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

CAPITAL ASSISTANCE FATER

Proposal and Recommendations
For the Review of the
Development Loan Committee

SPECIAL PERSONNEL: GREAT NORTH ROAD LOAN
(Phase II - Construction)

648-H-005
621 081

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

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AID-ILC/P-707 REVISED
July 11, 1968

MEMORANDUM FOR THE DEVELOPMENT LOAN COMMITTEE

SUBJECT: Africa Regional: Great North Road Loan
(Phase II--Construction)

Attached are the revised recommendations for authorization of a loan in an amount not to exceed \$13,000,000 to the Government of the United Republic of Tanzania to assist in financing the foreign exchange costs of goods and services for the engineering and/or construction of portions of the Great North Road Project.

This loan proposal was discussed by the Development Loan Staff Committee at a meeting on Wednesday, May 29, 1968 and concurred in by the Development Loan Committee on June 4, 1968.

Nachel C. Rogers
Assistant Secretary
Development Loan Committee

Attachments:
Summary and Recommendations
Project Analysis
ANNEXES I-X

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July 11, 1968

REGIONAL

GREAT NORTH ROAD - PHASE II

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REGIONAL
GREAT NORTH ROAD - PHASE II (CONSTRUCTION)

SUMMARY AND RECOMMENDATIONS

1. BORROWER: Government of the United Republic of Tanzania (GURT)
2. AMOUNT OF LOAN: \$13,000,000
3. TERMS: A. Interest: 2% per annum for the first ten years,
2½% per annum thereafter.
B. Maturity: 40 years including a ten year grace period.
C. Currency: Interest and principal payable in U.S. dollars.

4. COST OF TOTAL PROJECT:

A.I.D. Loan (FY 67)	\$ 1,600,000
A.I.D. Loan (Proposed FY 68)	13,000,000
IBRD Loans and Credits (Estimated)	33,500,000
Swedish Loan	5,000,000
United Kingdom Loan	3,500,000
Tanzania Contribution (Estimated)	19,400,000
Zambia Contribution (Estimated)	15,000,000
Total Cost (Estimated):	<u>\$91,000,000</u>

5. COST OF A.I.D. FINANCED PORTION OF PROJECT:

A.I.D. LOAN	\$13,000,000
GURT Contribution	<u>6,680,000</u>
Total Cost:	\$19,680,000

6. DESCRIPTION OF PROJECT: The total Project consists of the engineering and construction of the Great North Road, running northeast from Kapiri M'Poshi in Zambia northeast to Iringa in central Tanzania and from there branching east to Dar es Salaam, Tanzania. The Project is part of a major Central and East African regional effort to upgrade a number of sections of the Road to a standard required to meet current levels of traffic. The A.I.D. financing provided under this proposed loan will assist in financing (i) construction of the section between Tunduma and Iyayi in Tanzania and (ii) the final engineering of the sections between Iringa and Mahenge and Morogoro and Dar es Salaam in Tanzania.

7. PURPOSE OF THE LOAN: To finance the U. S. costs of the required construction and engineering services.
8. JUSTIFICATION OF THE PROJECT: The Great North Road in Tanzania is part of a major regional link between Zambia in Central Africa and East Africa. In addition, the sections to be constructed and designed with A.I.D. assistance serve areas in Tanzania with considerable promise for economic development. Traffic projections and anticipated tonnages indicate that the present sections are inadequate to serve the needs of Zambian and Tanzanian transportation and justify the construction and design of improved roadways.
9. BACKGROUND OF THE PROJECT: In the fall of 1965, prior to the Rhodesian Unilateral Declaration of Independence, A.I.D. agreed to finance a study to evaluate the need for an improved road between Zambia and Tanzania. This study, performed by Stanford Research Institute and completed in the summer of 1966, identified the need for substantial upgrading of the Great North Road. A.I.D. has received a request from the Government of Tanzania for assistance in engineering and construction of improvement to sections of the Great North Road in Tanzania.
10. EX-IM BANK CLEARANCE: Received, April 15, 1968.
11. MISSION VIEWS: The East African and Zambia Missions strongly endorse the Project.
12. STATUTORY CRITERIA: Satisfied; see Annex I.
13. ISSUES: None.
14. RECOMMENDATIONS: Authorization of a loan to the GURT for an amount not to exceed \$13,000,000 to finance the U.S. costs of the A.I.D. portion of the Project, in accordance with the draft Authorization attached as Annex II.

PROJECT COMMITTEE:

Capital Development Officer: Owen Cylke
Desk Officer: Nancy Hunt
Engineer: Robert Fedel
Counsel: Elliott Weiss

AFR/CDF, OCylke:lmg 5/8/68
AFR/CDF/ENGR, RFedel:lmg 5/10/68 (Section IV)

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July 11, 1968

CAPITAL ASSISTANCE PAPER

REGIONAL - GREAT NORTH ROAD - PHASE II

I. INTRODUCTION

A. Regional Highway Plan. The Great North Road (GNR) runs from Kapiri M'Poshi in Zambia northeast to Iringa in Central Tanzania and from there branches north to Nairobi, Kenya and east to Dar es Salaam. (See map, page iii). The GNR is part of the set of roads seen by some planners as a "Cape to Cairo" highway linking southern Africa and the Mediterranean. While the full implementation of this transport plan appears to be far in the future, the existing Great North Road in East Africa and Zambia has an immediate usefulness and a demonstrable economic rationale. It is not only a major road for Tanzania linking the Southern Highlands, an area of considerable economic potential, with Dar es Salaam and East Africa generally, but is also the major direct link between Zambia and the Tanzanian port of Dar es Salaam. As such it has been shown over the past two years to have an effective place in a general transport plan for Zambia, a country requiring a number of feasible alternative routes to the sea.

The portion of the Project described in this paper -- the construction of the section of the GNR in Tanzania between Tunduma on the Zambian border and Lyayi in western Tanzania, and the design engineering of the Iringa-Manenge and Morogoro-Dar es Salaam sections - is part of a major Central and East African regional effort to upgrade a number of sections of the GNR to a standard required to meet current levels of traffic. A.I.D. had previously assisted in loan financing the final design of the Tunduma-Iringa section, and an engineering reconnaissance of the two additional sections between Iringa and Dar es Salaam. (A.I.D. Loan No. 698-H-003; Capital Assistance Paper P-503).

The IBRD and United Kingdom contemplate financing some of the Zambian sections of the road. Under a loan made quite some time ago for the Kapiri M'Poshi-Serenge section of the road, the International Bank for Reconstruction and Development (IBRD) agreed to consider for future financing additional sections in Zambia provided the contracts for construction were entered into in accordance with IBRD requirements and after June 1, 1966. Based on a preliminary review, the Bank staff believes the contracts let for the Mpika-Tunduma sections meet these tests but not the contract awarded to a Yugoslavian organization for the construction of the Serenge-Mpika section of the road. The GRZ, then, will be responsible for that section. The United Kingdom has contributed \$3.5 million to construction of two sections in Zambia. Under a 1964 agreement, the IBRD/IDA is also financing the engineering design for the surfacing of 110 miles of the poorest sections of road in Tanzania between Iringa and Morogoro. Sweden has indicated interest in participating in the construction financing of these sections up to \$5.0 million.

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B. Background. A.I.D. interest in assisting transportation in the Project area developed in mid 1964. At that time A.I.D. discussed with the Government of Tanzania a study of the economic potential and transportation requirements of the southwestern portion of Tanzania, an area running from Dar es Salaam roughly west to Lake Tanganyika and the Zambian border, and south to Mtwara and Lake Nyasa. Prior to the completion of arrangements for this study, however, A.I.D. was requested in the summer of 1965 to assist Zambia in finding a suitable route to the sea through East Africa. A.I.D. suggested at that time that the scope of the southwestern survey be revised to serve the purpose of evaluating both Tanzanian and Zambian requirements for transportation in the area. This crystallized in the Tanzania-Zambia Highway Study which was the subject of a November 1965 tripartite Agreement among the Governments of Tanzania, Zambia, and the U.S.A.

The Stanford Research Institute (SRI) was chosen to perform the study, and work was begun in December 1965. Four reports were eventually prepared. The first, a brief, so-called "Emergency Study", which came out in January 1966, identified short-term improvements which could be made to the GNR and the port of Dar es Salaam. The second report, the "Operations Research" or "Alternative Route" Study was prepared by March 1966. This report inventoried all routes from Zambia to the Indian Ocean and the Atlantic, and identified feasible upgradings for various routes to expand their transport capacity. The third report, the "Tan-Zam Highway Study" itself, analyzes the requirements for improvements along the route of the Great North Road to meet projected increases in Tanzanian and Zambian traffic. The fourth report, a "Supplementary Study" designed to assist the Tanzanians in a rational allocation of highway costs among primary users of the GNR in Tanzania, is now in preparation.

After reviewing the Tan-Zam Highway Report, the Government of Tanzania in July 1966 forwarded, through the Ministry of Foreign Affairs, a diplomatic note requesting USG assistance in the improvement of the GNR. It was subsequently agreed between USAID/Tanzania and the GURT Ministers of Finance and of Economic Affairs and Development Planning that A.I.D. would initially consider assistance to the GNR Project through provision of the U.S. costs required for the final design by a U.S. A&E firm of the Tunduma-Iringa Section of the GNR.

In anticipation of the successful conclusion of loan negotiations, the Government of Tanzania in September 1966 sent a three-man "Selection Panel" to Washington to select an engineering firm to perform the design work on the Project road and to negotiate a contract. The U.S. firm of DeLeuw, Cather, International was accordingly selected from a wide field of firms interested in the job. This selection was approved by A.I.D. in October 1966. Successful negotiations between the Panel and DeLeuw, Cather were completed during the next three weeks, and in November 1966 the contract was approved by A.I.D. and executed. DeLeuw, Cather completed work in March 1968.

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During the visit of the Selection Panel, the scope of work for the engineering contract was discussed in detail with the IBRD to assure that the resulting design would be eligible for possible IBRD participation in construction financing. At that time A.I.D. also discussed with the Tanzania representatives the remaining two sections of the Tunduma-Dar es Salaam Road not covered by A.I.D.'s Project or by work being undertaken with IBRD assistance. It was agreed that A.I.D. would finance the U.S. costs of an engineering reconnaissance survey of these two sections, Iringa-Mahenge and Morogoro-Dar es Salaam.

In January 1968 A.I.D./IBRD representatives visited Dar es Salaam to finalize arrangements for design, construction, and financing of the Tanzania sections of the GNR. It was decided that A.I.D. would consider financing the U.S. costs of construction of a portion of the Tunduma-Iringa section (Tunduma-Iyayi). It was also agreed that A.I.D. would consider financing the U.S. costs of design engineering for the Iringa-Mahenge and Morogoro-Dar es Salaam sections. The GURT would finance all local costs. The IBRD agreed to consider financing the foreign exchange costs of construction of another portion of the Tunduma-Iringa section (Iyayi-Iringa), and in addition the Iringa-Mahenge and Mahenge-Morogoro sections. Such requirements as may exist for the Morogoro-Dar es Salaam section will probably be met by the GURT. The IBRD has previously financed the design engineering of the Mahenge-Morogoro section. For the Tanzania sections, the IBRD is considering IDA credits. For the entire distance from Iyayi to Morogoro, the IBRD had identified \$6 million as being now available. The Bank representatives trust that the IDA replenishment and a \$5.0 Swedish contribution will provide the balance of the needed financing. Close association among Borrower representatives, the IBRD, and A.I.D. has been maintained throughout the planning stages of the Project.

C. Relation of the Project to A.I.D. Strategy. One year ago, A.I.D. revised its African strategy to improve the effectiveness of U.S. policies and programs in the long, concerted effort required for African development. The new policy provides for more selective concentration of bilateral aid to selected countries, and regional projects involving cooperation by two or more African states. This inter-state emphasis seeks to strengthen African efforts to surmount national problems of limited resources, markets, and economic prospects. Further emphasis has been placed on the coordination of A.I.D. assistance throughout Africa in a multilateral framework, through arrangements under the leadership of the IBRD or the International Monetary Fund (IMF). These international agencies are in an advantageous position to set relatively objective performance standards and priorities, as well as to reduce the present extent of overlap and inconsistencies on the part of diverse donors.

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II. BORROWER

A. The Government of the United Republic of Tanzania. The Borrower will be the Government of Tanzania. This has been considered appropriate by the GURT, A.I.D., and the GRZ in view of the fact that the Project road is located wholly in Tanzania, and despite the regional nature of the Project and the strong interest of the GRZ in its implementation. There has been thorough coordination by the Governments of Tanzania and Zambia on the Project.

B. Project Management. The responsibility for the administration of the road system is vested in the Roads and Aerodromes Division (RAD) of the Ministry of Communications, Labour and Works (Comworks). The Division is directly responsible for the primary and secondary road systems, and also provides technical assistance to the District Councils which are in charge of the tertiary roads. The Mechanical and Electrical Division of the Ministry takes care of road construction and maintenance equipment. The organization of the highway administration is basically sound; however, the executive capacity of the RAD has been seriously impaired by shortage of competent professional staff.

The staff shortage developed in 1964 and 1965 with the progressive departure of expatriate engineers and the difficulties of replacing them from either local or foreign sources. The administrative establishment of about 50 engineers would barely meet the current requirements of Tanzania's highway system, but only about 85 percent of these positions are filled and even this staff partly consists of new graduates with little experience. While it is Government policy to fill administrative positions with Tanzanian nationals, the supply of qualified nationals is inadequate and will remain so for many years. In the meantime, the RAD will have to continue to depend heavily on foreign nationals. A.I.D. is financing operational personnel to serve in Comworks.

The Government recognizes the need to restore the strength of the RAD and has taken steps to that end. Engineering salaries were recently increased to more competitive levels and an overseas recruitment campaign launched. It attracted ten new engineers in 1966 and 14 in 1967, and further recruitment is under way. The provision of expatriate engineers and funds for their salaries have been arranged under a Swedish bilateral program (SIDA) and A.I.D. technical assistance. Similar assistance is being sought from other countries.

The Government is providing incentives, through scholarships and promotional campaigns among students, to attract young Tanzania nationals to Comworks. The Ministry plans to recruit annually at least five new graduate Tanzania engineers for the RAD. These recent graduates will, however, require extensive on-the-job training under experienced supervisors. The Ministry expects that in five years the supply of national professionals will be sufficient to provide trainees for all functions in the establishment of the RAD.

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C. FAA Section 611(e) Certification. The Director of the U.S. Mission to Tanzania has certified as to the GURT's capability effectively to maintain and utilize the Project.

D. FAA Country Limitation. The Office of the General Counsel has reviewed the Project to determine the applicability of the limitations contained in FAA Section 2.01(b) as to the number of countries to which Development Loans may be made. Following from that review, it has been determined that the loan constitutes assistance carried on in behalf of a group of nations, and that accordingly it need not be counted against the twenty country limitation.

III. ECONOMIC ANALYSIS

A. The Zambia-Tanzania Transport Problem. Zambia's long-range policy to diversify its trading and transport pattern and the recent impetus to accelerate that policy due to Rhodesia's Unilateral Declaration of Independence (UDI) has important implications for transport investment in East Africa, particularly in Tanzania.

Because Zambia is a land-locked country, depending heavily on exports and imports, a reliable access to the sea is essential. The country's primary link to the sea is over the Rhodesia Railways (of which Zambia is part owner with Rhodesia) from the Copper Belt through Rhodesia and then over Mozambique railways to the Mozambique ports of Beira and Lourenco Marques, both about 1,500 rail miles from the Copper Belt. Existing alternative routes include: a route over the Bas Congo-Katanga (BCK) and Benguela Railways through Katanga Province in the Congo and Angola to the Angolan port of Lobito on the Atlantic; the Katanga-Matadi rail/water route via Port Francqui, Congo, known as Le Voie Nationale; and a route over the rails of the BCK and the Compagnie des Chemins de Fer du Congo Superieur au Grands Lacs Africains (CFL), then across Lake Tanganyika and finally over the East African Railways line to Dar es Salaam. In addition to the alternative rail links, Zambia is connected through its trunk road network to the neighboring national highway/railway systems in Tanzania and Malawi which also provide outlets to the sea. It is the long-term policy of the Zambian Government to reduce the country's dependence on Rhodesia for access to the sea and for the supply of a wide range of manufactured goods and raw materials and to develop new and closer trade relations with East Africa. UDI and the transport problems arising from it have given added impetus to Zambia's shift in its international transport pattern. In its attempt to create a series of alternate routes through Malawi, the Congo, Angola, and most importantly Tanzania, Zambia initiated various projects in 1965. These included road transport over the GNR to Dar es Salaam, an air cargo operation, a petroleum pipeline, and increased utilization of existing minor routes by rail, lake, and road.

An emergency transport of petroleum products in steel drums to Zambia and backloading of copper and empty drums by truck to Tanzania began in December 1965. In mid-1966, the newly formed Zambian/Tanzanian Road Services Co., Ltd. (ZTRS) owned by the Zambian and Tanzanian Governments (35 percent each) and by FIAT (30 percent) began operating 30-ton truck-trailer units over the full distance of the GNR from Dar es Salaam to the Zambian line of rail. Operating at full capacity,

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the ZERS is to carry 600,000 tons a year, including 100,000 tons of petroleum, oil, and lubricants (POL) in collapsible pillow tanks, 200,000 tons of general imports, and 300,000 tons of copper for export. The operation is presently carrying approximately 250,000 tons in imports, and something less than 200,000 tons in copper exports. More complete figures are unavailable. The operation of the about 120 heavy trucks a day over the Great North Road, in addition to normal traffic, is beyond the safe capacity of most stretches of the road south of Morogoro in Tanzania to the Zambia border. Dust clouds, deep ruts, steep gradients and a narrow winding carriageway combine to make the run extremely dangerous. The damage done by this heavy traffic has been considerable and in many spots the road has broken up.

The emergency transport of oil and copper has so far proved to be a very expensive operation and has failed to reduce appreciably Zambia's dependence upon Rhodesia for access to the sea. As late as 1967, Zambia was still facing a severe fuel shortage; copper production was down by 25%; there were still costly stockpiles of manufactured copper; and Zambia had been forced at times to ship copper through Rhodesia at a cost nearly equal to that for total output. In 1967 the country did import all its POL via alternate routes, managed to export half of its copper in the same way, but remained heavily dependent on routes from or through Rhodesia for general imports and its coal supply. Zambia, therefore, wishes to develop, as quickly as possible, permanent alternative transport capacity to the sea. In these circumstances, Tanzania transport planning depends largely upon Zambian decisions.

Zambian Air Cargoes Ltd. is beginning to settle into a straight air cargo operation - thereby divesting itself of its previous role as an emergency POL supplier. It has solved the majority of its mechanical problems, and its yearly tonnage of general imports may grow to 20,000 tons.

The most advanced of current alternatives is the construction of a 960-mile oil pipeline from Dar es Salaam to Kapiri M'Poshi, Zambia, capable of handling the entire refined fuel requirements of Zambia - 160,000 tons in 1965 and 280,000 tons in 1970. The line is being designed so that it can carry crude oil when Zambian demand justifies a domestic oil refinery. The Zambian and Tanzanian Governments have formed a joint company to own and operate the pipeline which is estimated to cost about \$47.6 million. Early in 1967 a contract for the construction of the line was concluded with a subsidiary of the Italian ENI, with Italian financial institutions providing the necessary credit repayable over 15 years at an interest rate of 6%. The pipeline is expected to be in operation by October of 1968. It must be noted, however, that the pipeline will not carry heavy fuels. Recent discussions with American Metals Climax Corporation indicate that heavy fuels will now be imported to Zambia via the GNR to alleviate the coal shortage noted below. This pipeline will not only provide Zambia with a secure and cheap supply of POL, but will also release the present road capacity through Malawi and Tanzania for the use of general goods.

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The Governments of Zambia and Tanzania have also planned the accelerated improvement of the Great North Road. The heavy Zambian traffic over Tanzania's road network can be expected to continue for some time and must therefore be provided for in addition to Tanzania's own needs. The advantages to Tanzania of an improved road lie in the reduced transport costs for domestic traffic from the Southern Highlands (though these savings at present would not by themselves justify the full investment) and also in the additional benefits from the increased transport activity, employment, fuel taxes, and port revenues generated by Zambian traffic. The Economic Analysis of this paper indicates that Tanzania can probably realize a very satisfactory return on its extra road investment assuming that Zambian road traffic is maintained in volume for a number of years.

In addition to the pipeline and improved road connection, the Tanzania Government (acting as project leader on behalf of the three East African Governments) and the Zambian Government are considering the construction of a 978-mile rail link from Kampoyo on the Rhodesia Railway line to the Kidatu railhead in Tanzania which would provide a 1,300-mile route from the Copper Belt to the Indian Ocean. The idea of this link has been the subject of a number of engineering and economic investigations including a study by the U.K.-Canadian Governments. Although the Consultants' report has not been made public, it is understood that the estimated cost of the rail link, including civil engineering works, motive power, rolling stock, interest during construction and required EAR&H track relaying and port expansion, amounts to \$400 million. The People's Republic of China has proposed an "interest free loan" to the two Governments for this purpose. Zambia and Tanzania appear determined to press ahead with both the construction of the railroad and the upgrading of the Great North Road.

Since the beginning of the alternate route program, Zambia, spurred by the emergency atmosphere created by Rhodesia's UDI, has seized every opportunity to move both imports and exports by every conceivable route. This has sometimes meant the investment of scarce administrative skills, and money, into attempts to operate basically impractical routes, such as the Congolese rail route to Albertville, and the road to Mtwara in Southern Tanzania. Indications are that Zambia is beginning to lose interest in these minor routes and will concentrate on the four major ones: the GNR to Dar es Salaam, the rail route to Lobito, the road and rail route through Malawi to Beria and, of course, the proposed railway from Kampoyo to Kidato.

B. Description of Area and Road Use. The portion of the Great North Road which is the proposed A.I.D. financed construction portion of the Project runs from Tunduma on the Zambia border about 150 miles northeast to Iyayi in southern Tanzania. Iyayi is the junction of the GNR with the road to Njombe, Songea, and Mtwara in southern Tanzania. The major towns along the subject road are Mbeya and Tunduma. The portions of the Great North Road which are the proposed A.I.D. financed design engineering portions of the Project run from Iringa 49 miles east to Mahenge and from Morogoro 119 miles east to Dar es Salaam. The following economic analysis is broken into the three sections: Tunduma-Iyayi (150 miles), Iringa-Mahenge (49 miles) and Morogoro-Dar es Salaam (119 miles). See map, page iii.

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The CNR is the single surface transport link between the southwestern part of Tanzania and Dar es Salaam - the capital, main industrial area, and Tanzania's principal seaport. The Tunduma-Iringi section of the CNR traverses the highest mountains, an area of comparatively high rural population concentration in a generally sparsely populated country. This area also has relatively high land-use productivity at the present time and considerable agricultural potential, soils and rainfall being adequate in some areas to support a much larger and more intensive agricultural effort than is presently operative. The CNR is now used to transport modest tonnages of agricultural produce within the area and to Zambia and Dar es Salaam. Principal crops at the present time are maize, pyrethrum, coffee, and tea. The SRI report identifies specific potential for wheat, cotton, maize, pyrethrum, rice, and other staples in the area. Subsequently, SRI has informed A.I.D. that some of these schemes are now being developed. However, the existence of a good road will undoubtedly be an important factor in future decisions to invest in agriculture in the area, as the distances to the major market centers are great.

The Great North Road is also the shortest land link between Dar es Salaam and Zambia, and one of Zambia's principal outlets to the sea. The SRI report has concluded that the CNR is not a long run economic alternative for the transport of large quantities of bulk commodities, such as P/L and copper, but that the CNR can compete effectively with other routes to Zambia for the import of some classes of goods - particularly those produced in East Africa, and especially agricultural products. Given a good highway, there is considerable potential that the Mtwara-Iringi area in Tanzania could be developed to supply a substantial part of agricultural products to Zambia. The urban (or non-subsistence) population of Zambia now imports approximately 140,000 tons of food per year, or about half of total food consumed.

6. Road Transport. The volume of road transport is increasing rapidly in Tanzania. The primary role is in providing relatively short-haul services in rural areas to and from rail lines in and around the main towns. Longer haulage road transport between the population centers is on the increase.

The vehicle fleet in Tanzania is estimated to be growing at an annual average rate of 7.5 percent. The IBRD estimates that in 1966 there were about 25,000 registered motor vehicles (not including motorcycles and farm machinery) in Tanzania, or about one vehicle per every 190 inhabitants, about the same ratio as in Spain, but lower than the Kenya ratio of about one per 100. Of the total fleet about 40 percent are private automobiles, whose numbers have increased at a rate of 3 percent annually over the last five years. About 20 percent of the fleet consists of trucks, buses, and tractor trailers whose numbers have been increasing at about 7 percent a year. Over 70 percent of the total fleet has been registered during the past five years, indicating that the fleet is not over age, and has probably been growing in capacity and efficiency more rapidly than in numbers.

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While the road transport industry has been growing rapidly from a low level, it is still not highly developed. The carriage of goods and passengers for hire is restricted by route-licensing and area-licensing regulations designed primarily to protect the railway's differential tariff from road competition. The licensing system is administered by the Transport Licensing Authority (TLA) under the Minister of Communications, Labour, and Works. There are three types of licenses: the "A" License applying to passenger services; the "B" License for goods/services; and the "C" License for carriage of goods by their owner in his own vehicle. Applications for "A" or "B" Licenses must prove the need of their services on the specific route or in the specific area in question before a public meeting of the TLA. The most frequent objector at such meetings is the railway. In 1965, there were only 1,400 "A" Licenses (including urban buses) and 1,950 "B" Licenses in Tanzania. On the other hand there were over 6,300 "C" Licenses. Although there are no satisfactory statistics on utilization, these figures suggest that the "for hire" road transport industry actually handles a relatively minor element in the over-all movement of goods by road and that licensing restrictions have forced a great part of the demand for road transport to be met in a relatively high cost way. As a result of the licensing system, a substantial amount of "piracy" exists, with "C" licensed and unlicensed vehicles operating for hire and reward. The administration of the road-licensing regulations is not very effective, and therefore the economic effects of the system are difficult to assess. The modification, continuation or abandonment of present road-licensing regulations is one of the major points on which a current study of transport coordination in East Africa, being financed by the UNDP, will make recommendations.

While the road transport industry consists primarily of owner-operator truckers and small rural bus companies, there are some large units. The BARRH, for example, runs a feeder service between the Central Line and the Southern Highlands and there are two large bus companies, both subsidiaries of United Transport Overseas Ltd. (U.K.) offering long-distance services on main routes in Tanzania. The newly formed Zambia-Tanzania Road Service Co. (ZTRS), a public corporation owning over 400 large trucks, is exclusively engaged in the movement of Zambian import-export traffic through Tanzania. ZTRS has not made substantial improvement in its efficiency and appears to have reached its capacity with its present vehicle fleet. ZTRS and other groups are seeking government approval to purchase additional vehicles and/or create another trucking firm on the GNR. If one or more of these proposals are accepted and implemented, the haulage capacity on the road to Dar es Salaam could be doubled or tripled. These proposals, however, are at least one year away from full utilization. Some additional capacity, of course, will also be realized when POL tankers are converted to general goods haulers following the completion of the pipeline next fall. The derivation of appropriate growth rates for truck traffic is explained in Section D below.

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It would cost more than \$100 million to purchase the 3,500 trucks needed to adequately carry Zambia's expected level of foreign commerce - up to \$1.8 million of non-fuel imports and \$1.0 million of exports. Heavy expenditures would also be required to support a fleet of this size. In addition, finding the large number of persons with the organizational and technical skills necessary to operate such a system would be very difficult. Lack of qualified personnel has been a major factor in the GNR's failure to meet planned traffic levels over the last few years. The present road operation, which involves some 700 to 800 trucks, has been inefficiently managed. Because of inadequate maintenance, up to one-fourth of the truck fleet has been consistently disabled. Transport capacity, then, will probably remain a constraint even after the GNR is improved. The improvement of the road will enable general imports/exports to move more efficiently, but other alleviatory measures must be found to expand transport capacity. In this regard, the truck trailers presently carrying POL requirements will be available to carry general imports/exports to at least the same level of existing POL traffic reflected in the DeLeuw, Cather traffic counts.

The transport industry is also disrupted by the failure of the Tanzania National Transport Cooperative (TNT). TNT was formed in 1965 by the amalgamation of regional transport cooperative societies that were established early in the 1960's. The National Cooperative had strong political backing, but was weakly organized and managed. TNT expanded its fleet and services at a very fast rate in 1965, overextending its finances and weakening its control over its membership. With apparent immunity from administrative action, TNT operated without licenses throughout the country and subcontracted to non-members holding "C" Licenses to meet many contractual obligations. In 1966, TNT was nearly defunct since its local elements had begun to withdraw and form again as cooperative societies on a regional basis. The Government is examining TNT's problems with a view to reorganization.

D. Traffic Density Analysis.

1. Introduction. The first step in determining the economic feasibility of road improvements is to determine the volume of traffic using the road and the likely rate of growth in such traffic given an improved road. There are four types of traffic transversing the road: (a) cars, (b) buses, (c) trucks (1-9 tons), and (d) trucks (10-20 tons). Origin-destination studies were conducted by DeLeuw, Cather, International, engineering consultants, on the relevant sections of the road in July and December 1967. Vehicle classification counts were conducted by hour and by direction, and roadside interviews were conducted to determine the origin and destination of each trip. In order to effectively tabulate the origin-destination traffic data, the entire country of Tanzania was divided into traffic zones which vary in size depending upon proximity of the individual zones to the present road. The vehicle classification counts and roadside origin-destination surveys were conducted at designated stations for twelve hour periods on two consecutive days. These data were then checked against the earlier SRI projections. The studies indicated three basic categories of traffic to be considered for the Project Road: (i) local traffic originating and terminating within the termini of the road, (ii) long haul agricultural traffic moving toward Dar es Salaam or toward Zambia, and (iii) through traffic from Dar es Salaam and Kenya to Zambia and return, consisting presently of general import/export, copper and POL traffic.

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2. Local Traffic. Local traffic was carefully scrutinized to determine its economic relevance to the road. For example, a large portion of local traffic near Mbeya on the Tunduma-Iyayi section was not included in the traffic bases of this paper since it transversed a distance of less than 10 miles - using that portion of the road as an access to Lake Nyasa. To the DeLeuw, Cather actual figures for local traffic (car and bus traffic is tabulated in Annex III, C), SRI-derived growth rates of 8.9% for cars and 7.2% for buses were applied. The derivation of these growth rates is explained in Annex III, A.

3. Long Haul Agricultural Traffic. For long-haul agricultural truck (1-9 tons) traffic, only scattered and incomplete data were available to SRI on the historical rates of growth and anticipated future developments requiring small to medium truck transport. Therefore, SRI compiled detailed commodity flows for each segment of the road. This analysis resulted in a projection of commodity flows by tonnages of agricultural goods, industry and consumer products, forest products, and imports, exports, and trans-shipments. Using the known relationships between tonnages and types of trucks, average daily traffic (ADT) estimates were then derived for each year in the study. These figures show an average annual rate of growth in all classes of truck traffic of approximately 4.5%. This figure was therefore used in the traffic analysis for long-haul Tanzania agricultural truck (1-9 tons) traffic between the Project area and eastern/western Tanzania. The DeLeuw, Cather actual figures for long haul agricultural traffic are tabulated in Annex III, C.

4. Through International Traffic. For the estimate of Zambian through truck (10-20 tons) traffic using the road, a somewhat different procedure was used. Prior to the Rhodesian UDI, Zambian imports and exports transversing the GNR were negligible - less than 5,000 tons per annum. With the advent of UDI, however, and following subsequent differences between Zambia and Rhodesia over use of the Rhodesia Railways, the Government of Zambia made an effort to divert traffic from that route to the GNR. In the past, Zambia's pattern of trade had been directed almost exclusively to the south. Eighty-five percent of Zambia's imports in 1964 originated in Rhodesia, South Africa, Malawi, and Mozambique. The remaining 15% of Zambia's 1964 imports was from overseas. SRI indicated that most new sources of supply could not economically be substituted for these countries for most of the goods involved. The SRI estimate, however, has not been borne out by experience, and substantial import/export substitution has taken place. In view of that substitution, the Phase I Loan Paper estimated a 5.5% growth rate for through international traffic. As indicated in Annex III, B, however, there are economic and technical limits to the substitution possible, and since copper and POL traffic will probably not grow above 1971 levels, it is assumed that while there may be an initial "impulse jump" in traffic, adding to the absolute number of vehicles using the improved road, its constant level after 1971 will depress the over-all growth rate for traffic; and therefore, an estimated 4.5% growth rate has been used in this Paper rather than 5.5% used in the Phase I Loan Paper. The derivation of this rate is explained in Annex III, B.

5. Generated Traffic. In projecting future traffic levels, it is reasonable to anticipate additional local traffic, above the SRI growth rates, immediately after the road has been improved. Increased comfort, convenience speed and lower costs should generate substantially more travel and transport. For example, long haul agricultural traffic will save 8.10¢ per mile in vehicle operating savings over all segments of the improved roadway and up to 23.96¢ in distance savings from agricultural areas to principal markets. These savings would be reflected in market prices for agricultural goods and should account, in part, for an "impulse jump", estimated by United Research to be 25%. Before and over the years after improvement, it is assumed traffic will grow at the rates estimated by SRI. As discussed in F.2. below, the full 25% "impulse jump" is not included in the traffic calculations - rather 12.5%.

E. Economic Analysis Methodology. Economic project analysis requires consideration of investment possibilities on a basis which allows for meaningful comparison between alternatives having their benefits and costs distributed in different time patterns. This comparison is made by giving a present worth value to future benefits and costs through use of a discount factor. Discounting is the method by which future costs and benefits are converted to present worth values. It is based on the assumption that funds generated or expended in the future should have a corresponding penalty or premium when compared with the present use of funds. The discount factor is the interest rate at which future costs or benefits are discounted to their present worth values and may or may not (probably not) correspond to the commercial rate of interest. It should represent the rate of return which could be earned on capital invested today.

The benefits and costs related to the relevant GNR investments are considered as if they occurred as out-of-pocket income or expenses. In other words, costs are assumed to be incurred when services or materials are received regardless of how such services are financed. The costs used in this analysis correspond to the established cash flow of payments for construction costs. They are not based on the fact that a 40-year loan is being proposed to finance the investment. Including such financing factors would distort the economic analysis and result in the Project's economic viability being determined in part by Tanzania's credit worthiness or the availability of long term development aid.

The benefits and costs that result from the investment in each relevant section of the Project are estimated for yearly time periods over the Project's assumed economic life. The entire GNR investment has a time profile of 20 years, and the costs/benefits have been estimated individually for each of the years in order to arrive at the benefit and cost streams. These streams are then discounted to their present values so that the Project's present worth can be determined. The length of the time profile is discussed in Section III, F-4 below.

The economic methodology used in this paper is based on a comparison of the discounted present value of the future stream of benefits with the discounted present value of the stream of costs. These can be defined in the following way:

$$B = \frac{b_1}{1+r} + \frac{b_2}{(1+r)^2} + \dots + \frac{b_N}{(1+r)^N} + \frac{S_N}{(1+r)^N}$$

$$C = \frac{c_1}{1+r} + \frac{c_2}{(1+r)^2} + \dots + \frac{c_N}{(1+r)^N}$$

Where:

B = Benefits

C = Costs

N = Number of years in the time profile of the investment

S_N = Salvage Value.

b_1, b_2, b_N = Benefits occurring in years one, two, etc. and which include all related maintenance and operating costs as well as the capital costs.

c_1, c_2, c_N = Total costs occurring in years one, two, etc., and which include all related maintenance and operating costs as well as capital costs.

r = Rate of discount.

There are basically two different present worth methods used in the evaluation of this Project:

1. Benefit/Cost Ratio. This method is the most widely known. The present worth of the benefit is compared with the present worth of the costs in the form of a ratio. Thus, the Project is viable if $\frac{NPV(B)}{NPV(C)} \geq 1$

The major shortcomings of the benefit/cost ratio are:

- a. It is necessary to determine the discount rate.
- b. It gives a ratio without any indication of the magnitude of the investment. Therefore, one could choose, say, two projects which had a higher benefit cost ratio than a third, yet the third project since it had a greater absolute level of benefits would be the more desirable undertaking for maximizing the total growth of an economy.
- c. It assumes comparable quantification of benefits among different categories of projects.

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ii. Internal Rate of Return (IRR). The IRR of a project is defined as that rate of discount which will just equate the present value of benefits and costs. In other words, it is the economic rate of return on a given project expressed by a rate of interest over a given time period. The major difference between the IRR method compared with the preceding approach is that it assumes no discount rate. The IRR method merely establishes the discount factor at which the present value of benefits equals the present value of costs. Thus, the Project's viability can be determined without any additional discount factor. Attention, then, should be focused on some judgment as to the prevailing interest rates in Tanzania.

Further it must be observed that in the context for which this paper is written, namely A.I.D. financing in East Africa, there is seldom the opportunity to select projects from among mutually exclusive alternative investments. Hence, the major criticism of the IRR, that use of this method can result in improper ranking of priorities of projects, is probably not applicable here. The question, again, is whether the internal rate of return is sufficient, given the opportunity cost of capital, to justify the investment.

F. Benefit Analysis

1. Sources of Economic Benefits. The computation of benefits on highway projects has in the past taken into account a host of different beneficial effects which could more or less accurately be subjected to numerical analysis. Among these benefits have been time savings on goods, lower accident rates, additional government revenues, and so forth. More recently, however, it has become accepted practice to base highway project justifications solely on transport cost savings and road maintenance cost savings. This is the approach taken in this paper. To restrict benefits to user and maintenance savings omits an estimate of the added benefits to the national economy judged to accrue because of savings due to road improvements, a type of benefit covered in the SRI Tan-Zam Highway report by the application of an income multiplier of 1.3 to the user benefits. SRI also derived numerical benefits from the total value of production by new development schemes induced by the proposed highway improvements. These approaches were rejected in this paper because they assume secondary, macroeconomic benefits which cannot be identified and quantified specifically, however reasonable they may seem. It is felt that some secondary benefits will result from the Project, particularly through the encouragement of agricultural development in the Project area, but there is no way to accurately estimate these secondary effects other than as they have been already reflected in the DeLeuw, Cather traffic counts. Annex IV contains a brief summary of agricultural prospects. It is likely, therefore, that the analysis below understates the benefits which will actually accrue to the Project. This is further underscored by the low growth rates assumed above.

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2. Transport Cost Savings. Labor and equipment efficiencies resulting from improved highway facilities permit lower costs in transporting goods. These cost savings may be considered potential sources of additions to net national income on the assumption that the resources - for example, lower depreciation rates, less fuel consumption, longer tire life, and less maintenance - released as a result of the increased efficiencies will be employed elsewhere, thus expanding production in the economy and generating added income. Using traffic densities derived in the route analysis, transport cost savings (or user benefits) were calculated for the following categories:

- a. Normal growth or base traffic.
- b. Traffic growth feasible only with improved highway facilities, and whose growth is a function of the grade of road provided.

Transport cost savings essentially are the difference between the economic costs of transporting goods on the existing road and costs associated with transport on the improved highway. Users in the first category would realize such benefits; therefore, their total transport cost savings are included. The traffic in the second category, however, does not have any "costs on existing roads" to compare with costs on the improved highway. This traffic is sensitive in varying degrees to the grade of road constructed - that is, some traffic may be feasible if a gravel road is provided, while another may require an asphaltic concrete surface before it will be economic. It is logical to assume that traffic would be generated in proportion to the reduction of transport costs due to road improvements. Under this assumption, transport savings for generated traffic (25% "impulse jump") would be high for the first increment of new traffic and low for the last increment. For purposes of this analysis, therefore, only 50 percent of transport cost savings is assumed to accrue to generated traffic in the form of user benefits.

Economic benefits were calculated for each upgraded portion of the road for four vehicle classes -- cars, busses, 1-9 ton trucks and 10-20 ton trucks. These benefits were first in the form of lower operating costs for (1) fuel, (2) oil, (3) tires, (4) vehicle repair, (5) depreciation, and (6) driver wages (resulting from time savings), as well as in the form of reduced prices for fuel (resulting from reduced distribution costs for fuel to consumers at or around the Tanzanian-Zambian border). Cost savings were computed on a with or without improvement basis according to the average daily traffic count and mix (cars, buses, and trucks) that could be expected to travel the whole length of an upgraded link. Savings are calculated on the basis of cost per vehicle miles, rather than on cost per transported ton or per loaded vehicle trip. See Annex V for the calculation format.

Distance savings reflect total operating costs per vehicle mile, then multiplied times the appropriate total miles shorter distance. On the Tunduma-Iyayi section, for example, the savings is 12.5 miles. See Annex V for the calculation format.

The operating costs and savings used in the paper are those compiled by SRI. They are quite close to those used for the Kenya Two Roads analysis (A.I.D. Loan No. 698-H-004; Capital Assistance Paper P-564) and by the IBRD for its justification of the improvement and surfacing of the Kapiri M'Poshi-Serenje section of the GNR in Zambia. For the user savings computation, the Tunduma-Iyayi and Iringa-Mahenge sections were taken as dirt or low-grade gravel (Class II) roads, since even the engineered gravel sections are in poor condition, and much of the road is poorly engineered gravel or dirt. The Morogoro-Dar es Salaam section is taken as a bitumen (Class III) road. The vehicle operating savings used in the economic analysis are summarized below.

<u>Vehicle Operating Savings Per Mile(Class II)</u>		<u>Distance Savings Per Mile</u>	
Cars	4.23¢	Cars	11.75¢
Buses	9.01¢	Buses	28.00¢
Trucks I(1 to 9 ton)	8.10¢	Trucks I(1 to 9 ton)	23.26¢
Trucks II(10 to 20 ton)	18.47¢	Trucks II(10 to 20 ton)	48.50¢

Vehicle Operation Savings Per Mile(Class III)

Cars	2.71¢
Buses	5.61¢
Trucks I(1 to 9 ton)	5.03¢
Trucks II (10 to 20 ton)	11.85¢

3. Maintenance Savings. As indicated above, there is for any road a level of traffic above which maintenance costs on an earth road will be higher than they would be if the road were surfaced. Therefore, the surfacing of any road with such a level of traffic creates an immediate maintenance savings. This saving is a "benefit" deriving from the project and is used as partial justification of the initial construction cost.

The maintenance cost equations developed by United Research Corporation (transportation consultants to the GURT) to express the relationship between maintenance costs (MC) and average daily traffic (ADT) moving over the GNR are contained in Annex VI. The computation of maintenance savings is shown in Annex VII, Maintenance Savings Analysis.

4. Salvage Value. Roadlife studies are available to determine the useful life of various highway surfaces in the United States. To set up tables of life expectancy for all kinds of highways in Africa will be a long and difficult program. There are many variables such as soil, climate, topography, and traffic volume that will affect the life of essentially the same type of highway in different places. In some countries the alignment may remain unchanged for many years. On the other hand, a paved mountain road originally built on cheap, crooked alignment often becomes obsolete for the

increased volume and speed of traffic and is relocated before the life of the pavement is reached. Also, the art of highway building changes, so that the date of construction will influence the probable life of a new highway of given type. The residual value of the road after 20 years is estimated at 60% (when averaged) which represents the costs of the asphaltic concrete surface, the grading structures and right of way if maintained under the procedures outlined in Annex VII. That value, discounted at 6% and 10%, is included in the benefit calculations, Annex VIII.

5. Benefit Computations. The computation of total benefits deriving from up-grading the pertinent sections of the GNR to a realigned, asphaltic concrete highway are shown in Annex VII. The benefits were computed separately for the three sections of the road: Tunduma to Iyayi; Iringa to Mahenge, and Morogoro to Dar es Salaam. The benefits were discounted at 10% and 6%.

G. Cost Analysis

1. Cost Estimates. The final cost estimate prepared by DeLeuw Cather for upgrading and asphaltic concrete surfacing of the Tunduma-Iyayi section of the road is based on the completed final design and is premised further on a 30 month construction period. The estimate assumes the use of a U.S. contractor. The cost estimates for the Iringa-Mahenge and Morogoro-Dar es Salaam sections are based on completed reconnaissance surveys and will be refined upon completion of final design. The construction cost estimates are as follows:

Tunduma-Iyayi	\$15.0 million
Iringa-Mahenge	\$ 4.9 million
Morogoro-Dar es Salaam	\$10.5 million

2. Maintenance Costs. Maintenance cost estimates were developed by United Research (transportation consultants to the GURT) and are outlined in Annex VI. The computation of maintenance costs is shown in Annex VII, Maintenance Cost Analysis.

H. Economic Feasibility

1. Benefit/Cost Calculations. In the benefit/cost analysis, interest rates of 6% and 10% were selected for the calculations of the present values of costs and benefits. The choice was made to facilitate ready comparison with other sections of the road since these are the rates currently favored by the IBRD for this Project, and since they lay on either side of the prevailing interest rates in Tanzania. The benefit/cost calculations are as follows:

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	Benefits	Costs	Ratio
Tunduma-Iyayi			
at 6%	\$21,011,810	\$20,686,827	1.01:1
at 10%	\$15,039,885	\$19,443,343	.77:1
Iringa-Mahenge			
at 6%	\$26,703,023	\$ 4,604,656	1.8:1
at 10%	\$16,663,709	\$ 4,116,043	1.2:1
Morogoro-Dar es Salaam			
at 6%	\$ 8,355,477	\$10,747,832	2.5:1
at 10%	\$ 4,910,345	\$ 8,950,668	1.86:1

2. Internal Rate of Return Calculation. The following table was prepared by the Bank of Tanzania in March 1968; and must serve as the basis for ascertaining the opportunity cost of capital in the absence of more reliable data.

INTEREST RATES
(Per Cent)

	<u>1965</u>	<u>1966</u>	<u>1967</u>	
			June	Dec.
<u>Deposits</u>				
Commercial banks				
Savings	3.00%	3.00%	3.50%	3.50%
Time: (7 days' notice)	-	-	3.00-3.63%	3.00-3.50
3-6 months	3.50	3.50	4.00	4.00
6-9 months	3.75	3.75	4.25	4.25
9-12 months	4.00	4.00	4.50	4.50
12 months	4.00	4.00	4.50	4.50
Post Office Savings Bank	2.50	2.50	2.50	2.50
First Permanent (E.A.) Ltd.				
Savings	4.50	4.50	4.50	4.50
Deposit	5.50	5.50	5.50	5.50
Fixed term	5.50-6.00	5.00-6.00	5.00-6.00	5.50-6.00
<u>Loans and Advances</u>				
Commercial banks (minimum)	7.00	7.00	7.00	7.00
National Development Credit Agency				
Short-term	8.50	8.50	8.50	8.50
Medium-term	7.50	7.50	7.50	7.50
Long-term	7.50	7.50	7.50	7.50
Tanganyika Development Finance Co. Ltd.				
Medium-term	8.50	8.50	8.50	8.50

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	1965	1966	1967	
			June	Dec.
<u>Rediscounts and Advances</u>				
<u>Bank of Tanzania</u>				
Commercial bills				
Crop: 90 days	-	5.00	5.00	5.00
91-180 days	-	5.50	5.50	5.50
Other: 90 days	-	5.25-6.00	5.25-6.00	5.25-6.00
91-180 days	-	5.75-6.50	5.75-6.50	5.75-6.50
Treasury bills: 32 days				
Rediscounts	-	4.88	4.36	4.36
Advances	-	5.38	4.86	4.86

The internal rate of return calculations are as follows:

Tunduma-Iyayi:	<u>7.25%</u> ✓	9.4
Iringa-Mahenge:	11.5%	
Morogoro-Dar es Salaam:	21%	

3. Findings of Economic Analysis. The type of benefits included in the analysis are primarily distance savings and savings resulting from improved standards attributable both to vehicle owners and the Government through maintenance savings. The benefits which have been quantified have been expressed in the economic evaluation of the Project in the form of a benefit-cost ratio and also in the form of an internal rate of return.

The origin and destination survey information, together with the local interview information, indicated that by far the greater proportion of the traffic using the GNR will be through traffic, mostly freight traffic carrying imports and copper between Zambia and Tanzania. Through traffic is not expected to grow more rapidly than locally generated traffic, however, and local traffic over the years will be of greater significance. The initial benefits from the Project which are of real significance in justifying the Project are therefore those resulting from transport cost savings and those arising from the fact that the earth surfaced sections of the existing road will no longer require expensive maintenance. The rate of growth of the traffic which will use the GNR has been projected by considering relevant historical information on traffic growth in the project area, past and present trends in vehicle registration and petroleum consumption and the potential of the area of influence of the road to support future traffic growth.

In the benefit-cost calculations, the ratios is greater than one at both 6% and 10% discount rates. In the internal rate of return analyses, the returns are all greater than 7.99%. Therefore, although the Tunduma-Iyayi section is close to the lower limit of qualification, it is, considered sound to proceed at this time with the proposed Project to finance the construction engineering and survey work required to establish the degree of reconstruction economically justified for the various sections of the road.

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4. Financing GURT Road Program. Central Government road-user taxation, consisting of import duties on road transport equipment and fuels, consumption taxes on fuels, licenses and registration fees, has amounted to roughly \$56 million during the past five years as compared with total central Government road expenditures of \$44.8 million over the same period. Taxes on fuels and some import duties have been progressively and substantially raised in recent years as a general budgetary measure. However, considerable caution will probably be exercised in instituting any further increases in road-user taxation to finance the steep rise in road expenditures due to the implications for transport coordination among the various modes.

While road users should make a reasonable contribution toward the costs of providing and maintaining the road system, the position in this respect is not at all clear in Tanzania. In the first place, the revenues from road users which should be considered as charges to cover Government road costs and those which should be considered as general taxation, such as general revenue import duties, or duties designed to save on the foreign exchange expenditures, have not been analyzed. Secondly, the proportion of revenues that should be ascribed to the interurban system as opposed to urban streets has not been analyzed according to facility utilization. While road-user revenues, properly so regarded, may not have covered road expenditures in the past, the proportion of total road costs that should be borne by private road users is not at all clear. The total annual costs of road improvements should probably be borne by the road users but a proportion of maintenance and administration and some of the annual capital costs and depreciation of the basic access network would appear to be a burden that should be carried generally, due to the security and administrative need for this access - unless Government vehicles are also made subject to road-user charges. Finally, to require the road user to meet the costs of the highway system, while continuing to protect the railways by restrictive road licensing would probably lead to a maldistribution of demand by obscuring real economic costs. All of these questions are to be analyzed in a joint East African transport coordination study now under way, financed by the UNDP.

5. Allocation of benefits to Tanzania and Zambia. A precise allocation of benefits of the two countries primarily involved in this Project is not feasible since so many of the benefits cannot be quantified. A rough estimation, however, based on the traffic "allowed" in the above economic analysis, would indicate that approximately 40% of the operating cost savings will accrue to the through traffic to Zambia, with the remainder accruing to local and long-haul Tanzanian traffic.

Secondary benefits to the two countries, not included in the economic analysis, are also of importance. For Tanzania, the Project is expected to stimulate agricultural development in the Project area. For Zambia, the Project will provide a feasible alternative route to the sea for some types of traffic. For both countries, the Project is expected to stimulate trade between East Africa and Zambia which would be beneficial to both economies.

IV. TECHNICAL ANALYSIS

A. Detailed Description of A.I.D. Financed Construction Portion of Project. A.I.D. financed construction portion of the Project consists of construction and supervisory engineering services associated with the improvements of approximately 150 miles of the GNR in Tanzania. The termini of construction under this project are the towns of Tunduma, on the Zambia border, and Iyayi, at the junction of the GNR and a road extending south to Mjombe and Songea.

The improvement consists of new construction on a location generally paralleling the existing 162-mile route. Mileage savings (12 miles) have been realized through realignments developed during the design phase.

B. Design Details. The road constructed under this Project will conform to the design standards of other sections of the GNR in Zambia. It will consist of:

1. General. A paved surface 22 feet in width with two gravel shoulders each having a width of from three to five feet dependent upon terrain.

The Project design also provides a roadway foundation consisting of four inches of crushed stone based overlaying four inches of select subbase. Workmanship will be carried out in accordance with standard U.S. practice. Roadway design is based on a 9,000-pound wheel load.

The Project also includes the construction of about 15 reinforced concrete bridges designed to American Association State Highway Officials (AASHTO) H-20-44 loading standards.

2. Surface Type. As a consequence of heavy truck traffic and prolonged rains, a gravel or earth road rapidly deteriorates, and increased maintenance is required to keep the route open to traffic. The GURT, in view of the excessive maintenance required to keep the GNR open, has supplemented the maintenance performed by Comworks forces with contractual work performed by East African contractors. These contracts provide for the sealing of borrow material to road sites where it is either spread by hand labor by the GURT or, in cases of heavier maintenance, is spread and compacted by contract equipment and personnel. Roadside maintenance on the GNR such as minor pot hole repair, ditch cleaning, etc., is being performed by GURT labor in an effective manner.

At some point, the gravel road maintenance investment is balanced by an additional investment providing a bituminous or asphaltic concrete surface. Provision of a surface limits the deteriorating effects of rain by sealing and preserving the supporting quality of the base and sub-grade. Periodic maintenance of bituminous surfaces can be performed by unskilled labor using liquid bitumen for patching hand-compacted areas in need of repair. With bituminous tankers and spraying equipment, large sections of roadway can be treated in a short period of time.

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During the life of a bituminous-surfaced road, the deterioration of surface due to weather and traffic becomes such as to require a complete resurfacing of the surface, usually every three to six years depending upon the volume of traffic. The life of any bituminous seal coat is dependent upon traffic, weather, and the stability of the base construction. Under this Project, the base design of the Tanduma-Iyayi section will provide an adequate support structure using crushed rock. A double-bituminous surface would stand up for 10 to 20 years with routine patching of surface breaks and complete resurfacing every three to five years.

Asphaltic concrete provides a higher class of surface and can sustain heavier and higher volumes of traffic over a greater length of time, with considerably lower maintenance costs than would be necessary for a bituminous surface treatment. In addition to keeping the base dry and thereby maintaining structural support, a two inch (usual thickness) asphaltic concrete surface provides some structural support and a tough wearing layer. Complete resurfacing of asphaltic concrete roadways is seldom required earlier than 10 to 20 years following initial construction. Routine maintenance of surface would only involve spot patching and spraying with liquid bitumen to replace binding agents losses due to evaporation. In Tanzania such an operation might be required every two or three years.

In view of the reduced maintenance costs and the greater longevity and strength of asphaltic concrete, the two inch thickness for this Project is more beneficial in moving the heavy trailer truck traffic now using and expected to use the GNR. However, the economies of a double-bituminous surface treatment in lieu of asphaltic concrete prompted the GURT and DeLeuw, Cather to include it as a provisional tender in the bill of quantities.

3. Drainage. The Project also provides for the construction of about 11,000 linear feet of culverts of corrugated metal pipe or reinforced concrete. Reinforced concrete structures for the larger drains are also included in this Project. As noted above, the provision of surfacing will keep the proposed roadway base dry. However, it is not the rain alone that will cause a breakdown of the support designed and constructed in the embankment. By proper cross-section the embankment is so located that the side slopes and drainage ditches keep the ground water accumulated by rain runoff well away from and below the level of the road embankment. Should water accumulate in the ditches the embankment could become saturated and absorb the underlying water. Such a condition would cause immediate failure of the base since the compaction no longer remains static. In terms of the proposed Project, the design and construction will provide for normal drainage as well as that occurring from extraordinary storms. The probability of such storms occurring is a factor included in the design of drainage facility capacities.

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C. Present Condition Tunduma-Iyayi Section. The existing route is constructed of compacted earth and gravel except for approximately 27 miles of bituminous surfacing on the route's approaches to Mbeya. The road extends through rolling countryside except for the mountainous area east of Tunduma where travel over the Mbeya Escarpment involves hairpin and similar hazardous curvatures and grades.

The alignment in the rolling area is somewhat erratic in that minor obstacles such as gullies, rock outcrops, and dwellings have been avoided. Generally, the road surface lies two to four feet below the level of existing ground in cuts about 18 to 26 feet wide, including the undefined shoulder areas. Drainage is provided by vertical ditches connecting with the road.

D. Morogoro-Dar es Salaam Engineering. Based on the factors encountered and studied, the following recommendations were presented by DeLuw, Cather as the course of action which would best increase the serviceability of the highway to the user in relation to expenditure:

- i. Plans for the complete reconstruction of the sector from Morogoro to Dar es Salaam should be prepared immediately.
- ii. Construction should be started as soon as funds are available.
- iii. The facility should be designed to carry an axle load of 24,000 pounds. The proposed structural section for the pavement consists of asphaltic concrete, two inches in depth, over a sand asphalt base four inches in depth, over a select sub-base with a minimum depth of four inches and a minimum CBR of 40. The shoulders should consist of a sand-asphalt surface two inches in depth, over material equal to the select subbase.

The cost of construction to this standard is estimated to be \$10,523,000, inclusive of engineering supervision.

- iv. On the basis of over-all economic considerations, a construction period of three years should be adopted.
- v. As an alternate for a three-year construction period, in the event funds are not immediately available, reconstruction of the worst 39 miles should be started as soon as possible. The other sections should follow later on an order of priority related to maintenance costs.
- vi. Maintenance procedures should be modernized.

E. Iringa-Mahenge Engineering. Based on the factors encountered and studied, the following recommendations were presented by DeLeuw, Cather as the course of action which would best increase the serviceability of the highway to the user in relation to expenditure:

- i. It is recommended that plans be prepared immediately for a replacement facility.
- ii. That this replacement facility incorporate various salvageable parts of the existing facility.
- iii. That reconstruction work should commence before maintenance expenditure rises to uneconomic levels.
- iv. That consideration be given to the possible economic advantages in combining this sector reconstruction with adjacent projects scheduled for reconstruction.
- v. The standard of reconstruction should consist of a paved surface over a base adequate to carry an 18,000 lb. axle load. The prepared structural section consists of a double bituminous surface treatment over a crushed stone base four inches in depth, over a selected subbase varying from four inches to 12 inches in depth, through the normal terrain portion of the sector. In the Kitonga Gorge, where the basic subgrade is rock, a bituminous levelling course four inches in depth over the existing road surface, plus a surface course of bituminous concrete one and one half inches in depth, is proposed. In those areas in the Gorge where the existing pavement has failed, it should be removed to native rock or a depth of at least 12 inches and replaced with compacted crushed stone base prior to placing the asphaltic courses. The cost of the recommended reconstruction is \$4,934,000, including supervision of construction.
- vi. Major realignment of the highway through the Kitonga Gorge is not recommended, as the exorbitant cost could not be justified in relation to traffic. Minor adjustments in curvature are proposed, as shown on aerial mosaics.
- vii. Maintenance procedures should be modernized. Although a definite saving in annual maintenance costs should be realized after reconstruction is compared to those currently needed, they will still be above actual expenditures to date, which have not proven adequate to combat destruction caused by current traffic.

F. Maintenance: CURT Highway Administration and Road Maintenance Activities. The CURT Ministry of Communications and Works appears to have the technical competency to administer and carry out programs of highway planning, construction and maintenance. Their major limitation to undertaking construction is funds and sufficient supervisory personnel. The Ministry assigns their engineers to districts where they oversee the maintenance and road improvements undertaken in that area.

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The GURT Ministry of Communications and Works (COMWORKS) is responsible for maintaining about 10,000 miles of primary and secondary roads. Maintenance expenditures for this system of roads are financed from the GURT's current budget. A system of tertiary roads of about 10,700 miles is maintained by various local taxes and some GURT assistance.

Maintenance expenditures on COMWORKS roads in 1965-66 amounted to \$4.2 million. Funds for district roads were considerably less, averaging out to about \$60 per mile. This appropriation was inadequate as far as providing maintenance of gravel and earth roads is concerned.

Under the conditions precedent, the GURT will be required to provide sufficient funds to adequately maintain the GNR project.

G. Technical Studies. Traffic studies and preparation of design engineering plans, investigations, and IFB for the Tunduma-Iyayi section were carried out by the U. S. firm of DeLeuw, Cather International, Inc., under a contract with the GURT, financed by A.I.D. Loan 698-H-003. Final engineering for the two additional sections will also be carried out by DeLeuw, Cather.

H. Construction Cost Estimate: Actual bids were received on May 24, 1968. All bids were unresponsive, the low bid being \$17.2 million. The Engineer has revised his estimate at \$16.4 million. The new bids will be opened on June 25, 1968.

I. Engineering Cost Estimate: The GURT contract for engineering design services included the provision that supervisory engineering services could be provided by DeLeuw, Cather International, Inc., at the following rates with a maximum not to exceed \$25,500 per month.

Resident Engineer	\$ 3,715 per month
Soils Engineer	3,530 per month
Inspector of Works	2,790 per month

The foregoing contract provision relates to the entire Tunduma-Iringa section and only considers two construction supervisory staffs. However, in carrying out the project, the Tunduma-Iyayi section financed under this A.I.D. Project will require two construction spreads which will involve two supervisory engineering teams. The estimated cost for these services is estimated to be \$1 million. This estimate would provide about 300 man-months

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technical services using an average man-month cost of \$3,345 calculated from the above rates. Over a 30-month construction period this would provide ten men which can be considered adequate and necessary to supervise the two separate construction activities expected in the proposed construction work schedule.

The Project, as far as engineering services are concerned, includes additional design engineering for other sections of the GNR. These sections are the Iringa-Mahenge and that from Morogoro to Dar es Salaam. A GURT/DeLeuw, Cather contract for this work was reviewed by AID/W and approved in April 1968; at a cost of \$504,000.

The breakdown to the total engineering services included in the loan is as follows:

Tunduma-Iyayi; Construction Engineering	\$ 900,000
Iringa-Mahenge; Design Engineering	121,000
Morogoro-Dar es Salaam; Design Engineering	303,000
Total	\$1,324,000

J. Technical Soundness. The designs prepared by DeLeuw, Cather have been reviewed in detail by A.I.D. engineers and were found to be based upon sound engineering principles and consistent with character of road facility desired by the GURT and considered as necessary by A.I.D. The cost estimates were jointly reviewed by the GURT and A.I.D. and found to be sound.

Past experience with U.S. contractors bidding on heavy construction projects in Africa has indicated a reluctance on the part of the contractors to take on additional work. Their submission of tenders has frequently involved bids that exceeded the engineers' estimates. In such cases, engineers' estimates have been verified as to reliability, and AID/W concluded that U.S. contractors sometimes placed too high a cost for their acceptance of contracts in Africa. This has resulted in A.I.D. establishing a ceiling defining the highest responsive bid. Such action insures that only seriously interested contractors submit bids. This ceiling is usually set through A.I.D. discussions with the project's consulting engineers and host country representatives. In the case of the Great North Road, a ceiling of \$15.0 million has been established by DeLeuw, Cather and GURT and subsequently approved by AID/Washington.

K. Implementation Plan. The following schedule has been developed for the construction of the Tunduma-Iyayi section of the Project:

Bids Available:	April 1, 1968
Site Visit:	May 15, 1968
Bidders Conference:	May 20, 1968
Bid Opening	May 24, 1968
DeLeuw Recommendation	May 27, 1968
Bid Award	May 27, 1968
Contract Signing:	June 4, 1968
Contractor Mobilization	June, July, August, 1968
Completion Construction	November 1970

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V. FINANCIAL ANALYSIS

A. Financial Requirements. Total financial requirements are as follows:

	<u>U.S. Costs</u>	<u>Local Costs</u>	<u>Total</u>
Construction Tunduma-Iyayi	\$10.7	\$6.3	\$17.0
Construction Supervision	.900	.100	1.0
Design Iringa-Mahenge	.121	.040	.161
Design Morogoro-Dar es Salaam	.303	.040	.343
Contingency (11.5%)	.976	.200	1.176
	<u>\$13.000</u>	<u>\$6.680</u>	<u>\$19.680</u>

B. Financial Plan. It has been agreed that A.I.D. would finance all U.S. costs of the proposed elements of the Project for U.S. financing, and that the GURT would finance all local costs. On this basis the financial plan for the construction would be as follows:

	<u>U.S. Costs</u>	<u>Local Costs</u>	<u>Total</u>
A.I.D. Loan	\$13.000	\$ -	\$13.000
GURT Contribution	-	6.680	6.680
	<u>\$13.000</u>	<u>\$6.680</u>	<u>\$19.680 (100%)</u>

The financial requirements for the construction of the Tunduma-Iyayi road are based on the bid ceiling, as discussed in Section IV H, of \$15.0 million. The cost of the total contract will be \$15.0 million of which \$6.0 million will be met by the GURT in local currency. An additional \$1.0 million will be required for supervisory engineering, of which \$100,000 is in local currency and will be met by the GURT.

The financial requirements of the Iringa-Mahenge and Morogoro-Dar es Salaam sections are based on the cost of the executed contract between the GURT and DeLuw Cather. The cost of this contract is \$504,000, of which \$10,000 will be met by the GURT in local currency.

C. Other Sources of Financing. The Great North Road Project has substantial multi-lateral involvement. The following breakdown is relevant in this regard.

A.I.D. Loan (FY 67)	\$ 1,600,000
A.I.D. Loan (Proposed FY 68)	\$13,000,000
IBRD Loans and Credits (Estimated)	\$33,500,000
Swedish Loan	\$ 5,000,000
United Kingdom Loan	\$ 3,500,000
Tanzania Contribution (Estimated)	\$19,400,000
Zambian Contribution (Estimated)	\$15,000,000
Total Cost (Estimated)	\$91,000,000

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Private financing for this type of project is not available. The Ex-Im Bank stated that the Bank was not interested in this project because the borrower request at concessionary terms.

VI. ECONOMIC EFFECTS OF LOAN

A. Impact on U. S. Economy. This loan does not conflict with any U.S. business interests. To the contrary, the loan will assist the U.S. economy by financing approximately \$13.0 million in U.S. construction and engineering services. It is doubtful that U.S. contractors would have been successful on bidding for the Zambian sections of the Road, and most East Africa road projects have been awarded to non-U.S. contractors.

The construction element of this Project is being bid in association with the Lake Shore Project in Malawi in an effort to attract U.S. interest in construction in East Africa.

B. Impact on U. S. Balance of Payments. The loan should have no significant impact on the U.S. balance of payments since the total amount of the loan is for procurement of services in the United States. All local costs of the construction and engineering design are being financed by the GURT. As noted above, it is almost absolutely certain that U.S. contractors and suppliers would not be competitive for any awards contemplated in this loan were it not the proposed A.I.D. financing.

C. Effect on Private Enterprise. The loan will finance a GURT contract with a private U.S. construction and engineering firm. In addition, the loan is part of a project which, when completed, will assist private enterprise in Tanzania. The cost-savings from use of the improved road will accrue primarily to private persons and businesses in Tanzania and Zambia. In particular, the road is designed to assist, through the provisions of a more economical transport facility, the local, private agricultural producers located along the road throughout the Southern Highlands area. The road, in this sense, is part of Tanzania's over-all effort to assist and encourage the growth of private agricultural enterprises throughout the country. It is noteworthy, in this connection that the Minister for Economic Affairs and Development Planning in recent discussions with A.I.D. in Washington reaffirmed Tanzania's receptivity to joint-venture for agricultural production between U.S. and Tanzanian private parties.

D. Prospects of Repayment. Tanzania's recent economic performance has been satisfactory. In recent years, the gross domestic product has grown at an average annual rate of about 6 percent, rising to 8.8 percent in 1966. Although agriculture continues to be the dominant sector in the economy, the steady rising contribution of the other sectors - notably manufacturing - has brought about some diversification in output. Concerning Tanzania's economic performance in 1967, only preliminary comments can be made, since complete economic data are not yet available. As a result of inadequate rainfall in the latter part of 1966 and also the late arrival of the long rains in 1967,

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output of some of the leading commodities is likely to be lower, and hence the rather spectacular growth of GNP which took place in 1966 is not likely to be repeated in 1967. Encouraging progress is, however, being made in the output of other crops and, with a steady improvement in infrastructure, marketed output is expected to be higher. The contribution of the manufacturing sector increased by about 16 percent in 1966 and is likely to be fairly high also in 1967. Taking these factors into account, it is expected that GNP in 1967 may increase by about six percent.

In recent years, Tanzania has been successful in increasing the rate of investment (from around 11 percent of GDP in 1961-63 to about 16 percent in 1966), and in financing a growing proportion of this investment from domestic savings. Public sector savings have continued to grow, as a result of increases in government revenue and a strict avoidance of unproductive expenditure. These savings are projected to grow further in the 1967-71 period. However, given the rise in government investment which now seems probable in the next few years, it seems likely that, even after taking account of the estimated increases, domestic savings would be sufficient to finance only about one-half of the total investment program.

Tanzania's total external debt (including an estimated one-third share of debt on account of the Common Services) stood at \$257.8 million on June 30, 1967. The ratio of debt service payments to estimated foreign exchange earnings in 1966 was 4.5 percent. Debt service, i.e., interest payments and repayments of principal repayable in foreign currency, will be about \$9.7 million in 1968, or about 10% of the Tanzanian recurrent budget, an acceptable burden by international standards. (The IMF has stated debt servicing can go up to 20% of a country's recurrent budget providing the country's balance of payments remain in surplus.) This is a relatively light debt burden. However, a substantial hardening of debt terms should probably be avoided in view of the low per capita income level, the expectation of a much slower growth in export earnings following the high total attained in 1966, the possible slow down in economic growth toward the end of the sixties and the need for net capital imports over many years.

With continued growth in the economy and provided Tanzania's debt does not grow more rapidly than presently anticipated, there are reasonable prospects for repayment of the loan.

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CHECKLIST OF STATUTORY CRITERIA

July 11, 1968

Development Loan Fund

The following abbreviations are used:

FAA - Foreign Assistance Act of 1961, as amended by the Foreign Assistance Act of 1967

App. - Foreign Assistance and Related Agencies Appropriations Act, 1968

1. FAA §.102. *Assistance wherever practicable consists of U. S. commodities and services furnished consistent with efforts to improve the U. S. balance of payments.* Satisfied. To be covered in the construction contract and loan agreement.

2. FAA §.201(b)(1). *Information and conclusion on availability of financing from other free-world sources, including private sources within the United States.* Satisfied. See Section V C, Capital Assistance Paper.

3. FAA §.201(b)(2). *Information and conclusion on activity's economic and technical soundness, including the capacity of the recipient country to repay the loan at a reasonable rate of interest.* Satisfied. See Section III and VI D, Capital Assistance Paper.

4. FAA §.201(b)(3). *Information and conclusion on existence of reasonable promise activity will contribute to development of economic resources or increase of productive capacities.* Satisfied. See Section III F and H, Capital Assistance Paper.

5. FAA §.201(b)(4). *Information and conclusion on activity's relationship to other development activities, and its contribution to realizable long-range objectives.* Satisfied. See Section III F, Capital Assistance Paper.

6. FAA §.201(b)(5). *Country's self-help measures.* See Below.
See Items 23 through 29 re new FAA § 208.

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7. FAA §.201(b)(6). Information and conclusion on possible effects on U. S. economy, with special reference to areas of substantial labor surplus. Satisfied. See Section VI, Capital Assistance Paper.
8. FAA §.201(b)(7). Information and conclusion on the degree to which the country is making progress toward respect for the rule of law, freedom of expression and of the press, and recognition of the importance of individual freedom, initiative, and private enterprise. Satisfied. The GURT provides such protections.
9. FAA §.201(b)(8). Information and conclusion on the degree to which the country is taking steps to improve its climate for private investment. Satisfied. Since announcement of nationalization, GURT has made substantial progress in compensation negotiations and ^{has} defined areas in which it still encourages private enterprise. There has been a revival of investment and by mid-1967 private investment was at a "normal level".
10. FAA §.201(b)(9). Information and conclusion on whether or not the activity to be financed will contribute to the achievement of self-sustaining growth. Satisfied. See Section III and Annex IV, Capital Assistance Paper. The project will contribute to the country's agricultural sector which holds Tanzania's potential for self sustaining growth.
- *11. FAA §.201(b). Compliance with requirement that funds not be used to make loans to more than twenty countries in any fiscal year. Satisfied. See Section II D, Capital Assistance Paper.
12. FAA §.201(b). Information and conclusion on reasonable prospects of repayment. Satisfied. See Section VI D, Capital Assistance Paper.
13. FAA §.201(d). Information and conclusion on legality (under laws of the country and the U. S.) and reasonableness of lending and relending terms. Satisfied. Will be covered in Loan Agreement.
14. FAA §.201(e). Information and conclusion on availability of an application together with sufficient information and assurances to indicate reasonably that funds will be used in an economically and technically sound manner. Satisfied. See Section I, II, III and IV, Capital Assistance Paper.

15. *FAA §.201(f). If a project, information and conclusion whether it will promote the economic development of the requesting country, taking into account the country's human and material resource requirements and the relationship between the ultimate objectives of the project and the country's overall economic development.* Satisfied. See Section III, Capital Assistance Paper.
16. *FAA §.201(f). If a project, information and conclusion whether it specifically provides for appropriate participation by private enterprise.* Satisfied. See Section VI C, Capital Assistance Paper.
17. *FAA §.202(a). Total amount of money under loan which is going directly to private enterprise, is going to intermediate credit institutions or other borrowers for use by private enterprise, is being used to finance imports from private sources, or is otherwise being used to finance procurements from private sources.* Satisfied. The entire loan amount will finance goods and services from private sources.
- *18. *FAA §.207(a). Information that U. S. assistance places appropriate emphasis on encouraging strong economic, political, and social institutions needed for a progressive democratic society.* Satisfied. This has been the aim of the U.S. assistance program in Tanzania.
- *19. *FAA §.207(b). Information that U. S. assistance places appropriate emphasis on programs directed at enabling the country to meet the food needs of its people from its own resources.* Satisfied. A.I.D. programs recognize preponderant need of agricultural development in Tanzania. The project will assist the country's agricultural development.
- *20. *FAA §.207(c). Information that U. S. assistance places appropriate emphasis on improving availability in the country of educated manpower by improving education planning and research, training teachers and administrators, developing and constructing educational institutions, and using modern educational technology.* Satisfied. A.I.D. has assisted Changanbe Teacher Training Institute; Agricultural College, Morogoro; Dar es Salaam Technical College; and in the past, A.I.D. has provided educational materials and teachers for secondary schools and teacher training schools.

- *21. FAA §.207(d). Information that U. S. assistance places appropriate emphasis on programs aimed at malnutrition, disease eradication, skin clearance, water purification, sewage disposal, health education, maternal and child care (including family planning), and other public health assistance. A.I.D. has a PL 480 Program, has assisted in financing of water supply construction, and contributes to international programs providing indirect assistance to other such programs.
- *22. FAA §.207(e). Information that U. S. assistance places appropriate emphasis on other development activities including industrial development; growth of free labor unions, cooperatives and voluntary agencies; improvement of transportation and communication systems; development of capabilities for economic planning and public administration; urban development; and modernization of law to facilitate economic development. Satisfied. A.I.D. has furnished advisory and commodity assistance to "cooperative type" ventures in Tanzania and has a contract for planning services. Road construction will increase communication facilities for both people and commerce.
- *23. FAA §.207(f). Information and conclusion on the extent to which the country is taking measures to increase food production and food storage and distribution facilities. Satisfied. Tanzania has given appropriate emphasis to increasing food production. This project will contribute to the agricultural development of the Southern Highlands of Tanzania. See Annex Capital Assistance Paper.
- *24. FAA §.208(b). Information and conclusion on the extent to which the country is creating a favorable climate for foreign and domestic private enterprise and investment. Satisfied. GURT has signed an Investment Guarantee Agreement. See #9 above.
- *25. FAA §.208(c). Information and conclusion on the extent to which the country is increasing the role of the people in the developmental process. Satisfied. The Arusha Declaration placed prime emphasis on development as a responsibility of "rural peoples".
- *26. FAA §.208(d). Information and conclusion on the extent to which the country is allocating expenditures to development rather than to unnecessary military purposes or intervention in other free and independent nations. See also Items 63 and 76. Satisfied. Major budget allocations are to development and recurring non-defense budgets.
- *27. FAA §.208(e). Information and conclusion on the extent to which the country is willing to make contributions of its own to the projects and programs for which assistance is provided. Satisfied. The GURT is financing more than one-fifth of the GNR, and one-half of the cost of the GNR in Tanzania. See 4 of 11

12. FA 2.211(f). Information and conclusion on the extent to which the country is making economic, social, and political reforms such as tax collection improvements and changes in land tenure arrangements that will enable it to achieve developmental objectives more efficiently and justly.
- Satisfied. Within the limits of the segment of its population in the money economy, a tax system has been established. New lands are developed outside of the traditional tribal holdings. Land tenure is not a major problem in Tanzania.
13. FA 2.211(e). Information and conclusion (other than above) on the extent to which the country is responding to the economic, political, and social concerns of its people and showing a clear determination to take effective self-help measures.
- Satisfied. The Arusha Declaration and the Doctrine of Education for Self Reliance satisfy this requirement.
14. FA 2.211. Information on multilateral, bilateral and regional programs, including the extent to which U. S. assistance will encourage regional development programs.
- Satisfied. Completion of all segments of the project will involve U.S., U.K., Sweden and IDB/IDA financing. The project will help complete the region's transport network.
15. FA 2.211. Extent to which the loan will contribute to the objective of assuring maximum participation in the task of economic development on the part of the people of the developing countries, through the encouragement of democratic private and local governmental institutions.
- Satisfied. Some local private procurement is assured under the GURT's contribution.
16. FA 2.211(a). Information and conclusion whether loan will encourage efforts of the country to: (a) increase the flow of international trade; (b) foster private initiative and organizing; (c) encourage development and use of cooperatives, credit unions, and savings and loan associations; (d) discourage monopolistic practices; (e) improve technical efficiency of industry, agriculture, and commerce; (f) strengthen free labor unions.
- Satisfied as to (a), (b), (c), (d), and (e). See Section III and VI, Capital Assistance Paper. There is no information as to (f).
17. FA 2.211(i). Information and conclusion on how the loan will encourage U. S. private trade and investment abroad, and how it will encourage private U. S. participation in, or foreign assistance programs (including use of private trade channels and the services of U. S. private enterprises).
- Satisfied. See Section VI, Capital Assistance Paper.
18. FA 2.211(d). Conclusion and supporting information on compliance with the Congressional policy that engineering and professional services of U. S. firms and their affiliates are to be used in connection with capital projects to the maximum extent consistent with the national interest.
- Satisfied. Only U.S. engineering professional services are being and will be used.

35. FA 8.000, Information and conclusions *whether loan will permit American small business to participate equitably in the furnishing of goods and services financed by it.* Satisfied. USG competitive bid procedures will be followed.
36. FA 8.010(a), FA 8.100, Compliance with restriction of commodity procurement to U. S. sources as otherwise determined by the President and subject to statutory reporting requirements. Satisfied by Loan Agreement.
37. FA 8.010(b), Compliance with restriction that no funds be used to procure bulk commodities at prices higher than the market price prevailing in the U. S. at time of purchase. Not applicable.
38. FA 8.010(c), Compliance with requirement that market insurance on commodities be purchased on competitive basis or, if the participating country discriminates against any market insurance company authorized to do business in any State of the United States, that insurance be placed in the U. S. Satisfied by Loan Agreement
39. FA 8.010(d), Information as to the utilization of excess personal property in lieu of procurement of new items. Satisfied. To the extent practicable excess property will be utilized.
40. FA 8.010(e), Information and conclusion on availability of engineering, financial, and other plans necessary to carry out the assistance and of a reasonably firm estimate of the cost of the assistance to the United States. Satisfied. See Section IV, Capital Assistance Paper.
41. FA 8.010(f), Necessary legislative action required within recipient country and basis for reasonable anticipation such action will be completed in time to permit orderly accomplishment of purposes of loan. Satisfied.

42. FAA §.611(b); App. §.101. *If water or water-related land resource construction project or program, information and conclusion on a benefit-cost computation.* Not applicable, however, see Section III, Capital Assistance Paper.
43. FAA §.611(c). *Compliance with requirement that contracts for construction be let on competitive basis to maximum extent practicable.* Satisfied by Loan Agreement. Project advertised and at Bid.
44. FAA §.611(e). *Compliance with the requirement that for all projects estimated to cost in excess of \$1,000,000, the principal officer of AID in the country in which the project is located certify as to the capability of the country (both financial and human resources) to effectively maintain and utilize the project taking into account among other things the maintenance and utilization of projects in the country previously financed or assisted by the U. S. (Such certifications are to be approved by the Administrator or appropriate assistant administrator per Delegation of Authority #75 before assistance is authorized.)* Satisfied. See Annex II, and Section II C, Capital Assistance Paper.
45. FAA §.612(b) and 636(h). *Appropriate steps that have been taken to assure that, to the maximum extent possible, the country is contributing local currencies to meet the cost of contractual and other services and foreign currencies owned by the U. S. are utilized to meet the cost of contractual and other services.* Satisfied. The GURT contribution is the maximum contribution permissible given the country's financial situation.
46. FAA §.619. *Compliance with requirement that assistance to newly independent countries be furnished through multilateral organizations or in accordance with multilateral plans to the maximum extent appropriate.* Satisfied. The GURT is using 5 sources of finance for the entire project road.
47. FAA §.620(a); App. §.107(a) and (b). *Compliance with prohibitions against assistance to Cuba and any country (a) which furnishes assistance to Cuba or failed to take appropriate steps by February 14, 1961, to prevent ships or aircraft under its registry from carrying equipment, materials, or supplies from or to Cuba; or (b) which sells, furnishes, or permits any ships under its registry from carrying items of primary strategic significance, or items of economic assistance.* Satisfied.

48. FAA §.620(b). *If assistance to the government of a country, existence of determination it is not controlled by the international Communist movement.* Satisfied. Tanzania is not a Communist country.
49. FAA §.620(c). *If assistance to the government of a country, existence of indebtedness to a U. S. citizen for goods or services furnished or ordered where such citizen has exhausted available legal remedies or where the debt is not denied or contested by such government or the indebtedness arises under an unconditional guaranty of payment given by such government.* Satisfied. No such indebtedness exists.
50. FAA §.620(d). *If assistance for any productive enterprises which will compete with U. S. production in any country to prevent export to the U. S. of more than 20% of the enterprise's annual production during the life of the loan.* Satisfied. Not applicable.
51. FAA §.620(e)(1). *If assistance to the government of a country, extent to which it (including government agencies or subdivisions) has, after January 1, 1962, taken steps to repudiate or nullify contracts or taken any action which has the effect of nationalizing, expropriating, or otherwise seizing ownership or control of property of U. S. citizens or entities beneficially owned by them without taking appropriate steps to discharge its obligations.* Satisfied. GURT has discharged its obligations.
52. FAA §.620(f); App. §.109. *Compliance with prohibitions against assistance to any Communist country.* Satisfied. Tanzania is not a Communist country.
53. FAA §.620(g). *Compliance with prohibition against use of assistance to compensate owners for expropriated or nationalized property.* Satisfied. Only project costs will be financed.
54. FAA §.620(h). *Compliance with regulations and procedures adopted to ensure against use of assistance in a manner which, contrary to the best interests of the U. S., promotes or assists the foreign aid projects or activities of the Communist-bloc countries.* Satisfied. Procurement will be in the U.S. or Tanzania.

55. FAA §.620(i). Existence of determination that the country is engaging in or preparing for aggressive military efforts. Satisfied. Tanzania is neither engaging in nor preparing for aggressive military efforts.
56. FAA §.620(i). Information on representation of the country at any international conference when that representation includes the planning of activities involving insurrection of subversion against the U. S. or countries receiving U. S. assistance. Satisfied. The GURT has attended no such conference.
- *57. FAA §.620(j). Existence of a determination that the country has permitted or failed to prevent destruction of U. S. property by mob action or has failed to take steps to prevent a recurrence and to pay compensation. Satisfied. There has been no such action against U.S. property in Tanzania.
58. FAA §.620(k). If construction of productive enterprise where aggregate value of assistance to be furnished by U. S. will exceed \$100 million, identification of statutory authority. No applicable.
59. FAA §.620(l). Consideration which has been given to denying assistance to the government of a country which after December 31, 1966, has failed to institute the investment guaranty program for the specific risks of inconvertibility and expropriation or confiscation. Satisfied. Tanzania has signed the Investment Guarantee Program.
60. FAA §.620(n); App. §.107(b); App. §.116. Compliance with prohibitions against assistance to countries which traffic or permit trafficking with North Viet-Nam. Satisfied. No such traffic or trafficking has taken place.
61. FAA §.620(o). If country has seized, or imposed any penalty or sanction against, any U. S. fishing vessel on account of its fishing activities in international waters, information on the consideration which has been given to excluding the country from assistance. Satisfied. No such incident.
62. FAA §.620(p); App. §.117. U. A. R. restriction. Not applicable.
63. FAA §.620(q). Existence of default in payment under any Foreign Assistance Act loan to the country. Satisfied. The GURT is not in default on any loan.

- *64. FAA §.620(s). *Consideration of whether the country is diverting U. S. assistance to military expenditures, or is devoting an unnecessary percentage of its budget for military purposes, or using foreign exchange for military equipment to a degree which materially interferes with its development so as to warrant termination of assistance until such diversion no longer takes place.* Satisfied. It has been determined that GURT is not expending an unnecessary or excessive portion of its budget for military purposes.
- *65. FAA §.620(t). *Compliance with prohibition on aid if country has severed diplomatic relations with U. S. unless agreements have been negotiated after resumption of relations.* Satisfied. The U.S. and GOM have maintained diplomatic relations since GURT's independence.
- *66. FAA §.620(u). *Status of the country with respect to its dues, assessments, and other obligations to the United Nations.* Satisfied. GURT is not in default on its international obligations.
- *67. FAA §.636(f). *Compliance with prohibition on financing non-U. S.-manufactured motor vehicles (except where special circumstances exist and a waiver is authorized).* Satisfied. Such procurement will not be financed.
68. App. §.102. *Compliance with requirement that payments in excess of \$25,000 for architectural and engineering services on any one project be reported to Congress.* Satisfied.
69. App. §.104. *Compliance with bar against funds to pay pensions, etc., for military personnel.* Satisfied. Only project costs will be financed.
70. App. §.106. *If country attempts to create distinctions because of their race or religion among Americans in granting personal or commercial access or other rights otherwise available to U. S. citizens generally, application which will be made in negotiations of contrary principles as expressed by Congress.* Satisfied by Loan Agreement and AID-approved project contracts.
71. App. §.111. *Compliance with existing requirements for security clearance of personnel.* Satisfied.
72. App. §.112. *Compliance with requirement for approval of contractors and contract terms for capital projects.* Satisfied. A.I.D. has or will approve all project contracts.

73. App. §. 114. *Compliance with bar against use of funds to pay assessments, etc., of U. N. member.* Satisfied. Only project costs will be financed.
74. App. §. 115. *Compliance with regulations on employment of U. S. and local personnel for funds obligated after April 30, 1964 (AID Regulation 7).* Satisfied. Regulation 7 is a part of the proposed construction contract.
75. App. §. 118. *Viet-Nam iron and steel restrictions.* Satisfied. GURT does not export iron or steel.
- *76. App. §. 119. *Compliance with reducing assistance by amounts spent for the purchase of sophisticated military equipment in countries other than Greece, Turkey, Iran, Israel, Republic of China, Philippines, or Korea.* Satisfied. No such purchases have been made. If such purchases are made, appropriate reductions will be made.
77. App. §. 101. *Compliance with bar against use of funds for publicity or propaganda purposes within U. S. not heretofore authorized by Congress.* Satisfied. Only project costs will be financed.

UNCLASSIFIED
AID-DLC/P-707
ANNEX II (i)
July 11, 1968

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

I, Samuel H. Butterfield, the principal officer of the Agency for International Development in Tanzania, having taken into account, among other things, the maintenance and utilization of projects in Tanzania previously financed or assisted by the United States, do hereby certify that in my judgment Tanzania has both the financial capability and the human resources capability to effectively maintain and utilize the capital assistance project, the Great North Road.

/s/ Samuel H. Butterfield, Director

May 11, 1968

Date

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

A.I.D. Loan No.:

CAPITAL ASSISTANCE LOAN AUTHORIZATION
Provided from: Development Loan Funds

REGIONAL: Great North Road Loan (Phase II-Construction)

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, (the "Act") and the delegations of authority issued thereunder, I have received and taken into consideration a certification from the Director of USAID/Tanzania as to the financial and human resources capability of Tanzania to effectively utilize the Great North Road Project taking into account, among other things, the maintenance and utilization of projects in Tanzania previously financed or assisted by the United States, and I hereby authorize the establishment of a loan pursuant to Part I, Chapter 2, Title I, the Development Loan Fund, to the Government of the United Republic of Tanzania ("Borrower") of not to exceed thirteen million dollars (\$13,000,000) to assist in financing the foreign exchange costs of goods and services for the engineering and/or construction of portions of the Great North Road Project subject to the following terms and conditions:

1. Interest Rate and Terms of Repayment. Borrower shall repay the loan to A.I.D. in forty (40) years, including a grace period not to exceed ten (10) years. Borrower shall pay interest on the unrepaid principal and any interest accrued thereon at the rate of (a) two percent (2%) per annum during the grace period and (b) two and one-half percent (2-1/2%) per annum thereafter.
2. Currency of Repayment. Repayment of the loan and payment of interest shall be made in United States dollars.
3. Other Terms and Conditions.
 - (a) Goods and Services financed under the loan shall have their source and origin in the United States.

- (b) Such other terms and conditions as A.I.D. may deem advisable.

Administrator

Date

DERIVATION OF GROWTH RATES FOR CARS AND BUSES

I. CARS

Private traffic was computed as the average urban population growth (5%) plus the average annual increase in income of the middle class (4%) times the income elasticity of demand for transport (1.28) or 10.1%, and commercial and government traffic was assumed to grow at 5%, approximately the current rate of commercial growth in the area. To these figures 1% (average percent of disposable income spent on transport (4%) times average percentage transport savings on a surfaced road (20%) times the elasticity of demand for transport (1.28)) was added for private vehicles, and 1.6% was added for commercial and governmental vehicles, and 1.6% was added for commercial and governmental vehicles to account for increased activity on the road because of its improvement. These two rates (11.1% and 6.6%) were then averaged to get a composite rate of growth in cars on the improved road of 8.9%.

II. BUSES

A basic growth rate of 6.2% was computed as the average of the urban (5%) and rural (2.2%) rates of population growth (or 3.6%) plus the product of the average per capita income increase in the area (2%) and the income elasticity of demand for transport (1.28). To this basic rate 1% (the average percent of disposable income spent on transportation (4%) times the average percentage transport savings on a surfaced road (20%) times the elasticity of demand for transport (1.28)) was added to account for increased bus traffic on the road due to its improvement.

July 11, 1968

BACKGROUND: GROWTH RATES FOR THROUGH INTERNATIONAL TRAFFIC

SRI estimates for Zambia import substitution and GNR utilization have not been borne out by experience. In the first nine months of 1967, Zambia reduced its imports from Rhodesia to \$36 million, half the pre UDI rate. Much of the present imports from Rhodesia are made up of coal and electric power from the jointly-owned Kariba station. Zambia is now developing its own coal mines with French help, and tenders have already been received for a \$103 million hydro-electric station at Kafue, so dependence on Rhodesia may fall even further.

In 1965, Zambia imported only \$1.120 million worth of Kenya goods which rose to \$4.9 million in 1966, and \$3.0 million in the first nine months of 1967. Goods included petroleum, paper bags and boxes, building cement, clothing, footwear and foods such as bacon, dairy products and vegetables. Imports from Tanzania rose from \$392,000 in the first six months of 1966, to more than \$8.4 million in the same period last year. These included machinery, transport equipment and petroleum products from the Dar es Salaam refinery. SRI estimated that total Zambian imports (exclusive of POL and coal) by all routes were growing at approximately 3.1% per annum. This appears to be low in light of the actual 12% increase for 1965-1966.

It is clear that the current problems with transport by railroad are causing a diversion of traffic to the GNR (as well as other alternative routes), and it is felt that much of this diversion, as discussed above, will be permanent. For example, SRI estimated that approximately 60,000 tons of general imports could move economically on the GNR by 1966-1967. This estimate now appears to have been low, and general cargo destined for Zambia is now moving on the unimproved GNR from Dar es Salaam at a monthly rate approximating 70,000 tons per annum (as verified by the DeLeuw, Cather origin-destination study). From the conflicting estimates available, a growth rate of 5.5% per annum was chosen for Zambia imports over the GNR for the purposes of the Phase I Loan Paper. This rate was slightly higher than the original SRI estimate of 4.75% to account for changed trade patterns caused by the dislocation of traffic following UDI.

It should be noted that the Phase I Loan Paper analysis excluded three categories of goods now using or expected to use the GNR. The first category was the shipment of POL and copper-industry supplies to Zambia, or of copper to Dar es Salaam. These shipments were specifically excluded from the economic analysis of the road improvements because it was the judgment that, despite the movement of POL and copper over the road at the present time and despite the GRZ's stated intention to move substantial tonnages of these commodities over the GNR throughout the next decade, alternative routes would be used by the time the GNR was upgraded, probably in 1971. The second

category of traffic not included was traffic deriving from various large-scale agricultural, mining and forestry projects which might have been undertaken in the project area. As part of the Tan-Zam Highway study, SRI identified a number of such schemes, mostly in the Mbeya area (The Usangu Plain), which appeared quite profitable in their own right, and which, if undertaken would have added significantly to the traffic on the GNR in the period under study. While the average overall rate of traffic growth for the project was about 6.25%, SRI foresaw a rate of 7.75% if these schemes were undertaken. However, the investment required for these schemes was on the order of \$70 million for the period of 1967-1980, and it was deemed unlikely that this magnitude of investment in Tanzanian agriculture was in the cards. The third category of traffic not included in the previous projections was manufactured goods exported to Zambia from Kenya and Tanzania. Although traffic of this nature was reported to be growing to levels which might enhance the desirability of road improvements on the GNR, it was not reflected in SRI's traffic projections, and was, therefore, omitted from the figures in the Phase I Loan Paper.

On the basis of the actual traffic counts conducted by DeLew, Cather and in the light of recent experience, many of the assumptions in the Phase I Loan Paper might be re-examined. First, an ADT of 63 copper trucks is presently moving over the GNR in the three project areas. Since this traffic has not been diverted, and has, in fact, grown, it may be assumed that it will continue, and is, therefore, included in the traffic base in the calculation in this paper. However, for purposes of analysis in this paper, it is further assumed that the Kampoyo-Kidato-Dar es Salaam Railway will be completed in 1978, and that all Zambian traffic will move by rail to Dar es Salaam in 1979.

Zambian authorities plan to transport about 50,000 tons of general imports per month and an equal amount of copper on the backhaul after 1970. Although this would represent a marked increase for these commodities, actual present levels of Zambia traffic would not increase significantly. In effect, POL would be replaced by more general imports. It is assumed in the calculation in this paper that most POL will be transported by pipeline and that the planned volume of general imports will be reached by the end of 1971. For these calculations, however, it is also assumed that all the Zambian traffic will again shift to the proposed railway, when the railway is operational in 1978. This "diverted traffic" assumption is premised on the argument that transport will continue to be a traffic constraint even after the proposed road is improved.

It is expected that the GNR copper load will continue to grow rather than decline. For example, there were no copper shipments to Mtwara during December 1967, since shipments over that route had piled up in Tunduma. The improved Tunduma-Iyayi section will alleviate that situation and re-direct shipments to the GNR. The shipments made to Albertville were in response to constant Congo (K) Government and BCK railway urgings. As this route is very expensive, and provides no general cargo backhaul capacity, it is unpopular with both the copper companies and the GRZ. The general import backhaul over the GNR noted above, should serve to divert some of this traffic to the GNR. Copper traffic is assumed to continue over the GNR, therefore, until the Kampoyo-Kidato railway is completed in 1978.

With regard to the development traffic, whether the recent trade explosion will continue is problematical. The development of agriculture and secondary industry is largely parallel in the two regions. Zambia will be self-sufficient in cement, for example, by next year, and consumer goods such as radios are being assembled or manufactured there and in East Africa. On the more optimistic side, East Africans have shown interest in importing more of Zambia's better-quality clothing; and when Zambia's fabrication plant opens, it could provide East Africa with copper wire and rods. The East Africans on the other hand, could increase slightly their range of dairy and other agricultural products--Zambia has to import meat and that is one of Kenya's important exports.

It appears that Zambia will continue its great leap north. Since UDI it has invested in the East African shipping line, granted East African Railways and Harbors a \$4.2 million loan to improve harbor facilities at Dar es Salaam, and spent part of \$37.8 million British grant to improve transport conditions throughout East Africa. Of course, there is also the Zambian investment in the GNR itself and the proposed investment in the Tan-Zam Railway.

There are reports also that two schemes, one for wheat and the other for cattle; have been started by private interest in the Mbeya area. These schemes were evidently aimed at the Zambian market, and probably reflect an increasing awareness of the GNR for transport in Zambia. Since the Zambian market for agricultural products is good, it is probable that more such schemes will be developed in the Mbeya area.

The third category of traffic not included in the previous projections was manufactured goods exported to Zambia from Kenya and Tanzania, and agricultural traffic from the Mbeya area to Zambia. Accurate traffic counts are now available, and the traffic has been counted in the alternate calculations used in this paper.

Since the copper and POL traffic included in the alternate calculations is not expected to grow above 1971 levels, it is assumed that while such traffic will add to the absolute number of vehicles using the improved road, its constant nature will depress the overall growth rate for traffic, and the SRI 4.5% growth rate has been included in the alternate calculations rather than the 5.5% used in the Phase I Loan Paper.

DELEJU, CATHER ADT FIGURES

TUNDJMA-IYAYI

	<u>STATION ONE</u>		<u>STATION TWO</u>		<u>LOCAL</u>	<u>POL</u>		<u>STATION TWO LESS</u>		<u>STATION TWO PLUS</u>
	<u>TANZ/ZAM</u>	<u>TANZ</u>	<u>TANZ/ZAM</u>	<u>TANZ</u>	<u>TANZ</u>	<u>TANZ/ZAM</u>	<u>TANZ</u>	<u>POL AND LOCAL</u>	<u>ZAMBIA POL LESS</u>	<u>TANZ POL & LOCAL</u>
CARS	38	30	92	89	61	--	-	31	29	31
BUSSES	15	15	18	18	10	--	-	8	7	8
TRUCKS I	111	78	151	119	40	75	8	20 General 16 Copper	6 General	103
TRUCKS II	<u>59</u>	<u>33</u>	<u>54</u>	<u>27</u>	<u>--</u>	<u>27</u>	<u>3</u>	<u>9</u> Gen <u>18</u> Cop	<u>3</u> General	<u>51</u>
TOTAL	223	156	315	253	111	102	11	102	45	193

DELEUW, CATHER ADT FIGURES

IRINGI-MAHENGE

	<u>TANZANIA TRAFFIC</u>	<u>TANZANIA/ZAMBIA TRAFFIC</u>
CARS	39	40
BUSSES	15	15
TRUCKS I	98	118
TRUCKS II	11	28

MOROGORO-DAR ES SALAM

	<u>TANZANIA TRAFFIC</u>	<u>TANZANIA/ZAMBIA TRAFFIC</u>
CARS	120	122
BUSSES	45	47
TRUCKS I	151	166
TRUCKS II	13	22

AGRICULTURE IN TANZANIA

Tanzania is, as would be expected in such a vast country of varying altitudes and great lakes, under the influence of both the northeast and southeast monsoons. The climate is one of marked extremes of temperature and rainfall distribution and intensity. Well-marked dry and wet seasons characterize most of the country with the most severe dry season being on the central plateau and in Masailand. The northern part of the country has two well-marked rainy seasons, one from October to December and the other from March to June, with day shade temperatures generally about 90°F. and a rainfall between 15-50" rising to a peak in the west of Lake Victoria and in the Usambara mountain area. The southern part of the country in general is characterized by a single rainy season from November to April/May. The cooler weather is generally rainless from late May to October. A large part of this area is in the 30" to 40" rainfall regime with even higher rains on the southern slopes of the mountains rising from the plateau.

With the exception of the volcanic soils in the Arusha and Kilimanjaro areas, parts of the Mbeya region and alluvial soils in the main river basins, the soils of Tanzania are generally of low fertility. The volcanic soils, where rainfall is adequate, are used for coffee, pyrethrum, wheat, bananas, and seed beans. The coastal areas are characterized by poorer sandy soils, on which the cashew industry, now one of the largest in the world, is mainly based. Coconuts and cassava are the other important crops, with rice in the low, swampy areas. It is on the colluvial soils around the base of the mountains in the Kilimanjaro, Tanga and Morogoro areas that the sisal estates are established. The areas to the south and east of Lake Victoria show a well-marked catena effect and are the main Robusta coffee, cotton and livestock producing areas. The Brachistegia/Isobelinia ecological zone, south and southwest of the country, occupies about one-third of the land area in Tanzania. It is in this area, which also has catena characteristics, that the major flue and dark-fired tobacco areas are found, but grain crops, especially maize and sorghum, and groundnuts and other root crops and pulses are produced. Cotton is beginning to be grown in the northern parts of these areas. The main central plateau of Tanzania is characterized by umbrella Acacia, Baobabs, and thorn and scrub thickets in which the uncertain rainfall encourages stock-keeping. In good years, however, large crops of grain, groundnuts and castor are produced.

Only four percent of the African population of over 10 million live an urban life divorced from the land, and two-thirds of the population lives on one-third of the land north of the Central Railway line. Even then, the average density in the northern part of the country is only 35 persons per square mile, whereas south of the line the density is one-quarter of this density.

The extremes of the population density range from 500 people per square mile in the fertile mountain areas of Kilimanjaro, Maru, Usambara and Uluguru, and in small areas near Lake Victoria, to three per square mile in Masailand. In general, the main areas of population are around the periphery of the country in the better-watered and more fertile country. These are separated by large areas of undeveloped country, very often tsetse infested, with little or no permanent water apart from areas near rivers and lakes. The bantu, who constitute ethnologically about 95 percent of the population of Tanzania, are mainly agricultural people without predominant pastoral interests. The balance are mainly Hamitic and Nilotic, or related groups, and are predominantly pastoral, such as the Masai in the north and the Tusi in the west.

Tanzania has a dual farming economy. One sector is concerned with large-scale commercial farming and the other with peasant farming, primarily for subsistence. The large-scale commercial farm sector, employing skilled management, capital equipment and wage labor, covers somewhat over 2.5 million acres or only about one percent of the total land area. Yet this sector in 1960, produced 40 percent of agricultural exports, including sisal, coffee, pyrethrum, wattle, flue-cured tobacco, seed beans and tea. By 1966, although total production had increased, this proportion had dropped to 30 percent mainly due to a more rapid increase in the production of small-holders. In the peasant sector, the farmer's first aim is to be self-sufficient in foodstuffs, but the production of cash crops for sale has become progressively more important. Nevertheless, even in the more highly developed farming areas which have moved over predominantly to a cash economy, as for example in the coffee areas, the farmer still tries to produce the bulk of his own foodstuffs.

The peasant farming system is based in general on the hand hoe and unlimited land. Except in the case of tree crops and certain densely populated areas, land is normally cultivated continuously until productivity falls to a level at which the farmer considers his effort not worthwhile. He then clears new or reopens old land, allowing the area previously cultivated to revert to bush fallow. Mixed cropping practices in most areas of the country and the application of farmyard manure in some areas have to some extent helped to delay declines in fertility. With population pressures building up on the land over the years, there has been large-scale emigration to new areas. Where land is scarce, however, much more intensive systems for maintaining the fertility have been developed, as for example on Ukerewe Island and in the mountain areas generally. Large plantations and European farms on alienated land have had an appreciable influence on African farming in the vicinity, resulting in the introduction of new cultivation methods and new crops. Recently African farmers have shown a growing interest in the use of artificial fertilizers which eventually could revolutionize the farming pattern. A further innovation has been the increasing use of chemical sprays on cash crops. The recent expansion in the production of African mild coffee can be partly attributed to spraying. Insecticides are also being used to some extent in African domestic grain storage.

A growing number of individuals in diverse parts of the country are now farming with modern equipment. Farms of over 100 acres are no longer uncommon and, in fact, one African farmer in the Meru area is now successfully handling 3,000 acres of land under crop including 2,000 acres of wheat. The African tractor owner, having cultivated his own land, usually carries out contract plowing for his neighbors. This has often increased the area cropped but there is also evidence that an appreciable tractor capacity is merely being used to lighten the physical burden of farmers and their families, although a more thorough preliminary cultivation by tractor implements has tended to improve productivity. The major part of the food and cash crop production still comes from the peasant farmer holding, whose inputs and marketing facilities are mainly supplied by cooperatives.

Much land is devoted to livestock raising. Although the number of cattle is said to have risen from 6.3 million in 1951, to 7.7 million in 1959, and 10.3 million in 1966, Tanzania imports appreciable quantities of dairy produce and better grades of meat. The goat and sheep population has been relatively static over the last five years, having reached about 4.0 million and 2.5 million, respectively. Cattle in Tanzania are in large part still looked upon as a status symbol, an investment and a reserve to be tapped for customary functions and emergencies. Apart from Government and non-African ranches and plantations and the African farms on the Island of Ukerewe and around Kilimanjaro and Meru Mountains, where stall feeding for milk production is practiced, animal husbandry in the western sense is only practiced by a very small number of Tanzanians.

Agriculture is the main contributor to Tanzania's gross domestic product, accounting for about 55 percent of the total in 1965. It furnished almost all of the country's exports: about 85 percent during 1961-65. Directly and indirectly, it is the source of the major part of the central Government and local revenues. Furthermore, much of the country's internal trade and transport is devoted to the marketing of agricultural commodities and the limited supply of inputs to agriculture. Tanzania's industry is mainly occupied with the processing of the produce of the land, although recently it has begun to diversify.

The aim of the Five-Year Plan was to move towards a more general balanced economy. Although it was intended that primary production would expand at an increasing rate, other sectors, such as industry and commerce, were expected to expand at a higher rate. It was appreciated that agricultural production would continue to be the most important contributor to national income growth but that external, rather than internal, markets for agricultural production would be the greater constraint. It was also appreciated that the outcome of the Plan depended upon the reaction of farmers to a cash economy. With this in mind, a priority was given to community development to encourage a desire for a higher standard of living at village level.

In developing agriculture, the Government proposed concentrating its efforts in two fields, namely, "improvement" within the existing pattern of farming and the "transformation" or radical modernization of farming through development of new ranches, settlement, irrigation and flood control schemes. Both methods were expected to raise yields per acre and per man-hour through increased inputs, improved methods and the integration, where possible, of animal and crop husbandry to form a balanced farming system. The major part of the available capital was reserved for the "transformation" field.

Under the Plan, those public development expenditures mainly concerned with the "improvement" aspect of agriculture were to be undertaken by the Ministry of Agriculture, Forestry and Wildlife (16 million), while the Ministry of Lands, Settlement and Water Development (121 million) was to deal with the "transformation" aspects; the Ministry of Commerce and Industry (15 million) was made responsible for cooperatives, marketing, credit and processing; and, finally some investments, particularly in commercial ranching and in processing, were entrusted to the National Development Corporation. All these investments were expected to be supplemented by additional development outlays on community development, communications, transport and education.

There is little evidence that over the last two years the Plan has made a significant contribution to increasing output. In fact, Government expenditures on development of agriculture have lagged greatly behind targets. In the first two years, the Ministry of Agriculture, Forestry and Wildlife spent 51.8 percent of its budgets, the Ministry of Lands, Settlement and Water Development 66.2 percent and the Ministry of Commerce and Cooperative Development 23.2 percent. Many potentially worthwhile schemes remained on paper because there was not the organization and staff capable of doing the detailed planning to get them launched and because there were serious failures in implementation. Other worthwhile schemes had to be left in abeyance as finance was not included in the budget to launch them, even if it had been possible to do so. Moreover, much of the expenditure which actually took place has had little impact on production. The Ministry of Lands, Settlement and Water Development, for example, spent most of its allocation on settlement schemes which have largely proved a failure. There was wasteful expenditure for mechanization, both for the latter Ministry's settlement schemes and for the block mechanization schemes financed by the cooperatives and supervised by the Ministry of Agriculture. Some increase in the amount of credit injected into agriculture has taken place but it has not been on such a scale to affect total output significantly. Production has risen primarily as a result of a continuation of long-standing governmental activities and the response of farmers to market opportunities and monetary incentives.

The increase in the production of peasant cash crops has been particularly significant, amounting to 40 percent between 1960-62 and 1965. By the latter year, the market sector of agriculture was producing about as much as the subsistence sector. However, adverse weather conditions in 1964-65 reduced the output of the subsistence sector by about four percent and temporarily halted the growth in total agricultural output. The fact that total GDP rose only two percent in 1965 illustrates the impact which harvest fluctuations can have on the whole economy in a country that is so basically dependent on agriculture as Tanzania.

Crop husbandry has continued to account for about four-fifths of the total agricultural output. Peasant farmers in 1965, marketed over 40 percent of their crops, an appreciable increase over past performance.

Of particular importance has been the expansion of cotton production which has doubled since 1960, and is likely to exceed appreciably the target set in the Plan. It has now displaced sisal as the largest export crop. Coffee output in 1965-66 was 65 percent higher than in 1946-65, and Tanzania is now increasingly confronted with the problem of overproduction in light of the commitments under the International Coffee Agreement. A certain proportion of the surplus might be sold to non-traditional markets, but marketing of the balance is likely to present a difficult problem. Sisal, the main estate-produced crop, has failed to reach again the high level of production in 1964, but has generally maintained an even output slightly below this. While the output of tea has fluctuated, again due to weather conditions, the trend of production has been satisfactory. Other cash crops such as wheat, sugar, cashew and pyrethrum all have shown a fairly steady increase. Oilseeds increased rapidly until 1964, but fell again to the 1961 figure in 1966.

The increase in production has been brought about by a number of factors of which the most important is, as mentioned, the growing desire of peasant farmers for more cash income. This impetus has been reinforced by a well-organized drive by Government and TANU to increase production especially in the cash crop sector. Following independence, the opposition which had sometimes thwarted previous Government efforts to improve agriculture disappeared and gave way to enthusiastic, though not always well-directed, attempts on the part of the Government and political authorities to induce farmers to change their methods of cultivation. Dissemination of improved varieties of crops and wider application of better cultural practices have undoubtedly made it possible to raise output of a number of crops. The development of organized marketing through cooperatives and marketing boards also helped to some extent by providing a sure market, although in some respects the inefficiencies of the cooperative have unduly raised handling and processing margins to an extent that may have affected production incentives in oilseed and grain producing areas.

TRANSPORT COST SAVINGS ANALYSIS

TUNDUMA-IYAYI

A. Vehicle operating cost savings are computed as:

Cars 4.23¢ savings per vehicle mile x 150 miles
x 365 days = \$2,316 savings per year for a
car making one trip per day.

$$4.23¢ \times 150 \times 365 = \$ 2,316$$

Busses 9.01¢ x 150 x 365 = \$ 4,933

Truck I 8.10¢ x 150 x 365 = \$ 4,435

Truck II 18.47¢ x 150 x 365 = \$10,112

B. Distance Savings are computed as:

Cars 11.75¢ total operating cost per vehicle mile
x 12.5 miles shorter distance x 365 days =
\$536 per year for a car making one trip per
day.

$$11.75¢ \times 12.5 \times 365 = \$ 536$$

Busses 28.00¢ x 12.5 x 365 = \$1,278

Truck I 23.26¢ x 12.5 x 365 = \$1,061

Truck II 48.50¢ x 12.5 x 365 = \$2,213

TRANSPORT COST SAVINGS ANALYSIS

IRINGA-MAHENGE

A. Vehicle operating cost savings are computed as:

Cars 4.23¢ savings per vehicle mile x 49 miles
 x 365 days = \$755 savings per year for a
 car making one trip per day.

$$4.23¢ \times 49 \times 365 = \$ 755$$

Busses 9.01¢ x 49 x 365 = \$1,609

Truck I 8.10¢ x 49 x 365 = \$1,445

Truck II 18.47¢ x 49 x 365 = \$3,303

TRANSPORT COST SAVINGS ANALYSIS

MOROGORO-DAR ES SALAAM

A. Vehicle operating cost savings are computed as:

<u>Cars</u>	2.71¢ savings per vehicle mile x 119 miles x 365 days = \$1,176 savings per year for a car making one trip per day. $2.71¢ \times 119 \times 365 = \$1,176$
<u>Busses</u>	$5.61¢ \times 119 \times 365 = \$2,241$
<u>Truck I</u>	$5.03¢ \times 119 \times 365 = \$2,182$
<u>Truck II</u>	$11.85¢ \times 119 \times 365 = \$5,146$

B. Distance Savings are computed as:

<u>Cars</u>	11.75¢ total operating cost per vehicle mile x 7 miles shorter distance x 365 days = \$300 per year for a car making one trip per day. $11.75¢ \times 7 \times 365 = \$ 300$
<u>Busses</u>	$28.00¢ \times 7 \times 365 = \$ 715$
<u>Truck I</u>	$23.00¢ \times 7 \times 365 = \$ 587$
<u>Truck II</u>	$45.00¢ \times 7 \times 365 = \$1,149$

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AID/DLC/P-707
ANNEX VI

28 February 1968

Mr. A. E. Mbuya,
Principal Secretary,
Ministry of Communications, Labour
and Works,
P. O. Box 9177,
DAR ES SALAAM.

Attention: Mr. H. Singh
Director,
Roads and Aerodromes.

Dear Mr. Mbuya,

We have completed our investigation into comparative costs for alternative bitumen surfaces on an improved roadway from Iyayi to Tunduma on the Great North Road. Our findings are based upon the traffic projections developed in my letter of 14 February 1968, and these findings supplement the conclusions of that letter.

Conclusions

The returns in reduced annual maintenance costs with a two-inch asphalt mat should approach 9% annually, over the incremental application costs, if maintenance savings are calculated on local traffic alone and if this traffic grows at the rates projected by SRI. The inclusion of Zambian traffic again raises the rates substantially.

This incremental return is almost identical with the returns estimated in my earlier letter, for constructing an improved road and applying a double seal bitumen surface. Therefore, the overall return to realign, improve and apply a two-inch asphalt mat would approximate 9% for local traffic and approach 15% per year for all traffic.

The basis for these conclusions is explained in more detail in the succeeding paragraphs.

Present Maintenance

Maintenance of the south-western 156 miles of the Tunduma-Iyayi road is the responsibility of the Mbeya Regional Engineer, and the remaining 6.5 miles is the responsibility of the Iringa Regional Engineer. Of a total of 162.5 miles on the present road, 20 miles are bitumen surfaced, 20 miles are engineered gravel and the remaining 122.5 miles are classified as earth roads. As traffic densities have increased in the last few years, gravel in various amounts and thickness has been added to the earth surfaced sections.

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Records of funds spent on maintenance of the road are not kept by mile or segment but by single account for the entire length of roadway. That is, all money spent for maintenance on the Great North Road is carried under one account in each region. Recent maintenance expenditures on the Tunduma-Iyayi road have been as follows:

Thousands of Shillings

	<u>1964-1965</u>	<u>1965-1966</u>	<u>1966-1967</u>
Budgeted	468	793	861
Spent	N/A	943	1,325
Percent spent over budget	-	19%	54%
Average expenditures per mile	-	6.1	8.5

Although the amount of funds spent in 1964-65 is not available for the Tunduma-Iyayi section, expenditures exceeded budgeted funds by about 20% on the Great North Road in the Iringa Region. With this level of maintenance, the condition of the road deteriorated markedly under the increased volume of traffic and size of vehicles. The original construction was not designed for this heavy loading.

In late 1967, the Ministry of Communications, Labour and Works entered into an agreement with a private contractor for maintenance of the earth and gravel surfaced segments of the road from Tunduma to Morogoro via Iringa. The contract does not include maintenance of bitumen-surfaced roads. Contract cost per mile for the first year was approximately Shs. 35,100/-. Estimated cost per mile for the second year is estimated to be approximately Shs. 21,050/-. The difference between first and second year costs is largely for emergency placement of gravel and re-establishment of ditches during the first year. Emergency placement of gravel was estimated to average 3.7 inches loose thickness. It was estimated by the contractor that a five-inch loose measurement of emergency gravel was required for the Tunduma-Mbeya section. This would result in an estimated maintenance cost per mile of approximately Shs. 44,200/- for the first year. Assuming gravel loss is proportional to estimated emergency gravel replacement, the second year maintenance cost per mile would be approximately Shs. 25,200/-. Since the first year contains emergency and delayed maintenance costs, the second year is probably closer to normal costs for maintenance by a private contractor.

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These costs may be slightly higher than if the work were performed by COMWORKS. COMWORKS' wage and equipment rental scales are less than for a contractor and profit and mobilization are avoided.

Annual Maintenance Costs

Present maintenance costs have not been used in this analysis but are presented, as requested, for general background.

In this analysis, probable costs are compared only for two types of bitumen surface at optimal levels of maintenance for the range of traffic anticipated on this road. However, maintenance formulas are presented to permit calculation of annual costs at any selected traffic density for other surfaces, in the event the financial institutions wish to make further cost comparisons. Formulas are shown for earth, engineered gravel, single and double-seal bitumen and for two-inch asphaltic mat surfaces. In preparing these formulas, an unchanging traffic composition has been assumed, based upon the average composition of projected local traffic. Since Zambian vehicles are much heavier, this method may under-estimate somewhat, the incremental returns when savings are computed for all traffic.

Maintenance Formulas

Estimated costs for maintenance of longitudinal ditches, cleaning of culverts, cutting grass and brush, tools, miscellaneous minor repairs, work camps, etc., will be basically the same for the road regardless of surfacing. Yearly cost for this general maintenance is estimated at Shs. 2,530/- per mile. Variable maintenance costs are estimated separately for each type of surface.

A. Earth Surface

- (1) Grading of Surface: It is estimated that one blading will be required for near zero traffic and an additional blading for each 18,000 vehicles. The estimated annual cost, including the costs for grader, roller and water truck operation, is Shs. 350/- + 7 ADT per mile.
- (2) Gravel Replacement: It is estimated that $\frac{1}{4}$ -inch is lost per year by weathering and one inch is lost per year per 100 ADT. Using an average width of graveling of 22 feet, the annual cost equals Shs. 1,290/- + 52 ADT.
- (3) Total annual maintenance costs are Shs. 4,170/- + 59 ADT.

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B. Engineered Gravel Surface

The costs should be approximately the same as for earth surfaces. The difference would be in blading costs which would be minor.

C. Single-Seal Bitumen Surface - 20 Feet Wide

- (1) Grading of Shoulders: We estimate two minimum bladings per year would be required, with one additional blading per 60,000 vehicles. Estimated annual cost is Shs. 300/- + 1 ADT per mile.
- (2) Patching: COMWORKS' estimated annual patching costs, upgraded for recent wage and material cost increases, are about Shs. 4,790/- per mile. Because of the heavier truck loads, patching is estimated to cost about 30% more or Shs. 6,470/- per mile, at an estimated ADT of 250 vehicles. Patching costs should increase by Shs. 1,400/- for each additional 75 vehicles of ADT. Thus, estimated patching costs are Shs. 1,710/- + 19 ADT.
- (3) Resealing: We estimated that resealing will be required once every four years when the ADT is 150 and every three years when the ADT is 250. Resealing would become proportionally more frequent as traffic increased further. The estimated cost is Shs. 2,900/- + 20 ADT per mile per year.
- (4) Total maintenance cost is Shs. 7,440/- + 40 ADT per mile per year.

D. Double-Seal Bitumen Surface - 22 Feet Wide

- (1) Grading of Shoulders: This would be the same as for the single-seal surface or Shs. 300/- + 1 ADT per mile per year.
- (2) Patching: The basic COMWORKS' estimate of Shs. 4,790/- per mile should be increased about 10% because of the additional width and decreased 20% for less edge damage. The base course would be designed for heavier trucks so no increase in patching costs would be required to compensate for truck weight. Patching costs should increase by Shs. 1,400/- for each increase in ADT of 100 vehicles over the base traffic of 250 vehicles. Thus, the annual cost is estimated as Shs. 1,010/- + 14 ADT per year.

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- (3) Resealing: This should be done once every four years with an ADT of 150 and once every three years with an ADT of 250 with the frequency rising proportionally for traffic increases. The annual estimated cost is Shs. 3,200/- + 22 ADT.
- (4) Total maintenance costs are Shs. 7,040/- + 37 ADT per mile per year.

E. Two-Inch Asphaltic Mat Surface - 22 Feet Wide

- (1) Grading of Shoulders: Costs would be the same as above or Shs. 300/- + 1 ADT per mile per year.
- (2) Patching: We estimate two square yards (S.Y.) per mile would have to be removed and replaced each year, plus one additional S.Y. per 20,000 vehicles. The cost per S.Y. will be high because of the small quantity. Cost is estimated at Shs. 200/- + 2 ADT.
- (3) Sealing Cracks: Estimated cost per mile for each pass or crack sealing is Shs. 100/-. Cracks should be sealed twice per year, plus once for each 100 ADT. Estimated cost equals Shs. 200/- + 1 ADT.
- (4) Fog Seal: Rejuvenation of asphaltic mat will be needed because of traffic and oxidation. We estimate fog sealing will be required once every four years for an ADT of 200 and once every three years for an ADT of 350, rising proportionally for further traffic increases. The application recommended is 0.05 gallons of bituminous emulsion per square yard. Cost estimates are Shs 400/- + 2 ADT per mile per year.
- (5) Resealing and Chipping: We estimate resealing should be done once every eight years for an ADT of 150 and once every six years for an ADT of 250, increasing proportionally with further traffic. Costs estimates are Shs. 1,590/- + 11 ADT.
- (6) Total maintenance costs are thus Shs. 5,220/- + 17 ADT per mile per year.

Construction Costs

In comparing a double-seal bituminous surface with a two-inch asphaltic mat, all construction costs should be approximately the same except for a difference in surfacing costs.

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DeLeuw, Cather International estimate that the difference in cost per square yard should be about U.S. \$1,000, or about Shs. 7/20.

Thus, surfacing costs would be Shs. 93,300/- (\$13,060) per mile greater using a two-inch asphaltic mat for pavement 22 feet wide. The assumed life for both surfaces is 30 years with proper maintenance.

The difference in initial construction cost for the 150 miles of realigned surface between Tunduma and Iyayi is approximately Shs. 14,000,000/- (\$1,960,000).

Comparative Costs

We have compared the greater construction costs for a two-inch asphalt mat against the lower annual maintenance costs at the traffic levels anticipated over the assumed 30-year life of the surface. As noted above, the ratio of return is approximately 9% when the comparison is made for non-Zambian traffic alone. Our methods of calculation are presented on the enclosed sheets.

This completes the investigations we have been asked to do on the Great North Road and we hope the analysis proves helpful. We are prepared, of course, to undertake further studies if the Ministry so desires.

Sincerely,

Robert Busenburg
Chief of Party

Enclosures
a/s

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ANNEX VII (i)

July 11, 1968

MAINTENANCE ANALYSIS

TUNDUMA-IYAYI

<u>YEAR</u>	<u>TOTAL MAINTENANCE COSTS</u> <u>126 MILES - EARTH SURFACE</u>	<u>TOTAL MAINTENANCE COSTS</u> <u>150 MILES - ASPHALTIC CONCRETE</u>
1967	\$346,680	
1968	359,640	
1969	372,600	
1970	388,152	
1971	439,992	\$ 76,800
1972	458,136	77,550
1973	478,872	78,450
1974	499,608	79,050
1975	520,344	66,300
1976	544,968	114,150
1977	568,296	212,550
1978	603,288	55,800
1979	268,920	91,800
1980	283,176	37,200
1981	297,432	38,100
1982	314,280	108,300
1983	331,128	96,750
1984	350,568	41,100
1985	372,600	42,450
1986	393,336	43,650
1987	419,256	103,950
1988	445,176	111,450
1989	474,984	48,300
1990	504,792	50,100
1991	537,192	112,650

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ANNEX VII (ii)

MAINTENANCE ANALYSIS

IRINGA-MAHENGE

<u>YEAR</u>	<u>TOTAL MAINTENANCE COSTS</u> <u>49 MILES - ENGINEERED GRAVEL</u>	<u>TOTAL MAINTENANCE COSTS</u> <u>49 MILES - ASPHALTIC CONCRETE</u>
1967	\$ 78,400	
1968	81,928	
1969	88,200	
1970	92,904	
1971	109,760	\$ 25,382
1972	116,424	25,627
1973	122,696	25,823
1974	129,752	26,117
1975	137,200	26,411
1976	145,432	38,122
1977	154,056	72,275
1978	139,160	17,297
1979	147,784	38,318
1980	157,192	18,424
1981	166,992	19,061
1982	177,968	38,171
1983	189,336	41,993
1984	201,096	21,168
1985	214,032	22,001
1986	227,752	22,834
1987	242,648	46,648
1988	259,112	40,229
1989	275,968	25,872
1990	294,000	26,999
1991	314,384	52,920

MAINTENANCE ANALYSIS

MROGORO-DAR ES SALAAM

<u>YEAR</u>	<u>TOTAL MAINTENANCE COSTS</u> <u>126 MILES - DOUBLE BITUMEN</u>	<u>TOTAL MAINTENANCE COSTS</u> <u>119 MILES - ASPHALTIC CONCRETE</u>
1967	\$247,464	
1968	257,796	
1969	269,388	
1970	281,610	
1971	318,402	\$ 69,344
1972	333,774	70,924
1973	350,028	72,233
1974	368,298	73,542
1975	388,332	75,089
1976	407,862	120,071
1977	430,290	260,253
1978	454,104	68,544
1979	444,276	126,616
1980	470,358	70,567
1981	497,826	74,137
1982	527,688	104,720
1983	559,818	147,203
1984	594,846	86,513
1985	632,142	91,273
1986	680,652	97,461
1987	716,562	175,287
1988	764,064	116,858
1989	813,960	114,478
1990	868,518	121,380
1991	927,234	76,874

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ANNEX VIII (1)

BENEFIT ANALYSIS

TUNDUMA-IYAYI

Year	Traffic Density (ADT)					Annual Vehicle Operating/Distance Savings					Road Maintenance Savings	Total Annual Benefits	10% NPW Factors	1968 NPW 10% Benefits	6% NPW Factor	1968 NPW 6% Benefits	
	Cars	Bus	Tr.I	Tr.II	Total	Car	Bus	Tr.I	Tr.II	Total							
1967	31	8	103	51	193												
1968	33	9	108	53	203												
1969	36	9	112	56	213												
1970	39	10	118	58	225												
1971*	47	12	138	68	265	\$134,044	\$ 74,532	\$ 745,143	\$ 838,100	\$1,791,819	\$363,192	\$ 2,155,011	.751	\$ 1,618,413	.839	\$ 1,808,054	
1972	51	13	144	71	279	\$146,107	\$ 79,748	\$ 778,673	\$ 875,813	\$1,280,340	\$380,586	\$ 2,260,927	.683	\$ 1,544,213	.792	\$ 1,790,654	
1973	56	14	151	74	295	\$159,244	\$ 85,264	\$ 813,695	\$ 915,204	\$1,973,407	\$400,422	\$ 2,373,829	.620	\$ 1,471,773	.747	\$ 1,773,250	
1974	61	15	157	78	311	\$173,586	\$ 91,301	\$ 850,207	\$ 956,271	\$2,071,365	\$420,558	\$ 2,491,923	.564	\$ 1,405,444	.704	\$ 1,754,313	
1975	66	16	164	81	327	\$189,135	\$ 97,636	\$ 888,210	\$ 999,014	\$2,173,995	\$454,044	\$ 2,628,039	.513	\$ 1,348,184	.665	\$ 1,747,645	
1976	72	17	172	85	346	\$206,159	\$104,493	\$ 928,447	\$1,044,272	\$2,283,371	\$430,818	\$ 2,714,189	.466	\$ 1,264,812	.627	\$ 1,701,796	
1977	79	18	178	89	364	\$224,790	\$111,834	\$ 970,175	\$1,091,206	\$2,398,005	\$355,746	\$ 2,753,751	.424	\$ 1,167,590	.591	\$ 1,627,466	
1978	86	19	194	92	391	\$245,031	\$119,623	\$1,013,394	\$1,139,815	\$2,517,863	\$547,488	\$ 3,065,351	.385	\$ 1,180,160	.558	\$ 1,710,465	
1979**	94	21	12	6	133	\$267,015	\$128,045	\$ 62,521	\$ 88,338	\$ 545,919	\$177,120	\$ 723,039	.350	\$ 253,063	.526	\$ 380,318	
1980	102	22	13	7	144	\$291,008	\$136,989	\$ 65,336	\$ 92,304	\$ 585,637	\$245,976	\$ 831,613	.318	\$ 264,452	.496	\$ 412,480	
1981	111	24	13	7	155	\$317,281	\$146,603	\$ 66,431	\$ 96,416	\$ 626,731	\$259,332	\$ 886,063	.289	\$ 256,072	.468	\$ 414,677	
1982	121	24	14	8	168	\$345,833	\$156,814	\$ 69,390	\$ 100,763	\$ 672,800	\$205,980	\$ 878,780	.263	\$ 231,119	.442	\$ 388,420	
1983	132	27	14	8	181	\$376,930	\$167,845	\$ 72,519	\$ 105,306	\$ 722,600	\$234,378	\$ 956,978	.239	\$ 228,717	.417	\$ 399,059	
1984	144	29	15	9	196	\$410,844	\$179,547	\$ 75,788	\$ 110,073	\$ 776,252	\$309,468	\$ 1,085,720	.217	\$ 235,601	.393	\$ 426,687	
1985	157	31	16	9	213	\$447,840	\$192,143	\$ 79,219	\$ 114,996	\$ 834,198	\$330,150	\$ 1,164,348	.197	\$ 229,376	.371	\$ 431,973	
1986	171	33	16	9	229	\$488,187	\$205,633	\$ 82,763	\$ 120,206	\$ 896,789	\$349,686	\$ 1,246,475	.179	\$ 223,376	.350	\$ 436,266	
1987	187	35	17	10	249	\$532,154	\$220,017	\$ 86,512	\$ 125,612	\$ 964,295	\$315,306	\$ 1,279,601	.163	\$ 208,574	.330	\$ 422,268	
1988	203	38	18	10	269	\$580,007	\$235,371	\$ 90,403	\$ 131,264	\$1,037,045	\$333,726	\$ 1,370,771	.148	\$ 202,874	.311	\$ 426,309	
1989	222	41	19	10	292	\$632,284	\$251,843	\$ 94,470	\$ 137,162	\$1,115,759	\$426,684	\$ 1,542,443	.135	\$ 208,229	.294	\$ 453,478	
1990	242	43	19	11	315	\$689,120	\$269,506	\$ 98,715	\$ 143,318	\$1,200,659	\$454,692	\$ 1,655,351	.122	\$ 201,952	.277	\$ 458,532	
1991	263	46	20	11	340	\$751,181	\$288,363	\$ 103,146	\$ 149,783	\$1,292,473	\$424,542	\$ 1,717,015	.111	\$ 190,588	.261	\$ 448,140	
										Sub Total	\$35,781,217		\$13,934,325		\$19,412,250		
										Salvage Value	9,960,000		1,105,560		2,599,560		
										Total	\$45,741,217		\$15,039,885		\$21,011,810		

* 25% (12.5%) Impulse Jump
** Introduction of Railway

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ANNEX VIII (11)

BENEFIT ANALYSIS

IRINGA-MAHENCE

Year	Traffic Density (ADT)				Annual Vehicle Operating Savings					Road Main- tenance Savings	Total Annual Benefits	10% NPW Factors	1968 NPW 10% Benefits	6% NPW Factors	1968 NPW 6% Benefits	
	Car	Bus	Tr. I	Tr. II	Total	Car	Bus	Tr. I	Tr. II							Total
1967	40	15	118	28	201	\$ 30,200	\$ 24,135	\$170,510	\$ 92,484							
1968	44	16	123	29	209	33,220	25,744	177,735	95,787							
1969	48	17	129	31	225	36,240	27,353	186,435	102,393							
1970	52	18	135	32	237	39,260	28,962	195,075	105,496							
1971*	63	22	158	37	280	47,565	35,398	228,310	122,211	\$433,484	\$ 84,378	\$ 517,862	.751	\$ 388,914	.839	\$ 434,486
1972	69	24	165	39	297	52,095	38,616	238,425	128,817	457,953	90,797	548,750	.683	374,796	.792	434,610
1973	72	25	173	40	313	56,625	40,225	249,985	132,120	478,955	96,873	575,828	.620	357,013	.747	430,143
1974	82	27	180	42	331	61,910	43,443	260,100	138,726	504,179	103,635	607,814	.564	342,807	.704	427,901
1975	89	29	188	44	350	67,195	46,661	271,660	145,332	530,848	110,789	641,637	.513	329,159	.665	426,688
1976	97	31	197	46	371	73,235	49,879	284,665	151,938	559,717	107,310	667,027	.466	310,834	.627	418,225
1977	106	33	206	48	393	80,030	53,097	297,670	158,544	589,341	81,781	671,122	.424	284,557	.591	396,633
1978	115	35	186	19	355	86,825	56,315	268,770	62,757	474,667	121,863	596,530	.385	229,664	.558	332,853
1979**	125	38	194	20	377	94,375	61,142	280,330	66,060	501,907	109,466	611,373	.350	213,980	.526	321,582
1980	137	40	203	21	401	103,435	64,360	293,335	69,363	530,493	138,768	669,261	.318	212,824	.496	331,953
1981	149	43	212	22	426	112,495	69,187	306,340	72,666	560,688	147,931	708,619	.289	204,790	.468	331,633
1982	163	46	222	23	454	123,065	74,014	320,790	75,969	593,838	139,797	733,635	.263	192,946	.442	324,266
1983	177	50	232	24	485	133,635	80,450	335,240	79,272	628,597	147,343	775,940	.239	185,449	.417	323,566
1984	193	53	242	25	513	145,715	85,277	349,690	82,575	663,257	179,928	843,185	.217	182,971	.393	331,321
1985	210	57	253	26	546	158,550	91,713	365,585	85,878	701,726	192,031	893,757	.197	176,070	.371	331,583
1986	229	61	264	27	581	172,895	98,149	381,480	89,181	741,705	204,918	946,623	.179	169,445	.350	331,318
1987	250	65	276	28	619	188,750	104,585	398,820	92,484	784,639	196,000	980,639	.163	159,844	.330	323,610
1988	273	69	289	30	661	206,115	111,021	417,605	99,090	833,831	218,883	1,052,714	.148	155,801	.311	327,394
1989	297	74	302	31	704	224,235	119,066	436,390	102,393	882,084	250,096	1,132,180	.135	152,844	.294	332,860
1990	323	80	315	32	750	243,865	128,720	455,175	105,696	933,456	267,001	1,200,457	.122	146,455	.277	332,526
1991	353	85	330	34	802	266,515	136,765	476,850	112,302	992,432	261,464	1,253,896	.111	139,182	.261	327,266
										Sub Total	\$16,628,849	\$4,910,345		\$7,572,477		\$7,572,477
										Salvage Value	2,000,000	333,000		783,000		783,000
										Total	\$19,628,849	\$4,910,345		\$8,355,477		\$8,355,477

* 25% (12.5%) Impulse Jump
** Introduction of Railway

UNCLASSIFIED
AID-DLC/P-707
ANNEX VIII (111)

BENEFIT ANALYSIS

MROGORO-DAR ES SALAAM

Year	Traffic Density (ADT)					Annual Vehicle Operating/Distance Savings					Road Main- tenance Savings	Total Annual Benefits	10% NPW Factors	1968 NPW 10% Benefits	6 % NPW Factors	1968 NPW 6% Benefits
	Cars	Bus	Tr.I	Tr.II	Total	Cars	Bus	Tr.I	Tr.II	Total						
1967	122	47	166	22	357	\$ 180,072	\$138,932	\$ 459,654	\$138,490	\$ 917,148						
1968	133	50	173	23	379	\$ 196,308	\$147,800	\$ 479,037	\$144,785	\$ 967,930						
1969	145	54	181	24	407	\$ 214,020	\$159,624	\$ 501,189	\$151,080	\$ 925,913						
1970	158	58	189	25	430	\$ 233,208	\$171,448	\$ 521,341	\$157,375	\$1,083,312						
1971*	192	69	221	27	509	\$ 283,392	\$203,964	\$ 611,949	\$169,965	\$1,269,270	\$249,058	\$ 1,518,328	.751	\$ 1,140,264	.839	\$ 1,273,877
1972	209	74	231	28	542	\$ 308,484	\$218,744	\$ 639,639	\$176,260	\$1,343,127	\$262,850	\$ 1,605,977	.683	\$ 1,096,882	.792	\$ 1,271,933
1973	228	79	241	29	577	\$ 336,528	\$233,524	\$ 667,329	\$182,555	\$1,419,936	\$277,795	\$ 1,697,731	.620	\$ 1,052,593	.747	\$ 1,258,205
1974	248	85	252	31	616	\$ 366,048	\$251,260	\$ 697,788	\$195,145	\$1,510,241	\$294,756	\$ 1,804,997	.564	\$ 1,018,018	.704	\$ 1,270,717
1975	270	90	263	32	659	\$ 398,520	\$266,040	\$ 728,247	\$201,440	\$1,594,247	\$313,243	\$ 1,907,490	.513	\$ 978,542	.665	\$ 1,268,480
1976	295	97	275	34	701	\$ 435,420	\$286,732	\$ 761,475	\$214,030	\$1,697,657	\$287,791	\$ 1,985,448	.466	\$ 925,218	.627	\$ 1,244,875
1977	322	104	288	35	749	\$ 475,272	\$307,424	\$ 797,472	\$220,325	\$1,800,493	\$170,037	\$ 1,970,530	.424	\$ 835,504	.591	\$ 1,164,583
1978	351	111	301	37	800	\$ 518,076	\$328,116	\$ 833,469	\$232,915	\$1,912,576	\$385,560	\$ 2,298,136	.385	\$ 884,782	.558	\$ 1,282,359
1979**	382	119	355	33	779	\$ 563,832	\$ 51,764	\$ 706,095	\$144,785	\$1,766,476	\$317,660	\$ 2,084,136	.350	\$ 729,447	.526	\$ 1,096,255
1980	417	127	367	34	835	\$ 615,492	\$375,412	\$ 737,869	\$151,272	\$1,880,045	\$399,791	\$ 2,279,836	.318	\$ 724,987	.496	\$ 1,130,798
1981	454	136	379	35	894	\$ 670,104	\$402,016	\$ 771,055	\$158,075	\$2,001,250	\$423,689	\$ 2,424,939	.289	\$ 700,807	.468	\$ 1,134,871
1982	495	145	392	36	958	\$ 730,620	\$428,020	\$ 805,654	\$165,168	\$2,130,062	\$422,968	\$ 2,553,030	.263	\$ 671,446	.442	\$ 1,128,439
1983	540	155	395	37	1027	\$ 797,040	\$458,180	\$ 841,665	\$172,551	\$2,269,436	\$412,615	\$ 2,682,051	.239	\$ 641,010	.417	\$ 1,118,415
1984	588	166	319	29	1102	\$ 867,888	\$490,696	\$ 879,794	\$180,368	\$2,418,746	\$508,333	\$ 2,927,079	.217	\$ 635,176	.393	\$ 1,150,342
1985	641	178	333	30	1182	\$ 946,116	\$526,168	\$ 919,335	\$188,474	\$2,580,093	\$540,869	\$ 3,120,962	.197	\$ 614,295	.371	\$ 1,157,876
1986	699	190	348	31	1286	\$1,031,724	\$561,640	\$ 960,289	\$196,870	\$2,750,523	\$583,191	\$ 3,333,714	.179	\$ 596,734	.350	\$ 1,166,799
1987	762	204	364	33	1363	\$1,124,712	\$603,024	\$1,004,067	\$205,845	\$2,937,648	\$541,275	\$ 3,478,923	.163	\$ 567,064	.330	\$ 1,148,044
1988	831	218	382	34	1455	\$1,226,556	\$644,408	\$1,049,257	\$215,110	\$3,135,331	\$647,206	\$ 3,782,537	.148	\$ 559,815	.311	\$ 1,176,369
1989	906	233	397	36	1572	\$1,337,256	\$688,748	\$1,095,859	\$224,664	\$3,346,527	\$699,482	\$ 4,046,009	.135	\$ 546,211	.294	\$ 1,189,526
1990	987	250	415	37	1689	\$1,456,181	\$739,000	\$1,145,286	\$234,797	\$3,575,895	\$747,138	\$ 4,323,033	.122	\$ 527,410	.277	\$ 1,197,480
1991	1075	267	434	39	1815	\$1,586,700	\$789,252	\$1,196,831	\$245,364	\$3,818,147	\$850,360	\$ 4,668,507	.111	\$ 518,204	.261	\$ 1,218,480
											Sub Total	\$56,493,393		\$15,964,409		\$25,058,723
											Salvage Value	6,300,000		699,300		1,644,300
											Total	\$62,793,393		\$16,663,709		\$26,703,023

* 25% (12.5%) Impulse Jump
** Introduction of Railway

UNCLASSIFIED
AID-DLC/P-707
ANNEX IX (1)

July 11, 1968

COST ANALYSIS

TUNDUMA-IYAYI

<u>YEAR</u>	<u>DESIGN, CONSTRUCTION & MAINTENANCE</u>	<u>AT 6% - NPW</u>	<u>AT 10% - NPW</u>
1967	\$ 1,500,000	\$ 1,500,000	\$ 1,500,000
1968	6,450,000	6,082,350	5,863,050
1969	6,350,000	5,645,510	5,245,100
1970	3,300,000	2,768,700	2,478,300
1971	76,800	60,825	52,454
1972	77,550	57,929	48,081
1973	78,450	55,228	44,245
1974	79,050	52,568	40,552
1975	66,300	41,570	30,895
1976	114,150	67,462	48,399
1977	212,550	118,602	81,831
1978	55,800	29,350	19,530
1979	91,800	45,532	29,192
1980	37,200	17,409	10,750
1981	38,100	16,840	10,020
1982	108,300	45,161	25,883
1983	96,750	38,022	20,994
1984	41,100	15,248	8,096
1985	42,450	14,857	7,598
1986	43,650	14,404	7,114
1987	103,950	32,328	15,384
1988	111,450	32,766	15,045
1989	48,300	13,379	5,892
1990	50,100	13,076	5,561
1991	112,650	27,711	11,377
	<u>\$19,286,450</u>	<u>\$16,806,827</u>	<u>\$15,625,343</u>

COST ANALYSIS

IRINGA-MAHENGE

<u>YEAR</u>	<u>DESIGN, CONSTRUCTION & MAINTENANCE</u>	<u>AT 6% - NPW</u>	<u>AT 10% - NPW</u>
1967			
1968			
1969	\$2,467,000	\$2,193,163	\$2,037,742
1970	2,467,000	2,069,813	1,852,717
1971	25,382	20,102	17,335
1972	25,627	19,143	15,888
1973	25,823	18,179	14,564
1974	76,117	50,617	39,048
1975	26,411	16,559	12,307
1976	38,122	22,530	16,163
1977	72,275	40,329	27,825
1978	17,297	9,098	6,053
1979	38,318	19,005	12,185
1980	18,424	8,622	5,234
1981	19,061	8,124	5,013
1982	38,171	15,917	9,122
1983	41,993	16,503	9,099
1984	21,168	7,853	4,170
1985	27,001	7,700	3,938
1986	22,834	7,535	3,721
1987	46,648	14,507	6,903
1988	40,229	11,827	5,430
1989	25,872	7,166	3,156
1990	26,999	7,046	2,996
1991	52,920	13,018	5,311
	<u>\$5,654,692</u>	<u>\$4,604,656</u>	<u>\$4,116,043</u>

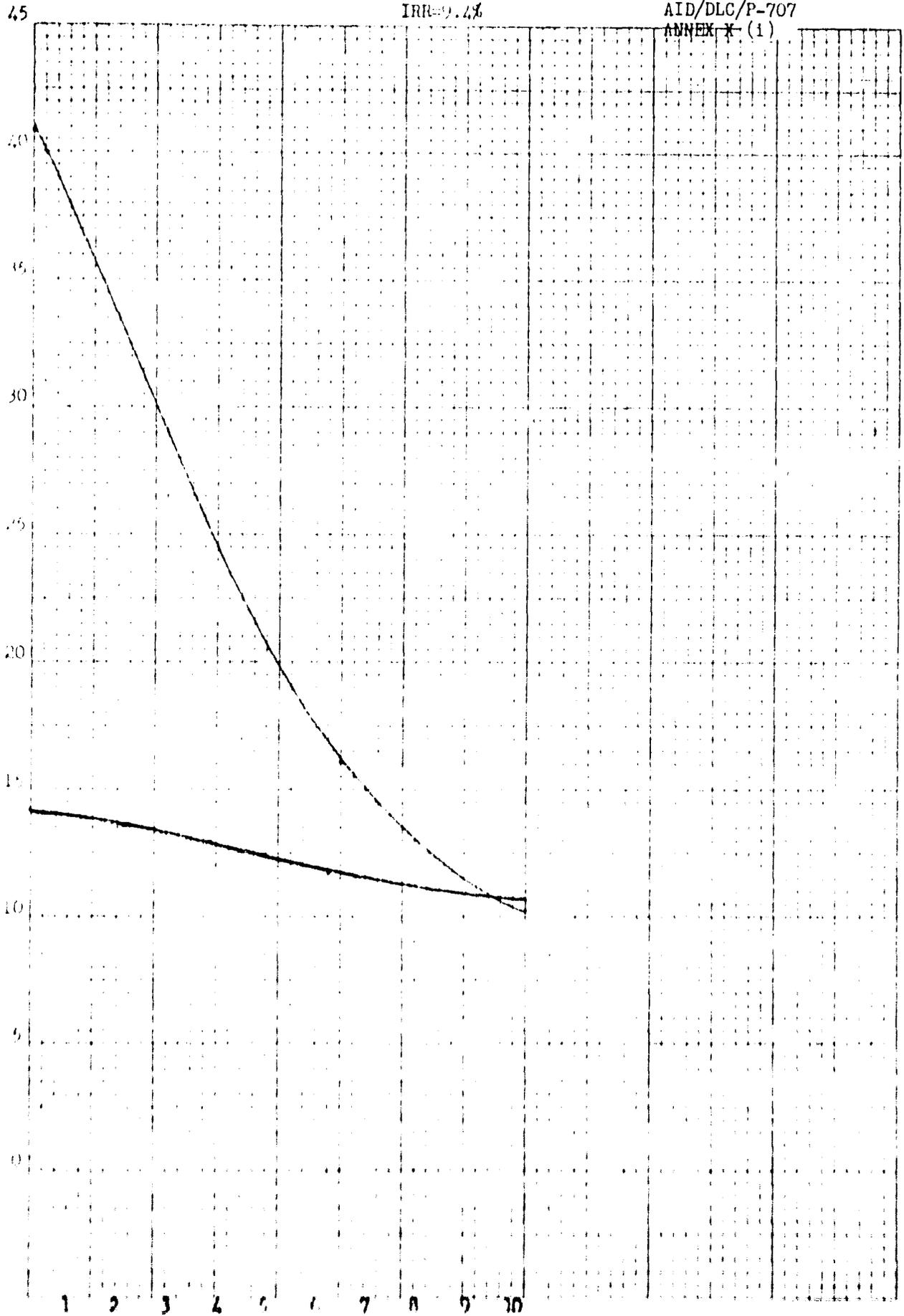
COST ANALYSIS

MOROGORO-DAR ES SALAAM

<u>YEAR</u>	<u>DESIGN, CONSTRUCTION & MAINTENANCE</u>	<u>AT 6% - NPW</u>	<u>AT 10% - NPW</u>
1967			
1968			
1969	\$ 5,250,000	\$ 4,950,750	\$ 4,336,500
1970	5,250,000	4,667,250	3,942,750
1971	69,344	58,179	47,361
1972	70,924	56,171	43,972
1973	72,233	53,958	40,739
1974	73,542	51,773	37,727
1975	75,089	49,934	34,991
1976	120,071	75,284	50,910
1977	260,253	153,809	100,197
1978	68,544	38,253	23,990
1979	132,804	69,854	42,221
1980	75,208	37,303	21,735
1981	78,897	36,923	20,749
1982	106,743	47,180	25,511
1983	154,700	64,509	33,569
1984	91,987	36,150	18,121
1985	96,985	35,981	17,360
1986	102,340	35,819	16,681
1987	188,139	62,085	27,844
1988	119,357	37,120	16,113
1989	121,261	35,650	14,793
1990	128,520	35,600	14,265
1991	223,363	58,297	22,559
	<u>\$12,935,304</u>	<u>\$10,747,832</u>	<u>\$ 8,950,668</u>

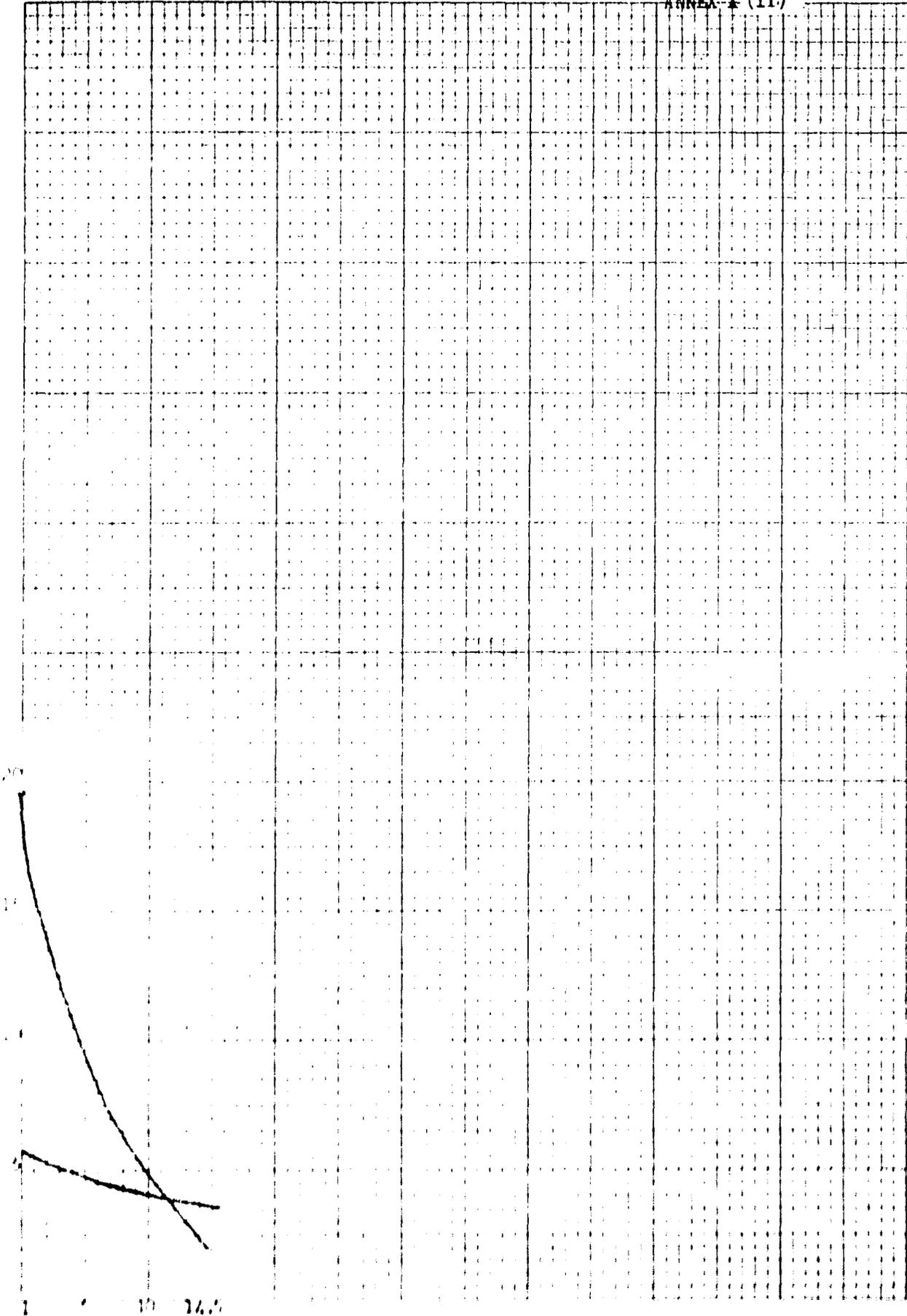
TUNDUMA-IYAYI
IRR=9.4%

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ANNEX X (1)



IRINGA-MAHENGÉ
IRR=11.5%

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ANNEX-X (11)



10 14.5

MOROGORO-DAR ES SALAAM
IRR=21%

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AID/DLC/P-707
ANNEX X (111)

