5120272-(5)

PD-AAA-308-A1

LIMITED OFFICIAL USE

1210

DEPARTMENT OF STATE

AGENCY FOR INTERNATIONAL DEVELOPMENT
Washington 25, D.C.

DEVELOPMENT LOAN PAPER

Proposal and Recommendations
For the Review of the
Development Loan Committee

BRAZIL - COMBINED HIGHWAY PROJECT

512-22-310-272
512-L-015

AID-DLC/P-165

LIMITED OFFICIAL USE

6/13/77

DEPARTMENT OF STATE
AGENCY FOR INTERNATIONAL DEVELOPMENT
Washington 25, D.C.

LIMITED OFFICIAL USE

AID-DLC/P-165
Revised June 25, 1963

MEMORANDUM FOR THE DEVELOPMENT LOAN COMMITTEE

SUBJECT: Brazil - Combined Highway Project

Attached are revised pages to be inserted in the loan paper for this project.

The recommendations for authorization of a loan in an amount not to exceed $11,000,000 to the Superintendencia de Desenvolvimento de Nordeste (SUDENE) to assist in financing the costs of goods, materials and services to construct or improve 182 miles of state highways of Northeast Brazil were discussed by the Development Loan Staff Committee at its meeting on June 21, 1963 and are scheduled for discussion by the Development Loan Committee at its meeting on June 28, 1963.

Walton C. Groce
Secretary
Development Loan Committee

Attachments: (Revised)
Summary and Recommendations
Project Analysis, pp 5, 6, 8, 9, 12, 13 and 14
Annex IV

Previously Distributed:
Summary and Recommendations
Project Analysis
Annexes I-IV

LIMITED OFFICIAL USE

LIMITED OFFICIAL USE
AID-DLC/P-165
June 18, 1963

NORTHEAST BRAZIL

SUDENE - COMBINED HIGHWAY PROJECT

TABLE OF CONTENTS

NORTHEAST BRAZIL

SUDENE - COMBINED HIGHWAY PROJECT

SUMMARY AND RECOMMENDATIONS

1. BORROWER: The Superintendencia de Desenvolvimento de Nordeste (SUDENE), the Superintendency of Development in Northeast Brazil. The State Highway Departments of the relavent States will be sub-borrowers of the cruzeiros into which the dollar proceeds of the loan will be converted, and will carry out the respective highway projects.

2. AMOUNT OF THE LOAN: A loan of up to $11,000,000. Total costs of the six projects combined in this loan are presently estimated at Cr $5,160 million. At the time of the sub-loan applications (Mid-April, 1963) this represented $11,200,000 at the then prevailing official rate of exchange (Cr $460=$1.00). A devaluation of April 23 (to Cr $600=$1.00) theoretically reduced the need in foreign exchange to $8.6 million. However, because of the tendency for the official exchange rate to lag behind internal prices in Brazil, the most realistic loan figure which will insure that the project be fully funded, is the approximate dollar figure applied for.

   Dollar proceeds will be made available through special letters of credit which can only be used for U.S. procurement. The counter value of these proceeds will be made available by SUDENE (See Financial Analysis).

   Between 95 and 100% of project costs will be paid in local currency. Some procurement of U.S. engineering services up to a maximum of 5% of project costs, may occur.

3. TOTAL COST OF PROJECT:

   (a) SUDENE target investment in roads,

   NE Brazil, 1961-65: $194,000,000 (Cr $89,393 million)1/

   (b) Portion of (a) assigned to State

   Highways: $ 50,700,000 (Cr $23,330 million)

(c) Portion of (b) composed by

This project: $ 11,200,000 (Cr $ 5,160 million)

4. PURPOSE: To cover the combined total costs of goods, materials and services to improve 303 kms (182 miles) of state highways in 5 states of Northeast Brazil which are part of the five year Northeast Highway Development program.

BACKGROUND: By agreement dated April 13, 1962, the U.S. agreed to make available to the Government of Brazil during a period of 2 years, $131,000,000, in dollars and cruzeiros, toward implementation of the Northeast Five Year Plan of development as formulated by SUDENE, an agency of the Brazilian Government. The Plan allocated substantial sums to the development of highways and the present loan, if approved by AID, will apply against AID's 2 year commitment.

The specifications, cost and preparatory engineering on these road projects have been reviewed by a team of representatives of the U.S. Bureau of Public Roads (BPR) during a special tour of duty in Northeast Brazil just completed. The BPR group finds the projects adequately prepared and technically feasible and recommends approval by AID.

6. PROJECT DESCRIPTION: The project is the construction, surfacing and/or paving of 126 kms of state highway on routes MA-51 and MA-15 in Maranhao (2 projects); 33 kms on route PB-1 in Paraiba; 50 kms on route RN-4 in Rio Grande do Norte; 44 kms on route AL-13 in Alagoas; 50 kms on route CE-35 in Ceara. All construction contracts will be let by public bidding.

The project constitutes some 6% in value of a $194 million five year program of highway development being carried on under SUDENE in Northeast Brazil. The balance of program costs will be derived directly from SUDENE, from the various states' budgets, and from further borrowings.

AID considers the SUDENE road program as an excellent example of self-help.

1/ Exchange rate Cr $460 = $1.00 used to establish compatability between these figures and loan amount.

7. AVAILABILITY OF ALTERNATIVE FINANCING: The Inter-American Development Bank is not interested in this project. The Export-Import Bank has also informally advised that it is not interested in the project, and official confirmation of this position is expected in the near future. 1/ No other source of financing, including the use of PL-480 proceeds, are available.

8. VIEWS OF COUNTRY TEAM: The country team recommends this combined project.

9. STATUTORY CRITERIA: The statutory criteria have been satisfied. (See Annex II).

10. ISSUES:

Relation of this Loan to Pending Application for Maintenance Equipment: AID plans to propose a loan for maintenance equipment which will be used on some of the highways to be constructed under the present project. In order that the loan proposed in this paper may not indirectly commit the U. S. Government to the maintenance equipment loan, this loan will require, as a condition precedent to disbursement, that the respective sub-borrowers satisfy AID that appropriate arrangements have been made for provision of adequate maintenance. In the event that AID makes the maintenance equipment loan, this condition will automatically be satisfied. In the event that such a loan is not made, AID will not be obligated to disburse funds for roads which cannot be properly maintained.

1/ Received on June 18, 1963.

11. RECOMMENDATIONS: Authorization of a loan to SUDENE for an amount not to exceed $11,000,000.

(a) The Borrower shall be obligated to repay the loan in United States dollars within forty (40) years from the first disbursement under the loan, including a grace period of ten years.

(b) The Borrower shall pay a credit fee in United States dollars of three quarters of one (3/4 of 1) percent per annum on the disbursed portion of the loan.

(c) The loan shall be secured in a manner satisfactory to AID.

(d) Dollars utilized under the loan to finance local currency costs shall be made available through Special Letter(s) of Credit and shall be only for procurement in the United States.

(e) As conditions precedent to disbursement, AID will require:

(1) Arrangements satisfactory to AID whereby cruzeiros will be made available to the project, in counter value to disbursement of dollars.

(2) Employment by each sub-borrower of a qualified technical consultant, satisfactory to AID, to advise and assist in carrying out the respective project.

(3) Evidence satisfactory to AID that arrangements have been made for maintenance of the roads to be constructed under this loan.

(f) Such other terms and conditions as AID may deem advisable.

Project Committee:

Loan Officer: R. T. Murphy
Counsel : H. Adelman
Engineer : B. Watkins
Consultant : E. G. Burland
Desk Officer: S. J. Gionfriddo

Drafting Officers:
R. T. Murphy
S. J. Gionfriddo
H. Adelman

LIMITED OFFICIAL USE
AID-DLC/P-165
Revised, June 25, 1963

NORTHEAST BRAZIL

SUDENE - COMBINED HIGHWAY PROJECT

I. PLACE OF PROJECT IN PROGRAM

Northeast Brazil is the most extensive populated area in the Western Hemisphere with an income level of less than $100 per capita. In all states of the Northeast, per capita income falls well below the Brazilian average. The disparity of income levels between the Northeast and the Center-South of the country constitutes one of the most serious problems to be faced at the present stage of Brazil's economic development. Much of the population of the Northeast is depressed and frustrated over prospects for a rapid improvement in living conditions and changes in the existing social order and, therefore, is inclined to favor radical solutions to their problems.

On April 13, 1962, Brazil and the United States concluded a General Agreement to assist in the development of Northeast Brazil. The United States will lend a total of $131 million (within two years) while the GOB will put in $145 million. The program is designed to bring about some immediate social and economic improvements while laying the foundation for the region's long-range development. As of June 15, 1963, $30,829,216 had been obligated. By the end of June it is expected that a total of about $44.0 million ($16.7 million in dollars, 27.3 million in cruzeiros) will have been obligated leaving approximately $87.0 million to be obligated in FY 1964. It is estimated that the equivalent of approximately $40,000,000 in dollars and cruzeiros will be ready for commitment during the first quarter of FY 1964.

Improvement of the areas highway system has been assigned a very high priority by United States and Brazilian authorities (SUDENE) engaged in Northeast Development efforts. The total five-year SUDENE highway program will cost save $194 million, part of which will be privided by SUDENE, part by the State, and part by loan-financing. In 1962, for example, AID understands that SUDENE allocated $5.2 million and disbursed $3.2 million for highway construction.

The six roads which will be financed by the loan are parts of the states' road systems, which supplement the federal road network. All roads financed by the loan will improve communication between rural agricultural and urban areas, and presumably, therefore, will increase rural incomes and the availability of food supplies in the urban areas.

NORTHEAST BRAZIL

SUDENE - COMBINED HIGHWAY PROJECT

II. THE PROJECT

A. Borrower

The Superintendency for the Development of the Northeast (SUDENE) is the Brazilian Government's agency for the planning, facilitating and coordinating of public and private investment in the nine states of Northeast Brazil. SUDENE formulates development policies for the Northeast, supervises execution of developmental projects, executes certain projects itself and in general coordinates all national and foreign assistance for the Northeast. It was created by Law No. 3,692 of December 15, 1959. SUDENE is directly under the Brazilian Head of Government, and has its headquarters in Recife, Capital of the State of Pernambuco.

SUDENE is governed by a Deliberative Council of 25 including (1) ex officio, the Superintendent, the head of the Government agency to combat droughts, and the head of the power commission controlling the Sao Francisco Valley hydro-electric development (2) the Governors of the nine Northeast States (3) representatives of the eight principal federal ministries and (4) representatives of the National Bank for Economic Development, the Bank of Brazil, the Bank of Northeast Brazil, the Sao Francisco Hydro-Electric Co. at Paulo Afonso and the General Staff of the Armed Forces.

SUDENE has stressed the importance of private enterprise and its studies have revealed an ample industrial potential in the Northeast. In the development of private investment SUDENE looks to the Bank of Brazil and the Bank of Northeast Brazil for close cooperation, as these institutions, among others, are charged by law to coordinate their regular investment budget and investment activities with SUDENE's private investment priorities.

SUDENE's resources consist of a minimum of 2% of Brazil's national budgetary revenues (based on the previous year's collection); half of local currency premiums arising out of the official auction of foreign exchange received from the export of goods produced in the Northeast; and, finally, allocations from other federal agencies, special funds, earmarked budgetary revenues or special budgetary appropriations. In 1962, for example, SUDENE's budget was $70,000,000.

B. Northeast Brazil: Five Year Plan for Development

1. General

Northeast Brazil, as delineated for development purposes, comprises an area of 597,000 square miles equal to the area of Central America. It is composed of 9 states with a (1960) population of 22,427,000. It represents 17.6% of Brazil in area and 33.9% in population. It receives only 14.5% of Brazil's national income, which amounts to the equivalent of about $95 per capita per year for the region as an whole; for Ceara, of which Fortaleza is the Capital, the per capita income is $62. Northeast Brazil has been described as the largest populated area in the Western Hemisphere with per capita income under $100. 80% of the area income is derived from agriculture.

SUDENE's Five Year Plan of development 1961-65 aims at (1) creating an economic infra-structure as a prerequisite to sustained growth; (2) providing other than agricultural horizons in the developmental process; (3) introducing carefully selected projects which will have special impact on standards of living in the urban areas; and (4) to encouraging and intensifing industrial investment in the private sector.

Under an agreement dated April 13, 1962 between the Government of Brazil and the U.S., the latter agreed to make available in loans and grants over a period of two years, the amount of $131,000,000 in dollars and cruzeiros to assist in carrying out the Northeast Five Year Plan of development. If AID approves the subject loan proposal, it will apply against this commitment. As of June 15 1963, some $30 million in funds had been made available under the commitment.

SUDENE's target investment in roads for the 5 year period 1961-65 is Cr $89,393 million, or at Cr $460 = $1.00, about $194,000,000. 1/ This will be devoted to federal highways and to state highways. The total length of state highways in the Northeast region as of September 1960 was 13,281 kms of which 12,905 kms had a silicon-clay surface or natural roadbed, while only 373 kms or 2.8% had been paved.

Of the total Cr $89 million program, SUDENE plans to devote Cr $23,330 million to building state roads, and the balance to federal roads.

2. This Project: Costs

The six projects making up the present proposal are included in the state road total. Estimated costs were prepared by SUDENE in 1960 when the Five Year Plan, 1961-5, was formulated. In comparing such former estimates with the estimates, as shown in the present project, it should be noted that there has been a threefold increase since 1960 in the cost of materials and services in Northeast Brazil and that, in costing the present projects, 10% to 15% has been added for contingencies and 3 ½% to 5% for consulting engineering services. Costs of the present project are summarized as follows:

1/ The exchange rate of Cr $460 - $1.00, which prevailed until April 23, 1963, is used throughout the paper to ensure compatibility with the dollar amount of the loan recommended. As noted in the Summary and Recommendations and in the Financial Analysis, the old exchange rate is used by AID in determining the loan level as a technique of securing adequate funding of the project. In general, and over the long run, adjustments in the official exchange rate reflect internal inflation and allow the dollar equivalent cost of highway projects to remain relatively stable. However, at any given moment in time, the exchange rate adjustment may lag, thus creating a temporary but real rise in dollar equivalent costs.

	Highway Number	Kms	000,000's of Cr$s	000's US$
Maranhao	MA-51	53	447	970
Maranhao	MA-15	73	1,171	2,540
Paraiba	PS-1	33	690	1,500
Rio Grande do Norte	RN-4	50	920	2,000
Alagoas	AL-13	44	1,242	2,700
Ceara	CE-35	50	690	1,500
		303	Cr$ 5,160	$ 11,210

C. National Highway Department of Brazil (DNER)

There are about 1,000 kms of paved national highways, bearing BR route numbers, which traverse Northeast Brazil. It is planned by the Departamento Nacional de Estradas de Rodagem (DNER) to increase the paved portions of the national network to about 6,000 kms within the period of SUDENE's 1961-65 Plan. The National highway system depends on national resources for expansion and improvement of the network. DNER is a large relatively efficient organization staffed with competent engineers. It sets national standards and specifications for all highway construction, participates in the formulation of highway development plans, and each year schedules the work to be done for which it has funds available. However, in practice, it negotiates arrangements with the several state highway departments to contract-out the actual work and to supervise its execution.

D. State Highway Departments: Execution of Projects

The projects financed by this loan will be executed by the several state highway departments. All State Highway Departments in Northeast Brazil are legally constituted state agencies responsible for the design, construction, maintenance and operation of the respective state highway systems.

The basic organizational structure of these agencies is similar to that of an analagous US highway agency in a low to medium population state. The various sources of revenues are likewise similar to those of an analagous US state agency, i.e., National

Highway Fund allocations, State transportation taxes, interest on bank deposits, traffic fines, surplus sales, etc.

Each of the States participating in the present combined loan project has been visited by a team of BPR highway engineers recently on TDY in Northeast Brazil. A major objective of these visits was on-the-site evaluation of the technical competence of these agencies with respect to personnel, administrative capability, specialized establishments (maintenance, laboratory, tec.) and actual operational experience. It was the conclusion of these BPR specialists that the several state agencies concerned are competent to undertake and discharge satisfactorily their technical responsibilities related to the proposed projects.

E. Project Description

The highways to be constructed under this loan are described below:

Highway	Nature and Purpose

1. MA-51 (Maranhao) This is a penetration highway, replacing an existing road open only during the dry season. The new road will accomodate traffic during all seasons, and will connect a rich agricultural area with the industrial center of Maranhao.

2. MA-15 (Maranhao) This highway is half of an all weather route being constructed to service an area of new settlement, which is expected to have some 125,000 families within five years. The State is building the other road section.

3. PB-1 (Paraiba) This project will extend paved surfacing to connect a rich agricultural area with the state capital and industrial center. The highway will serve some 100,000 rural people.

4. RN-4 (Rio Grande do Norte) This project will allow improvement of a well-travelled existing earth-surfaced road. The road is part of the route from the State Capital to important sisal and mineral producing areas.

5. AL-13 (Alagoas) This is a penetration highway which will link the State's major rice-producing area with the main road network.

6. CE-35 (Ceara) This is a project to improve (including paving) an existing road which connects the important commercial-industrial-agricultural area of Crato/Juazeiro with the main highway system. The project will serve over 100,000 people.

F. Engineering and Economic Analysis

The engineering and economic analysis of the six highway projects combined in the present project, is contained in six separate technical reports (Annex III, Exhibits 1 through 6), which include detailed project descriptions, maps, construction schedules, itemized cost estimates, cost-benefit ratios, where applicable, and other economic data. These are the loan applications of the sub-borrowers as submitted by the state highway departments to SUDENE. The sub-borrowers presented these applications only after they were reviewed and revised by the US BPR Group. Each paper contains the statement in which the U.S. BPR Group and AID concur, that the proposed project has been prepared and will be carried out in accordance with the requirements of FAA Sec. 201 and FAA Sec. 611.

The USAID and AID/W are satisfied that the project will make a substantial, economically justified, contribution to the development of the 5 states involved. The applications all evidence economic soundness. Cost-benefit ratios have been made where applicable, and are favorable.

As indicated in the applications, maintenance arrangements for three of the highway segments to be constructed are good, and the BPR is satisfied that these roads can be maintained adequately. However, additional maintenance equipment is needed to ensure proper maintenance on the three remaining roads (Paraiba: PB-1, Algoas: AL-13, and Ceara: CE-35). AID will shortly propose a loan to finance highway maintenance equipment, to be used in part to strengthen the highway departments constructing the above-referenced roads. However, to avoid commiting AID to make such an equipment loan at this time, and to ensure adequate maintenance for these three roads in any event, AID will require as a condition precedent to disbursement under this loan that the sub-borrowers furnish satisfactory evidence that adequate maintenance will be provided. In the event that the equipment loan is not made, then funds under the present loan would not be disbursed to the cited highway departments until such time as alternative arrangements were made for providing adequate maintenance facilities.

G. Financial Analysis

The total combined cost of the proposed project is presently calculated at Cr$5,160 million. The funds will be required almost entirely in cruzeiros, as only the consulting engineers, who may be from the US, would be paid in dollars. Since US owned cruzeiro funds are not available from counterpart sources, the Country Team recommends that the proposed loan be made in dollars. 1/

With regard to the financing of cruzeiro costs, United States dollar proceeds of the loan shall be made available to the Government of Brazil, or its designee, through special letters of credit from time to time which can only be used for procurement in the United States of goods and services of United States origin. The United States dollar amounts of such special letters of credit will correspond to SUDENE's combined quarterly requirements of cruzeiros, estimated in advance, to carry out the projects. Simultaneously with the opening of such special letters of credit the Government of Brazil or its designee will pay to SUDENE the counter value thereof in cruzeiros. Separate amounts of cruzeiros will thereupon be advanced by SUDENE to the respective State Highway departments under separate sub-loan agreements. The State Highway departments will repay the principal and credit fee on the loans to SUDENE in cruzeiros when due, on the same terms as are accorded SUDENE by AID.

In order to establish a dollar amount for the loan, the cruzeiro costs of Cr$5,160 million, stated above, were converted into dollars at Cr$460 = $1,00, which was the ruling rate when the cost estimates were prepared, resulting in a rounded loan application figure of $11,200,000. On April 23, 1963 the Brazilian Government changed the corresponding official exchange rate to Cr$600 = $1.00, and conversion at this rate would result in a dollar loan figure of $8.6 million. It may be assumed that costs in Brazil will tend to rise over the 2 to 3 years which will be required to carry out the project, and that future changes in official exchange rates may tend to lag behind price rises. It is, in fact, the established practice of the State Highway Departments, when contracting-out highway work, to permit a review of price every 3 months and to adjust contract payments in accordance with fluctuations in the costs of materials and services.

1/ All presently available cruzeiro balances have been committed, although final obligation and/or disbursements are slow. Under the Second Sales Agreement Cr$1.3 billion are undisbursed, but committed to the Banco Nacional do Desenvolvimento Economico (BNDE). Under the Third Sales Agreement Cr.$11.7 billion are undisbursed but committed to BNDE. Under the Fourth Sales Agreement Cr.$19.0 billion had been deposited by May 15, 1963, and an additional Cr.$9 billion is expected to be deposited. By May 15, Cr.$9.3 billion had been committed to BNDE and Cr.$10.8 billion to SUDENE; in addition Cr.$6.0 billion are reserved in the Sales Agreement for the private sector, and another Cr.$1.3 billion has been programmed for Goias.

Price inflation in Brazil recently appears to be from 30% to 40% per year, but there is no accurate way to estimate the probable rise nor to predict official changes in the exchange rates in the near future. It appears relatively safe to assume that the dollar equivalent cost of the project calculated at the old exchange rate ($11.2 million) is a cost near the upper limit which might occur, since the 460 rate was very much out of line with the free rate. On the other hand, the dollar equivalent cost calculated at the present exchange rate ($8.6 million) represents possibly the lowest dollar figure, which will rapidly become insufficient as inflation continues, and the legal rate of exchange lags behind. The safest approach, to ensure adequate project funding, is to select a loan amount close to the higher figure. Thus, AID is recommending a loan amount of up to $11 million (i.e. $11.2 million rounded to the nearest unit million). Any amount of dollars remaining unused in the loan account, when the projects are completed, can and will be cancelled. Since disbursements will be linked to contracts approved by AID, no excess funds would be available to the Borrower or sub-borrower in the event that the loan should prove to be overfunded.

There is no problem as to repayment by the sub-borrowers. The favorable terms of the AID loan (40 years repayment, 10 years grace, at 3/4%) will be passed on by SUDENE to the respective State highway departments. Because of the terms, and because of the distribution of loan proceeds among five highway departments, the annual amounts due on principal and interest are relatively small. Thus, the largest amounts due will come from the State of Maranhao, where principal and interest will total approximately $150,000 annually. Since the various State highway departments have assured sources of funds (National Highway Fund allocations, State transportation taxes, traffic fines, etc.) there is no question as to the ability of the sub-borrowers to repay the loan. AID would offer no objection, however, if SUDENE should make loan proceeds available to the respective highway departments on a basis of grant, or non-maintenance of dollar value. Either alternative would, of course, greatly reduce the obligations of the states.

AID will demand that appropriate security be provided for repayment of the dollar loan. It is not clear at this point as to the type of security which SUDENE can supply (e.g. its general credit, credit of the GOB, guaranty, etc.). Therefore, this provision is worded in general terms in the Recommendations and in the Loan Authorization, so that AID may work out details at a later date.

III. EFFECT ON THE U. S. ECONOMY

Implementation of the project will have no direct effect on the U. S. economy, except a possible procurement of a small amount of U. S. engineering services. On the other hand, all dollar proceeds of the loan will be spent in the U. S. and will therefore, have a direct positive effect on the U. S. economy.

The project will not be in competition with US enterprise.

IV. ISSUES

Relation of this Loan to Pending Application for Maintenance Equipment: AID plans to propose a loan for maintenance equipment which will be used on some of the highways to be constructed under the present project. In order that the loan proposed in this paper may not indirectly commit the U. S. Government to the maintenance equipment loan, this loan will require, as a condition precedent to disbursement, that the respective sub-borrowers satisfy AID that appropriate arrangements have been made for procision of adequate maintenance. In the event that AID make the maintenance equipment loan, this condition will automatically be satisfied. In the event that such a loan is not made, AID will not be obligated to disburse funds for roads which cannot be properly maintained.

LIMITED OFFICIAL USE
AID-DLC/P-165
June 17, 1963

NORTHEAST BRAZIL

SUDENE - COMBINED HIGHWAY PROJECT

SUMMARY AND RECOMMENDATIONS

1. BORROWER: The Government of Brazil, either directly or through an appropriate agency. If possible, the loan will be extended directly to the Superintendencia de Desenvolvimento de Nordeste (SUDENE), the Superintendency of Development in Northeast Brazil. The State Highway Departments of the relavent States will be sub-borrowers of the cruzeiros into which the dollar proceeds of the loan will be converted, and will carry out the respective highway projects.

2. AMOUNT OF THE LOAN: A loan of up to $11,000,000. Total costs of the six projects combined in this loan are presently estimated at Cr $5,145 million. At the time of the sub-loan applications (Mid-April, 1963) this represented $11,200,000 at the then prevailing official rate of exchange (Cr $460=$1.00). A devaluation of April 23 (to Cr $600=$1.00) theoretically reduced the need in foreign exchange to $8.6 million. However, because ofthe tendency for the official exchange rate to lag behind internal prices in Brazil, the most realistic loan figure which will insure that the project be fully funded, is the approximate dollar figure applied for.

   Dollar proceeds will be made available through special letters of credit which can only be used for U. S. procurement. The counter value of these proceeds will be made available by, or through SUDENE (See Financial Analysis).

   Between 95 and 100% of project costs will be paid in local currency. Some procurement of U. S. engineering services up to a maximum of 5% of project costs, may occur.

3. TOTAL COST OF PROJECT:

   (a) SUDENE target investment in roads,

   NE Brazil, 1961-65: $194,000,000 (Cr $89,393 million)1/

   (b) Portion of (a) assigned to State

   Highways: $ 50,700,000 (Cr $23,330 million)

(c) Portion of (b) composed by

This project: $ 11,200,000 (Cr $ 5,145 million)

4. PURPOSE: To cover the combined total costs of goods, materials and services to improve 303 kms (182 miles) of state highways in 5 states of Northeast Brazil which are part of the five year Northeast Highway Development program.

5. BACKGROUND: By agreement dated April 13, 1962, the U. S. agreed to make available to the Government of Brazil during a period of 2 years, $131,000,000, in dollars and cruzeiros, toward implementation of the Northeast Five Year Plan of development as formulated by SUDENE, an agency of the Brazilian Government. The Plan allocated substantial sums to the Development of highways and the present loan, if approved by AID, will apply against AID's 2 year commitment.

The specifications, cost and preparatory engineering on these road projects have been reviewed by a team of representatives of the U. S. Bureau of Public Roads (BPR) during a special tour of duty in Northeast Brazil just completed. The BPR group finds the projects adequately prepared and technically feasible and recommends approval by AID.

6. PROJECT DESCRIPTION: The project is the construction, surfacing and/or paving of 126 kms of state highway on routes MA-51 and MA-15 in Maranhao (2 projects); 33 kms on route PB-1 in Paraiba; 50 kms on route RN-4 in Rio Grande do Norte; 44 kms on route AL-13 in Alagoas; 50 kms on route CE-35 in Ceara. All construction contracts will be let by public bidding.

The project constitutes some 6% in value of a $194 million five year program of highway development being carried on by SUDENE in Northeast Brazil. The balance of the program, i.e. 94% is being accomplished through funds made available from SUDENE. Of the total SUDENE program, some 60% of funds will be used for federal highways and the balance for state highways.

AID considers the SUDENE road program as an excellent example of self-help.

1/ Exchange rate Cr $460 = $1.00 used to establish computability between these figures and loan amount.

7. AVAILABILITY OF ALTERNATIVE FINANCING: The Inter-American Development Bank is not interested in this project. The Export-Import Bank has also informally advised that it is not interested in the project, and official confirmation of this position is expected in the near future. No other source of financing, including the use of PL-480 proceeds, are available.

8. VIEWS OF COUNTRY TEAM: The country team recommends this combined project.

9. STATUTORY CRITERIA: The statutory criteria have been satisfied. (See Annex II).

10. ISSUES:

Identity of Borrower: The loan application was submitted by SUDENE. However, evidence available to AID indicates that SUDENE may not have borrowing authority, although legislation conveying it is known to be under consideration by the Brazilian Parliament. In order to provide AID with the flexibility necessary to extend the loan either to SUDENE, to another appropriate GOB agency, or to the GOB itself, as the facts may warrant, the Borrower has been defined in general rather than specific terms in the loan authorization. If possible, the loan will be extended directly to SUDENE.

Security for Loan: AID will require that the loan be effectively secured. However, since the nature of the appropriate security (e.g. guaranty, general credit of the borrowing entity) will vary with the identity of the Borrower, this requirement is phrased in general rather than specific terminology in the loan authorization.

Relation of this Loan to Pending Application for Maintenance Equipment: AID plans to propose a loan for maintenance equipment which will be used on some of the highways to be constructed under the present project. In order that the loan proposed in this paper may not indirectly commit the U. S. Government to the maintenance equipment loan, this loan will require, as a condition precedent to disbursement, that the respective sub-borrowers satisfy AID that appropriate arrangements have been made for provision of adequate maintenance. In the event that AID make the maintenance equipment loan, this condition will automatically be satisfied. In the event that such a loan is not made, AID will not be obligated to disburse funds for roads which cannot be properly maintained.

11. RECOMMENDATIONS: Authorization of a loan to the Government of Brazil or an agency thereof for an amount not to exceed $11,000,000.

(a) The Borrower shall be obligated to repay the loan in United States dollars within forty (40) years from the first disbursement under the loan, including a grace period of ten years.

(b) The Borrower shall pay a credit fee in United States dollars of three quarters of one (3/4 of 1) percent per annum on the disbursed portion of the loan.

(c) The loan shall be secured in a manner satisfactory to AID.

(d) Dollars utilized under the loan to finance local currency costs shall be made available through Special Letter(s) of Credit and shall be only for procurement in the United States.

(e) As conditions precedent to disbursement, AID will require:

(1) Arrangements satisfactory to AID whereby cruzeiros will be made available to the project, in counter value to disbursement of dollars.

(2) Employment by each sub-borrower of a qualified technical consultant, satisfactory to AID, to advise and assist in carrying out the respective project.

(3) Evidence satisfactory to AID that arrangements have been made for maintenance of the roads to be constructed under this loan.

(f) Such other terms and conditions as AID may deem advisable.

Project Committee:

Loan Officer: R. T. Murphy
Counsel : H. Adelman
Engineer : B. Watkins
Consultant : E. G. Burland
Desk Officer: S. J. Gionfriddo

Drafting Officers:

R. T. Murphy
S. J. Gionfriddo
H. Adelman

LIMITED OFFICIAL USE
AID-DLC/P-165
June 18, 1963

NORTHEAST BRAZIL

SUDENE - COMBINED HIGHWAY PROJECT

I. PLACE OF PROJECT IN PROGRAM

Northeast Brazil is the most extensive populated area in the Western Hemisphere with an income level of less than $100 per capita. In all states of the Northeast, per capita income falls well below the Brazilian average. The disparity of income levels between the Northeast and the Center-South of the country constitutes one of the most serious problems to be faced at the present stage of Brazil's economic development. Much of the population of the Northeast is depressed and frustrated over prospects for a rapid improvement in living conditions and changes in the existing social order and, therefore, is inclined to favor radical solutions to their problems.

On April 13, 1962, Brazil and the United States concluded a General Agreement to assist in the development of Northeast Brazil. The United States will lend a total of $131 million (within two years) while the GOB will put in $145 million. The program is designed to bring about some immediate social and economic improvements while laying the foundation for the region's long-range development.

Improvement of the area's highway system has been assigned a very high priority by United States and Brazilian authorities (SUDENE) engaged in Northeast Development efforts.

The six roads which will be financed by the loan are parts of the states' road systems, which supplement the federal road network. All roads financed by the loan will improve communication between rural agricultural and urban areas, and presumably, therefore, will increase rural incomes and the availability of food supplies in the urban areas.

NORTHEAST BRAZIL

SUDENE - COMBINED HIGHWAY PROJECT

II. THE PROJECT

A. Borrower

The Superintendency for the Development of the Northeast (SUDENE) is the Brazilian Government's agency for the planning, facilitating and coordinating of public and private investment in the nine states of Northeast Brazil. SUDENE formulates development policies for the Northeast, supervises execution of developmental projects, executes certain projects itself and in general coordinates all national and foreign assistance for the Northeast. It was created by Law No. 3,692 of December 15, 1959. SUDENE is directly under the Brazilian Head of Government, and has its headquarters in Recife, Capital of the State of Pernambuco.

SUDENE has applied for the loan. However, evidence available to AID indicates that SUDENE may not have borrowing authority, although legislation which would confer such is presently under consideration by the GOB Parliament. If it should prove that SUDENE cannot legally conclude a loan agreement to AID, the loan will be made either directly to the GOB or to an appropriate agency of the GOB. In any event, loan proceeds will be made available to SUDENE, and thence to the sub-borrowers. AID/W is currently querying USAID Brazil on a priority basis as to the appropriate borrower for this project.

SUDENE is governed by a Deliberative Council of 25 including (1) ex officio, the Superintendent, the head of the Government agency to combat droughts, and the head of the power commission controlling the Sao Francisco Valley hydro-electric development (2) the Governors of the nine Northeast States (3) representatives of the eight principal federal ministries and (4) representatives of the National Bank for Economic Development, the Bank of Brazil, the Bank of Northeast Brazil, the Sao Francisco Hydro-Electric Co. at Paulo Afonso and the General Staff of the Armed Forces.

SUDENE has stressed the importance of private enterprise and its studies have revealed an ample industrial potential in the Northeast. In the development of private investment SUDENE looks to the Bank of Brazil and the Bank of Northeast Brazil for close cooperation, as these institutions, among others, are charged by law to coordinate their regular investment budget and investment activities with SUDENE's private investment priorities.

SUDENE's resources consist of a minimum of 2% of Brazil's national budgetary revenues (based on the previous year's collection); half of local currency premiums arising out of the official auction of foreign exchange received from the export of goods produced in the Northeast; and, finally, allocations from other federal agencies, special funds, earmarked budgetary revenues or special budgetary appropriations. In 1962, for example, SUDENE's budget was $70,000,000.

B. Northeast Brazil: Five Year Plan for Development

1. General

Northeast Brazil, as delineated for development purposes, comprises an area of 597,000 square miles equal to the area of Central America. It is composed of 9 states with a (1960) population of 22,427,000. It represents 17.6% of Brazil in area and 33.9% in population. It receives only 14.5% of Brazil's national income, which amounts to the equivalent of about $95 per capita per year for the region as an whole; for Ceara, of which Fortaleza is the Capital, the per capita income is $62. Northeast Brazil has been described as the largest populated area in the Western Hemisphere with per capita income under $100. 80% of the area income is derived from agriculture.

SUDENE's Five Year Plan of development 1961-65 aims at (1) creating an economic infra-structure as a prerequisite to sustained growth; (2) providing other than agricultural horizons in the developmental process; (3) introducing carefully selected projects which will have special impact on standards of living in the urban areas; and (4) to encouraging and intensifing industrial investment in the private sector.

Under an agreement dated April 13, 1962 between the Government of Brazil and the U.S., the latter agreed to make available in loans and grants over a period of two years, the amount of $131,000,000 in dollars and cruzeiros to assist in carrying out the Northeast Five Year Plan of development. If AID approves the subject loan proposal, it will apply against this commitment.

SUDENE's target investment in roads for the 5 year period 1961-65 is Cr$89,393 million, or at Cr$460 - $1.00, about $194,000,000. 1/ 60% will be devoted to federal highways and 40% to state highways. The total length of state highways in the Northeast region as of September 1960 was 13,281 kms of which 12,905 kms had a silicon-clay surface or natural roadbed, while only 373 kms or 2.8% had been paved.

Of the total CR$89 million program, SUDENE plans to devote Cr$23,330 million to building State roads, and the balance to federal roads.

2. This Project: Costs

The six projects making up the present proposal are included in the state road total. Estimated costs were prepared by SUDENE in 1960 when the Five Year Plan, 1961-5, was formulated. In comparing such former estimates with the estimates, as shown in the present project, it should be noted that there has been a threefold increase since 1960 in the cost of materials and services in Northeast Brazil and that, in costing the present projects, 10% to 15% has been added for contingencies and 3 1/2% to 5% for consulting engineering services. Costs of the present project are summarized as follows:

1/ The exchange rate of CR$460 = $1.00, which prevailed until April 23, 1963, is used throughout the paper to ensure compatibility with the dollar amount of the loan recommended. As noted in the Summary and Recommendations and in the Financial Analysis, the old exchange rate is used by AID in determining the loan level as a technique of securing adequate funding of the project. In general, and over the long run, adjustments in the official exchange rate reflect internal inflation and allow the dollar equivalent cost of highway projects to remain relatively stable. However, at any given moment in time, the exchange rate adjustment may lag, thus creating a temporary but real rise in dollar equivalent costs.

	Highway Number	Kms	000,000's of Cr$s	000's US$
Maranhao	MA-51	53	447	970
Maranhao	MA-15	73	1,156	2,509
Paraiba	PS-1	33	690	1,500
Rio Grande do Norte	RN-4	50	920	2,000
Alagoas	AL-13	44	1,242	2,700
Ceara	CE-35	50	690	1,500
		303	Cr$ 5,145	$ 11,179
				$ 11,200)

C. National Highway Department of Brazil (DNER)

There are about 1,000 kms of paved national highways, bearing BR route numbers, which traverse Northeast Brazil. It is planned by the Departamento Nacional de Estradas de Rodagem (DNER) to increase the paved portions of the national network to about 6,000 kms within the period of SUDENE's 1961-65 Plan. The National highway system depends on national resources for expansion and improvement of the network. DNER is a large relatively efficient organization staffed with competent engineers. It sets national standards and specifications for all highway construction, participates in the formulation of highway development plans, and each year schedules the work to be done for which it has funds available. However, in practice, it negotiates arrangements with the several state highway departments to contract-out the actual work and to supervise its execution.

D. State Highway Departments: Execution of Projects

The projects financed by this loan will be executed by the several state highway departments. All State Highway Departments in Northeast Brazil are legally constituted state agencies responsible for the design, construction, maintenance and operation of the respective state highway systems.

The basic organizational structure of these agencies is similar to that of an analagous US highway agency in a low to medium population state. The various sources of revenues are likewise similar to those of an analagous US state agency, i.e., National

Highway Fund allocations, State transportation taxes, interest on bank deposits, traffic fines, surplus sales, etc.

Each of the States participating in the present combined loan project has been visited by a team of BPR highway engineers recently on TDY in Northeast Brazil. A major objective of these visits was on-the-site evaluation of the technical competence of these agencies with respect to personnel, administrative capability, specialized establishments (maintenance, laboratory, tec.) and actual operational experience. It was the conclusion of these BPR specialists that the several state agencies concerned are competent to undertake and discharge satisfactorily their technical responsibilities related to the proposed projects.

E. Project Description

The highways to be constructed under this loan are described below:

Highway	Nature and Purpose

1. MA-51 (Maranhao) This is a penetration highway, replacing an existing road open only during the dry season. The new road will accomodate traffic during all seasons, and will connect a rich agricultural area with the industrial center of Maranhao.

2. MA-15 (Maranhao) This highway is half of an all weather route being constructed to service an area of new settlement, which is expected to have some 125,000 families within five years. The State is building the other road section.

3. PB-1 (Paraiba) This project will extend paved surfacing to connect a rich agricultural area with the state capital and industrial center. The highway will serve some 100,000 rural people.

4. RN-4 (Rio Grande do Norte) This project will allow improvement of a well-travelled existing earth-surfaced road. The road is part of the route from the State Capital to important sisal and mineral producing areas.

5. AL-13 (Alagoas) This is a penetration highway which will link the State's major rice-producing area with the main road network.

6. CE-35 (Ceara) This is a project to improve (including paving) an existing road which connects the important commercial-industrial-agricultural area of Crato/Juazeiro with the main highway system. The project will serve over 100,000 people.

F. Engineering and Economic Analysis

The engineering and economic analysis of the six highway projects combined in the present project, is contained in six separate technical reports (Annex III, Exhibits 1 through 6), which include detailed project descriptions, maps, construction schedules, itemized cost estimates, cost-benefit ratios, where applicable, and other economic data. These are the loan applications of the sub-borrowers as submitted by the state highway departments to SUDENE. The sub-borrowers presented these applications only after they were reviewed and revised by the US BPR Group. Each paper contains the statement in which the U.S. BPR Group and AID concur, that the proposed project has been prepared and will be carried out in accordance with the requirements of FAA Sec. 201 and FAA Sec. 611.

The USAID and AID/W are satisfied that the project will make a substantial, economically justified, contribution to the development of the 5 states involved. The applications all evidence economic soundness. Cost-benefit ratios have been made where applicable, and are favorable.

As indicated in the applications, maintenance arrangements for three of the highway segments to be constructed are good, and the BPR is satisfied that these roads can be maintained adequately. However, additional maintenance equipment is needed to ensure proper maintenance on the three remaining roads (Paraiba: PB-1, Algoas: AL-13, and Ceara: CE-35). AID will shortly propose a loan to finance highway maintenance equipment, to be used in part to strengthen the highway departments constructing the above-referenced roads. However, to avoid commiting AID to make such an equipment loan at this time, and to ensure adequate maintenance for these three roads in any event, AID will require as a condition precedent to disbursement under this loan that the sub-borrowers furnish satisfactory evidence that adequate maintenance will be provided. In the event that the equipment loan is not made, then funds under the present loan would not be disbursed to the cited highway departments until such time as alternative arrangements were made for providing adequate maintenance facilities.

G. Financial Analysis

The total combined cost of the proposed project is presently calculated at Cr$5,145 million. The funds will be required almost entirely in cruzeiros, as only the consulting engineers, who may be from the US, would be paid in dollars. Since US owned cruzeiro funds are not available from counterpart sources, the Country Team recommends that the proposed loan be made in dollars.

With regard to the financing of cruzeiro costs, [illegible] United States dollar proceeds of the loan shall be made available to the Government of Brazil, or its designee, through special letters of credit from time to time which can only be used for procurement in the United States of goods and services of United States origin. The United States dollar amounts of such special letters of credit will correspond to SUDENE's combined quarterly requirements of cruzeiros, estimated in advance, to carry out the projects. Simultaneously with the opening of such special letters of credit the Government of Brazil or its designee will pay to SUDENE the counter value thereof in cruzeiros. Separate amounts of cruzeiros will thereupon be advanced by SUDENE to the respective State Highway departments under separate sub-loan agreements. The State Highway departments will repay the principal and credit fee on the loans to SUDENE in cruzeiros when due, on the same terms as are accorded SUDENE by AID.

In order to establish a dollar amount for the loan, the cruzeiro costs of Cr$5,145 million, stated above, were converted into dollars at Cr$460 = $1,00, which was the ruling rate when the cost estimates were prepared, resulting in a rounded loan application figure of $11,200,000. On April 23, 1963 the Brazilian Government changed the corresponding official exchange rate to Cr$600 = $1.00, and conversion at this rate would result in a dollar loan figure of $8,575,000. It may be assumed that costs in Brazil will tend to rise over the 2 to 3 years which will be required to carry out the project, and that future changes in official exchange rates may tend to lag behind price rises. It is, in fact, the established practice of the State Highway Departments, when contracting-out highway work, to permit a review of price every 3 months and to adjust contract payments in accordance with fluctuations in the costs of materials and services.

Price inflation in Brazil recently appears to be from 30% to 40% per year, but there is no accurate way to estimate the probable rise nor to predict official changes in the exchange rates in the near future. It appears relatively safe to assume that the dollar equivalent cost of the project calculated at the old exchange rate ($11.2 million) is a cost near the upper limit which might occur, since the 460 rate was very much out of line with the free rate. On the other hand, the dollar equivalent cost calculated at the present exchange rate ($8.6 million) represents possibly the lowest dollar figure, which will rapidly become insufficient as inflation continues, and the legal rate of exchange lags behind. The safest approach, to ensure adequate project funding, is to select a loan amount close to the higher figure. Thus, AID is recommending a loan amount of up to $11 million (i.e. $11.2 million rounded to the nearest unit million). Any amount of dollars remaining unused in the loan account, when the projects are completed, can and will be cancelled. Since disbursements will be linked to contracts approved by AID, no excess funds would be available to the Borrower or sub-borrower in the event that the loan should prove to be overfunded.

There is no problem as to repayment. The favorable terms of the AID loan (40 years repayment, 10 years' grace, at 3/4%) will be passed on by SUDENE to the respective State highway departments. Because of the terms, and because of the distribution of loan proceeds among five highway departments, the annual amounts due on principal and interest are relatively small. Thus, the largest amounts due will come from the State of Maranhao, where principal and interest will total approximately $150,000 annually. Since the various State highway departments have assured sources of funds (National Highway Fund allocations, State transportation taxes, traffic fines, etc.) there is no question as to the ability of the sub-borrowers to repay the loan.

III. EFFECT ON THE U.S. ECONOMY

Implementation of the project will have no direct effect on the U.S. economy, except a possible procurement of a small amount of U.S. engineering services. On the other hand, all dollar proceeds of the loan will be spent in the U.S. and will therefore, have a direct positive effect on the U.S. economy.

The project will not be in competition with US enterprise.

IV. ISSUES

Identity of Borrower: The loan application was submitted by SUDENE. However, evidence available to AID indicates that SUDENE may not have borrowing authority, although legislation conveying it is presently being considered by the Brazilian Parliament. In order to provide AID with the flexibility necessary to extend the loan either to SUDENE, to another appropriate GOB agency, or to the GOB itself, as the facts may warrant, the Borrower has been defined in general rather than specific terms in the loan authorization. If possible, the loan will be extended directly to SUDENE.

Security for Loan: AID will require that the loan be effectively secured. However, since the nature of the appropriate security (e.g. guaranty, general credit of the borrowing entity) will vary with the identity of the Borrower, this requirement is phrased in general rather than specific terminology in the loan authorization.

Relation of this Loan to Pending Application for Maintenance Equipment: AID plans to propose a loan for maintenance equipment which will be used on some of the highways to be constructed under the present project. In order that the loan proposed in this paper may not indirectly commit the U. S. Government to the maintenance equipment loan, this loan will require, as a condition precedent to disbursement, that the respective sub-borrowers satisfy AID that appropriate arrangements have been made for procision of adequate maintenance. In the event that AID make the maintenance equipment loan, this condition will automatically be satisfied. In the event that such a loan is not made, AID will not be obligated to disburse funds for roads which cannot be properly maintained.

ANNEX I - PROGRAM FRAMEWORK

(Refer AID-DLC/P-138 - BRAZIL - Santa Cruz Power)

ANNEX II - CHECKLIST OF STATUTORY CRITERIA

1. F.A. Act of 1961, as amended, Section 204.

   The loan will be subject to the standards and criteria for lending operations dstablished by the Development Loan Committee.

2. F.A. Act of 1961, as amended, Section 251(a).

   The loan will promote economic development in Latin America.

3. F.A. Act of 1961, as amended, Section 251(b).

   The loan is primarily related to the development of economic resources.

4. F.A. Act of 1961, as amended, Section 251(b)(1).

   Account has been taken of the principles of the Act of Bogota and of the Charter of Punta del Este.

5. F.A. Act of 1961, as amended, Section 251(b)(1).

   Account has been taken of the extent to which Brazil is showing a responsiveness to the vital economic, political, and social concerns of its people and is demonstrating a clear determination to take effective self-help measures.

6. F.A. Act of 1961, as amended, Section 251(b)(2).

   The activity to be financed is economically and technically sound.

7. F.A. Act of 1961, as amended, Section 251(b)(3).

   The activity is consistent with and is related to other development activities being undertaken or planned and will contribute to realizable long-range objectives.

8. F.A. Act of 1961, as amended, Section 251(b)(4).

   The loan will have no effect on the U. S. economy and will not have a serious effect on the areas of substantial labor surplus.

9. F.A. Act of 1961, as amended, Section 251(b).

Financing from other free world sources on reasonable terms for this project is not available.

10. F.A. Act of 1961, as amended, Section 251(b).

Brazil has made efforts to repatriate capital invested in other countries by its own citizens.

11. F.A. Act of 1961, as amended, Section 251(b).

There are reasonable prospects of repayment of this loan.

12. F.A. Act of 1961, as amended, Section 251(b); 201(d).

Funds will not be loaned or reloaned at rates of interest excessive or unreasonable for the borrower or higher than the applicable legal rate of interest for the country.

13. F.A. Act of 1961, as amended, Section 251(b); Section 204.

The loan shall be subject tothe standard and criteria for lending operations established by the DLC.

14. F.A. Act of 1961, as amended, Section 251(e).

An application has been received for this loan which gives sufficient information and assurances to indicate reasonably that the funds will be used in an economical and technically sound manner.

15. F.A. Act of 1961, as amended, Section 601.

The loan will be handled in such a manner as to encourage and facilitate participation by private enterprise to the maximum extent practicable.

16. F.A. Act of 1961, as amended, Section 602(a)(1);(2) and (3).

To the extent practicable and consistent with the accomplishment of American objectives small business will be assisted to participate equitably in the furnishing of commodities and materials financed from these funds.

17. F.A. Act of 1961, as amended, Section 603 and Merchant Marine Act of 1936, as amended, Section 901.

Shipment of goods, etc., financed by funds provided under this loan will be consistent with the requirements of the referenced statutes.

18. F.A. Act of 1961, as amended, Section 604(a). Presidential Determination of October 18, 1961.

All procurement from loan funds will be in Brazil and the U. S.

19. F.A. Act of 1961, as amended, Section 604(b).

Funds made available under this loan will not be used to purchase commodities in bulk at prices higher than the U. S. Market price.

20. F.A. Act of 1961, as amended, Section 604(d).

Marine insurance will be purchased pursuant to statutory requirements.

21. F.A. Act of 1961, as amended, Section 606(c).

Funds made available under this loan will not be used to purchase drugs of the kind described in this section.

22. F.A. Act of 1961, as amended, Section 611(a)(1).

Necessary substantive technical or financial planning has been completed with this project.

23. F.A. Act of 1961, as amended, Section 611(a)(2).

No legislative action required.

24. F.A. Act of 1961, as amended, Section 611(b).

Not applicable.

25. F.A. Act of 1961, as amended, Section 611(c).

All contracts for construction outside the United States will be made on a competitive basis to the maximum extent practicable.

26. F.A. Act of 1961, as amended, Section 619.

Full consideration has been given to financing this loan through multilateral organizations.

27. F.A. Act of 1961, as amended, Section 620(a).

No assistance will be furnished under this loan to the Government of Cuba or to any country which furnishes military or economic aid to that government.

28. F.A. Act of 1961, as amended, Section 620(b).

The Secretary of State has determined the host country is not controlled by international Communist movement.

29. F.A. Act of 1961, as amended, Section 620(c).

The host country is not included for goods or services to a U. S. citizen who has exhausted available legal remedies or whose claim is not denied or contested or arises under an unconditional guaranty of payment.

30. F.A. Act of 1961, as amended, Section 620(d).

The loan does not finance construction or operation of any productive enterprise which will compete with United States enterprise.

31. F.A. Act of 1961, as amended, Section 620(e).

Neither the government of the host country nor any governmental agency or subdivision has acted inconsistently with subsections 620(e)(1) or (2) and failed within a reasonable time not to exceed six months to take appropriate steps to discharge its obligations under international law.

32. F.A. Act of 1961, as amended, Section 620(f).

The assistance provided in this loan will not be furnished to any Communist country.

33. F.A. Act of 1961, as amended, Section 620(g).

The assistance provided in this loan will not be used to compensate for expropriated property.

34. F.A. Act of 1961, as amended, Section 620(h).

The assistance provided in this loan will not be used in a manner which promotes or assists the foreign aid projects of the Communist bloc countries.

35. F.A. App. Act of 1963, Section 102.

Obligations of funds in excess of $25,000 for architectural and engineering fees to any firm or group of firms on any one project will be reported to the Committees on Appropriations of the Senate and the House.

36. F.A. App. Act of 1963, Section 104.

None of the funds obligated for this project shall be used for pensions, annuities, etc., as provided in this section.

37. F.A. App. Act of 1963, Section 107(a).

Brazil does not furnish or permit ships under its registry to carry material to Cuba as prescribed in this subsection.

38. F.A. App. Act of 1963, 107(b).

Brazil does not furhish or permit ships under its registry to carry items of economic assistance to Cuba as prescribed in this subsection.

39. F.A. App. Act of 1963, Section 109.

The Brazil Government is not based on a Communistic theory of government.

40. F.A. App. Act of 1963, Section 110.

The United States will not be a party to the contracts entered pursuant to this loan.

41. F.A. App. Act of 1963, Section 111.

All contracts pursuant to this loan will require that U. S. citizens performing services thereunder be investigated for loyalty and security as though regularly employed by the United States.

42. F.A. App. Act of 1963, Section 112.

The United States will directly approve the terms of contracts and the firms providing engineering procurement, or construction, services on the project.

43. F.A. App. Act of 1963,Section 114.

None of the loan funds will be used to pay any assessments, arrearages or dues to the United Nations.

44. F.A. App. Act of 1963, Section 601.

None of the loan funds will be used for publicity or propaganda within the United States.

ANNEX III - EXHIBITS AND MAPS

TABLE OF CONTENTS

STATE OF MARANHAO

HIGHWAY PROJECT - MA-51

TABLE OF CONTENTS

AID/W NOTE:

The order of exhibits has been slightly changed from the original submitted for purposes of simplicity.

NORTHEAST BRAZIL

SUDENE - COMBINED HIGHWAY PROJECT

State of Maranhao - Highway MA-51

(NOTE: This section was prepared by the Director of Highways of the State of Maranhao, in collaboration with a U.S. Bureau of Public Highways - BPR, group on TDY in Northeast Brazil.)

* * * * *

April 15th, 1963

Dr. Amadeu Freire
Director, Division of Transport
Superintendency for the Development
of the Northeast

SUDENE

Dear Sir:

We enclose for your review and consideration an engineering analysis showing the detailed cost and other data for the construction of about 53 km of grading, drainage and surfacing of MA-51, in the State of Maranhao.

The total amount of the loan we request to complete the grading, drainage and surfacing of this highway is Cr$ 447,000,000 or US$ 970,000 at the rate of CR$ 460 per US dollar. Our contribution to this project consists of initial engineering studies, cost of right of way and preparation of plans, estimates and specifications. This project MA-51 is in lieu of project MA-23 on which we had previously made application for a B.I.D. loan. Since MA-23 is now under construction with our own funds we request the substitution.

The loan application also includes procurement of the services of a qualified engineering consultant firm to be selected by the State Highway Commission (DER-MA) in accordance with USAID regulations.

For your information this project is included in our four year highway plan as a penetration highway and the benefits derived will greatly aid the economic and social welfare of our state and contribute to the improvement of the Northeast region. We consider the need for the project to be of the highest priority.

We would therefore appreciate your kind and favorable consideration of this request. Since it is proposed to begin construction work on this project at the end of the present rainy season it would be appreciated if this application could be expedite.

Cordially yours

(Signed) Dr. Domingos Freitas Diniz Neto
Director of Highway
Maranhao

Enclosure: Engineering Analysis.

(Initialled by the Governor
of Maranhao)

The Project

This loan project includes grading, drainage and a sand-clay or laterite gravel surface of 53 km of Maranhao State Highway MA-51. The project extends from the town of Bacabal on BR-22 to Lago da Pedra in the agricultural area along the Grajau River. Total cost of the loan will be Cr$ 447,000,000 or the equivalent US $ 970,000 on the basis of Cr$ 460 per US$ 1.00. The project includes no unusual design or construction features.

The proposed loan will also provide for the procurement of a qualified consulting engineering firm selected by the Department of Highways of Maranhao, DER-MA, subject to the approval of USAID/NE/B. The engineering firm will advise and assist DER-MA in the preparation of final plans, specifications and estimates and in the engineering supervision and inspection of the construction work being done under the loan. The consultant will certify to USAID/NE/B as to the quality and quantity of the construction work performed.

Engineering Plan

The activity described above, which will be totally financed by the proposed loan is considered to be technically sound in accordance with FAA Sec. 201 (b) (2). The requirements of FAA Sec. 611 for completion of preliminary engineering plans and a reasonably firm estimate of cost have been set.

A preliminary estimate of cost has been prepared which adequately covers the construction work to be done under the loan. (See Exhibit D).

The project crosses rolling topography for most of its length. The horizontal alinement is generally good. The grade line has been rolled to conform to the undulating topography and excavation areas. Deposits of laterite gravel for the selected borrow surfacing are available throughout the length of the project. Coment for the concrete culverts and for the small bridge will be shipped in from Paraiba. Steel for the drainage structures will come from Sao Paulo.

Trained equipment operators and semi-skilled laborers generally will not be available locally in numbers adequate for the needs of the project. They may be obtained from other Northeastern States. Local unskilled labor can be readily trained and adapted to the work.

In compliance with FAA Sec. 611 (c) the construction under the loan will be by pre-qualified contractor selected on the basis of competitive bids. The bidding will be open to U.S. contractors. The award of contract will be subject to the concurrence of USAID/NE/B.

The project design is in conformity with DNER (National Highway Department) criteria for Class II roads. DNER specifications will be used to control construction operations and materials placed. Special provisions may be included in the construction contracts to meet any special conditions of the work not covered by the standard specifications. The consulting engineer will assist DER-MA in the preparation of the contract documents and documents for advertising, bidding and in the award of contract. The work is scheduled for construction during the dry seasons, July through December of 1963 and 1964.

The maintenance of the roadway after completion will be done by DER-MA maintenance forces. The maintenance department is generally well equipped having recently purchased twelve Caterpillar Motor Graders.

DETAILED PROJECT DESCRIPTION

Route MA-51 is in the State of Maranhao. The project starts at the town of Bacabal on BB-22 about 240 km south of Sao Luis. The western terminus is at Lago da Pedra. The section to be constructed under the loan is the total length of MA-51 or about 53 km. The project will follow an essentially new location as the existing road into the area is of low design and only passable by motor vehicle during the dry season.

Construction work to be done under this loan will include grading, drainage and placing a 6" select borrow surface that will consist of sand-clay or laterite gravel. The necessary right of way is being acquired by DER-MA with their own funds.

A detailed preliminary estimate of the quantities involved and the cost of the work to be done is shown in Exhibit E. The roadway plan and profile have been reviewed and quantity books have been spot checked. Unit prices used in the estimate are based on the average of bid prices for construction projects let to contract in Maranhao in 1961. These prices have been revised to provide for escalation of labor, materials and equipment prices since 1961. The quantities are considered reasonable and adequate for the work involved.

Soils in the general area of the project are sandy silts and clays with many deposits of laterite gravel. Soils investigations do not indicate rock will be encountered in the roadway excavation areas.

The sand-clay or laterite gravel surface will be adequate for anticipated traffic after the road is completed. The laterite gravels that have been used to surface existing roads now under traffic in the State present a very adequate riding surface when properly maintained.

Present and Future Traffic Generating Activities

At the present time there is no vehicle traffic on MA-51 during the wet season. Improvement of this section of highway to an all-weather, all-year-around road can be readily justified as a definite contribution to the economic advancement of the region. Tremendous traffic generations can be expected with the completion of highway project MA-51 under this loan. Highway MA-51 connects this rich agricultural area to the State's industrial center.

Traffic Capacities

Automobiles registration in the State of Maranhao increased from 2128 vehicles in 1956 to 3677 vehicles in 1960. This is a 73% increase in 5 years.

Liquid fuel consumption within the State increased from 14,690,000 liters to 40,302,000 lites during the period 1955 to 1960. (See Exhibit E). Based on the 73% increase in motor vehicle registrations and 174% increase in liquid fuel consumption it is estimated that traffic will increase by about 100% over a 5 year period. This high rate of increase appears to be justified due to the considerable migration of people from other Northeastern States to Maranhao during periods of drouth.

Justification for the Scope of Improvement

There is no traffic information available for the existing roadway of MA 51. It is therefore impossible at the present time to evaluate a cost-benefit ratio mathematically. The section is given first priority in the DER MA, three year highway program as a "penetration highway" serving the area between BR 22 and the Grajau River. An unofficial estimate of traffic on BR 22 in the area of Bacabal is 350 vehicles per day. At least 70% of this traffic is large trucks.

It is estimated that improvement of MA-51 will generate an average daily traffic of 35 vehicles on completion. Expanding this volume by 100% every 5 years gives an average daily traffic of 500 vehicles at the end of 20 years. DNER design criteria provides for Class II standards for traffic volumes of 500 to 1000 vehicles per day. The design is considered adequate for anticipated traffic.

Design Criteria

The design of the project will be in accordance with DNER standards as shown in Exhibit 7. Criteria for a Class II highway, rolling terrain will govern. See Exhibit C for the project typical section.

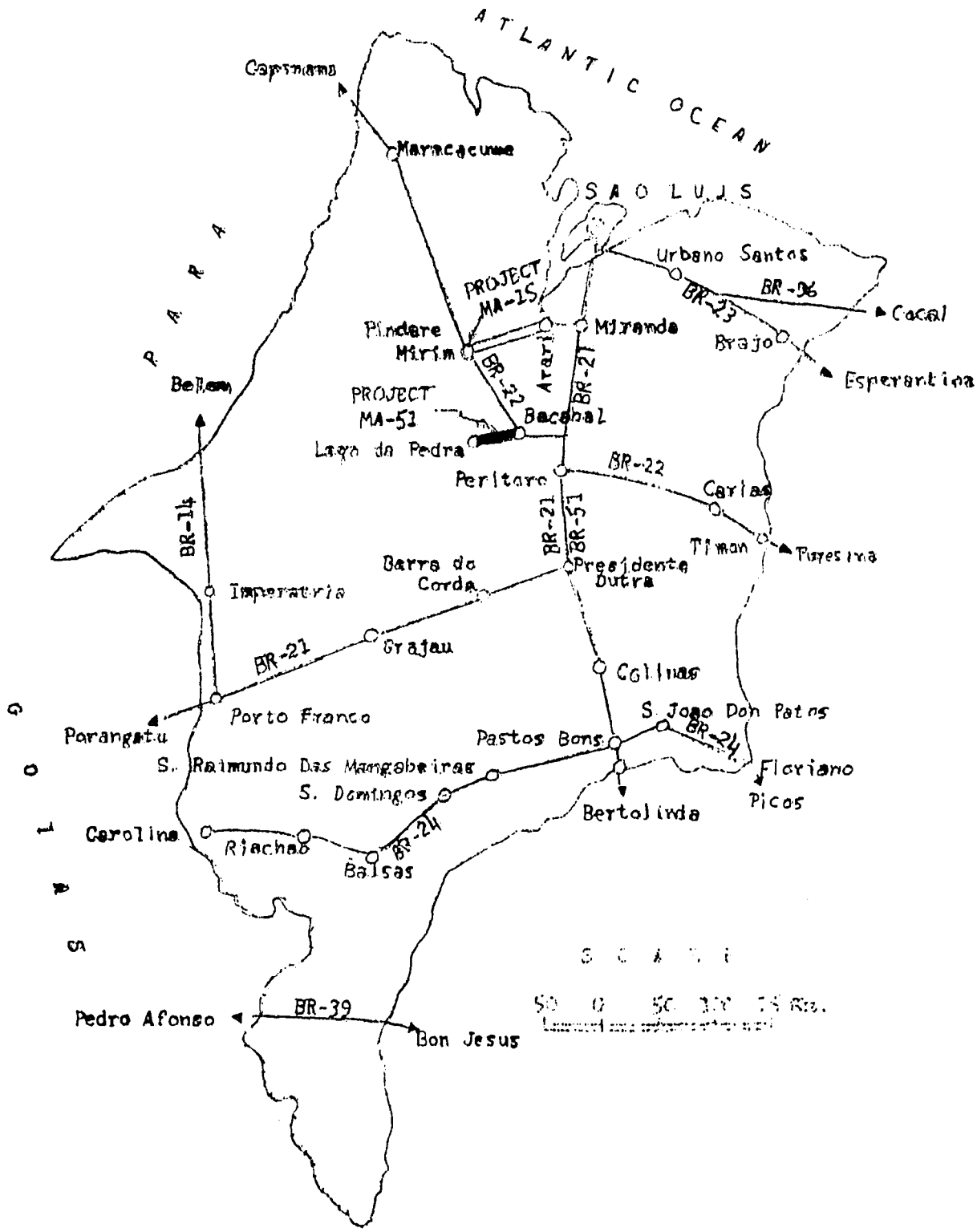
Surveys and Preliminary Plans

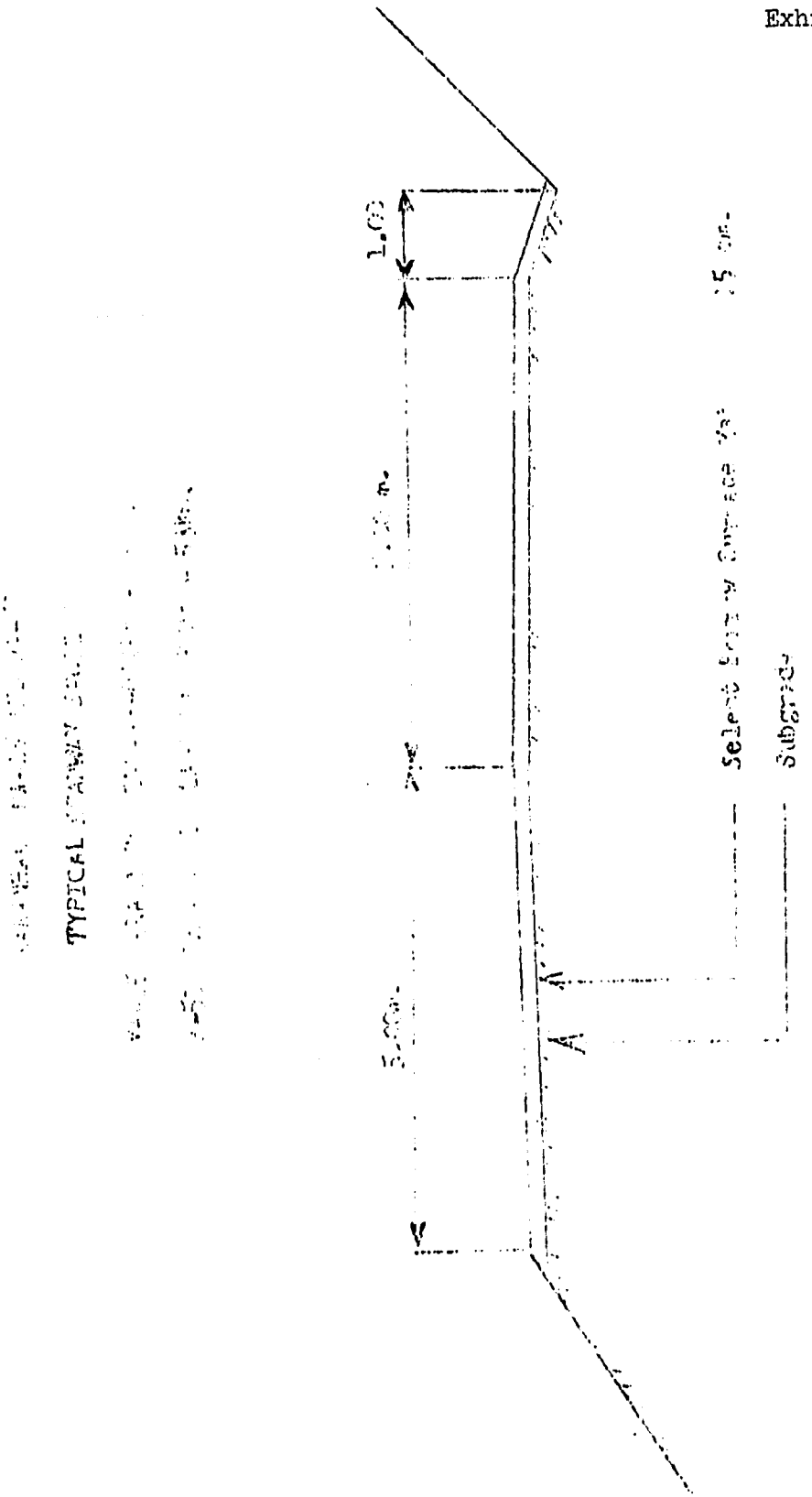
The survey has been completed and preliminary plans have been prepared by DER-MA. The rolling terrain tends to concentrate cross drainage. No unusual problems are anticipated either in design or construction of the project.

Construction Standards

The construction procedures and quality of materials used will be governed by the provision of the DNER Standard Specifications. The standards have been reviewed and are considered to be complete and adequate to control the proposed work.

MARANHÃO


ATLANTIC OCEAN
PARA
Capanema
Maracacume
SAO LUIS
Urbano Santos
BR-226
Cocal
BR-230
Brejo
Esperantina
PROJECT MA-25
Pindare Mirim
Miranda
Arari
BR-222
BR-21
Belem
PROJECT MA-51
Bacabal
Lago da Pedra
Peritoro
BR-22
Carlas
BR-14
BR-21
BR-51
Timon
Teresina
Barra do Corda
Presidente Dutra
Imperatriz
Grajau
BR-22
Colinas
Porangatu
Porto Franco
S. Joao Dos Patos
Pastos Bons
BR-24
S. Raimundo Das Mangabeiras
Floriano
S. Domingos
Bertolinia
Picos
Carolina
Riachao
BR-24
Balsas
GOIAS
SCALE
50 0 50 100 150 Kms.
Pedro Afonso
BR-39
Bon Jesus



STATE OF MARANHAO

Estimate of Quantities and Costs

PROJECT MA-51

Length 53 km.

ITEM	Unit	Quantity	Unit Cost	Cr$ Total Cost	US $ Equiv. 460 Cr$/ $1.00
a. Clearing (Estimated 20M on each side road)	M2	2,129,800	8,00	17,038,400	37,100
b. Grubbing (Based on number of trees within clearing limits)	Each	10,648	1,350,00	14,374,800	31,300
c. Concrete culverts 0.8M	M	810	30,000,00	24,300,000	52,700
d. Concrete culverts 1.0M	M	740	38,000,00	28,120,000	61,000
e. Reinforced concrete bridge	M	10	800,000,00	8,000,000	17,400
f. Unclassified Excavation (Includes Haul)	M3	638,940	260,00	166,124,400	362,000
g. Compaction of embankments	M3	424,000	85,00	36,040,000	78,200
h. Select borrow surface material -6" depth, Includes Haul	M3	79,500	806,00	64,077,000	139,000
i. Processing & Spreading Surface Material	M2	319,440	28,00	8,944,320	19,500
j. Compaction of Surface Material	M3	55,650	85,00	4,730,250	10,300
CONSTRUCTION Totals:-				371,749,170	808,500

Project length: 53 km. or 33 miles
Average Construction Cost:
7,000,000 Cr$ per km.
US$ 24,500 per mile.

	CR$ Millions	Equivalent US$ Thousands
CONSTRUCTION PROJECT TOTALS	372	809
15% for contingencies	56	121
5% for Consulting Engineering	19	40
	447	970
DEVELOPMENT LOAN TOTAL		

MOTOR VEHICLE REGISTRATION

STATE OF MARANHAO

Year	Automobiles	Buses & Trucks	Total
1956	1,053	1,075	2,128
1957	1,189	1,246	2,435
1958	1,371	1,434	2,805
1959	1,461	1,675	3,136
1960	1,673	2,004	3,677

FUEL CONSUMPTION

(1000 Liters)

Year	Automobiles	Buses & Trucks	Total
1955	9,788	4,902	14,690
1956	10,599	8,696	19,295
1957	9,468	5,699	15,167
1958	11,070	6,982	18,052
1959	16,572	10,799	27,371
1960	21,444	18,585	40,302

STATE OF MARANHAO

HIGHWAY PROJECT MA-15

TABLE OF CONTENTS

AID/W NOTE:

The order or exhibits has been slightly changed from the original submission for purposes of simplicity.

NORTHEAST BRAZIL

SUDENE - COMBINED HIGHWAY PROJECT

State of Maranhao - Highway MA-15

(NOTE: This section was prepared by the Director of Highways of the State of Maranhao, in collaboration with a U.S. Bureau of Public Highways - BPR, group on TDY in Northeast Brazil.)

* * * * * *

April 15, 1963

Dr. Amadeu Freire
Director, Division of Transport
Superintendency for the Development of the
Northeast

SUDENE

Dear Sir,

We enclose for your review and consideration an engineering analysis showing the detailed cost and other data for the construction of about 73 Km. of grading, drainage and surfacing of MA-15 in the State of Maranhao.

The total amount of the loan we request to complete the grading, drainage and surfacing of this highway is Cr$ 1,156,000,000 or US$ 2,509,000 at the rate of Cr$ 460 per US dollar. Our contribution to this project consists of initial engineering studies, cost of right of way and preparation of plans, estimates and specifications. This project MA-15 is in lieu of MA-23 on which we had previously made application for a B.I.D. loan. Since MA-23 is now under construction with our own funds we request the substitution.

The loan application also includes procurement of the services of a qualified engineering consultant firm to be selected by the State Highway Commission (DER-MA) in accordance with USAID regulations.

For your information this project is included in our four year highway plan as a penetration highway and the benefit derived will greatly aid the economic and social welfare of our state and contribute to the improvement of the Northeast region. We consider the need for the project to be of the highest priority.

We would therefore appreciate your kind and favorable consideration of this request. Since it is proposed to begin construction work on this project at the end of the present rainy season it would be appreciated if this application could be expedite.

Cordially yours

(Signed) Dr. Domingos Freitas Diniz Neto
Director of Highway
Maranhao

Enclosure: Engineering Analysis

(Initialled by
Governor of Maranhao)

STATE OF MARANHAO

HIGHWAY PROJECT MA-15

The Project

The project loan includes grading, drainage and sand clay or laterite gravel surfacing of about 73 km. of State Highway MA-15 between the towns of Arari and Pindare in the State of Maranhao at a total cost of Cr$1,156,000,000 or the equivalent US$2,507,000. The project will include one major bridge about 200 meters in length over the Mearim River at Arari and 14 smaller structures ranging from 4 meters to 30 meters in length. The project connects with 30 km of MA-15 now nearly completed between Arari and Miranda on the east and with BR-22 at Pindare on the west.

The proposed loan will also provide for the procurement of a qualified consulting engineering firm meeting the requirements of the USAID/NE/B regulations and selected by the Maranhao Department of Highways, DER subject to the approval of USAID.NE/B. The consulting engineer will advise and assist the DER in the preparation of final plans, specifications and estimates and in supervising the construction inspection of the work under the loan. The consultant will certify to USAID as to the quality and quantity of the construction work performed.

Engineering Plan

The activity, described above, to be totally financed by the development loan, is considered to be technically sound in accordance with FAA Sec. 201 (b) (2). The requirements of FAA Sec. 611 for completion of preliminary engineering plans and a reasonably firm cost estimate have been met.

A detailed preliminary estimate of cost has been prepared which adequately covers the construction work to be done under the loan. (See Exhibit D for preliminary cost estimates). The project traverses flat topography for most of the distance with an elevated grade line to keep above the high water of the rainy season. The major part of the excavation will be borrow from areas adjacent to the road. The project is on entirely new location with excellent alignment. For traffic going from Sao Luis to Pindare-Mirim the project will result in a saving of about 165 km in distance over the present route via BR-21 and BR-22. Also the project will be the direct route from Sao Luis to the colonization project just west of Pindare-Mirim where 125,000 families are to be relocated over a 5 year period. Since the development of the colonization project will involve the investment of about US$13,000,000, it can be seen that completion of MA-15 is a necessary factor in the development of this region.

The consultant procured under the loan will assist the DER in preparation of final plans, specifications and estimates for the work and additional pre-contract engineering work and material studies deemed necessary.

Trained equipment operators and semi-skilled laborers generally will not be available locally, but may be obtained from other Northeast States. Local unskilled labor can be readily adapted to the work.

The project design is in conformity with the DNER (National Highway Department) criteria for Class II roads. DNER specifications will be used for the items of construction. The DNER specifications may be modified by special provisions to meet the special needs of this particular work. The consultant will also assist the DNER in preparation of contract and bid documents for advertisement and award of contract. Equipment and materials are available locally.

The work is scheduled for construction during the dry season from July through December during the years 1963 and 1964. In compliance with FAA Sec. 611 (c) the construction under the loan will be by a pre-qualified contractor selected by the contracting agency on the basis of competitive bids. The award of the contract will be subject to the concurrence of the USAID/NE/B.

The maintenance of the completed project will be done under the direction of the DER. The maintenance department is generally well equipped having recently purchased twelve Caterpillar Motor Graders. At present, the DER maintains 500 km of roadway.

The geographic position of the State Highway Route MA-15 in the State of Maranhao is seen on the map in Exhibit B.

The eastern terminus is at the village of Miranda on BR-21 about 110 km south of Sao Luis. The section about 30 km long from Miranda to Arari is under construction for grading, drainage and laterite gravel surfacing at the present time by the DER. This 30 km is in its final stage of completion. At Arari the section to be financed by the aid loan begins and extends westerly about 73 km through the village of Vitoria do Mearim to BR-22 just south of Pindare-Mirim. At Arari the project includes a bridge of about 200 meters length over the Mearim River.

The work included in the development loan is clearing, grading, drainage and surfacing with laterite or sand clay. Cost of the right of way is being paid by the DER with their own funds.

At the present time it is not possible to travel on this route during the rainy season from January through June. There is no bridge at present across the Mearim River and much of the present road rail is under water during the rainy season. The new construction will be at an elevated grade line about 3 to 6 feet above the ground level in the low areas. The borrow excavation will be obtained from sites directly adjacent to the road.

A detailed preliminary estimate of the quantities and cost of the work to be done under the loan for MA-15 can be seen in Exhibit D. The quantities for this section have been reviewed and are considered reasonable and adequate for the work involved. The soils in the general area of the project are silt and sand with many deposits of laterite gravel. The preliminary estimate prepared by the DER indicates that there will be only common earth with no rock anticipated.

The sand clay or laterite gravel surface will be adequate for the traffic on opening the road and will serve as a subbase for future ase and surface courses as increases in traffic require such paving.

Present and Future Traffic Generating Activities

The area directly west of Pindare-Mirim between the Pindare and Turiacu Rivers has been settled by 70,000 squatters who have moved in during the past few years since construction of BR-22 in this stretch was begun.

The SUDENE Colonization Project is located just north of the Turiacu River. This project involves moving in 125,000 families over a period of 5 years.

The economy of the 70,000 squatters has improved during the several years they have occupied the area between the Pindare and Turiacu Rivers. SUDENE has hired 24 school teachers and is furnishing supplies for the schools in this area. An extensive medical program is also being carried out by SUDENE. As this area progresses with its economy it will generate more traffic destined for Sao Luis and other parts of the Northeast.

At the present time there is no vehicle traffic on the roads serving the squatter area and the SUDENE Colonization Project during the wet season. Any supplies shipped by vehicle must move only in the dry season generally August to December. Considerable produce is now shipped out of Pindare-Mirim down the river during the wet season.

The traffic serving the area around Pindare and beyond by way of the project from Arari to Pindare can be estimated at about 50 vehicles per day when it is opened. On completion of the SUDENE Colonization Project this traffic will probably be increased to about 200 per day at which time a bituminous paving should be warranted.

Traffic Capacities

Automobile registrations within Maranhao increased from 2,128 to 3,677 over the period 1956 through 1960 or a 73 per cent increase in 5 years.

Liquid fuel consumption within Maranhao increased from 14,690,000 liters to 40,302,000 liters or an increase of 174 per cent during the period 1955 to 1960. (See Exhibit E).

There is no count of present traffic available. Based on the 73 percent increase in registrations and 174 percent increase in liquid fuel consumption it is estimated thattraffic will increase by about 100 percent over a five year period. This appears to be a very large rate of traffic increase however due to the considerable influx of immigrants to Maranhao from other States of the Northeast [illegible] considered to be reasonable.

Justification of the Scope of Improvement

The estimated daily traffic for this project on opening is 50 vehicles per day and 800 vehicles per day at the end of 20 years. (See Exhibit F). The road is designed to DNER Class II standards which provides for a capacity of 500 to 1000 vehicles per day. The design is considered adequate for the anticipated traffic.

Design Criteria

The design of the project will be in accordance with DNER standards as outlined in Exhibit 7. The depth of sand clay or laterite provided

for the project surfacing is 6 inches. The following standards are applicable to Class II design based on flat topography.

Design Speed	-	80 km per hr.
Maximum grade	-	3 per cent
Maximum Sight Distance	-	100 m
Minimum Radius Curve	-	200 m
Subgrade Width	-	10 to 11 m

See Exhibit C, for project typical section.

Surveys and Preliminary Plans

The survey and preliminary plans have been prepared for the grading and drainage by the DER. The bridge over the Mearim River is being designed by Mauro Vieira, a person who works as a private consultant and also as an employee of the DNER in Rio. The site data including foundation borings were furnished by DER. The cost estimate of the bridge is based on an assumed cost per linear meter since the design is not yet complete. The preliminary estimate submitted by the consultant shows that prestressed concrete design has a cost advantage over conventional reinforce concrete design. The estimate is considered reasonable.

Flood conditions in the area of the project during the wet season are rather unusual. A report dated March 20, 1963 by Mr. R. Petersen, USAID/NE/B advises that the water rose 9 meters vertically since Feb. 1 at BR-22 and the Turiacu River had risen 10 meters at BR-22. The report advised that there has been no vehicle travel out of Pindare-Mirim for a month and that all access to the area is by air or river boat. The report further advises that SUDENE rainfall records show 102 to 118 inches of rain from January to June 1960, 1961 and 1962.

The heavy rainfall in the area and the high flood water levels during the rainy season are important factors in the design of this project. The grade line is generally elevated above the natural ground surface by up to 3 to 6 feet. It is suggested that the consulting engineer in reviewing the designs of this project give special attention to the adequacy of waterway openings of bridge structures. Grade line elevations with respect to flood level data should also be thoroughly checked. Even though adequate bridge waterway openings are provided there is still a good possibility of having fills washed out where high water tops the fills.

Construction Standards

The construction procedures and the quality of materials used will be governed by the provisions of the DNER specifications. These specifications have been reviewed and are considered to be complete and adequate to control the proposed work.

Note: For exhibits B and C, see preceding Exhibit.1.

I T E M	Unit	Quantity	Unit Cost	Cr$ Total Cost	US$ Equiv. 460 Cr$/ $1.00
a. Clearing (Estimated 20M each side road)	M2	2,918,400	8.00	23,347,200	50,600
b. Grubbing (Based on Number of Trees Within Clearing Limits)	Each	18,240	1,350.00	24,624,000	53,500
c. Concrete Culverts 0.8M	M	410	30,000.00	12,300,000	26,800
d. Concrete Culverts 1.0M	M	2,700	38,000.00	102,600,000	223,000
e. Prestressed Concrete Bridge	M	200	1,000,000.00	200,000,000	434,800
f. Miscellaneous Concrete Structures - Vary from 4M to 30M in Length	M	120	800,000.00	96,000,000	208,700
g. Unclassified Excavation, Includes Haul	M3	1,314,000	206.00	341,640,000	742,700
h. Compaction of Embankments	M3	788,400	85.00	67,014,000	145,700
i. Select Borrow Surface Material - 6" Depth, Includes Haul	M3	109,500	806.00	88,257,000	191,900
j. Processing and Spreading Surface Material	M2	438,000	28.00	12,264,000	26,700
k. Compaction of Surface Material	M3	87,600	85.00	7,446,000	16,200
CONSTRUCTION TOTALS				975,492,200	2,120,600

Project Length 73 km or 45 miles.
Average Construction Cost =
13,400,000 Cr$ per km =
US $47,100 per mile

	Cr$ Millions	Equivalent US $ Thousands
CONSTRUCTION PROJECT TOTALS	976	2,121
15% FOR CONTINGENGIES	146	313
5% FOR CONSULTING ENGINEERING	49	106
DEVELOPMENT LOAN TOTAL	1,171	2,540

STATE OF MARANHAO

MOTOR VEHICLE REGISTRATION

YEARS	AUTOMOBILES	BUSES & TRUCKS	TOTAL
1956	1,053	1,075	2,128
1957	1,189	1,246	2,435
1958	1,371	1,434	2,805
1959	1,461	1,675	3,136
1960	1,673	2,004	3,677

Registration increased from 2,128 to 3,677 or an increase of 73 per cent over the 5 year period.

FUEL CONSUMPTION (1,000 Liters)

YEARS	GASOLINE	DIESEL	TOTAL
1955	9,788	4,902	14,690
1956	10,599	8,696	19,295
1957	9,468	5,699	15,167
1958	11,070	6,982	18,052
1959	16,572	10,799	27,371
1960	21,444	18,858	40,302

Fuel consumption increase from 14,690,000 liters to 40,320,000 liters or an increase of 174 per cent during the period 1955 through 1960.

Based on the registration and fuel consumption increase it is estimated for planning purpose that traffic will increase about 100 per cent each 5 years. This high rate of increase reflects the large population gains as migrants move from the drought areas into Maranhao.

BENEFIT COST RATIO

From the estimate of 50 vehicles per day on opening the road and based on the rate of increase of 100% every 5 years the traffic at the end of 10 years is 200 vehicles per day and 800 vehicles per day at the end of 20 years. The average traffic over the 20 year period is then 350 vehicles per day.

Assume that only half of these vehicles are destined for the Sao Luis area with the saving of 165 km or about 100 miles. The benefit derived from the construction of the project based solely on this saving in distance can be computed as follows:

Traffic assume 50% cars, 50% trucks - this is a conservative assumption since counts in this area usually show more than 50% trucks. Also assume that car costs are $0.10 per mile and truck costs are $0.20 per mile. Then the saving for average daily traffic:

350 x .5 x $.10 x 100 = $1,750
350 x .5 x $.20 x 100 = $3,500

Total daily saving = = $5,250

The cost of the entire project MA-15 plus the 30 km now under construction is about $3,000,000. The daily cost of this 120 km section is equal to the capital cost plus the cost of maintenance. The capital at 3/4% for 30 years is:

0.0373 x $3,000,000 = $112,000 per year or $306 per day

The maintenancecost is estimated at $200 per km or 200 x 120 = $24,000 per year or $65 per day.

The benefit cost ratio is then:

$$\frac{5,250}{306 + 65} = 14.2$$

STATE OF PARAIBA

HIGHWAY PROJECT PB-1

TABLE OF EXHIBITS

AID/W NOTE:

The order of exhibits has been slightly changed from the original submission for purposes of simplicity.

NORTHEAST BRAZIL

SUDENE - COMBINED HIGHWAY PROJECT

STATE OF PARAIBA - HIGHWAY PB-1

(NOTE: This section was prepared by the Director of Highways of the State of Paraiba, in collaboration with a U.S. Bureau of Public Highway - BPR, group on TDY in Northeast Brazil.)

* * * * *

April 15th, 1963

Dr. Amadeu Freire
Director, Division of Transport
Superintendency for the Development of
the Northeast

SUDENE

Dear Sir:

We enclose for your review and consideration additional data (revised cost estimate, etc.) in conjunction with our previously submitted loan application for surfacing and paving approximately 33 Km of state highway PB-1 in the State of Paraiba.

The total amount of the loan requested to complete the surfacing and paving is CR$690,000,000 or U.S.$1,5000,000 (at the exchange rate $1= CR$460). Our own contribution to this project consisting of initial engineering studies, preparation of plans and estimates and specifications, as well as site preparation, earth work construction and preparation of subgrade, is outlined in the Loan Application.

The loan request also includes procurement of services of a qualified engineering consulting firm to be selected by the State Highway Department (D.E.R.) in accordance with US.A.I.D. regulations.

For your information this project is included in our 5 year highway plan and the benefit derived will greatly aid the economic and social welfare of our State and contribute to improvement of the Northeast region. Previous information furnished with the original submission contained a detailed discussion of the need for this project and with subsequent economic development since that time we consider the need for this project to be of highest priority.

We would therefore appreciate your kind and favorable consideration of this request. Since it is proposed to begin construction work on this project at the end of the present rainy season it would be appreciated if this application could be expedite.

Cordially your

(Signed) Dr. Jose Carlos Dies Freire

Director of D.E.R. Paraiba

De Acordo.

(Signed) Governor of Paraiba

Enclosure: Engineering Analysis.

The Project

The project loan includes base surfacing and paving on approximately 33 kilometers of State Highway PB-1 between the end of the present pavement at Mari and the town of Guarabara in the State of Paraiba, Brazil at a total cost of Cr$690,000,000,00 or equivalent US$ 1,500,000,00. The grading work and drainage structure on this 33 kilometers of State Highway PB-1 was completed by D.E.R. (Paraiba State Highway Department) during 1962. Completion of this paving project will finalize the connection from National Highway BR-23 to Guarabira over State Highways PB-3 and PB-1. Guarabara is a city of 38,000 inhabitants and is located in an area comprising some of the State's richest agricultural lands.

The loan will also include the procurement of a qualified consulting engineering firm meeting the requirements of AID regulations and selected by DER with the concurrence of the USAID/NE/B. The consultant will assist DER in the preparation of the final plans, specifications and estimate for the project, and the engineering supervision of the construction work under the loans. The consultant will certify to USAID/NE/B as to the quality and quantity of the construction work performed.

Engineering Plan

The activity, described above, to be totally financed by the development loan, is considered to be technically sound in accordance with FAA, Sec. 201 (b). The requirements of FAA, Sec. 611 for completion of preliminary engineering plans and a reasonably firm cost estimate have been met.

In December 1961 a survey study of highway PB-1 was made by Companhia Brasileira de Pavimentacao (COBRAPA) for D.E.R. to determine the geometrics and type of pavement most suitable and economical for this highway. COBRAPA took test borings every 100 meters of roadway and C.B.R. values were run to determine the required thickness of pavement for this class of highway. Sand and rock sources in the area were analysed, tested, and found satisfactory for use. No gravel deposits were found in the area. Suitable rock deposits for base and surfacing were located 20 kilometers from the Mari end of the Project near the bridge over Sobrado creek on State Highway PB-3. The consultant procured under the loan will guide and assist D.E.R. in the preparation of the final PS&E for the work and any additional pre-contract engineering work and materials studies deemed necessary. A detailed preliminary estimate of cost has been prepared which adequately covers the construction work to be done under the loan. The location of the project is controlled by prior grading and structure work completed to DNER (National Highway Department) Standards for a Class I highway. It is anticipated that equipment operators and laborers, experienced in paving operations, will be available locally.

Project design will be by D.E.R. assisted by the consultant. The project will be designed in conformance with DNER design standards and specifications. The consultant will also assist D.E.R. in the preparation of contract and bid documents for advertisement and award of contract. Construction equipment and materials are available locally.

The work is scheduled for construction during the dry seasons, September 1963 to April 1964 and September 1964 to March 1965. In compliance with FAA, Sec. 611 (c), the construction under the loan will be by a pre-qualified contractor selected by the contracting agency on the basis of competitive bids. Award of contract will be subject to the concurrence of USAID/NE/B.

The management and maintenance of the completed project will be under the direction of D.E.R. Presently D.E.R. is lacking in road maintenance facilities and equipment. D.E.R. has performed satisfactory maintenance on State Highway PB-3 (a double surface treatment pavement) from Federal Highway BR 23 to the town of Sape, a distance of 14 kilometers. From Sape to Mari, 11 kilometers, the double surface treatment pavement completed in 1962 is in very good condition. A current highway maintenance development loan is under consideration which will assure D.E.R. maintenance capability on this project. The record of satisfactory maintenance performed by D.E.R. on the adjoining State Highway from Mari to Sape and from Sape to Federal Highway BR-23 indicates that this capability can be readily extended to cover an additional paved section between Mari and Guarabira.

DETAILED DESCRIPTION OF PROJECT

The geographic position of State Highway route PB-1 in the State of Paraiba can be seen on the map in Exhibit B.

State highway PB-1 is located in the middle-east area of the State and extends across the counties of Sape, Mari Maluger and into Guarabira. The section of highway PB-1 extending west from Bage is paved with a double surface treatment to Mari; and graded from Mari to Guarabira. The section of State highway PB-3 extending south from Sape and connecting with concrete paved Federal highway BR-23 is also paved with a double surface treatment. Going west from the State Capital, Joao Pessoa, on BR-23 to the junction with State highway PB-3, then north to Sape on OB-3 and west to Mari on PB-1, travel is on paved highways. Therefore, the paving of the section of State highway PB-1 from Mari to Guarabira will afford a continuous paved highway from this rich agricultural area to the State Capital.

The work included in the development loan is base stabilization and bituminous paving on the 33 kilometer section of State highway PB-1 from Mari to Guarabira. The grading work on this 33 kilimeter section was completed to Class I highway standards in 1962.

A detailed preliminary cost estimate of the work to be accomplished under the loan between Mari and Guarabira is shown in Exhibit D. The quantities for this section have been reviewed and are considered reasonable and adequate for the work involved. The geological formation of this area is sedimentary with a predominance of clay and silt. There is a large deposit of laterite at kilimeter 7 and two sandstone deposits, one at km 16 and one at km 19, which have tested satisfactory for use in the subbase stabilization. Stone from a granite quarry, located 20 km east of Mari, will be used for construction of the base and paving. The subbase will be constructed to a depth of 20 cm and the crushed rock base to a depth of 10 cm. The pavement is double surface treatment 7 meters in width, with aggregates to be produced from the granite quarry. The asphalt for paving will be shipped in from Sao Paulo.

Present and Future Traffic Generating Activities

Improvement of this section of highway PB-1 can be readily justified as a definite contribution to the economic advancement of eastern Paraiba. PB-1 will connect the rich agricultural area of Guarabira to the State's industrial center. Tremendous traffic generation can be expected with completion of highway project PB-1 under this loan. Highway PB-1 serves an area of 3,000 square kilometers and a population of over 100 thousand inhabitants.

Traffic Capacities

Present and projected traffic (ADT) on highway PB-1 is detailed in the benefit-cost analysis, Exhibit F. Average daily traffic reported for 1963 is expanded at the rate of 90% per 5 year period. Said rate was developed from records of State motor vehicle registrations for the period 1956 to 1960 as shown in Exhibit E.

Justification of the Scope of Improvement

The total average daily traffic (ADT) for this project projected to 1983 is 1080 vehicles. (See Exhibit F) The National Highway Department (DNER) standards call for a Class I highway where the ADT is over 1000 vehicles.

Design Criteria

Design of the project will be in accordance with DNER standards as outlined in Exhibit 7. Total surfacing depths are based on the climate and rainfall conditions and the type of subgrade material encountered on the projected. The following limiting values apply to the project:

Category - Class I; Design Speed 60 to 100 Kph;
Maximum grade - 6%; Minimum Radius Curve - 100 meters;
Subgrade Width 14 meters; Paved Surface 7 meters.
(See Exhibit C, for typical section)

Surveys and Preliminary Plans

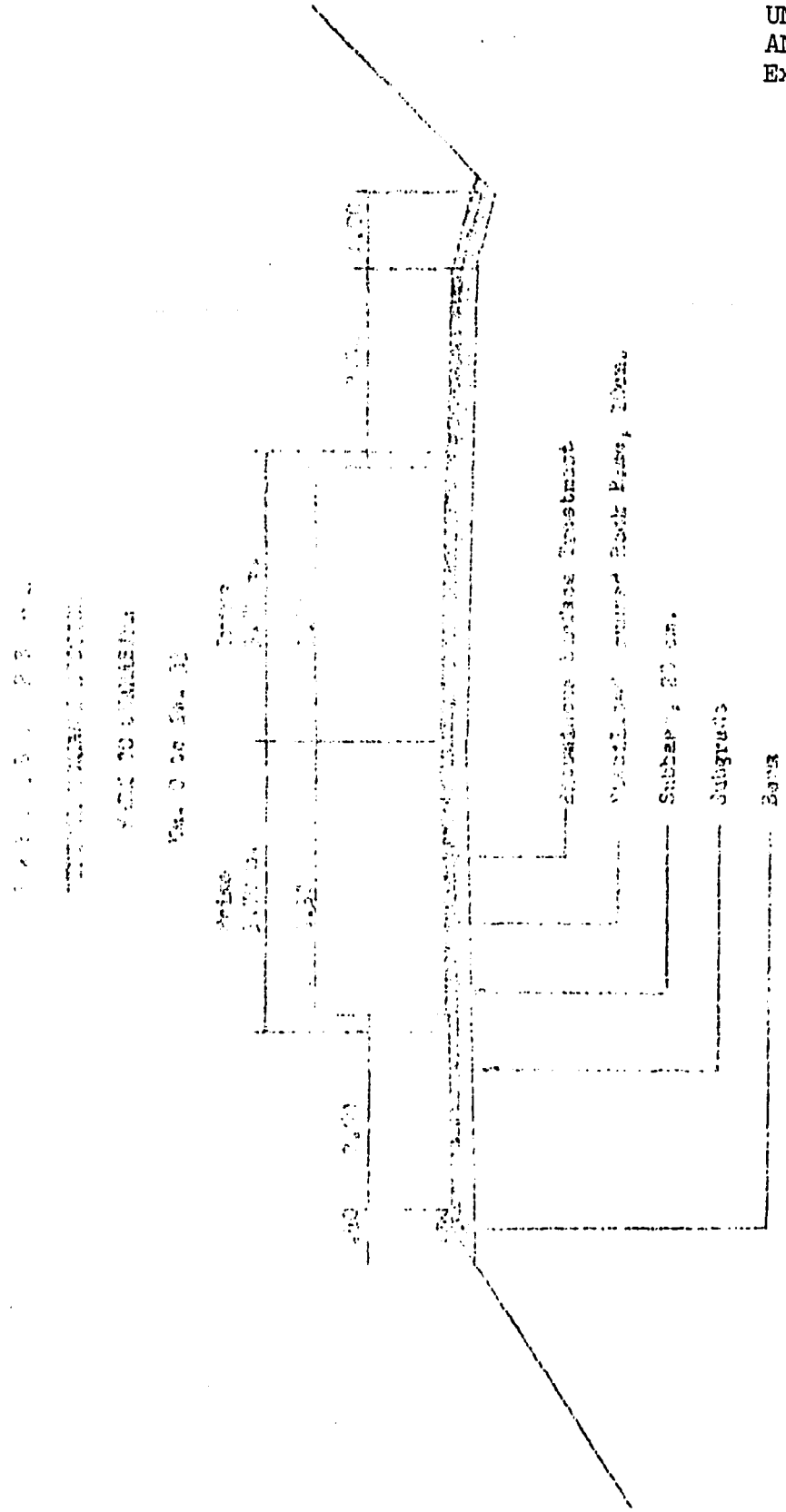
The work under the loan is principally surfacing of a previously graded project. The preliminary location and construction of the grading was to Class I highway standards. The graded roadbed is in very good condition and appears well constructed. No additional settlement of the graded roadbed is anticipated, and the project appears very satisfactory for paving.

It is anticipated that further materials studies will be carried out prior to completion of the final paving construction plans. This can be handled either by the consultant or by the Paraiba State Highway Department (D.E.R.) assisted by the consultant.

Construction Standards

Construction procedures and quality of materials will be governed by the provisions of the DNER Standard Specifications. These specifications have been reviewed and are complete and adequate to control the proposed work.

M A P O F P A R A I B A



STATE OF PARAIBA

HIGHWAY PROJECT PB-1

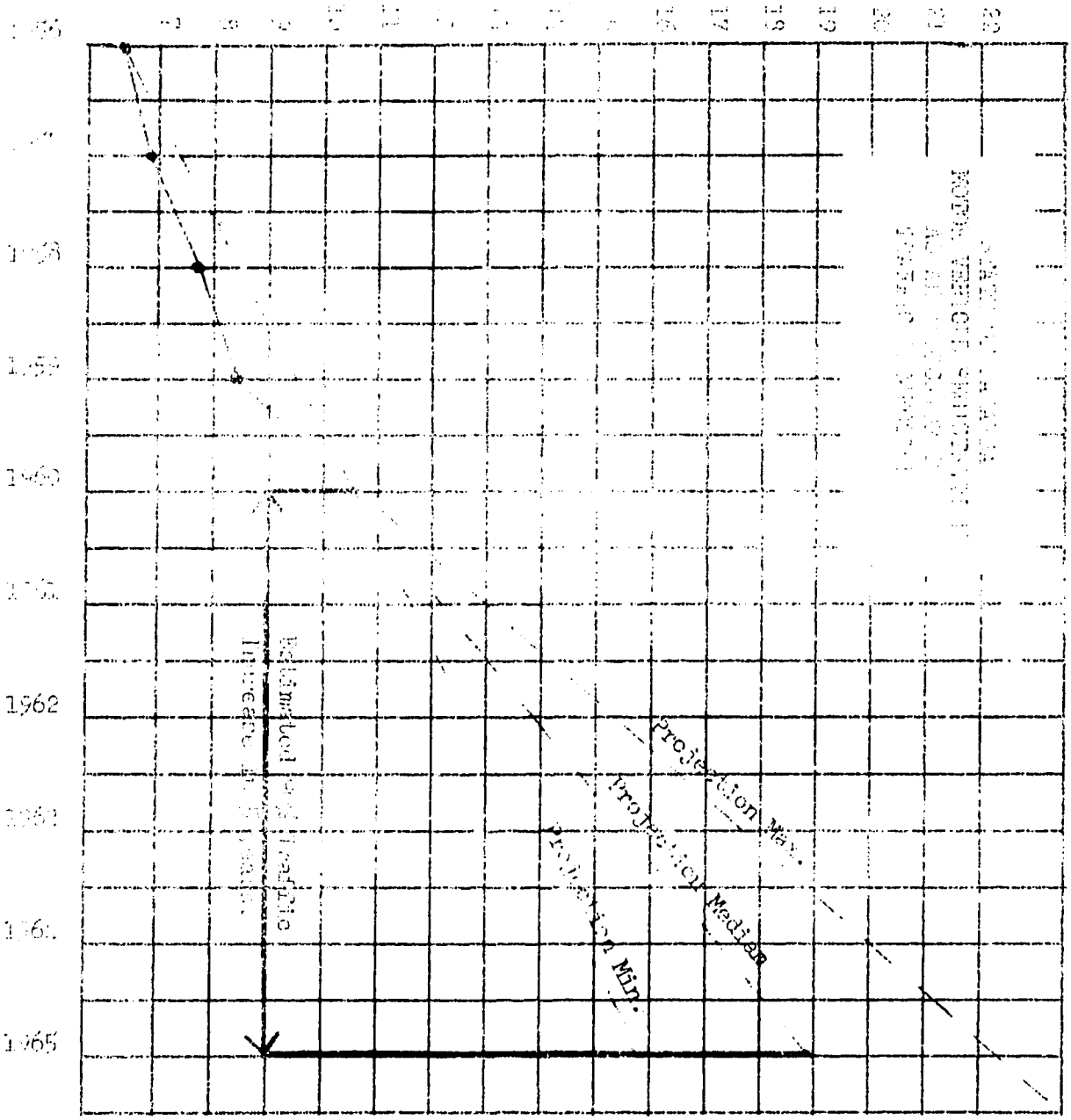
Estimate of Quantities and Costs

ITEM OF WORK	Unit	Quantity	Unit Cost Cr$	Cr$ Total Cost	US$ Equiv. Cost 460/1
(a) Select Borrow for Subbase	M3	96,000	400	38,400,000	83,500
(b) Haul of Select Borrow Subbase	Ton	192,000	300	57,600,000	125,200
(c) Processing, Watering and Compacting Subbase	M3	96,000	1,000	96,000,000	208,600
(d) Stabilized Crushed Rock Base (Including: furnishing, processing, watering and compacting base).	M3	50,000	2,500	125,000,000	271,800
(e) Haul of Crushed Rock Base	Ton	110,000	1,300	143,000,000	311,000
(f) Application of Prime Coat (MC-1)	M2	245,000	30	7,350,000	16,000
(g) Construct Double Surface Treatment (Including: AC application and furnishing the aggregate)	M2	231,000	270	62,370,000	135,400
(h) Haul of Surface Treatment Aggregate	Ton	10,200	1,300	13,260,000	28,800
(i) Asphalt for Prime (MC-1)	Ton	400	59,000	23,600,000	51,300
(j) Asphalt for Double Surface Treatment AC 150-200	Ton	750	54,000	40,500,000	88,100
CONSTRUCTION TOTALS:-				607,080,000	1,319,700

Project is 33 km or 20.5 miles in length
Average Construction Cost = Cr$ 18,400,000 per kilometer
Average Construction Cost = US$ 64,375 per mile

	CR$ Millions	Equivalent US$ 460/1 Thousands
Construction Project Total	607	1,320
10% for Contingencies	61	132
3 1/2 for Consultant Engineering	22	48
DEVELOPMENT LOAN TOTAL: -	690	1,500

PARAIBA MOTOR VEHICLE REGISTRATION (THOUSANDS)



BENEFIT COST RATIOS

The Paraiba Department of Highways reports a present average daily traffic (ADT) on Route PB-1 of approximately 300 vehicles, (70% trucks and buses). From Exhibit F, it is estimated that traffic on PB-1 will increase at the rate of 90% per 5-year period.

Traffic computed for 1973 and 1983 is as follows:

VEHICLES PER DAY

	1963	1973	1983
Automobiles	90	162	324
Trucks and Buses	210	378	756
Total ADT	300	540	1080

Assuming 14.05 cents per mile as the cost of operation on earth road and 9.80 cents per mile as the cost of operation on a paved road, both in good condition, the saving is 4.25 cents per mile for cars. Also assume that the saving for trucks and buses is equal to double that for one car. The saving for one mile for one day then becomes:

	1963	1973	1983
Cars x 1	90 - 90	162 - 162	324 - 324
Trucks and Buses x 2	210 - 420	378 - 756	756 - 1512
Vehicles per Day	510	918	1836
Benefit (Savings at 4 1/4)	$21.68	$39.02	$78.03

Costs have been computed assuming that the maintenance of the earth road and the paved road would be the same, then the cost is capital cost only.

Construction cost from Exhibit E, is Cr$ 18,400,000,00 per kilometer which at 460 cruzeiros per U.S. dollar is $64,375,00 per mile. The capital cost at 3/4 per cent for 30 years is 0.0373 times $64,375.00 = $2,401.19 per year or $6.58 per day.

	1963	1973	1983
Benefit Cost Ratio is	21.68/6.58 3.29	39.02/6.58 5.93	78.03/6.58 11.86

ANNEX III
Exhibit 4

STATE OF RIO GRANDE DO NORTE

HIGHWAY PROJECT - RN-4

TABLE OF EXHIBITS

AID/W NOTE:

The order of exhibits has been slightly changed from the original submission for purposes of simplicity.

NORTHEAST BRAZIL

SUDENE - COMBINED HIGHWAY PROJECT

State of Rio Grande do Norte - Highway RN-4

Dr. Amadou Freire
Director, Division of Transport
Superintendency for the Development
of the Northeast
SUDENE

Dear Sir:

We enclose for your review and consideration additional data (revised cost estimate, etc.) in conjunction with our loan application submitted previously for a BID loan. Our revised application for an A.I.D. development loan entails approximately 50 kilometers of surfacing and paving, including 3 1/2 km. of grading work, on State Highway RN-4 in the State of Rio Grande do Norte.

The total amount of the loan requested to complete the grading, surfacing and paving is Cr$ 920,000,000.00 or U.S. $2,000,000.00 (at the exchange rate of $1 - Cr$ 460). Our own contribution to this project, consisting of initial engineering studies, preparation of plans and estimate and specifications, as well as site preparation, earthwork construction and preparation of subgrade, is outlined in the loan application.

The loan request also includes procurement of services of a qualified engineering consulting firm to be selected by the State Highway Department (D.N.E.R.) in accordance with US.A.I.D. regulations.

For your information this project is included in our 5-year highway plan and the benefits derived will greatly aid the economic and social welfare of our State and contribute to improvement of the Northeastern region. Previous information furnished with the original submission contained a detailed discussion of the need for this project and with subsequent economic development since that time we consider the need for this project to be of the highest priority.

We would therefore appreciate your kind and favorable consideration of this request. Since it is proposed to begin construction work on this project at the end of the present rainy season, it would be appreciated if this application could be expedite.

Cordially yours,

(signed) Dr. Antomar Ferreira de Sauza
Director of Hwys, Rio G. Do Norte

(Initialled by
Governor of Rio Grande do Norte)

Encl: Engineering Analysis

STATE OF RIO GRANDE DO NORTE

HIGHWAY PROJECT - RN 4

The Project

The loan project includes base surfacing and paving on approximately 50km of State Highway RN-4 between the towns of Ceara-Mirim and Joao Camara in the State of Rio Grande do Norte, Brazil, at a total cost of Cr$ 920,000,000, or equivalent US$ 2,000,000. The grading work and drainage structures on the Ceara-Mirim - Joao Camara section of RN-4, excepting a 3 1/2 km gap adjacent to the town of Taipu, was completed by DEER (Rio Grande do Norte State Highway Department) during 1953. The loan will also include grade-drain construction of this 3 1/2 km portion of RN-4 by passing the town of Taipu. Completion of the paving will finalize the connection of Joao Camara to Ceara-Mirim which in turn is connected by previously completed telford stone pavement to the State Capital of Natal, thus spanning the central portion of the coastal sector of the State.

The proposed loan will also include procurement by DEER (with approval by USAID/NE/B) of a qualified consultant engineering firm to guide and assist DEER in the preparation of the final plans, specifications and estimates and engineering supervision of the construction work under the loan. The consultant will certify to USAID/NE/B as to the quality and quantity of the construction work performed.

Engineering Plan

The activity, described above, to the totally financed by the development loan, is considered to be technically sound in accordance with FAA, Sec. 611 (a) (2). The requirements of FAA, Sec. 611 for completion of preliminary engineering plans and a reasonably firm cost estimate have been met.

A detailed preliminary estimate of cost has been prepared which adequately covers the construction work to be done under the loan (See Exhibit D) for preliminary cost estimate. The location of the project is controlled by prior grade-drain work completed with Government of Brazil funds. Suitable surfacing and paving materials are readily available for the work along this section of the RN-4 roadway. The consultant procured under the loan will assist DEER in

preparation of final plans, specifications and estimates for the work and any additional pre-contract engineering work and materials studies deemed necessary. It is not anticipated that equipment operators and semi-skilled laborers, experienced in modern paving operations, will be readily available locally. However, experienced personnel will be available from neighboring Northeast States. Local unskilled labor can be readily adapted to the work.

The project design, including preparation of final plans. specifications and estimate will be conformance with the DNER (National Highway Department) specifications. The DNER specifications may be modified by special provisions to meet the special needs of this particular work. The consultant will also assist DEER in preparation of contract and bid documents for advertisement and award of contract. Equipment and material are available locally.

The work is scheduled for construction during the 1963 and 1964 dry seasons. In compliance with FAA, Sec. 611 (c), the construction under the loan will be by a pre-qualified contractor selected by the contracting agency on the basis of competitive bids.

The management and maintenance of the completed project will be under the direction of DEER. Presently DEER is generally lacking in road maintenance organization, facilities and equipment, although they have had relative success with maintenance of all-weather unpaved roads in the State. The record of adequate maintenance performed by DEER on the adjoining RN-4 pavement between Natal and Ceara-Mirim indicates that this capability can be readily extended to cover a paved section between Ceara-Mirim and Joao Camara.

DETAILED PROJECT DESCRIPTION

The geographic position of State Highway route RN-4 in the Northeastern part of the State of Rio Grande do Norte can be seen on the map in Exhibit B.

RN-4 originates in Natal, the Capital and principal Atlantic port of the State. At a point 8 kms west of the city center of Natal the route crosses the Potengi River and enters the town of Igape over a 500 meter long bridge that alternately serves both railroad and motor vehicle traffic. Traffic anticipated in future years will require either modification of the existing structure to a highway bridge or construction of a separate new highway crossing to be accomplished at a future date in conjunction with final paving of the entire Route RN-4. From Igape to Ceara-Mirim, a principal sugar producing area, the distance is 27 km over a telford stone pavement which is maintained in good condition by DEER, affording an adequate riding surface. From Ceara-Mirim, RN-4 proceeds westerly to Taipu and Joao Camara. The Taipu-Joao Camara area comprises the Sisal producing center of the State. The grading of this 50 km section from Ceara-Mirim to Joao Camara was completed in 1953. Some pit run laterite and some sand-gravel was placed on the subgrade in 1960. However, 3 $\frac{1}{2}$ km of the main highway alignment adjacent to Taipu is yet to be constructed. Presently traffic is detoured off the main route and passes through the center of Taipu. The work included in the estimate is for base and paving on the entire section from Ceara-Mirim to Joao Camara, plus grading and drainage on the 3 $\frac{1}{2}$ km gap adjacent to Taipu. From Joao Camara to Macau the distance is about 104 km. Commencing at Joao Camara, about 100 km of this section has been recently graded, including a gravel surface that is fairly well-consolidated. Further consolidation of the embankments on this section by traffic use and natural settlement is considered desirable prior to construction of final pavement. The existing surface can be considered "all weather" and will meet traffic needs for several years. The remaining 4 km to the western terminus of RN-4, the city of Macau, is yet to be completed. Macau is the only significant Atlantic port in the north of the state and is the focal point of Brazil's principal salt production centered in the Pendencias - Macau region.

A detailed preliminary estimate of cost of the work to be accomplished under the loan between Ceara-Mirim and Joao Camara is seen in Exhibit D, Annex III. The quantities for the grading and drainage work on the $3\frac{1}{2}$ km gap in the route adjacent to Taipu are from the DEER design for this section which has been reviewed and is considered adequate for the work involved. The principal work under the loan is 50 km of surfacing and paving to be constructed in conformance with DNER (National Highway Department) standards for Class II Highway. (See Exhibit 7). The estimate contains provisions for preparation of the existing subgrade, constructing roadside ditches in cuts, and some minor widening of the roadbed at a few locations. The existing subgrade consists of a gravelly or laterite cover stone, obtained from deposits along the project, and previously placed to facilitate traffic over the fine sandy material native in the original cuts and embankments. A pit run gravel subbase obtained from these local deposits will be constructed to a depth of 20 cm. A crushed gravel base produced from suitable sources along the project will be constructed to a depth of 20 cm. The pavement is double surface treatment, with aggregates to be produced from the excellent granite deposits at Joao Camara. The asphalt will be shipped in from Sao Paulo.

Present and Future Traffic Generating Activities

Improvement of RN-4 can be readily justified as a definite contribution to the economic advancement of northeastern Rio Grande do Norte. Eventual completion of this highway route will link Natal, the State Capital and principal Atlantic port, to the sisal producing centers of Taipu and Joao Camara, and to Brazil's principal salt production center at Macau and Pendencias. Long range plans for Macau include an industrial center in this salt-mining area which will provide for production of caustic soda, soda-ash, potassium-based fertilizer, etc., which will affect a reduction in importation of these items. The route will also serve the largest fishing region of the State in the northern counties of Maxaranguape, Touros and Sao Bento do Norte where plans have been drawn for industrialization of fish products.

Traffic Capacities

Since 1960 the section of RN-4 between Ceara-Mirim and Joao Camara has had an "all weather" surface. Recent and projected traffic counts on the section are detailed in the benefit-cost analysis, Exhibit F. The traffic counts taken in 1961 were expanded at the rate of 10% per year to arrive at the traffic volumes shown for 1973 and 1983. The 10%

rate is based on vehicle registration and liquid fuel consumption in the State of Rio Grande do Norte during the period 1956 to 1960. (See Exhibit E).

Justification of the Scope of Improvement

The total average daily traffic (ADT) for the project, projected to 1983, is 752 vehicles. (See Exhibit F). DEER standards call for a Class II Highway where ADT is 500 to 1000 vehicles.

Design Criteria

Design of the project will be in accordance with DEER standards as outlined in Exhibit 7. Total surfacing depths are based on materials studies performed for DEER by an experienced materials engineer on loan form DER, Pernambuco. The following limiting values apply to the project:

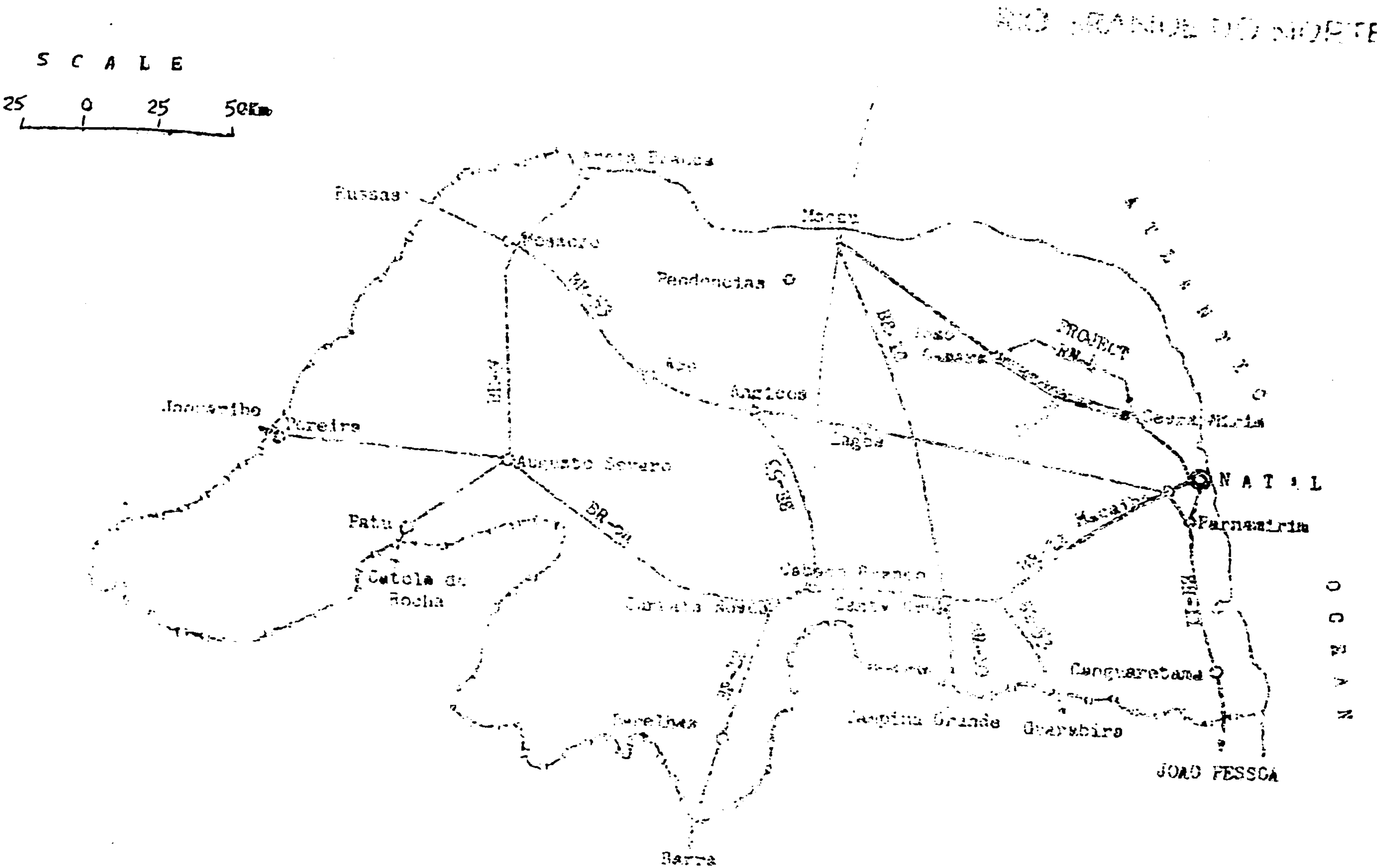
Category: Class II - Design Speed: 40 to 80 klh - Maximum Grade: 6% - Minimum Sight: Distance: 70 Meters - Minimum Radius Curve: 30 meters - Subbase Width: 10 Meters - Shoulder Width: 8.2 meters, curb to curb. See Exhibit C, for project typical section.

Surveys and Preliminary Plans

As the work under the loan is principally paving, the preliminary surveys and location of the project were accomplished previously. The preliminary location and design of the 3 $\frac{1}{2}$ km gap in the grading adjacent to Taipu has been viewed in the field and is considered adequate. It is anticipated that further materials studies will be carried out prior to final PS&E for the project. This can be handled either by the Consultant or by DEER assisted by the Consultant. At this writing it is anticipated that the Consultant will prepare the major portion of the PS&E and such contingency is considered in the cost estimate.

Construction Standards

Construction procedures and quality of materials will be governed by the provisions of the DEER Standard Specifications. The specifications have been reviewed and are complete and adequate to control the proposed work.



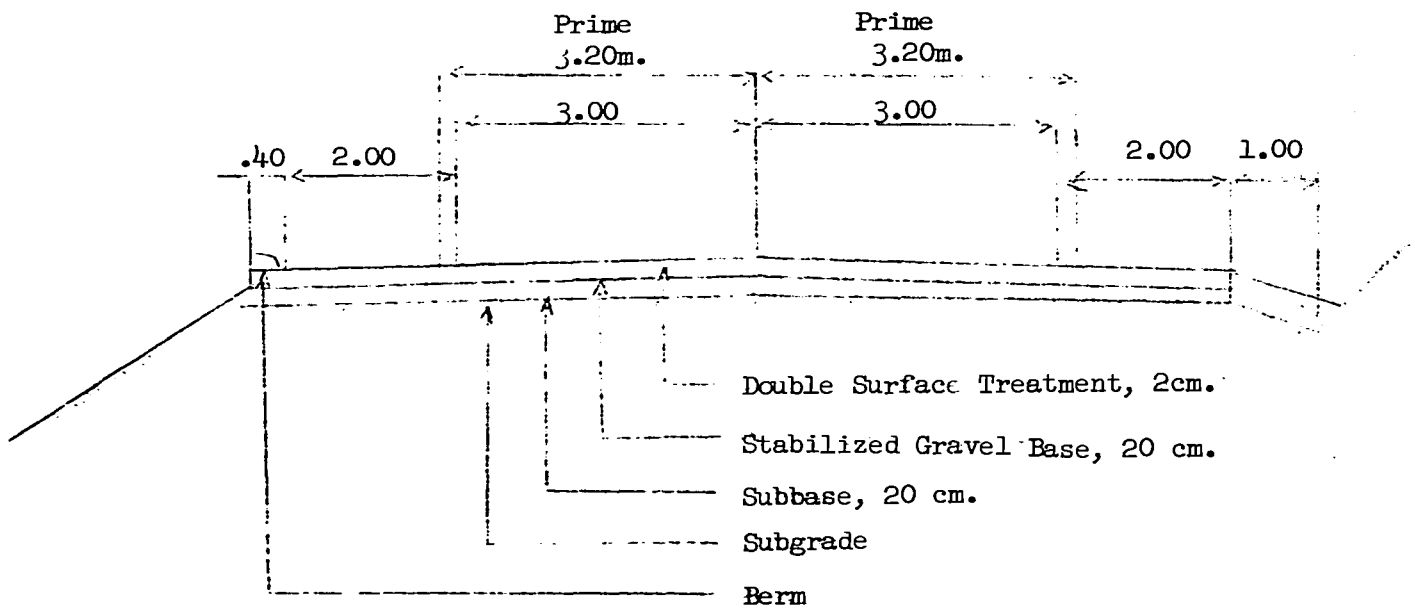
UNCLASSIFIED
ANNEX III, Page 39 of 72
Exhibit 4-B, Page 8 of 15

RIO GRANDE DO NORTE - BN-4

Typical Roadway Section

CEARA MIRIM ○ JOAO CAMARA

km. 0 to km.50



STATE OF RIO GRANDE DO NORTE

HIGHWAY PROJECT RN-4

Quantities and Costs

ITEM	Unit	Quantity	Unit Cost	Cr$ Total Cost	US$ Equiv. Cost 460/1
A) Clearing (Estimated 15M each side of road from Km 0-Km 20.5 & Km 24-Km 50, and 60M wide Km 20.5 - Km 24)	M2	1,605,000	5	8,025,000	17,400
b) Grubbing (Estimated 60M wide Km 20.5 - Km 24)	M2	210,000	3	630,000	1,400
c) First Class Excavation (Common excavation from Km 20.5 - Km 24 and miscellaneous excavation from Km 0 - Km 20.5 & Km 24 - Km 50)	M3	80,000	350	28,000,000	60,900
d) Second Class Excavation (Intermediate excavation from Km 20.5 - Km 24)	M3	18,000	500	9,000,000	19,600
e) Third Class Excavation (Rock excavation from Km 20.5 - Km 24)	M3	9,000	1,000	9,000,000	19,600
f) Excavation of Roadside Ditches (Lineal meters)	M	25,000	75	1,875,000	4,100
g) Haul of Excavation (Ave. one Mk).	M3	89,000	150	13,350,000	29,000
h) Concrete Culverts 0.80M.X0.80M- (From Km 20.5 - Km 24)	M	110	5,000	550,000	1,200
i) Concrete Culverts 1.00MXI.20M- (From Km 20.5 - Km 24)	M	36	7,000	252,000	500

Quantities and Costs

ITEM	Unit	Quantity	Unit Cost	Cr$ Total Cost	US$ Equiv. Cost 460/1
j) Concrete Culverts 1.20MX1.50M- (from Km 20.5 - Km 24)	M	38	9,000	342,000	700
k) Concrete Culvert Extension (From Km 0-20.5 & Km 24- Km 50)	M	24	90,000	2,160,000	4,700
l) Select Borrow for Subbase (From Km 0-Km 50)	M3	116,500	270	31,455,000	68,400
m) Haul of Select Borrow (Ave. 9Km)	Ton	210,000	420	88,200,000	191,700
n) Preparation of Subgrade and processing and compacting Subbase (From Km 0-Km 50)	M3	116,500	930	108,345,000	235,500
o) Crushed Gravel Base (Including hauling, processing and compaction) From Km 0-Km 50	M3	116,000	2,500	290,000,000	630,400
p) Application of Prime Coat (NC-1) (From Km 0-Km 50)	M2	350,000	30	10,500,000	22,800
q) Construct Double Surface Treatment (Including AC application & furnishing the aggregate) Km 0- Km 50)	M2	300,000	270	81,000,000	176,000
r) Haul of Surface Treatment Aggregate (Ave.25 Km) (From Km 0- Km 50)	Ton	13,000	1,100	14,300,000	31,100

Quantities and Costs

ITEM	Unit	Quantitiy	Unit Cost	Cr$ Total Cost	US$ Equiv. Cost 460/1
s) Asphalt for Prime (MC-1)	Ton	550	59,000	32,450,000	70,500
t) Asphalt for Double Surface Treatment (AC 150-200)	Ton	950	54,000	51,300,000	111,500
CONSTRUCTION TOTALS:				780,734,000	1,697,000

Project is 50 Km or 31 Miles long.
Average Construction Cost - Cr$ 15,600,000 per kilometer
Average Construction Cost - US$ 54,700 per mile

	Cr$ Millions	Equivalent US$ Thousands
CONSTRUCTION PROJECT TOTALS	781	1,697
13% for Contingencies	100	218
5% for Consultant Engineering	39	85
DEVELOPMENT LOAN TOTAL	920	2,000

STATE OF RIO GRANDE DO NORTE

Motor Vehicles in Circulation in Rio Grande do Norte

YEARS	AUTOMOBILES	BUSES & TRUCKS	TOTAL	ANNUAL INCREASE	
1956	1,811	2,659	4,470	VEH	%
1957	1,908	2,794	4,702	+ 232 +	5.2
1958	2,097	3,160	5,257	+ 555 +	11.8
1959	2,219	3,359	5,578	+ 321 +	6.1
1960	2,640	4,040	6,680	+1,102 +	19.8
			Average		+ 10.7%

Liquid Fuel Consumption in Rio Grande do Norte

(Million Liters)

YEAR	1956	1957	1958	1959	1960
Gas	27	26	30	28	34
Diesel	14	15	18	20	23
Total	41	41	48	48	57
Annual Increase		0	7	0	9
% Increase		0	17.1	0	18.7
			Average Increase		8.95 %

Based on the above data it is estimated that the average annual increase in traffic will be about 10% per year.

At 10% per year - 2 year increase - 21%
10 year increase - 159%

BENEFIT COST RATIO

Traffic counts on the pertinent section of RN-4 developed in 1961 showed the following results:

	Average Daily Traffic			
	Ceara-Mirim/Taipu	Taipu/J.Camara	Ave. ADT	%
Cars	27	15	21	23
Trucks & Buses	77	66	72	77
	104	81	93	100

The 1963, 1973 and 1983 traffic have been computed using the 10% estimated annual increase in traffic from Exhibit E, Annex III.

	Vehicles per Day			
Year	1961	1963	1973	1983
Cars	21	25	65	168
Trucks & Buses	72	87	225	583
Total ADT	93	112	290	752

Assuming 14.05 cents per mile as the cost of operation on earth road and 9.80 cents per mile as the cost of operation on a paved road, both in good condition, the saving is 4.25 cents per mile for cars. Also assume that the saving for trucks and buses is equal to double that for one car. The saving for one mile for one day then becomes:

	1963	1973	1983
Cars x 1	25 - 25	65 - 65	168-168
Trucks and Buses x 2	87 -164	225 -450	583-1166
Vehicles per Day	189	515	1334
Benefit (Savings at 4 1/4 ¢)	C 8.03	$ 21.89	$ 56.70

Costs have been computed assuming that the maintenance of the earth and paved road would be the same, then the cost is capital cost only.

Construction cost from Exhibit E is Cr$ 15,600,000 per Km, which at 460 cruzeiros per US$1.00 is $54,700 per mile.

The capital cost at 3/4 per cent for 30 years is 0.0373 x $54,700 - $2,040 per year or $5.58 per day.

	1963	1973	1983
Benefit Cost Ratio is	8.03/5.58	21.89/5.58	56.70/5.58
	1.44	3.93	10.16

STATE OF ALAGOAS

HIGHWAY PROJECT AL-13

TABLE OF EXHIBITS

AID/W NOTE:

The order of exhibits has been slightly changed from the original submission for purposes of simplicity.

NORTHEAST BRAZIL

SUDENE - COMBINED HIGHWAY PROJECT

State of Alagoas - Highway AL-13

(NOTE: This section was prepared by the Director of Highways of the State of Alagoas, in collaboration with a U.S. Bureau of Public Highway - BPR, group on TDY in Northeast Brazil.)

* * * * *

April 15th, 1963

Dr. Amadeu Freire
Director, Division of Transport
Superintendency for the Development
of the Northeast

SUDENE

Dear Sir:

We enclose for your review and consideration additional data (revised cost estimate, etc.) in conjunction with our previously submitted loan application for grading, surfacing, and paving approximately 44 km of State highway AL-13 in the State of Alagoas.

The total amount of the loan requested to complete the grading, surfacing and paving of this highway is CR$1,242,000,000 or U.S.$2,700,000 (at the exchange rate $1 - CR$460). Our own contribution to this project, consisting of initial engineering studies, preparation of plans and estimates and specifications, is outlined in the loan Application.

The loan request also includes procurement of services of a qualified engineering consulting firm to be selected by the State Highway Commission (C.E.R.) in accordance with U.S.A.I.D. regulations.

For your information this project is included in our 5 year highway plan and the benefits derived will greatly aid the economic and social welfare of our State and contribute to improvement of the Northeast region. Previous information furnished with the original sumission contained a detailed discussion of the need for this project and with subsequent economic development since that time we consider the need for this project to be of highest priority.

We would therefore appreciate your kind and favorable consideration of this request. Since it is proposed to begin construction work on this project at the end of the present rainy reason it would be appreciated if this application could be expedited.

Cordially yours

(signed Dr. Vinicius Furtado Maia Hobre
Director of C.E.R. Alagoas

(signed) Governor of Alagoas

Enclosure: Engineering Analysis.

The Project

The proposed loan of Cr$1,242,000,000 or equivalent US$2,700,000 (See Exhibit E) includes the complete construction of the entire 44 km length of State Highway Al-13 which extends between the cities of Penedo and Junqueiro in the southern part of Alagoas, Northeast Brazil. Acquisition of Right of Way, any required fencing, and disposition of utilities will be by the Government of Brazil and is not included in the purposes of the loan. The construction of AL-13 entails grading, drainage, one 10 meter bridge, subbase and base surfacing and bituminous double surface treatment paving to be accomplished as shown in the proposed construction schedule in Exhibit D.

The loan will also include procurement by the Alagoas State Highway Commission (CER), with concurrence by USAID/NE/B or a qualified consultant engineering firm to guide and assist CER in pre-contract engineering work and engineering supervision of the construction work carried out under the loan. The consultant will certify to USAID/NE/B as to the quality and quantity of the contruction work performed.

Engineering Plan

The activity, described above, to be totally financed by the development loan, is considered to be economically and technically sound in accordance with FAA, Sec.201 (b) (2). The requirement of FAA, Sec. 611 for completion of preliminary engineering plans and reasonably firm cost estimates have been met.

In 1961 location and design of AL-13 was completed for the Highway Commission by the engineering department of the San Francisco Valley Commission (CVSF). Plans and profile have been reviewed in the field and the CVSF design is considered a satisfactory basis for the detailed preliminary estimate of cost of the work to be done under the loan (See Exhibit E). With a minor revision, the CVSF location is considered adequate, as it is properly adapted to the existing terrain and affords an economical and direct route between Penedo and Federal Highway BR-11 adjacent to Junqueiro. The location follows the general route of the narrow, unimproved, existing railroad from Penedo to Junqueiro. After this 1961 location survey by CVSF, construction work on BR-11 adjacent to Junqueiro was started. The BR-11 alignment is south of Junqueiro and the bridge over the Piranhana River has been constructed. The original location survey of AL-13 will be revised to connect with BR-11 about two kilometer west of Junqueiro. This revision will improve the original alignment and grade on the last three kilometers

and also eliminate the need for constructing another bridge over the Perucaba River. The preliminary cost estimate (ExhibitE) has been based on this revision and elimination of the originally planned 15 meter bridge.

Suitable aggregate sources are available on or near the project for the surfacing and paving work. The consultant procured under the loan will assist CER in preparation of final Plans, Specifications and Estimate for the work and additional pre-contract engineering work and materials studies deemed necessary.

Trained equipment operators and semi-skilled laborers generally will not be available locally, but may be obtained from neighboring Northeastern States. Local unskilled labor can be readily adapted to the work.

The project design, including preparation of final plans, specifications and estimate will be in conformance with the DNER (National Highway Department) specifications. The DNER specifications may be modified by special provisions to meet the special needs of this particular work. The consultant will also assist CER in preparation of contract and bid documents for advertisement and award of contract. Equipment and materials are available locally.

The work is scheduled for construction during the dry seasons, September 1963 to April 1964 and September 1964 to April 1965. In compliance with FAA, Sec. 611 (c), the construction under the loan will be by a prequalified contractor selected by the contracting agency on the basis of competitive bids. Competitive bidding will be open to US contractors.

The management and maintenance of the completed project will be under the direction of CER. Presently CER is generally lacking in road maintenance organization, facilities and equipment, although they have had relative success with maintenance of all-weather unpaved roads in the State. A current highway maintenance development loan is under consideration which would assure CER maintenance capability on this project. It is recommended that approval of a maintenance loan need not precede action on this constructional loan.

DETAILED PROJECT DESCRIPTION

The geographic position of State Highway Route AL-13 in the State of Alagoas is seen on the map in Exhibit B.

The southern terminus of Route AL-13 is at the intersection of Piassabucu Road and Wanderley Avenue at the city limits of Penedo. Penedo is situated near the southern tip of Alagoas, about 25 km up-stream from the mouth of the San Francisco River. Penedo is the focal point of the Northeast's principal rice producing zone which borders along the San Francisco River. Route AL-13 extends northerly from Penedo a distance of 44 km crossing Penedo, Piassabucu and Igreja Nova Counties and entering Junqueiro County. The northern terminus of the route is at its intersection with Federal Highway BR-11 approximately 2 km west of the city of Junqueiro.

The work included in the development loan is clearing, grading, drainage pipe, one 10 meter bridge, surfacing and bituminous paving on the entire 44 km length of AL-13.

At the present time AL-13 consists of narrow, winding trail-road about 48 kilometers in length. The horizontal curvature is extremely sharp and the gradient is sometimes very steep. On the flat stretches, the present road is in a ditch since the topsoil has been bladed to the sides in order to reach the sandy clay soil beneath. During the rainy season these ditch sections are full of water and impossible to drain. This present road passes through the small town of Alagoinhas which has a very narrow street with houses on both sides.

The new location survey for AL-13 follows the general route of the present road with good alignment and grades. The survey properly fits the existing terrain and lands itself to economical construction. The small town of Alagoinhas is by passed some 100 meters, and the flat stretches are designed with a small fill embankment for proper drainage. The new location of AL-13 will be some 4 kilometers shorter than the present winding trailroad.

A detailed preliminary estimate of the quantities and cost of the work to be accomplished under the loan AL-13 can be seen in Exhibit E. The quantities for this section have been reviewed and are considered reasonable and adequate for the work involved. The principal work under the loan is the construction and paving of 44 kilometers of new road in conformance with DNER (National Highway Department) standards for a Class II Highway. The clearing is considered light to medium, and the grading appears common with no solid rock in evidence. A pit run sandy subbase obtained from local deposits along the road will be constructed to a depth of 20 cm. A stabilized crushed gravel base produced by screening and crushing suitable gravel deposits in the area will be constructed to a depth of 15 cm. The pavement is double surface treatment 7 meters in width, with aggregates to be produced from the granits outcrops ten kilometers west of Junqueiro on the BR-11 highway. The asphalt will be shipped in from Sao Paulo.

Present and Future Traffic Generating Activities

Improvement of highway AL-13 can be readily justified as a definite contribution to the economic advancement of southeastern Alagoas. AL-13 connects Penedo, the center of the States rice production, with the principal Federal Highway BR-11. With the step-up of industrialization in the metropolitan centers, connecting highways are of vital importance for the transportation of agricultural products. Tremendous traffic generation can be expected with completion of BR-11 and the highway project under this loan. Highway AL-13 serves an area of 2,000 square kilometers and a population of approximately 75 thousand inhabitants. The agricultural products produced in this area are mainly rice, cotton and manioc.

Traffic Capacities

Recent and projected traffic counts on highway AL-13 are detailed in the benefit cost analysis, Exhibit G. The traffic counts taken in 1960 were expanded at the rate of 10% per year to arrive at the traffic volumes shown for 1973 and 1983. The 10% rate is based on vehicle registration and liquid fuel consumption in the State of Alagoas during the period of 1956 to 1960. (See Exhibit F).

Justification of the Scope of Improvement

The total average daily traffic (ADT) for this project (Highway AL-13), projected to 1983 is 891 vehicles. (See Exhibit G). The National Highway Department (DNER) standards call for a class II Highway where the ADT is from 500 to 1,000 vehicles.

Design Criteria

Design of the project will be in accordance with DNER standards as outlined in Exhibit 7, Annex III. Total surfacing depths are based on the climate and rainfall conditions and the types of subgrade materials encountered on the project. The following limiting values apply to the project:

Category - Class II; Design Speed 40 to 80 kph;
Maximum Grade - 6% Minimum Sight Distance - 65 meters;
Minimum Radius Curve - 110 meters; Subgrade Width - 12 meters;
Paved Surface - 7 meters. (See Exhibit C, for Project typical section)

Surveys and Preliminary Plans

The location survey and preliminary plans were completed in 1961 by the engineering department of the San Francisco Valley Commission (CVSF). The location survey is considered very good as it fits the terrain well

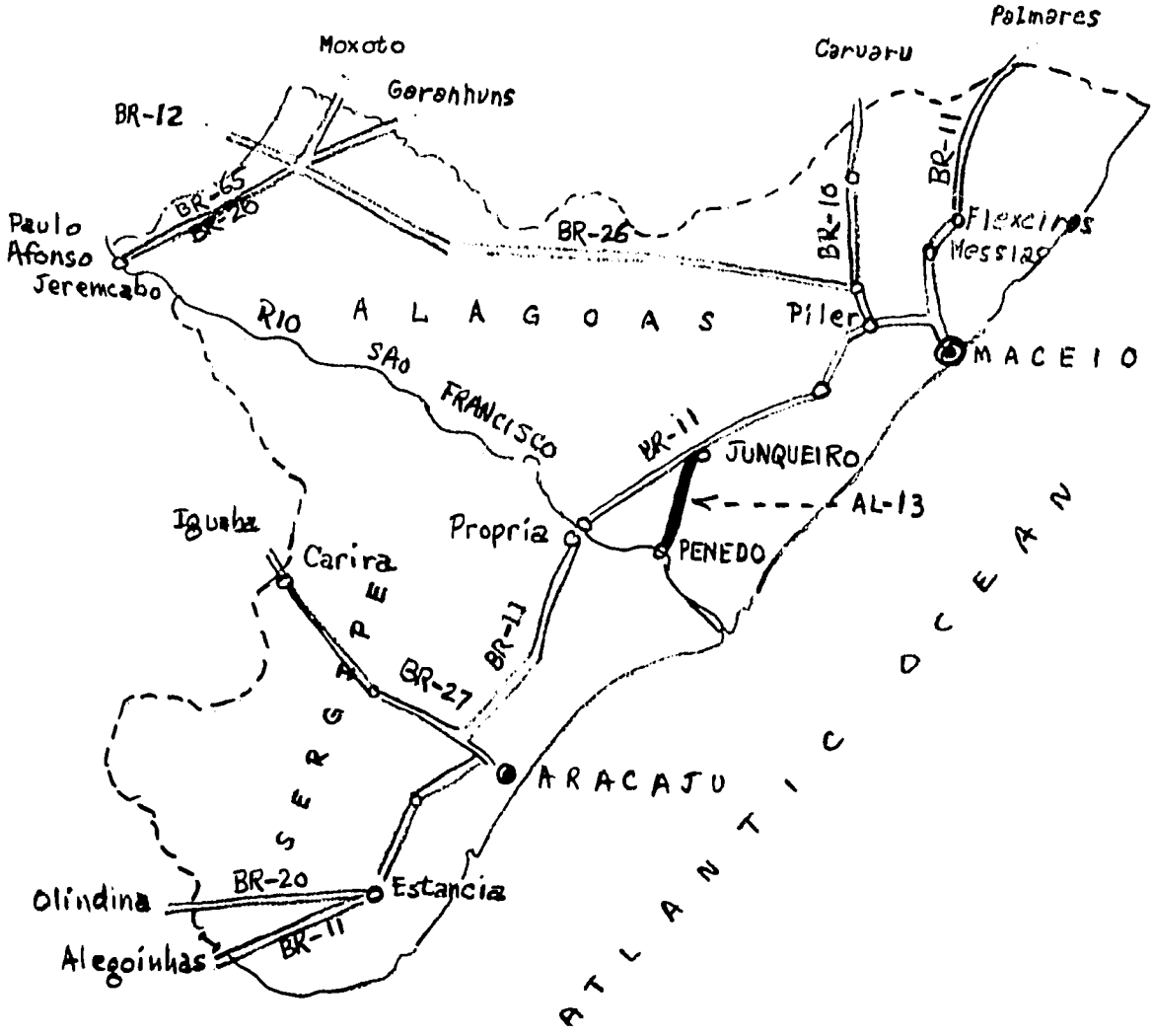
with light curvature and good gradeline. Conditions near Junqueiro, at the north end of the project, have changed since the location survey was made. This will require a minor revision in the alignment at the north end to properly connect with the new construction on Federal Highway BR-11. It is anticipated that this revision will be made and that further materials studies will be carried out prior to final Plans, Specifications and Estimate (PS&E) for the project. This can be handled either by the consultant or by the Alagoas State Highway Commission (CER) assisted by the consultant. At this writing it is anticipated that the consultant will prepare the major portion of the PS&E and such contingency is considered in the cost estimate.

Construction Standards

Construction procedures and quality of materials will be governed by the provisions of the DNER Standard Specifications. The specifications have been reviewed and are complete and adequate to control the proposed work.

MAP OF ALAGOAS & SERGIPE

BRAZIL

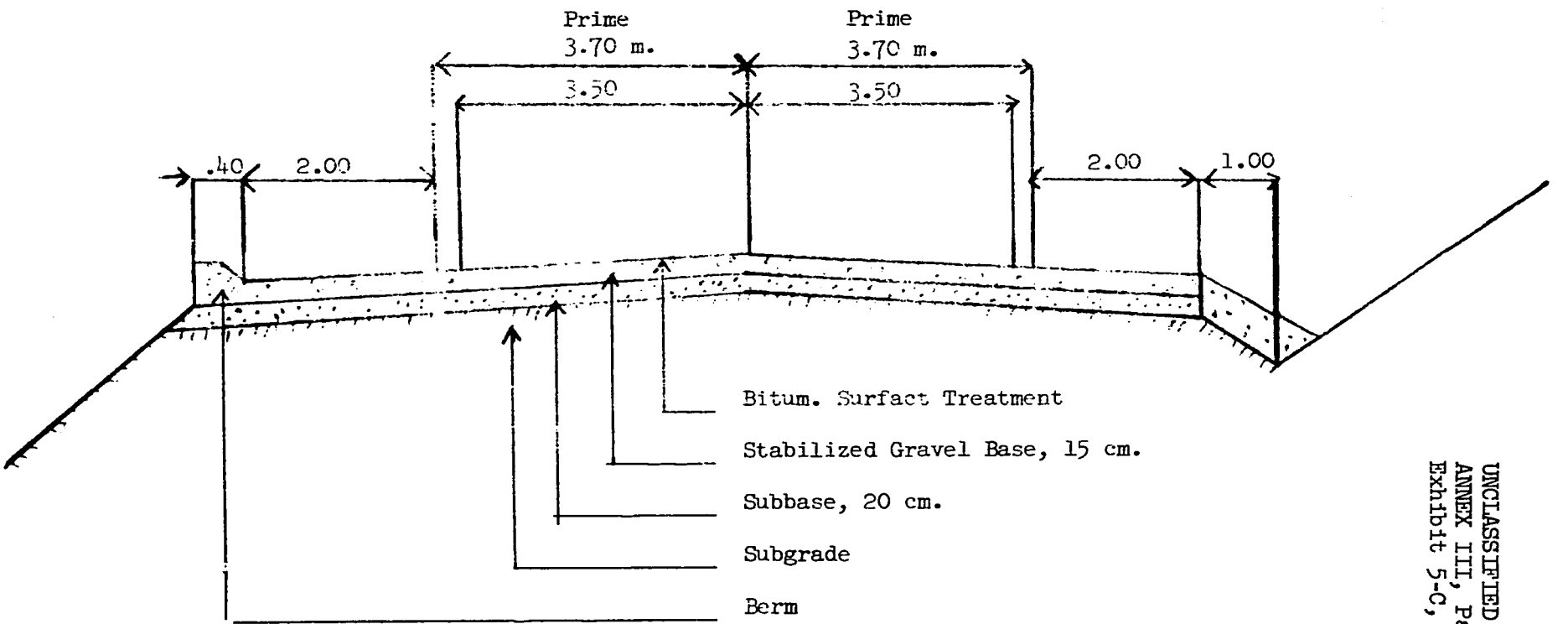


A L A G O A S AL-13

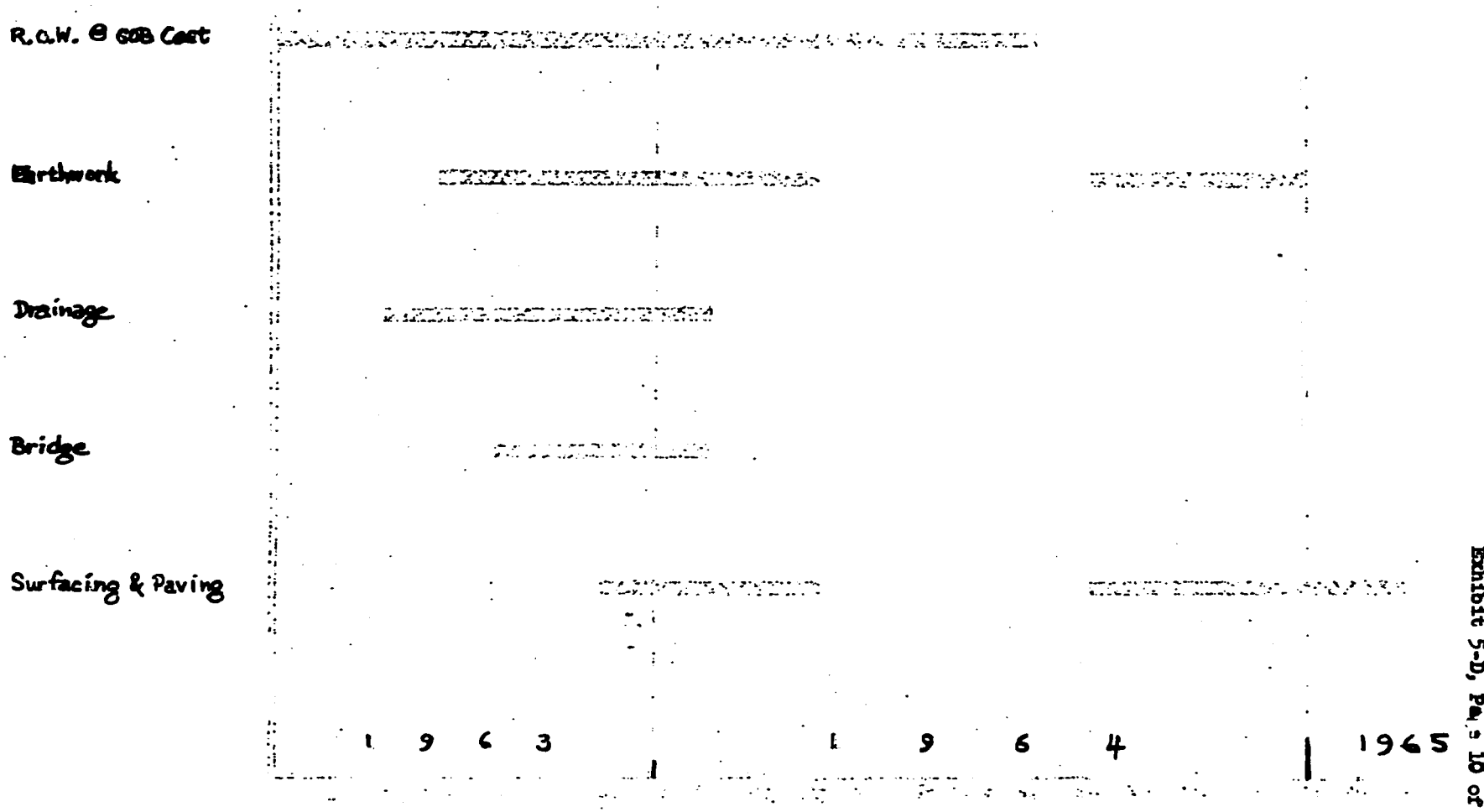
TYPICAL ROADWAY SECTION

PENADO TO JUNQUEIRO

Km. 0 to Km. 44



PROPOSED CONSTRUCTION SCHEDULE FOR AL-13



STATE OF ALAGOAS

HIGHWAY PROJECT AL-13

Estimate of Quantities and Costs

	ITEM	Unit	Quantity	Unit Cost Cr$	Total Cost Cr$	US$ Equiv.Cost at 460/1
(a)	Clearing & Grubbing	M2	880,000	10	8,800,000	19,100
(b)	First Class Excavation (Including Roadside Ditches, Overhaul, Water & Compaction)	M3	950,000	400	380,000,000	826,100
(c)	Concrete Culverts (Diameter 0.6M to 2.0M)	Ea.	18	200,000	3,600,000	7,800
(d)	Concrete Box Culvert 5M Span	Ea.	1	2,000,000	2,000,000	4,400
(e)	Concrete Bridge 10M Span	Ea.	1	5,540,000	5,540,000	12,100
(f)	Select Borrow Subbase (Including: Hauling, watering, processing and compacting - Ave. 20 cm. depth)	M3	110,000	1,170	128,700,000	279,800
(g)	Stabilized Crushed Gravel Base (Including: Hauling, watering, processing, and compacting - Ave. 15 cm depth)	M3	85,000	4,000	340,000,000	739,100
(h)	Application of Prime Coat (MC-1)	M2	325,600	30	9,768,000	21,200
(i)	Construct Double Surface Treatment (Including: AC Application and furnishing the aggregate)	M2	308,000	270	83,160,000	180,800

	ITEM	Unit	Quantity	Unit Cost Cr$	Total Cost Cr$	US$ Equiv.Cost at 460/1
(j)	Haul of Surface Treatment Aggregate	Ton	13,500	1,800	24,300,000	52,800
(k)	Asphalt for Prime (NC-1)	Ton	510	59,000	30,090,000	65,400
(l)	Asphalt for Surface Treatment (AC 150-200)	Ton	980	54,000	52,920,000	115,000
	CONSTRUCTION TOTALS:				1,068,878,000	2,323,600

Project is 44 km or 27.3 miles.

Average Construction Cost - Cr$24,293,000 per km.

Average Construction Cost - US$85,000 per mile.

	CR$ Millions	Equivalent US$ Thousands
CONSTRUCTION PROJECT TOTAL	1,069	2,324
11% for Contingencies	120	260
5% for Consultant Engineering	53	116
DEVELOPMENT LOAN TOTAL	1,242	2,700

ALAGOAS VEHICLE REGISTRATION AND LIQUID FUEL CONSUMPTION

MOTOR VEHICLES IN CIRCULATION IN ALAGOAS:

YEARS	AUTOMOBILES	BUSES & TRUCKS	TOTAL	ANNUAL INCREASE	
				VEH.	%
1956	1751	2101	2852		
1957	1875	2215	4090	238	+ 6.2
1958	2072	2428	4500	410	+ 10.0
1959	2178	2624	4802	302	+ 6.7
1960	2628	3020	5648	846	+ 17.6
				Average	+ 10.1%

LIQUID FUEL CONSUMPTION IN ALAGOAS:

(Million Liters)

	1956	1957	1958	1959	1960
Gas	20	21	25	25	27
Diesel	11	10	14	15	16
Total	31	31	39	40	43
Annual Increase					
Million Liters		0	+ 8	+ 1	+ 3
%		0	+ 25.8	+ 2.6	+ 7.5 Average = 9.0 %

Based on the above data it is estimated that the average annual increase in traffic will be about 10% per year.

At 10% per year: 3 year increase = 33%
10 year increase = 159%

BENEFIT COST RATIO

From the SUDENE report on the project Average Daily Traffic (ADT) on AL-13, in 1960 was 100 vehicles per day (70% trucks).

The 1963, 1973 and 1983 traffic has been computed using the 10% estimated annual increase from Exhibit G, Annex III.

	VEHICLE PER DAY			
	1960	1963	1973	1983
Automobiles	30	40	103	267
Trucks	70	93	241	624
TOTAL DAILY	100	133	344	891

Assuming 14.05 cents per mile as the cost of operation on earth road and 9.80 cents per mile as the cost of operation on a paved road, both in good condition, the saving is 4.25 cents per mile for cars. Also assume that the saving for one truck is equal to double that for one car. The saving for one mile for one day then becomes:

	1963	1973	1983
Cars x 1	40-40	103-103	267-267
Trucks x 2	93-186	241-482	624-1248
Vehicles per day	226	585	1515
Benefit (Savings at 4-1/4 ¢)	$ 9.61	$ 24.86	$ 64.39

Costs have been computed assuming that the maintenance of the earth and paved road would be the same, then the cost is capital cost only.

From Exhibit F, Annex III the average cost per kilometer of the project is Cr$24,293,000 or US$85,000 per mile. The capital cost at 3/4 per cent for 30 years is 0.0373 x $ 85,000 = $ 3,170 per year or $ 8.68 per day.

	1963	1973	1983
Benefit Cost Ratio is	9.61/8.68	24.86/8.60	64.39/8.68
	1.11	2.85	7.43

STATE OF CEARA

HIGHWAY PROJECT CE-35

TABLE OF EXHIBITS

AID/W NOTE:

The order of exhibits has been slightly changed from the original submission for purposes of simplicity.

NORTHEAST BRAZIL

SUDENE - Combined Highway Project

STATE OF CEARA - HIGHWAY - CE-35

(NOTE: This section was prepared by the Director of Highways of the State of Ceara, in collaboration with a U. S. Bureau of Public Highway - BPR group on TDY in Northeast Brazil.)

* * * * * * *

April 17, 1963

Dr. Amadeu Freire
Director, Division of Transports
Superintendency for the Development
of the Northeast
SUDENE

Dear Sir,

We enclose for your review and consideration additional data (revised cost estimate, etc.) in conjunction with our previously submitted loan application for surfacing and paving approximately 50 Km. of State Highway CE-35 in the State of Ceara.

The total amount of the loan requested to complete the grading, drainage and paving of this highway is Cr$690,000,000 or US$1,500,000, at the exchange rate of Cr$460 per US dollar. Our own contribution to this project, consisting of initial engineering studies, preparation of plans, estimate and specifications is outlined in the Loan Application.

The loan request also includes procurement of services of a qualified engineering consulting firm to be selected by the State Highway Commission (DAER-CE) in accordance with USAID regulations.

For your information this project is included in our four year highway plan and the benefits derived will greatly aid the economic and social welfare of our State and contribute to the improvement of the Northeast region. Previous information furnished with the original submission contained a detailed discussion of the need for this project and with subsequent economic development since that time we consider the need for this project to be of the highest priority.

We would therefore appreciate your kind and favorable consideration of this request. Since it is proposed to begin construction work on this project at the end of the present rainy season it would be appreciated if this application could be expedite.

Cordially yours

(signed)

Director of Highways
Ceara

Enclosure: Engineering Analysis

STATE OF CEARA

HIGHWAY PROJECT - CE-35

The Project

The proposed loan at a total cost of Cr$ 690,000,000 or US $1,500,000 (See Exhibit E) includes grading, drainage and paving of about 55 km of a section of State Highway CE-35 which begins near the south limit of Barbalha and extends easterly through Missao Velha to a point on Br-13 south of Milagres. Acquisition of right of way, any required fencing and disposition of utilities will be by Government of Brazil and is not included in the loan.

The loan will also include procurement by the Ceara State Highway Commission (DAER-CE) of a qualified consulting engineering firm meeting the requirements of the AID regulations and selected by the DAER subject to the approval of USAID/NE/B. The consultant will assist the DAER in preparation of the plans and specifications and in the engineering supervision and inspection of the construction work under the loan. The consultant will certify to USAID/NE/B as to the quality and quantity of the construction work performed.

Engineering Plan

The activity, described above, to be totally financed by the Development loan is considered to be economically and technically sound in accordance with FAA, Sec.201 (b) (2). The requirement of FAA, Section 611 for completion of preliminary engineering plans and reasonably firm cost estimates have been met.

The present road was graded about 10 years ago. The alignment and grades of the existing road are generally good and the grading will consist chiefly of widening the cuts and fills to the full plan width of 13 meters in cuts and 12 meters in fills. At a few low areas, water was over the road in recent heavy rains. Additional cross drains will be placed and the grade raised in these areas.

The streets through Missao Velha are partly telford stone and partly telford stone covered with sand asphalt. The existing sand asphalt can be used as a base for final surfacing. The telford stone will require leveling if it is to be used as a base for paving.

The existing bridges were constructed about 1949 and the roadways are only 7 meters wide. They are in fair to good condition and are considered adequated to remain in place.

Suitable aggregate sources for base course material are found at several locations near the project. There is some question as to whether the quantity of aggregates will be sufficient for the base. The consultant should assist the DAER in locating sufficient sources for the work since cement stabilization as an alternate design would increase the cost of the base construction.

There are sufficient sources of sand for the sand asphalt surface. The sand asphalt will be designed according to Marshall design procedures and mixed in a pug mill type plant with RC-2 liquid asphalt. It is estimated that the mixture will require about 7 percent of RC-2 asphalt by weight of dry sand. Asphalt will be hauled to the project from Fortaleza in tank trucks. The cost of the asphalt is estimated at Cr$ 35,000 per ton at Fortaleza and Cr$ 42,000 at the project.

The project design will be in accordance with DNER standards for Class I highways. The construction work will be performed in accordance with DNER specifications. The consultant will assist the DAER in preparation of contract and bid documents for advertisement and award of the contract. Equipment and materials are available locally.

The work is estimated to require 19 months for completion. Construction is difficult during the rainy season from January through May. In compliance with FAA, Sec. 611 (c), the construction under the loan will be by a pre qualified contractor selected by the contracting agency on the basis of competitive bids. Competitive bidding will be open to US contractors. The award of the contract will be subject to the concurrence of USAID/NE/B.

The Maintenance of the complete work will be under the direction of the DAER. Presently the DAER is generally lacking in a road maintenance organization, facilities, and equipment. A maintenance development loan is under consideration to furnish additional equipment and technical assistance. This proposed loan would improve the DAER's ability to maintain this project as well as all other state highways. It is recommended that approval of a maintenance loan need not precede action on this construction loan.

DETAILED PROJECT DESCRIPTION

The goegraphic position of State Highway Route CE-35 in the State of Ceara is shown on the map in Exhibit B.

CE-35 connects the important commercial and industrial centers of Crato and Juazeiro do Norte and the surrounding rich agricultural area with BR-13 known as the Transnordestina Highway. The portion to be improved under the loan application extends from Barbalha to BR-13. The area served by the project has over 100,000 population and BR-13 is its principal outlet north to Fortaleza, east to the port of Recife and south to Rio and Sao Paulo.

The work included in the development loan is grading, drainage and paving over the entire section of about 50 km.

The existing road was graded about 10 years ago to a fairly good line and grade. Some of the cuts and fills measure only about 7 meters. The grading will closely follow the existing road consisting mostly of widening of cuts and fills with some improvement in the grade line. The topography is gently rolling for about the first 20 km and then becomes more hilly on the balance of the project to its terminus at BR-13.

A detailed preliminary estimate of the quantities and cost of the work to be accomplished under the loan for CE-35 can be seen in Exhibit D. The quantities for the section have been reviewed and are considered reasonable and adequate for the work involved. The grading and drainage on this project are minor since this work largely involves widening of cuts and fills. The principal work consists of paving the project. The subbase consists of about 8 inches (20 cm) of sandy gravel. The depth will be varied depending on tests by CER or Group Index method of the subgrade material. The base will be a uniform 6 inch (15 cm) thickness consisting of material with a minimum CBR of 50, an expansion not exceeding 1%, Liquid Limit not exceeding 25 and Plastic Index not exceeding 6. The wearing surface will consist of 2 inches (5 cm) of sand asphalt. The sand will have the following grading:

Screen No.	% Passing
10	100
40	25-90
80	5-60
200	0-13

The per cent of asphalt RC-2 will be limited to from 6 to 8 per cent by weight of sand. There will be lime in the amount of 1 or 2 per cent by weight of sand added for the purpose of improving the mixture of sand and asphalt.

Present and Future Traffic Generating Activities

The towns of Crato, Juazeiro do Norte and Barbalha have an urban population of about 100,000. The rural population in the immediate vicinity of the project is another 85,000 people making this a rather densely populated area of the northeast. This population center now has no direct ready access to Fortaleza, Recife, or the industrial south of Brazil. At the present time, BR-13, the Transnordestina Highway, is impassable due to grading operations and the rainy seasen. This road is on the five year federal plan for paving north toward Fortaleza and south toward Recife and Sao Paulo. Due to the present impassable condition of BR-13 the present traffic on CE-35 is only a small fraction of what it will be when the paved connections on BR-13 are completed. Recife is the main port for this area and at the present time traffic must travel southwest to Araripina and then easterly Salgueiro to Recife. This present route is about 160 km longer than the route via CE-35 and BR-13. This same longer route is required for traffic to and from the industrial south of Brazil.

The agricultural production of Crato, Juazeiro do Norte, Barbalha, Missao Velha and Milagres served directly by the project, in 1959 was 319,680 tons of Sugar Cane, Manioc, Cotton, Beans, Corn, Rice, and others valued at Cr$384,800,000. The principal agricultural exports will be shipped out over the projects as this will be the direct route to Fortaleza, Recife, and south of Brazil.

Traffic Capacities

Present and projected traffic counts on CE-35 are outlined in the benefit cost analysis, Exhibit F. Since the actual count was taken at a time when BR-13 to the south was impassable, it seems reasonable to assume that present traffic will be double the actual count on completion of BR-13 paving and the benefit cost ratio has been computed on this basis. The vehicle registration in Ceara has been increasing at an average rate of 15 per cent per year. See Exhibit E. A rate of traffic increase of 150 per cent over a 10 year period has been assumed.

Justification of the Scope of Improvement

The total average daily traffic estimated over a period of 20 years, the life of the pavement, is 212 trucks, 162 buses and 208 cars or 582 vehicles per day. The National Highway Department (DNER) standards call for a Class II highway for traffic of 500 to 1000 vehicles per day. Paving is usually economically warranted for vehicular traffic of over 200 vehicles per day.

Design Criteria

The design of the project will be in accordance with the DNER standards as outlined in Exhibit 7. Total surfacing depths are based on climate and rainfall conditions and the bearing values of the subgrade materials on the project. The following limiting values apply to the project.

	TOPOGRAPHY	
Class II Highway	Rolling	Hilly
Design Speed	80 kmh	60 kmh
Minimum Radius	230 m	170 m
Maximum Grade	5%	7%
Right of Way Width	80 m	70 m
Width of Pavement	7 m	7 m
Shoulder Width	2 m	1.5 m
Width of Ditches in Cuts	1 m	1 m

The typical cross section is shown in Exhibit C.

Surveys and Preliminary Plans

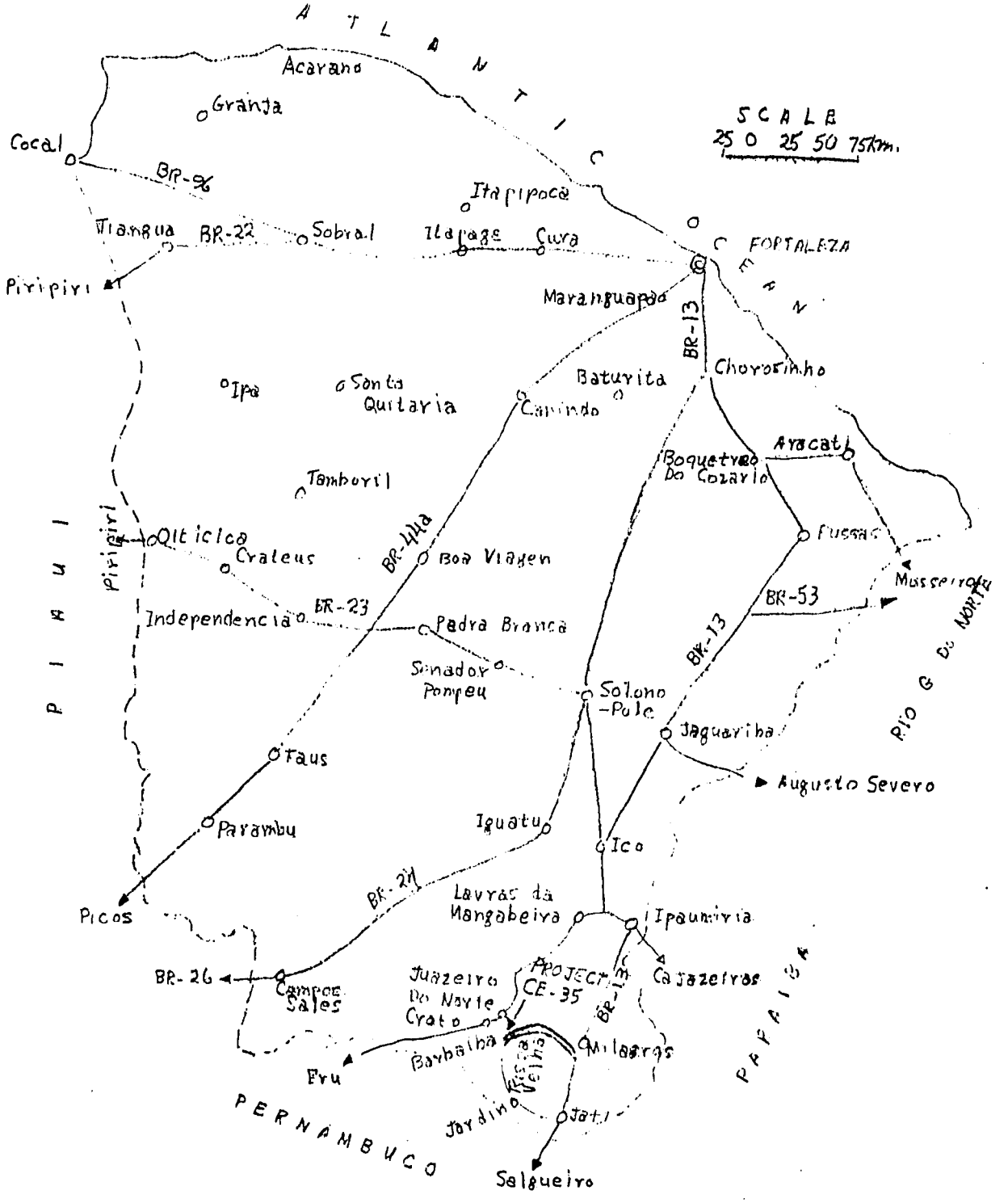
The bridges were constructed in 1949 and the grading of the existing road was completed about 1953. The alignment and grades of the present road are generally good. A relocation to the south of Missao Velha should be considered at some future date to eliminate the portion on the existing narrow city streets. Some of the fills measure only about 7 meters and most of the grading will consist of widening the cuts and fills to make the project suitable for paving. Recent rains have topped some of the fills and additional drainage and some minor raising of the grade line is advisable.

Additional surveys should be made by the DNER to locate granular material for subbase and base course. The cost of portland cement delivered on the project from Joao Pessoa or Recife is Cr$1,000 for a 50 kilo sack. The cost of cement stabilization as an alternate to natural gravel is high enough to make additional search for granular material sources advisable. It is anticipated that the consultant will check on the adequacy of granular base course material as a part of his review of the plans and specifications.

Construction Standards

Construction procedures and the quality of materials used in the construction will be governed by the DNER standard specifications. These specifications have been reviewed and are considered to be complete and adequate to control the proposed work. Special provisions will be prepared to govern items peculiar to this individual project.

MAP OF CEARA

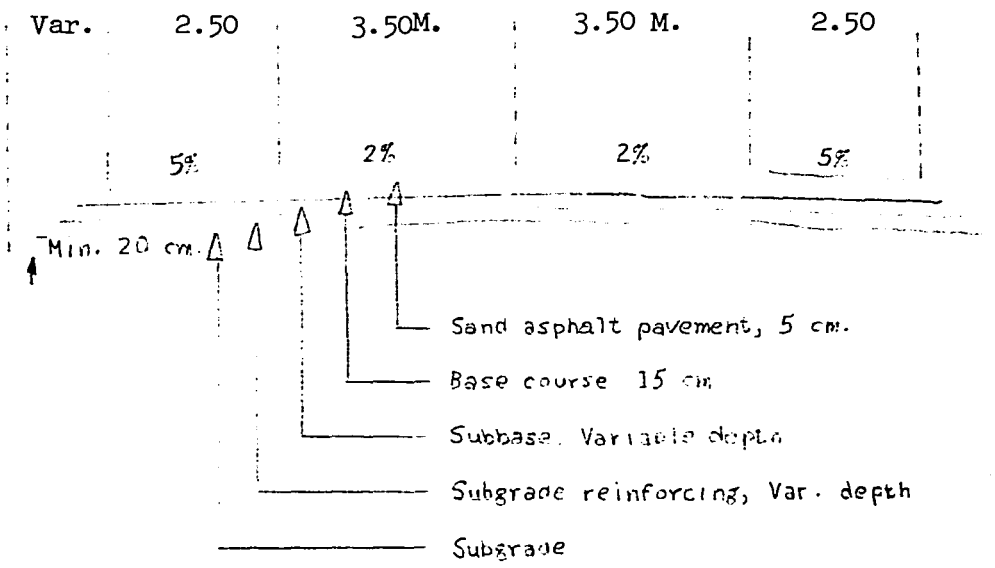

ATLANTIC
SCALE
25 0 25 50 75Km.
Acarau
Granja
Cocal
BR-9
Itapipoca
Tianguá
BR-22
Sobral
Ilaiage
Cuna
FORTALEZA
Piripiri
Maranguape
BR-13
Chorozinho
Ipu
Santa Quiteria
Canindo
Baturite
Aracati
Boqueirao Do Cesario
Tamboril
Piripiri
Oiticica
Crateus
BR-404
Boa Viagem
Russas
Mossoro
BR-53
Independencia
BR-23
Padra Branca
Senador Pompeu
BR-13
Solono -Pulo
Jaguaribe
Rio G. Do Norte
Augusto Severo
Iguatu
Ico
Parambu
Picos
BR-21
Lavras da Mangabeira
Ipaumirim
BR-26
Campos Sales
Juazeiro Do Norte
Crato
PROJECT CE-35
BR-116
Cajazeiras
Barbalha
Milagres
Missao Velha
Jardim
Jati
Salgueiro
Fru
PERNAMBUCO
PARAIBA

C E R R A CE 35

TYPICAL ROADWAY SECTION

BARBALHA TO BR 13

Km. 0 to Km. 50



STATE OF CEARA

HIGHWAY PROJECT CE-35

Estimate of Quantities and Cost

	Unit	Quantity	Unit Cost	Cr$ Total Cost	US $ Equiv.Cost 460/1
a. Exacavation (Includes haul & Compaction)	M3	195,000	420	81,900,000	178,100
b. Excavation for Borrow (Includes haul & Compaction)	M3	320,000	330	105,600,000	229,600
c. Excavation for Roadside Ditches	M3	6,500	200	1,300,000	2,800
d. Excavation for Furrow Ditches	M3	25,000	250	6,250,000	13,600
e. Concrete Culverts 0.8mx0.8m. & 2.0m x 2.5m (Mainly extensions for existing Cross drains)	M	315	60,000	18,900,000	41,100
f. Widening Existing Concrete Bridges	M	68	180,000	12,240,000	26,600
g. Fine Grading Subgrade & reinforcing with select borrow (Includes haul)	M3	48,680	550	26,774,000	58,200
h. Crushed gravel for subbase (Includes haul spreading & compaction)	M3	97,360	850	82,756,000	180,100
i. Crushed gravel for base course (Includes haul, spreading & compacting)	M3	73,000	1,010	73,730,000	160,000
j. Hot Mix, Sand-Asphalt surface (Includes asphalt, mixing, haul, placing, & Furnishing & Placing asphalt for prime)	M2	340,760	450	153,342,000	333,400
CONSTRUCTION TOTALS:				562,792,000	1,223,500

Project is 50 Km. or 31 miles long
Average Construction Cost =
Cr$11,260,000/Km. - Average Construction Cost - US$ 39,500/Mile

	Cr$ Millions	Equiv.US$ Thousands
CONSTRUCTION PROJECT TOTALS	563	1,224
18% for Contingencies	99	215
5% for Consultant	28	61
DEVELOPMENT LOAN TOTAL	690	1,500

VEHICLES REGISTERED IN CEARA

YEARS	AUTOMOBILES	BUSES & TRUCKS	DIFFERENCE	PER CENT
1956	4439	6194		
1957	4798	6703	509	8.2
1958	5427	7014	311	4.6
1959	5714	7833	819	11.6
1960	7823	10540	2707	34.5
Average annual increase:				14.8 per cent

BENEFIT COST RATIO

A traffic count taken during January 1963 showed the following:

Trucks	33
Buses	25
Cars	32
Total	90

Since the count was taken while BR-13 south was impassable it seems reasonable to at least double this count in anticipation of completion of paving on BR-13. Assuming the 150 per cent increase in 10 years the traffic volumes are:

	1963	1973	1983
Trucks	66	163	406
Buses	50	125	312
Cars	64	160	400
Total	180	448	1.118

Assuming 14.05 cents per mile as the cost of operation on an earth road and 9.80 cents per mile as the cost of operation on a paved road the saving is 4.25 cents per mile for cars. Also assume that the saving for trucks and buses is 3 times that for cars. The average traffic over a 20 year period is 582 vehicles of which 212 are trucks, 162 are buses and 208 are cars.

The saving (benefit) for one mile for one day then becomes:

212 x 3 x $.0425	=	27.00
162 x 3 x $.0425	=	20.70
208 x 1 x $.0425	=	8.80
	$	56.50

The cost has been computed assuming that the maintenance cost of the earth and paved road are the same, then the cost is capital cost only. From Exhibit E the average cost per kilometer of the project is Cr$ 11,260,000 or US $ 39,500 per mile. The capital cost at 3/4 per cent for 30 years is 0.0373 x $ 39,500 = $ 1,480 per year or $ 4.05 per day.

The benefit cost ratio is then $\frac{56.50}{4.05} = 14$

D E S I G N C R I T E R I A D. N. E. R. S T A N D A R D S

(Note: This table is applicable to, and was originally incorporated in, all six applications.)

PROJECT CATEGORY	CAPACITY ADT(1)	TERRAIN	DESIGN SPEED Km/Hr	SUPER. %	MIN. RADIUS M.(2)	MIN. SIGHT DISTANCE STOP	MIN. SIGHT DISTANCE PASS	MAX. GRADES %(3)	PAVE. WIDTH Meter(4)	MIN. SHOULD WIDTH	EMB. SLOPES UNDER 3m	EMB. SLOPES OVER 3m
SPECIAL	Over 3000	Flat	100	Max 10	430	200	800	3	7.5	3.0	1:4	1:2
		Rolling	80	Min 2	280	150	500	4		2.5		
		Mountain	60		160	100	300	5		2.0		
CLASS I	Over 1000	Flat	100	Max 2	340	150	800	3	7.0	2.5		
		Rolling	80	Min 2	200	100	500	4		2.0		
		Mountain	60		100	85	300	6		1.5		
CLASS II	500 to 1000	Flat	80	Max 8	200	100		3	6.0	2.0		
		Rolling	60	Min 2	110	65		4	to	1.5		
		Mountain	40		30	35		6	7.0	1.2		
CLASS III	Under 500	Flat	60	Max 8	110	65		4	6.0	1.0		
		Rolling	40	Min 2	50	35		5	to	1.0		
		Mountain	30		30	25		7	7.0	1.0		

(1) Whenever a traffic of over 3000 ADT is anticipated, the roadway design is expected to be drafted to include two independent lanes, often interconnected. The same applies to steep areas where 2000 ADT is anticipated.

(2) Special and Class I Roads - All curvature of less than 600 meters shall be transmitted with transition curves with radii in direct proportion to the length. Class II & III Roads - Transition curves shall be adopted for curvature radius of less than 440 meters. The transition to be used may be one called Circular Transition with double radius.

(3) Values are maximum for sections up to 1000 meters above sea level. They shall be reduced .5% for altitudes over 1000 meters. They may be increased 1% for lengths of sections up to 900 meters on flat terrain, 300 meters in rolling terrain and 150 meters in mountainous terrain.

(4) On the roads containing two independent roadways with two lanes on each roadway, the roadway should be 7 meters wide. Curves will be widened where required by design speed and radius of curvature.

LOAN AUTHORIZATION
Provided from: Alliance for Progress Funds
BRAZIL: Combined Highway Project.

Pursuant to the authority vested in the Administrator of the Agency for International Development (A.I.D.) by the Foreign Assistance Act of 1961, as amended, and the delegations of authority issued thereunder and after consultation with the Development Loan Committee, I hereby authorize the establishment of a loan pursuant to Part I, Chapter 2, Title VI, Alliance for Progress, to the Superintendencia de Desenvolvimento de Nordeste (Borrower) of not to exceed eleven million United States dollars ($11,000,000) to assist in financing the costs of goods, materials and services to construct or improve 182 miles of state highways of Northeast Brazil, this loan to be subject to the following terms and conditions:

1. Credit Fee and Terms of Repayment: The credit fee on this loan shall be three-quarters of one percent (3/4%) per annum on the disbursed balance of the loan. The loan shall be repaid within forty (40) years from the date of the first disbursement under the loan including a grace period of not to exceed ten (10) years.

2. Currency of Repayment: Provision shall be made for repayment of the loan and period of not to exceed ten (10) years.

3. Other Terms and Conditions:

   (a) Equipment, materials and services (except shipping and marine insurance and except as provided in subsection (b) hereof) financed under the loan shall be procured from the United States of America or Brazil.

   (b) United States dollars utilized under the loan to finance local currency shall be made available to the Borrower or its designee through a Special Letter of Credit and shall be used only for procurement in the United States of equipment, material and services of United States origin.

   (c) The loan shall be secured in a manner satisfactory to A.I.D.

(d) As conditions precedent to disbursement, the loan will require:

i. Arrangements satisfactory to A.I.D. to make available the cruzeiros for the project.

ii. Employment by the Brazilian states or their highway departments of technical consultants, satisfactory to A.I.D., to advise and assist in carrying out the project.

iii. Arrangements satisfactory to A.I.D. for maintenance of the roads to be constructed or improved.

(e) The loan shall be subject to such other terms and conditions as A.I.D. may deem advisable.

_____

Administrator

_____

Date