (for the type of road) "long term" financing where none existed before and secondly, that the economic, technical and financial plans required by the BNDE necessitated more planning within the DER. Also, he mentioned that he was impressed that the BNDE made regular inspections of the work being done.

No general state transportation priorities were outlined during our discussion, as was the case in Belém, but the DER/MA does have a number of project proposals ready for presentation to the BNDE.

For the remainder of the meeting Mr. Pador and I discussed with Eng. Figueira the economic justification presented to the BNDE on the present project and discussed various methods of economic analysis on rural roads. Eng. Figueira explained that on the present projects financed by the BNDE it would have been impossible to do traffic counts on the existing municipal roads or trails out of Pinheiro because the only way to do this would be to count every vehicle that could be seen on the road. In this situation, light trucks could be on the trip but the earth trails would not support heavier trucks along the entire route. Working with the available data (IEGE production statistics) the consultant had attempted to evaluate the benefits to be derived from the road construction program. (method outlined below).

The project as conceived by the DER/MA was to build a State road (Class III) from the federal trunk highway (presently under construction) into Pinheiro which is largest town and municipality in the area. In addition, state roads were to be built from Pinheiro east to São Bento, north to Santa Helena and North east to Alcântara and Itauna. (Towns in neighboring municipalities). Using the municipality of Pinheiro as his base, the consultant compared its past agricultural growth rate (based on IBGE's statistics) which was the highest in the region, with those of the surrounding municipalities. The similarities of the agricultural areas were treated in narrative form and the consultant assumed that the outlying municipalities with year round access to Pinheiro and the federal trunk highway would be able to attain growth rates similar to Pinheiro. On this basis the production projections were figured and noted as the agricultural benefits to be derived from the road program. In response to our many questions concerning the assumptions and evaluations made (e.g. calculation of benefits over a 10 year period, area similarities, other factors which influence agriculture development, etc.), Eng. Figueira stated that there are many relevant factors and if money were no question undoubtedly a consultant could (doing his own detail research) measure almost indefinitely indirect benefits of road investment. However, the cost of the study might easily be higher than the cost of the road. The relevant factors in the case of the Pinheiro project were the population to be served, the agricultural area as a whole and the fact that the town of Pinheiro was developing as the marketing center for the district. The road requirements for the area were viewed from the standpoint of the area as a whole as opposed to detailed justification for each road.

Wednesday, March 18 - Maranhão - field trip to Pinheiro

Eng. Aluizio Togo, Mr. Fedox, Mr. Richard and I accompanied Dr. José Reinaldo Carneiro Tavares, Director-General of the DER/MA, on a field inspection of the BIRD financed projects in the Pinheiro area.

At Itauna we examined the road which links it to Pinheiro. The state plans to initiate in July 1970 a ferry boat service (2 boats, each capable of carrying 10 large trucks) between Itauna and São Luís across the bay. At present it is a 14 hour trip by car from Pinheiro to São Luís on state and federal roads. The ferry boat service and the present road from Itauna to São Luís will reduce this to a 2-2 1/2 hour trips.

Flying over the section of this road which enters Pinheiro, Dr. Carneiro pointed out that a large roadbed had to be built over the flat lands used extensively for cattle grazing because during the rainy season the area is almost completely inundated. Before the road was built, it was impossible for any vehicle (truck or dray-cart) to cross these areas.

On the road from Pinheiro towards Cacauzinho and the federal highway, we went beyond the presently constructed road (Class III standard) and continued on the existing municipal road. The state has "taken over" this roadway and by building over the municipal dirt road assumes responsibility for maintenance, etc. The completed state road is sufficiently wide for two trucks to pass, and is gravel surfaced and in its present condition, traffic moves easily and rapidly. At the end of the completed section, we entered on the municipal road - a one lane dirt road built over and around every imaginable feature of the topography. Because no scrapping or heavy grading were involved in the construction of this road, the road's path was rather tortuous and had it been raining I doubt if any vehicle could have driven on the earth surface.

In Pinheiro we spoke to a number of citizens at random and a local dry goods store owner. I have summarized some of their comments below.

[The road from Pinheiro to Santa Helena (41 kms) was completed in mid-1969].

1. A bus company was formed in late 1969 consisting of two buses for the Pinheiro-Santa Helena run. Because of the demand (apparently) the company has recently "announced" that four additional buses are to be purchased, two of which will be used on a new route (Alcântara-Pinheiro) and two will be added to the Santa Helena-Pinheiro run.
2. The store owner now receives an increasing proportion of this business from people in Santa Helena who come to Pinheiro for the markets, etc. He purchases his wares every other month in São Luís. A few years ago he used to go for a week, almost all travel time. The federal road around the bay (400-450 kms) was improved so now it takes him a day and half by bus. When the ferry service opens and the road to Itauna is completed he plans to go and return in one day.
3. I was told that the attendance in one secondary school in Pinheiro has tripled in the last year. A large part of the increase was attributed to the commuting students from the Santa Helena area which has no secondary school facilities. In the past, students from outside Pinheiro had to board with family and friends in order to attend secondary school. We were unable to visit the school and discuss this matter because of time constraints.

From Pinheiro we drove to São Bento and flew from there to São Luís.

Thursday, March 19 - Teresina, Piauí

In the morning Eng. Togo, Mr. Richard and I drove from São Luiz to Teresina on the newly paved RR-135 and RR-316 highways.

In the afternoon Eng. Togo, Dr. Tabosa, Mr. Richard and I met with Eng. Carlos Wagner Leopoldo Lima, Director General of the DER/Piauí.

1. The present DER-BRDE program in Piauí consists of 19 roads (380 km total), most of which (15) are being built by contractors. The present program is part of the state's 4 year plan (1968-71) to construct 1500 kms and in so doing double the state highway network. All roads to be built under this plan are to be Category III gravel roads. The average cost of Category III roads within the BRDE program is RCr\$25,000 per kilometer.
2. No benefit/cost analysis was attempted on the road construction proposal presented by the DER to the BRDE. The economic justification consisted of a narrative description of the area including the IBGE statistics for agricultural production for the last few years. Eng. Lima claimed that these were the only readily available statistics and would be until the state Commission for Development of State Statistics was in full operation. Again SUDENE's traffic count program was mentioned but only as it applied to federal roads. My suggestion that consultants be used by the DER to study agricultural areas needing rural transport was favorably received, however, Eng. Lima suggested that this be included as part of the cost of the entire project hence eligible for financing by the BRDE program. Another alternative was to consider the costs of these studies as part of the DER's 40% contribution in projects approved by the BRDE.
3. Eng. Lima fully approved of the BRDE's present operations (i.e. loan terms, tying National Highway Fund resources, inspections, etc.) SUDENE had not entered into the present program and Eng. Lima felt that if they did require states to seek their approval of future programs this would delay procedures somewhat.

With Eng. Lima we made a courtesy call on the Governor of Piauí.

Friday, March 20 - Teresina Field Trip

All the ENDE projects in Piauí are relatively short roads (5-25 km) which link municipal centers directly to BR-316. A few kilometers out of Teresina the paving on BR-316 ends but the Army and the DNER are still working on the road.

Two of the roads which we inspected were the 5 km road into the community of Agricolândia and the 24 km road into Hugo, Napoleão.

1. The first person we talked to in Agricolândia asked the Director General of the DER when a new road would be constructed to Água Branca, a larger community about 10 kms away on another federal highway. Literally everyone we talked with on this field trip had recommendations for new roads to be built. The reason usually given was that an extension of the new road through their community to the other trunk highway would provide important linkage between the main roads and increased access for them to other markets and, of course, more traffic through their community.
2. We discussed with a group truckers and farmers in both towns the new federal and state roads and what they thought some of the benefits had been to them. We got all sorts of opinions and impressions, for example: cattle were increasing being carried by trucks to Picos (large market center on BR-316) instead of being driven in herds by man on horseback (we did encounter on BR-316 large cattle trucks as well as the cattle herds being driven to market); travel times had been drastically cut; new communities had been formed at intersections, and new gas stations, etc; a bus line now enters Agricolândia; the number of sales representatives who call on store owners have increased; etc.

Trip Observations

1. The ENDE program, in these states at least, has forced the DERs to focus on the state network to be built or improved in a specific or limited area as opposed to roads scattered throughout the state. The DER/DARA has made use of area research which has been completed by a state planning agency. The DER/PA used consultants for essentially

the same purpose. Data exists for agricultural production for each municipality, although opinions vary as to the accuracy of this information.

2. Indirect benefits, (bus transport, school attendance, etc.) wholly or partially attributed to the investment in roads, can be observed post facto to measure each of these benefits would be very difficult as would be an attempt to predict what each might be.
3. The states visited are very interested in an expanded FIDEL program and have additional proposals ready for presentation to the FIDEL.
4. The FIDEL and HED will have to establish agreement on the work procedures. It is our feeling that HED will not be able to directly assist states in the preparation of proposals.

The states' expenses related to project preparation (costs for site & economic studies, other studies, research) could be included in the overall project cost of a FIDEL approved project. This cost could be considered as part of the state's 40% project share by agreement. This issue should be raised in UNAD meetings with the FIDEL.

Copies to:
ARBE, Johnson (Vice President)
COSTA, Robert (Director)
FARMER, John (Director)
HED: [unclear]
ADRI, Pedro, [unclear]
IRISH, William, [unclear]

COPY: [unclear]

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the same purpose. Data exists for agricultural production for each municipality, although opinions vary as to the accuracy of this information.

2. Indirect benefits, (bus transport, school attendance, etc.) wholly or partially attributed to the investment in roads, can be observed post facto to measure each of these benefits would be very difficult as would be an attempt to predict what each might be.
3. The states visited are very interested in an expanded IDI program and have additional proposals ready for presentation to the IDI.
4. The IDI and UNCTAD will have to reach some agreement on the review procedure. It appears that UNCTAD will not be able to directly assist states in the preparation of proposals.
5. The state's expenses related to project preparation (consultants, economic studies, other studies, research) could be included in the overall project cost of IDI approved projects. This cost could be considered as part of the state's IDI project financing package. This issue should be raised in UNCTAD and with the IDI.

Copies to:
AMB: Tolson (Van Dellen)
CO: [unclear] (Ritter)
E: [unclear] (Richard)
D: [unclear]
ADD: [unclear], [unclear]
DRC: [unclear], [unclear]

CHESH: [unclear]

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