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Field Report: An Assessment of Transport Infrastructure
Relative to Zambian Coastal Linkage

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PREFACE

The following report, prepared for the United States Agency for International Development (USAID) under contract number AID-611-00-T, Project No. 698-0135, is a field report of transport conditions relative to Zambian import/export traffic. Although the report has been prepared in conjunction with and in order to assist the movement of fertilizer and food financed by the United States Government (USG) under the Commodity Imports and PL 480 Programs, the appraisal offered here views overall short and long term Zambian transport needs within the framework of Southern Africa as a region. Within the context of this report, Southern Africa is defined as inclusive of those countries and territories located south of 8 degrees south latitude: The Republic of South Africa (RSA), Lesotho, Swaziland, Namibia (Southwest Africa), Botswana, Zimbabwe (Zimbabwe-Rhodesia/Southern Rhodesia), Zambia, Malawi, and Mozambique. Although Angola and Tanzania are excluded from the region of Southern Africa as defined here their inclusion in this appraisal is warranted by their relevance to Zambian Coastal links.

The main report begins with an assessment of the various modes of which the internal Zambian transport system is composed and by which the country is externally linked to coastal ports; an assessment of various port facilities in the region is also included. This is followed by analysis of traffic flow through the system --- including such topics as management, capacity constraints, and internal distribution --- and a closing discussion of findings and recommendations. Several annexes are provided after the main report in order to present such information as activity by other donors, bridge status reports, and field trip/inspection reports.

The field work on which this report is based was conducted over a period of two months with a cut-off date of March 28, 1980. Analysis included in the report makes extensive use also of previous reports and surveys. Readers interested in additional background material are referred in general to the various transport studies prepared in conjunction with the Southern African Development Analysis Project (SADAP) and in particular to Coastal Transport Links for Zambia: An Examination of Route Options through Northern Mozambique and Associated Project Development, USAID, Contract No. Afr-c-1593, Washington, D.C., December 31, 1979.

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SECTION I - TRANSPORT AS A MAJOR
CONSTRAINT ON ECONOMIC DEVELOPMENT IN ZAMBIA

I. INTRODUCTION

Zambia's geographic position as a land-locked state sets the transport needs of the country apart from those of coastal states whose ports provide direct access for import/export traffic. Exports of Zambian copper, the major export and source of foreign exchange, must, thus, travel not only across the country but through one or more countries before reaching an ocean port.

The transport costs of such movement affect the international competitiveness of Zambian copper and the costs which must be paid for imports into the country. A far more serious concern, however, results from the complications inherent in transport across national boundaries over transport facilities over which Zambia has no direct control. Even in the most amicable regional political setting, differences in transport policy and regulation, alternate technologies, and internal economic priorities can restrict access to transport for the land-locked state.

The political setting in Southern Africa today is far from amicable, and political factors have played a major role in restricting transport options for Zambia. Included among these factors have been:

- The internal Zambian political configuration itself.
- Variations in perspectives of their respective national interests by the countries in Southern Africa.
- Divergent perspectives and policies among the Southern African states concerning how to best deal with the apartheid politics of the Republic of South Africa (RSA), as well as the different steps taken to implement these policies. Countries in the region vary widely in the openness of their contacts with the RSA and their willingness to use transport routes through the RSA. This is best demonstrated by air traffic connections, but it also affects surface transport.
- The decision by the Front Line states to close the border with Southern Rhodesia after the Unilateral Declaration of Independence (UDI). This cut the

hub of rail transport linking the ports of Mozambique with the interior of the region.

- The erosion of security as the result of guerrilla groups resulted in the closure of international operation by the Benguela railroad to the port of Lobito, the only rail link to the western coast (Namibia excepted), and closed traffic over such certain potentially meaningful routes as the Cassacatiza/Tete route in Mozambique.
- Specific commando actions by the Rhodesian Security Forces taken during 1979 including damage to eleven road or rail bridges in Zambia, and the sinking of the Kasungula Ferry. Indirectly also included would be damage in Mozambique to road and rail bridges and to certain facilities at the port of Beira.

As a consequence of these factors, route options for Zambia have been restricted, and until the reopening of the border with Southern Rhodesia in late 1979, Zambia's primary coastal link has been via rail and road to Dar es Salaam. The result is the inability of the Zambian transport system to satisfy the basic "flexibility rule" of transport management, i.e., the ability to provide maximum traffic over various route options. Although the political situation in Zimbabwe has been substantially altered as a result of the recent elections, political considerations will continue to restrict Zambian transport and limit flexible responses to transport needs.

Even assuming a redirection in the restriction played by political considerations on Zambian access to transport, serious systemic limits remain. As a system, the ability of the transport sector to function as a distributive mechanism is dependent on the performance of all of its parts. The Zambian transport system and the external links upon which the country depends, are characterized by:

- Operational inefficiencies
- Managerial inefficiencies
- Inadequate maintenance
- Scarcities of spare parts, lubricants and, in certain cases, even fuel
- Insufficient supply of trained manpower.

There is really no level or part of the Zambian transport system which does not suffer from one or all of these problems.

II. THE CONSTRAINING ROLE OF TRANSPORT

Whether one discusses the Zambian economy on the basis of pragmatic experience or as the result of econometric analysis, the conclusion one reaches is the same; inadequate transport represents the major constraint on economic development in Zambia. This conclusion is a basic corollary of the proposition that all productive activity is dependent upon the transfer of goods and services. The situation is most dramatically reflected by the current food crisis necessitating large scale imports of maize, but the inclusiveness of the transport constraint on all sectors of the Zambian economy during the last decade provides a classic illustration of the impact of transport on development. For example:

- Agricultural Production - The constraining role of inadequate transport is most clear in the agricultural sector, especially in terms of such inputs as seed and fertilizer. Each year Zambia must import at least 120,000 metric tons of fertilizer. The inability of the transport system to handle this quantity at a rate sufficient to meet the 1978 planting created a major crisis. Disaster was averted by reopening traffic over the southern border with Zimbabwe. Once inputs are in-country, however, distribution to rural areas remains a problem. Although less serious, the problem includes the distribution of hand tools and seed in certain areas.

The availability of extension services is particularly constrained by transport consideration. Extension programs have a very limited budget for gasoline, and extension agents often limit their visits to commercial farms which are willing to refill the tanks of their vehicles. The tangential nature of contact by the extension service with the majority of small holders is also reflected in the types of research in which the extension service is involved.

- Marketing: Collection/Distribution - Closely related to agricultural production is the ability of an economy to collect, market and distribute what

is produced. One of the first projects undertaken by NAMBOARD was a campaign in 1967/68 to increase the production of produce by small holders. This project failed in the end because there was insufficient provision for collection and, in the end, much of the vegetable crop was ploughed into the soil. A marketing project for 20 to 100 bag production of maize in the Southern Province is currently experiencing difficulties because the 8 to 10 ton trucks being used to collect bagged maize cannot pass over feeder roads in the remote areas.

There is some indication that in rural areas maize collection is better than the delivery of meal and processed foods. Some observers feel that this reflects a bias toward the urbanized consumer who needs the maize produced in rural areas. It is beyond the scope of this study to really assess such a claim, but at the least one would have to observe that the proximity of the urban population to major distribution points in the transport system automatically gives them greater access to goods and services.

- Milling - Related to the issue of distribution is the impact of transport on maize milling in the country. Surplus maize from one region may be needed to fill the allocation for mills in other areas. This has been a particular problem since the damage to the road and rail bridges in the fall of 1979. Most mills in the country are still not working at capacity and rather complex logistics have been necessary in order to supply such remote areas in the north as Mansa.
- Mining and Foreign Exchange - Delays in shipping copper ingots to the ports have limited the flow of foreign currency into Zambian hands, in turn limiting the ability of the country to buy spare parts and other essential imports. Currency considerations, in turn, have played an important part in the rationale for the structuring of tariffs, making imports too expensive for the average worker. The very mining of the copper, moreover, has also been constrained by transport. This has been mainly a result of the inability of Zambian Railways to consistently supply coal from Maamba to electric power generating plants which service the mines in the Copperbelt.

- Commerce - Commercial interests in Zambia are seriously constrained by the inadequacy of the transport sector. It is difficult to obtain commodities for wholesale and retail business. Such special services as customs orders or emergency shipments of spare parts are difficult transactions even when possible. Transit losses are high, necessitating expensive insurance costs.
- Industry - The inadequacy of the transport system is a major disincentive to investment in industrial projects in Zambia. The costs of transport and restricted capacity of the transport system limit the rate of return on investment and reduce production levels needed in order to apply the economics of scale necessary for profitable production. The development of small-scale production is equally restricted by transport. The inability to obtain spare sewing machine parts or materials, for example, could easily bankrupt a tailor or low volume producer of garments.
- Regulation - Transport constraints hinder regulation of not only the transport industry--including axle load weights and the standards of safe vehicle operation--but other sectors as well. A report released in February 1980 by the senior price control officer for the Central Province expressed concern over the lack of transport for price inspectors regulating pricing by independent traders. Most of the work was, in fact, being done on foot and was restricted to urban areas.

The primary, immediate concern of transport planning in Zambia in 1980 is meeting the domestic demand for maize by supplemental imports from the USA and the RSA. The brief overview presented above of constraints by transport on all productive sectors is intended to remind the reader that the current crisis is not just the result of events peculiar to the present crop year, but is an extension of the general transport situation which constrains the Zambian economy. The examples given are far from inclusive but are sufficient to indicate the great social and economic costs associated with inadequate transport.

SECTION II - ASSESSMENT OF ZAMBIAN RAIL AND ROAD TRANSPORT

I. RAIL TRANSPORT

The analysis of rail transport providing Zambia with coastal access presented in this section offers an overview of the constraints and problems affecting the mode rather than a detailed description of rail infrastructure. Additional information relevant to transport by rail is also included in Annex III, Field Trip/Inspection Reports.

A. Zambia Railways

The operation of Zambia Railways (ZR) is crucial to the consideration of coastal links for Zambia as well as to internal distribution related to import/export traffic. In previous years port operations at Dar es Salaam and problems with the TAZARA railway have been the major transport bottlenecks for import/export traffic. With the resumption of traffic over the southern route and increased efficiency projected for the northern route, the operation of ZR will become a crucial determinant of capacity.

The railway has encountered an increasing problem with profitability. This has mainly resulted from a drop in local traffic. The major causes for this have been the general economic recession and increased competition from road haulage (ZTRS, NCZ and CH). The situation has also been complicated by rate charges for about 17 products, most of which are food products such as maize, wheat, salt and beans, which are below cost. Equally important, however, have been operational problems.

Table 1. Zambia Railways: Locomotive Requirements, 1979

<u>Summary of Locomotive Requirements</u>	<u>Proposed @ 75% Availability</u>	<u>Present @ 68% Availability</u>
Freight	47 units	29 units
Passenger	6 "	5 "
Yard	13 "	13 "
Servicing Mtce	22.5 "	22 "
Contingencies	$\frac{1.5}{90}$ "	$\frac{6}{69}$
Leased	-	4 "
On Loan to Malawi Railways	-	1 "
Heavily Damaged	$\frac{-}{90}$	$\frac{6}{80}$ "

The availability target which has been set for Zambian Railways is 75%. It is currently at 68% exclusive of heavily damaged locomotives which until an adequate supply of spares is provided, will not be available for service. These figures compare with 90% for North America, 85% summer and 80% winter on Indian Railways and 70% or less for other Central African Railways.

At this stage it is unlikely that a figure in excess of 75% can be achieved. Many factors have an effect on availability and those which have the most impact on Zambia Railways are as follows:

1. Long lead time and inconsistency in the supply of spares.
2. Shortage of fully qualified artisans and technical staff.
3. Half of the present fleet is over 8 years old and failures are on the increase.
4. Locomotives are operated under full load on 75% of the assignments.

Our objective which is not now being achieved is to obtain 250,000 GTKm/unit day. This target while modest is difficult under conditions on Zambia Railways.

Source: Zambia Railways.

1. Major Problems Affecting Operation of ZR

a. Track Conditions - The poor state of the track and road bed is a major constraint on operation requiring the imposition of speed restriction in certain areas. About 490 kilometers of the 850 kilometer main line are laid with 45 kilogram rail and the remainder of the main line is railed with 40 kilogram rail. The section north of Livingstone is in serious need of being rerailed. About 95 percent of the main line is on wooden sleepers. Sleeper replacement has been a major problem and ZR hopes to construct a concrete sleeper factory and shift away from wooden sleepers entirely. Stone ballast is also short on many sections of the main line.

b. Shortage of Equipment - Equipment is scarce at almost every level, but is particularly related to line equipment.

Locomotives - ZR has about 75 main line locomotives, all of which are GE diesel units purchased between 1967 and 1976. An additional 14 units are being supplied under an assistance program by the Federal Republic of Germany. A major problem in the past has been unit availability. At times this has been as low as 25 percent. At present the rate is about 70 percent, and ZR hopes to reach a level of 75 percent. (See Table 1, Zambia Railways: Locomotive Requirements, 1979.)

Wagons - Estimates of the number of freight wagons available for ZR traffic vary from about 3,600 to 4,000. ZR is using a computer to keep track of wagon location. Although the age of wagons inherited from the unitary system is becoming an increasing problem, ZR has done an extensive study and feels that the greater problem is wagon turn-around time. Shortening the time period by one day, for example, would be equivalent to 300 additional wagons. (See Table 2, Zambia Railways: Wagon Requirements by Level of Traffic, 1978, and Table 3, Zambia Railways: Analytical Summary of Actual "In Service" Holdings.)

Table 2. Zambia Railways: Wagon Requirements by Level of Traffic, 19
LOCAL TRAFFIC - 3.0M. N/T PROJECTED

Source: ZR

This comprises all Agrocultural, fuels and chemicals, const. material and ores and minerals.

A low average of 33 Net/tonnes per wagon, and a midway average turnaround of 12 days, may therefore be assumed.

Applying these factors as a base gives us the following requirements.

- a) $\frac{3.0m \text{ Net/tonnes}}{33 \text{ N/T per wagon}} = 90909.0 \text{ wagons per/annum}$
- b) $\frac{90909.0 \text{ N/T P/A}}{365 \text{ Days}} = 249.0 \text{ wagons generated per/day}$
- c) $249.0 \times 12 \text{ Day cycle} = 2988.0 \text{ wagons required}$
- d) Allowance for spares and maintenance 10%
 $2988 + 298 = 3286$
 Say 3300 wagons required for all local traffic.
Ratio = 909.0 Net/tonnes per/wagon per/annum

EXPORT TRAFFIC - .6M NET/TONNES PROJECTED

- a) $\frac{.6m \text{ Net/tonnes}}{40 \text{ N/T per wagon}} = 15000 \text{ wagons per/annum}$
- b) $\frac{15000 \text{ N/T P/A}}{365 \text{ Days}} = 41.0 \text{ wagons generated per/day}$
- c) $41.0 \times 30 \text{ Day cycle} = 1230 \text{ wagons required}$
 - Allowance for spares and maintenance 10%
 $- 1230 + 123 = 1353$
 $- \text{ZR INPUT } 50\% \quad \frac{677}{676}$
 Say 700 ZR wagons required for all export traffic
RATIO : 428.5 Net/tonnes per/wagon per/annum
 (ZR portion 857.1 N/T P/W Per/annum).

* NOTE: Imports are covered by return of wagons in export traffic.
 Summarized required - Current levels of traffic:

TRAFFIC	N/TONNES	WAGONS REQ'D
LOCAL	3.0 M	3300
TO DAR	.6	700
FROM DAR	.4	NIL*
TO ZAIRE	.1	NIL (BY OTHERS)
TRANSIT	.7	NIL (" ")
	<u>4.3</u>	<u>4000</u>

Table . Zambia Railways. MONTHLY SUMMARY OF ACTUAL IN-SERVICE HOLDINGS

SOURCE OF STATISTICS = ZAMBIA RAILWAYS COMPANY REPORT FOR 26.6.78
 COMPUTER ACTIVITIES REPORT FOR MONTH OF AUGUST - 1978

MONTH	26.6.78	COMPL. ACTIVITY REPORT	URR			URR COMPL. ACTIVITY REPORT
			ACTIVITY	COMPL. 26.6.78	ACTIVITY REPORT	
1978	196	1206	2413	1089	876	958
97	96	73	273	121	82	208
98	94	39	155	115	95	89
25	25	25	-	-	-	59
25	25	25	18	16	16	-
187	189	187	-	-	-	-
143	143	143	-	-	-	-
(24)	(24)	(6)	-	-	-	-
(24)	(24)	(124)	-	-	-	-
-	-	-	(358)	(69)	(72)	-
(24)	(24)	-	-	-	-	-
-	-	-	(6)	(48)	(46)	-
25	194	1822	3280	1481	1189	954
(24)	(24)	(176)	(471)	(112)	(120)	-
295	197	1698	2559	1562	1089	954
297	197	1698	2559	1562	1089	954

COMPL. ACTIVITY REPORT
 ZAMBIA RAILWAYS COMPANY
 ZR REPORT 1978
 ZR - 2000
 UR - 1050
 UR - 950
 TOTAL - 4000

Source: ZR

BEST AVAILABLE DOCUMENT

c. Other Problems - Various other problems also constrain operation of ZR:

- Shortage of skilled manpower in mechanical, electrical and civil engineering fields;
- Shortage of spare parts and lubricants;
- Poor state of control equipment; and
- Industrial relations.

2. Investment Program

ZR has prepared a corporate plan for the period 1979-1983 which seeks to rationalize profits and operations. The main elements in the strategy contained in this plan involve:

- Acquiring 14 locomotives and 1100 wagons;
- Carrying out intensive track renewal;
- Acquiring a new Centralized Train Control System (CTC);
- Improved facilities and workshops; and
- Training and incentive programs to retain skilled staff.

The total cost of this investment program is K110 million or about US\$137.5 million. A discussion of the IBRD project for Zambia Railways is included in Annex I. The breakdowns and specific categories in the two lists of investments do not necessarily correspond. In part this is the result of certain such projects as the Kafue Bridge being held outside the IBRD project and in part reflects the inclusion of investment under alternate categories. (See Table 4, Zambia Railways: Summary of ZR Investment Plan, 1979-1983.) Some of the programs listed under these two inventories are, in fact, already underway.

Table 4 . Zambia Railways:
Summary of ZR Investment Plan 1979 - 83

<u>Investment item</u>	<u>Purpose</u>	<u>K million</u>
14 Locomotives	Expansion	11.36
1100 wagons	Replacement & expansion	38.00
CTC equipment	Replacement	10.00
Relaying and resleepering	Maintenance	12.16
Extension and removal of crossing loops	Maintenance	0.26
Plant and machinery	Maintenance & expansion	1.67
Concrete sleeper factory	Diversification	3.56
Kafue Bridge	Replacement	5.00
Telecommunications facilities	Replacement	2.76
Telecommunications facilities	Expansion	3.00
Wrecking crane	Replacement	1.10
Workshops equipment	Replacement & expansion	2.14
Running depots	Replacement & expansion	1.25
Handling equipment	Expansion	2.20
Staff houses	Replacement & expansion	10.00
Motor vehicles	Replacement	2.50
Station and yards	Expansion and replacement	1.50
Repair tracks	Replacement	0.04
Miscellaneous		1.51
Total investment 1979 - 83		110.00

Source: Zambia Railways.

TABLE 5. ZAMBIA RAILWAYS: OBJECTIVES 1980-1983

FINANCIAL OBJECTIVES	UNITS	1980	1981	1982	1983	Average	Actual
<u>PROFITABILITY</u>							
Net Profit	k'mil	3.787	6.120	3.280	6.876	4.954	3.476
Return on Assets	%	4.9	6.2	4.4	4.9	4.9	3.9
Return on Equity	%	3.1	4.6	2.3	4.5	3.8	3.6
<u>PRODUCTIVITY</u>							
Traffic units per capita	In thou.	236	234	234	232	233	192
Growth of Traffic Units	%	7.8	-0.9	-0.9	0	1.5	1.7
<u>FINANCIAL POSITION</u>							
Debt/Equity ratio	r	0.6	0.7	0.7	0.8	0.7	0.50
Current ratio	r	1.9	1.8	1.7	1.6	1.8	2.22
Acid test ratio	k'mil	62.234	69.483	71.121	75.773	69.675	45.779
<u>OTHER KEY FIGURES IN FINANCIAL FINANCIAL PLANS</u>							
	UNITS	1980	1981	1982	1983	TOTAL	
Total Investment	K'mil	24,991	23,887	23,889	23,886	96.653	
Internal Financing	"	5,365	5,365	5,364	5,363	21.460	
New Loans	"	29,626	18,524	18,523	18,523	75.196	
Net Worth	"	121,069	133,309	139,869	153,621	-	
Total Assets	"	195,241	224,615	245,193	272,952		

The adequacy of the proposed investment is somewhat difficult to assess. ZR feels that the proposed investment will handle the basic equipment problems which they now face. Manpower needs, worker motivation, and wagon turn-around time remain short and long term serious issues which must be resolved in order to bring the system to capacity. Their resolution cannot be judged in cost terms. A preliminary estimate by the IBRD, moreover, indicates that ZR will need an additional investment at least equivalent to the present IBRD project to insure maximal capacity during the rest of the decade. This investment, moreover, would not increase capacity to meet the projected growth in demand for import/export traffic by the end of the century.

B. Tazara Railways

In the late 1960s the People's Republic of China agreed to offer assistance for the construction of a railway linking the Tanzanian port of Dar es Salaam to the internal rail system of Zambia. The Tanzania-Zambia Railway Authority was established to oversee the construction of the new system and the Tanzania-Zambia Railway Act of 1974 was passed in both countries for the regulation, management, and operation of the joint railway which has come to be called the TAZARA Railway.

The TAZARA system consists of 1,860 kilometers of main line single track running from the eastern terminus of Zambian Railways at Kapiri Mposhi to Dar es Salaam. The track is 3 feet 6 inches gauge allowing connection with the rail system in Zambia as well as in the ports of Central and Southern Africa. It is not compatible, however, with the rail systems of Tanzania and East Africa.

The headquarters for the railway is in Dar es Salaam. Management positions are held by either Zambian or Tanzanian nationals assisted by a deputy of the other nationality. The system is divided into two sections, one for Zambia and one for Tanzania each of which in turn is divided into two divisions.

Performance by TAZARA Railways has been disappointing. Although the system has a potential capacity for 90,000 metric tons of imports a month, traffic has never equalled even 50% of that figure. Estimates by the U.N. survey team of transport in South Africa in 1979 indicated a projected capacity for Zambian imports of 20,000 metric tons a month. Performance during 1979 reached or exceeded this level only in five months, but the average monthly capacity for Zambian imports for the ten months of operation before the Chambeshi rail bridge was damaged in November was only about 22,000 metric tons.

1. Locomotives - One of the major limits on rail capacity has been limited locomotive power. Engine availability for the system as a whole during the late 1970s declined to about 42 percent. In early 1980, availability was believed to be 50 percent for the system as a whole but down to 25 percent on the Zambian side. The major problems seem to have included:

- Engine design combined with the stress of operating conditions over the route
- Shortage of skilled maintenance and repair staff

- Shortage of spare parts and delays in receiving orders after they are placed.

TAZARA currently has 41 main line locomotives in service. They need an additional ten. Twelve new locomotives are expected early in 1980 and experiments are under way with repowering some of the Chinese built locomotives. Upon the receipt of the additional locomotives, TAZARA hopes to increase the number of trains a day, but the ability of the system to substantially increase capacity during 1980 over the 1979 projected targets is unlikely.

2. Rail Wagons - Although capacity was initially constrained by technical problems related to rail wagons the major problems have been availability and turn-around times. As of early 1980, TAZARA had 2,150 rail wagons. (See Table 6 . TAZARA: Freight Rolling Stock, January 1980.) Availability for these wagons was reported to be a maximum of between 80 and 90 percent. This compared to availability in 1978/79 of 78 percent or less. TAZARA attributed the improved situation to:

- the receipt of additional spare parts;
- an increase in the stock of parts kept on hand;
- cutting the time lag in ordering parts not kept on hand.

Wagon turn around for TAZARA ideally should never exceed 15 days. In actuality this rate has never been reached and the best rate was in 1976/77 when wagon turn around was on an average of 27.8 days. (See Table 7 . TAZARA: Average Wagon Turn-Around Times, 1976/77-1980.) The rate declined steadily, reaching over 70 days in May 1979. TAZARA reported an improvement during June and July which cut the time almost in half. Service was disrupted in the fall but with the reopening of service in early 1980 turn-around of 35 days was projected. The ability of the line to maintain this rate after the expansion of service was uncertain.

The major factor delaying wagon turn-around appears to be off-loading, mainly once the wagons reach Zambia Railways. TAZARA cites three major causes:

- A shortage of locomotive power and wagons;
- Long terminal lines in Zambia for wagon off-loading (sometimes wagons are used as holding containers for cargo);

- The use of TAZARA wagons by Zambian Railways for domestic haulage.

Table 6
Tazara Railways: Freight Rolling Stock
Nov 1979

<u>Wagon Types</u>	<u>No. of Units</u>	<u>Capacity (tonnes)</u>
Covered Wagons	523	30
High Sided Opens	400	50
Low Sided Opens	735	30
Flats	161	50
Tanks	126	31
Livestock	30	15
Refrigerator	<u>21</u>	<u>25</u>
Total General Freight	1,995	35 (average)
Ballast	<u>69</u>	<u>50</u>
Well	2	90
Brake Vans	<u>84</u>	<u>--</u>
Total Specials	<u>155</u>	<u>-</u>
TOTAL	2,150	-

Source: Tazara Railways

Table 7
TAZARA: Average Wagon Turn-Around
Times, 1976/77-1980

<u>Period</u>	<u>Days on Tazara</u>	<u>Days on Zambia R.</u>	<u>Total</u>
1976-77	11.7	16.1	27.8
1977/78	11.1	19.8	21.0
Projected 1978/79	18.0	23.7	41.7
First Quarter 1979	17.3	21.0	38.3
April 1979	18.1	34.5	52.6
May 1979	38.5	33.2	71.7
First Quarter 1980 (projected)	11.0	24.0	35.0

Source: Tazara Railways.

3. Route Wash-Outs and Shippage - As a result of heavy continuous rains from October 1978 and May 1979, the earth became heavily saturated and there was major ground slippage in embankments and cuttings as well as wash-outs to the roadbed. A British engineer has been called in to advise on temporary and permanent repairs. Roadbed has been reinforced in certain spots and new foundations of crush rock have been substituted for earth. Speed over these sections must still be reduced and it is not certain if additional repairs or even relocation of the route at points will be necessary.

4. Other Problems - Aside from such technical problems as the braking system, the two other major problems have been communications and derailments. Communication outages are a serious problem during the rainy season. Derailments are mainly the result of haste and misuse; they are confined largely to yard traffic.

C. Malawi Railways

Malawi Railways (MR) consists of 803 kilometers of 1,067 mm gauge mainline linked to the east with the northern and central systems of the Caminhos de Ferro do Mozambique, which in turn, connects with the ports of Nacala and Beira respectively. The system has been undergoing considerable expansion in recent years. In 1970 the 101 kilometer eastern link from Nkaya to Nayuci was opened; in early 1979 the extension of the system from Salima to Lilongwe was opened; extension of the system from Lilongwe to the border is underway and hopefully will be completed by 1981. Assistance to the present expansion is being provided by CIDA. Rerailing portions of the system with heavier rail is also included under this project.

Although there are no major deficiencies not covered in the development plans Malawi has for MR, several issues are relevant to rail operation:

- The system uses an electric token system rather than a CTS for controlling train movements;
- Not all systems have crossing loops and some of those which do exist are too short;
- Locomotive power is the major constraint on capacity. In early 1980 MR has less than 40 locomotives. Availability was about 70 percent for mainline operation. Sixteen diesel locomotives have been ordered from Canada. The first six or eight should be in service by the end of May.

- In late 1979, the wagon fleet consisted of about 700 standard freight wagons which basically fills the demands of MR operation. Tankers and double decker vehicle wagons have been recently added to meet scarcities of these types of wagons. At any one time 28 percent of the MR wagons are in Mozambique, counter balanced by 500 foreign wagons in Malawi.
- There is a high percentage of empty wagons running to the ports.
- Zambian traffic has an allocation for imports over MR from Nacala and Beira of almost 15,000 metric tons a month. Zambian utilization has been irregular, however, making Zambia a "mixed-value" user of MR. During 1979, for example, total Zambian input traffic equalled about 30,500 metric tons. Actual month traffic ranged from about 320 to about 11,000 metric tons. Traffic was concentrated in April, May and June.
- Dependence upon the operating efficiency of Mozambique Railways is a major constraint on capacity. A major fuel crisis developed in 1979 as a result of this dependence. MR extended temporary assistance in management and maintenance to CFM on an unofficial basis which helped ran the situation some, but the constraint remains.

D. Mozambique Railways

The Caminhos de Ferro de Mozambique (CRM) is administered by the Direcao dos Servicos des Portos e Caminhos de Ferro (DNPCF) which is headquartered in Maputo and jointly oversees rail and port operations in Mozambique. The CFM is composed of three major regional systems and several coastal lines none of which connect with one another. Linkages between the three major systems is possibly only via third countries -- CFM(s) and CFM-Centro via Zimbabwe and CFM-Centro and CFM-Norte via Malawi -- greatly complicating internal rail communication.

With the closure of the border with Rhodesia in 1976, the only international rail link for the southern system was via the RSA. (The opening of the Beit Bridge line between Rhodesia and the RSA provided indirect linkage but the GOM did not permit direct use of this route for Rhodesian cargo. The RSA has been especially interested in the southern system and the port of Maputo for import/export flow for its northeastern territory and has been providing technical and capital assistance to Mozambique for port and rail operation.) Damage to the Limpopo route

to Zimbabwe includes about 90 kilometers of track inside Zimbabwe, 40 kilometers of track inside Mozambique, a six span bridge over the Limpopo River itself, and at least one other bridge as well as damage to the stations, communication systems, and the road bridges in the area which in turn are needed to get materials in to make rail repairs. It is estimated that the line will not be able to function before the end of 1980. Reconstruction may easily take longer, especially if Zimbabwe divides to upgrade its rail line while reconstruction takes place.

In the short-run and perhaps in the long-run, the CFM-Centro is the system which will receive major emphasis. This system links with Zimbabwe via Umtali, carried traffic to Moatize, where transshipment to truck haulage to Zambia is possible, and to Malawi where linkages to Nacala and transshipment to Zambia are both possible. The Umtali route has just been re-opened and in late March one train was passing every other day. The number of wagons was still restricted until the weight of the trains had tamped the ballast; wagons were bringing coal from Wankie down but most were going back empty.

The route to Moatize was disrupted in late 1979 by guerrilla activity which included destruction of a major bridge. This required re-routing of traffic from Beira through Malawi and then over to Moatize. The bridge reopened in late February. By mid-March, a train a day pulling about half a load of wagons (20 compared to 35 or 40) was traveling over the route. Wagons are coming down with coal and returning empty. Track and road beds need considerable attention at various points along the system.

The CFM-Norte line connecting Nacala and Malawi Railways was only completed in 1969. It was built somewhat speculatively on the assumption that proceeds from the operation of the line could later be used to upgrade the route to handle heavier traffic. The rail needs to be upgraded, ballasting is necessary, and some engineering work may have to be considered including realignment.

Rail operation throughout CFM has declined substantially. This has been true both in terms of absolute volume and the quality of operations. Major causes of this include:

- Closure of the border with Rhodesia in 1971;
- The departure of about 95 percent of the Portuguese nationals who staffed the railway before independence in 1975;

- Rail wagon and locomotive scarcities.

The only system running at a profit is the Southern system which has high volume and short distance handling to the RSA.

1. Locomotives - Mozambique has recently purchased another 20 GE diesel locomotives from Brazil. It is planned to purchase another 20 diesels but financing guarantees have been a problem. The diesels are to be used on the northern and southern systems and the CFM hopes to recondition 18 steam locomotives for use on the central line in its own shops at a rate of about five locomotives at a time over four months each or about two years for all the locomotives. There will need to be assistance for reorganization of the shops if this schedule is to be met.

2. Wagons - CFM-Centro has a total of about 4,100 freight wagons of which about 1,800 are wagons from Unitary Rhodesian Railways stranded in-country after the closure of the border. These wagons have been maintained by CFM and are now being sent via Umtali to bring coal out from Wankie. The RR wagons have increased supply to a basically adequate level but this may become a problem with the border reopened. Availability during the late 1970s has been high, reportedly 90 percent, but during 1979 maintenance problems began to increase. On CFM-Norte there is a deficit of wagons -- less than 1,000 -- and utilization is complicated by lower availability rates and wagon turn-around times. There is a local rail wagon factory but it has limited capacity.

E. Rhodesian Railways

Conditions in Zimbabwe-Rhodesia during the preparation of this survey made it impossible to inspect rail facilities in the country. Most information concerning the railway, moreover, has been regarded as classified information by Rhodesian Railways (RR). Selected comments are offered here to supplement discussion appearing in the SADAP transport survey documents or in other sources.

RR used to serve as a hub for rail transport to Mozambique. Its 3,000 some kilometers of line offered four major international connections linking Botswana, Zambia and Mozambique. In 1974 a fifth line was established providing direct linkage with the RSA through Beit Bridge rather than relying on routing through Botswana. Operation over the line through Botswana has continued--in fact, RR operates rail traffic through Botswana--but the link to Zambia and the two connections to Mozambique were closed by the Front Line States after UDI. Zambia reopened the route through Zimbabwe in 1978 for its transit traffic and, except for a short period at the end of 1979, the line has remained open. Efforts are underway to open the two routes to Mozambique. The Limpopo route, however, will require at least nine months of reconstruction before it can be opened, limiting traffic to the line through Umtali.

Although deterioration of RR cannot be substantiated, major investment in rail transport was diverted to the construction of the line to Beit Bridge. Efforts had been undertaken to relay portions of the main line with heavier rail on concrete sleepers, but progress in this project is not known. The availability of locomotives has decreased as a result of a shortage of spare parts and skilled personnel; international traffic to Zambia and Zaire is, in fact, powered by RSA locomotives under a special arrangement the details of which remain confidential. It is possible that there may also be some short-term shortages of rolling stock.

Zambian traffic over Victoria Falls is presently limited to about 30,000 metric tons a month. Slow turn-around times inside Zambia have resulted in a slowdown of the number of rail wagons that RR sends over the bridge each day. Capacity over the route could be increased almost 100 percent with the implementation of 24 hour service. Capacity for Zambian traffic, assuming the utilization of at least one other main route, would not seem to be significantly restricted by technical considerations. The capacity of port facilities in Mozambique, however, may be a constraint on increased traffic for Zambia over this route. (See discussions in Section IV and Section V.)

F. South African Railways (SAR)

South African Railways is operated by South African Railways and Harbours (SARH) in conjunction with South African Airways, various harbors in the RSA, pipelines, and a road vehicle fleet. The rail system contains some 22,600 kilometers of single track, a fleet of about 4,680 locomotives and 184,000 wagons. No direct contact was made in conjunction with this survey with officials of SAR nor was there any observation of SAR facilities or equipment. By virtue of the very scale of SAR operations, however, it is obvious that SAR will have no problems absorbing the additional Zambian demand on its routes generated by the reopening of the border with Zimbabwe. Although SAR does not represent a physical constraint upon Zambian traffic, political considerations could result in closure of this route or limitations on Zambian traffic to ports in the RSA.

G. The Benguela Railway

After the closure of the border with Southern Rhodesia, Zambia shifted its import/export traffic to the port of Lobito to which it was connected by the Benguela Railway and the Societe National des Chemin de Fer Zairois (SNCZ). In 1975, however, guerrilla activities forced the closure of international traffic over the Benguela, and Zambian traffic was shifted to Dar es Salaam once TAZARA opened to traffic. Major efforts were undertaken in 1979 to finance reopening of the railway. Little progress has been made in this regard, and security considerations continue to be a problem along the line. It is unlikely that this route will be operational for another 18 months or more. It is difficult, moreover, to calculate capacity over this route even if and when it does reopen to international traffic. Preparation of this report did not include travel to Angola, but certain comments on the state of the Benguela can be made on the basis of preliminary reports which have been made in conjunction with efforts to reopen the line.

Considerable investment will have to be made to reestablish operation over this route. About 80 percent of the rail is 30 kilogram weight and will have to be replaced. Extensive replacement is also necessary for sleepers, and the availability of wooden sleepers in-country is uncertain. Almost 80 percent of the locomotives are steam and half of these are over 20 years old (some are almost 60 years old). The exact size of the remaining fleet of rail wagons is unknown, but it is certain that they are in poor repair.

Rehabilitation will cost at least 45 to 50 million European Unites of Account, 1979 prices. The equipment, management, condition of rail line, and maintenance program of SNCZ will also have to be assessed further if the route to Lobito is to be reopened.

II. ZAMBIAN ROAD HAULAGE

Road haulage theoretically is a very appealing transport mode. The size of a truck fleet can respond relatively rapidly to increases in demand either through the use of subcontracts or the order of additional vehicles. As long as weight restrictions are maintained, moreover, road networks can sustain heavy traffic levels. The use of truck haulage to move freight is limited, however, by several considerations:

- The cost of road haulage exceeds that of rail transport.
- Road haulage demands supply of petrol usually purchased with scarce foreign exchange from overseas, whereas trains can run on local supplies of coal or electricity or operate with less fuel oil consumption.
- Operation of road haulage requires extensive maintenance and repair capacity.
- Coordination of efficient road haulage operations requires a full range of managerial skills.

After independence in 1964 the GRZ established the National Transport Corporation (NTC)--which later was placed under ZIMCO-- to oversee the road haulage industry. Operation was further broken down according to the type of service and destination of the cargo. The Zambia-Tanzania Road Service (ZTRS) was given a monopoly over freight service between Zambia and Dar es Salaam. ZTRS has, however, employed subcontractors to augment their fleet. Most of these subcontractors are non-Zambian firms, the majority being Tanzanian, Kenya or Somali in origin. Contract Haulage (CH) was given operation of international service for Botswana, Malawi and Mozambique--and now Zimbabwe as well. CH has been assisted in this task by two private firms, Biddulphs and Cargo Lines.

A. Zambia-Tanzania Road Services Limited

During recent years ZTRS has suffered from very low vehicle availability rates, reaching as low as 40 percent at times during 1978 and 1979. The causes of this have been:

- inadequate maintenance;

- a shortage of spare parts;
- the age of the fleet.

The deterioration and age of the fleet by the end of 1978 reflected the expectation that traffic via the TANZAM Highway would decline as a result of the opening of TAZARA, and only one new truck was added to the fleet between mid-1976 and December 1978. Increased demand as a result of events in 1978 resulted in the decision to write off half the fleet and replace them with new vehicles. Present plans are for maintaining the total ZTRS fleet at about 500 vehicles with an availability rate of 75 percent. (See Table 8, Zambia: ZTRS Vehicle Replacement Program.)

ZTRS projects have average monthly capacity for imports of about 18,000 metric tons and for exports of 20,000 metric tons. This figure assumes an availability rate of 75 percent but could be increased by the use of additional subcontractors. (See Table 9, Zambia: ZTRS Cargo and Projected Revenue for the Years 1977/78 to 1983/84.) According to the Office of Contingency Planning, monthly capacity in 1978 was as high as 15,700 metric tons but averaged at only about 11,600 metric tons.

Table 8 - Zambia: Z.T.R.S. Vehicle Replacement Program.

(a) Trucks

	1978/9	1979/80	1980/1	1981/2	1982/3	1983/4	TOTAL
Present	475	475	500	500	500	500	N/A
Additions	236	98	75	125	40	118	692
Total	714	573	575	625	540	618	N/A
Write Offs	239	73	75	125	40	118	670
Balance:	475	500	500	500	500	500	N/A

(b) Cost of Additional Trucks

Year	Truck Replacements	Cost (K. Million)
1978/9 *	236 x K42,000	9.91
1979/80 **	98 x K42,000	4.11
1980/81 ***	75 x K45,000	3.38
1981/82	125 x K49,000	6.12
1982/83	40 x K52,000	2.08
1983/84	118 x K54,000	6.37
Sub-Total		31.87
Contingency		3.17
Totals	692	35.04

* 200 already in operation

** 134 undergoing body-building; will be ready for operation by March/April, 1980

*** 100 on order with Fiat, Italy

Table 8 . (Continued)

(c) Trailers

Year	Trailer Replacements	Cost
1978/79	30 x K20,000	K1,600,000
1979/80	20 x K20,000	K 400,000
1980/81	20 x K22,000	K 440,000
1981/82	30 x K22,000	K 660,000
1982/83	10 x K22,000	K 220,000
1983/84	20 x K22,000	K 440,000
Sub-Total		K3,760,000
Contingencies		K. 376,000
Totals	180 *	K4,136,000

(d) Workshops

(i) Improvements to Existing Workshops (K'000s)

Location	1978/79	1979/80	1980/81	1981/82	1982/83	1983/84	TOTAL
Kitwe	K50,000	K50,000	K50,000	K50,000	K50,000	K50,000	K300,000
Dar-es-Salaam	50,000	K50,000	K50,000	K50,000	K50,000	K50,000	430,000

(ii) New Workshops

-	N	I	L	-
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* More than 100 trailers have been rehabilitated from old fleet; 80 were purchased

Table 9 . Zambia: Z.T.R.S. Cargo and Projected Revenue

for the Year 1977/78 to 1982/83

1. <u>Effective Fleet Availability:</u>	1977/78	1978/79	1979/80	1980/1	1981/82	1982/83	1983/84
(a) Total Available	475	500	500	500	500	500	500
(b) <u>Actual Running Fleet</u>							
Z.T.R.S. (Inc. leased)	250	410	370	375	375	375	375
Sub-Contractors	200	120	130	130	130	130	130
2. <u>Expected Cargo (Tonnes)</u>							
Exports - Copper	240,000	240,000	240,000	240,000	240,000	240,000	240,000
Imports - General	216,000	216,000	216,000	216,000	216,000	216,000	216,000
3. <u>Single Truck-Trips</u>							
Z.T.R.S. Ltd	3,940	7,498	6,500	6,750	6,750	6,750	6,750
SUB - CONTRACTORS	3,172	2,160	3,240	3,240	3,240	3,240	3,240
4. <u>Cargo Disposals (Tonnes)</u>							
Z.T.R.S. Ltd - Export	115,402	202,176	190,792	102,250	102,250	102,250	102,250
Z.T.R.S. Ltd - Imports	89,821	187,200	167,400	168,750	168,750	168,750	168,750
Sub-Contractors - Export	76,114	58,320	87,480	87,480	87,480	87,480	87,480
Sub-Contractors - Imports	64,393	54,000	81,000	81,000	81,000	81,000	81,000

B. Contract Haulage

Contract Haulage is organized in three divisions, the Southern Division, the Northern Division, and the Eastern Division. The latter is mainly responsible for international service and operates 170 trucks or about 42 percent of the total fleet of about 400 trucks. Vehicle availability for international service operated by CH during the late 1970's was about 60 percent of the approximate 220 trucks in service. The total for international service includes about 50 vehicles operated by Biddulphs and Cargo lines (34 and 15 respectively in the late 1970's).

Operation has been limited by a scarcity of spare parts and low maintenance standards. The situation has been complicated by the mix of vehicle types in operation. Efforts are underway to consolidate the types of vehicles used, but the shift to Volvo and Mercedes vehicles will require increased technical sophistication.

Total capacity by CH during the late 1970's was about 59,000 metric tons of exports and 43,000 metric tons of imports. CH has an operating target of twice these figures.

SECTION III - MAJOR ROAD ROUTES PROVIDING COASTAL ACCESS

As assessment of major rail links providing coastal access for Zambia has been included under the discussion of rail transport in Section II, but discussion of road routes has been broken out separately in this section. Additional information relative to road routes is also contained in Annex II, Bridge Status Reports, and in Annex IV, Zambia/Mozambique Route Options.

Heavy rains during the late 1970's, especially 1977/78, resulted in spot or full road bed damage to 40 to 60 percent of the roads in Zambia. Damage was heavy on the Lusaka/Livingstone Road and to a lesser degree to the route providing access to Kasama. More serious problems relate to secondary roads, the maintenance of which falls to provincial authorities and which do not directly relate to international traffic and coastal links. The only section of primary road relevant to coastal linkage which has not been completely restored is the small section of road between Mazabuka and Lusaka. The condition of the route, however, seemed adequate to handle current demands for traffic.

I. GENERAL OVERVIEW

By the late 1970's Zambia had a road network of about 19,000 kilometers of designated roads of which about 3,100 or 16 percent were classed as international main roads (Class T). Of the Class T roads, about 2,700 kilometers or 87 percent were bituminous roads, about 215 kilometers or 7 percent were gravel II or III roads, and about 175 kilometers or 5 percent were earth. Most Class T roads have a road surface of 6.7 meters or more. (See Table 10, Zambia: Road Widths, Gradients, Design Speeds and Capacity of Zambia's Bituminous Roads.)

Road maintenance has been a recurring problem. This has in part been the result of budget problems. From 1972 to 1976, for example, of the amount estimated by the Roads Department as needed for road maintenance, only about 51 percent was approved and only about 94 percent of the approved amount was actually expended. Perhaps even more significant than the budget problem--although certainly related to it--is the fact that the Roads Department suffers from a shortage of technically skilled personnel and the inability of the Mechanical Services Branch to maintain the vehicles needed by the Roads Department for road maintenance. During the late 1970's the availability rate for equipment of certain

Table 10. Zambia: Road Widths, Gradients, Design Speeds and Capacity on Zambia's Bituminous Roads

	<u>Bituminous Road Standard</u>		
	<u>A</u>	<u>B</u>	<u>C</u>
Road width (meters)	7.30	6.70	6.10
Shoulder widths (meters)	3	2-3	2
Flat topography: design speed (km/hr)	100	100	100
grade limit (%)	4	5	6
Rolling: design speed (km/hr)	100	80-100	80
grade limit (%)	6	6	7
Mountainous: design speed (km/hr)	80	60-80	60
grade limit (%)	7	8	8
Average daily traffic range (ADT)	1500 to 5000	500 to 1500	Up to 500

Source: Roads Department

types was less than 40 percent and the life expectancy was 12 to 16 months. A road maintenance program is underway under an IBRD project. Small scale equipment maintenance programs are being provided directly by such equipment suppliers as Volvo and Champion under grants by SIDA and CIDA.

II. ROAD ROUTES

A. The Great North Road

The Great North Road, alternately the TANZAM Highway, is Zambia's major cross-country route connecting the southern border with Zimbabwe and the northeastern border with Tanzania. The road runs about 473 kilometers to Lusaka from Livingstone and then 1,886 kilometers from Lusaka to Dar es Salaam. The section of the road within Zambia was built during 1968/1969. The link from Tundoma to Dar es Salaam was finished between 1971/1974. After the completion of this section, the road became known as the TANZAM Highway (the combined road and rail route is frequently referred to as the TANZAM Corridor). The entire route is paved.

Although the portion of the road within Zambia was relatively well constructed and intended for heavy truck traffic, there are serious problems relating to design and construction on the Tanzanian side. The Zambian portion of the route does need spot repairs, but it is estimated that 85 percent of the Tanzanian portion is life expired and needs at least an overlay. The cost of this project would be about US\$45 million, 1979 prices.

Deterioration of the Tanzanian portion has certainly been accelerated as a result of vehicle overloading. Tanzania has increased load restriction, cutting the tons permitted per axle from 10 tons to 8 tons per axle. A maximum weight of 35 gross tons has also been instituted. The rate in Zambia remains at 10 tons. Although these new regulations reduce capacity per truck to about 25 to 30 metric tons, regulation is not well enforced.

B. The Kasungula Crossing

With the closure of the border with Southern Rhodesia after UDI, the Kasungula Crossing became the only link between Zambia and Botswana. Imports and exports were filtered over this route from the RSA via two pontoon ferries. The traffic over this route represented about

about 400 to 500 metric tons of imports and 20 metric tons of exports a month. In early 1979 one of the ferries sank, and Rhodesian security forces blew the other ferry out of the water. Service was not restored over this route until February 1980. The route is also limited by the need to complete paving the road on the Botswana side of the crossing. Assuming the establishment of a stable government in Zimbabwe, the importance of this route will diminish.

C. The Great East Road

The Great East Road runs for about 635 kilometers from Lusaka to the border with Malawi. This route opened in 1966/1967 and was relatively well constructed. The road has not had proper maintenance, however, and surface deterioration--especially in regard to the edges along the shoulders--is in process. Traffic over this route initially was keyed to Chipata and the border at Mchinji, but with the opening of the paved section from Mchinji to Lilongwe greater international traffic is expected. In 1979 this route carried 2,500 metric tons of imports and about 1,250 metric tons of exports a month.

D. The Katete/Cassacatiza/Moatize Road

Branching off from the Great East Road at Katete is a gravel surfaced road running to the border at Cassacatiza and linking with the railhead at Moatize. Transshipment at Moatize from truck to rail provides access to the port at Beira. The present road is a dry weather road only and both curvature and grade problems exist. The GRZ has been committed for several years to paving this route, but funding has been a recurrent problem.

The total cost of bringing this road to paved standard is estimated at almost US\$11.25 million. About US\$2.5 million is for the construction of three bridges and four box culverts. The Roads Department had hoped to have all the bridge and culvert work completed by November of 1979 but did not make the deadline before the fall rains. Completion of this work was rescheduled for November 1980. Priority has been given to repairing the bridges damaged by Rhodesian security forces, however, and the date may again be delayed. No estimate has been made of when funds will be available to pave the road itself, and improvements to the road surface have been limited to grading and gravel filling of washed spots.

The potential offered by this route for import and export traffic across the border and to the coast has been recognized by both Zambia and Mozambique. Although only about 20,000 metric tons of imports were carried over this route in 1979--mainly reflective of its status as a dry weather road--import traffic in January and September were about 10,500 and 5,380 tons respectively. The completion of the proposed paving could bring monthly capacity to the January level. Both countries are interested in opening this route.

Traffic over the route during late 1978 and 1979 was restricted by security considerations as well as by rain. It is reported that one of Contract Haulage's trucks was destroyed by guerrillas in the area below the border at Cassacatiza. In late 1979 anti-frelimo guerrillas also blew up a bridge on the rail line below Moatize. This has since been repaired and the route was reopened in late February.

The road south from Cassacatize has reportedly been paved by the government of Mozambique, but portions of this road are believed to be in need of additional upgrading. The route was only opened as a dry weather road in 1975, and the strength of bridges and culverts on the route was inadequate at that time to handle the weights of trucks which have been using the road. It is presumed that some structures may have been improved, but additional information is needed. Storage facilities at Moatize are available, but information about their capacity has not been obtained.

SECTION IV - Assessment of Port Facilities Servicing Zambian Import/Export Traffic

The following section includes both statistics and capability analysis of port facilities along the eastern and southern coast of Africa relevant to Zambian transport needs. Field trips were made to Dar es Salaam, Beira and Nacala, and additional comments and observations of these ports are included in Annex III and Annex IV of this report. The reader is also referred to in the summary in Section VII of this report. Brief discussions of facilities at Nacala and East London based on secondary sources, are also included in this section.

I. Dar es Salaam

The port of Dar es Salaam is situated in a natural cove, access to which is reached via a channel over three kilometers along with a minimum depth of 7.6 meters below chart datum. The administration and operation of the port is the responsibility of the Tanzania Harbours Authority (THA) which also owns the port. THA has been formed from the East Africa Harbours Corporation and the East African Cargo Handling Services. The formation of the new harbor authority has been a time consuming process which has diverted attention from port operation and performance.

The port is served by an approximately 1,730 meter long main wharf along the west shore of the harbor with eleven deep-water berths eight anchorage points for lighter unloading of large vessels, and a lighterage wharf separate from the deep-water berths. All of the deep-water berths were designed for general cargo operations, however, berth 9 has an open platform and is used for container cargo. The only warehouse facilities close to the port are the actual transit sheds on the quays. In all there are ten sheds along the main quay. These are distributed as shown in Table 11. Dar es Salaam: Covered Warehouses, Main Wharf and provide about 56,000 metric tons of storage. At the lighterage quay there are two old sheds and a recently constructed shed with a combined capacity of at least 2,000 metric tons. Open storage areas around the port have a capacity of at least 57,000 metric tons. There is also a copper depot at Gerezoni. Rail service is available along the quay for both the Tanzania Railway Corporation (TRC) and the TAZARA Railway. Service for the two lines, each of which has a different gauge, is split between the berths and overlaps marginally only at the middle berths. This greatly complicates off-loading since almost all vessels have cargoes with mixed Zambian/Tanzanian destinations. The port is also restricted by topographical features.

TABLE 11. Dar es Salaam: Covered
Wharehouses, Main Wharf

<u>Berth No.</u>	<u>First line Wharf-side</u>	<u>Second Row Back-side</u>
1	2 story	
2	↑ ↓	2 adjoining single story
3		
4		
5	1 single story	
6	1 single story	
7	↑ ↓	↑ ↓ 1 single story
8		
9	open, no shed	
10	↑ ↓	↑ ↓ 1 single story
11		

The port has a major problem with mechanical handling equipment, especially forklifts. The availability rate is low reflecting the age of much of the equipment, the scarcity of spare parts, and inadequate maintenance. (See Table 12. Tanzanian: Status of Port Equipment, Dar es Salaam, February 29, 1980.) Preference is given to cargo that is palletized or in containers but the discharge rate is low. This reflects low productivity by stevedore gangs. Last year the discharge rate was reported at 500-600 metric tons per gang/ship a day. By 1980 the official figure had dropped to 450-500 metric tons and some sources believe it is even lower.

Accurate information on port capacity is difficult to obtain. During the late 1970s the port handled about 2.2 million metric tons annually. Of this amount, about 60 percent represented imports. Zambian traffic ranged from 50 to 60 percent of total traffic through the port. Approximately 75 percent of all exports were composed of such metals as copper, lead, and zinc. Imports of bulk and bagged grains have represented 15 to 30 percent of total imports.

There are major variations in waiting time from month to month and sometimes from week to week. For example, the average waiting time for 1979 was 3.6 days. In mid-February 1980, waiting time was 17 days. By the end of the month, there were five ships waiting (12 were at berth and 2 were at anchor) and the waiting time for early March was projected at six days. Monthly variations are largely the result of seasonal fluctua-

Table 12, Tanzania: Status of Port Equipment
Dar es Salaam, February 29, 1980

A. Fork Lifts

Total of 150 of which 90 to 100 available on daily basis.
AR = 60-65%
60 ordered from Japan and expect another 61, probably
from the UK, within 4 to 5 months. 186 of old units
completely written off.

B. Tractors

Total of 90 of which 28 work AR = 31%

C. Vac-u-vators

5 with 100% AR

D. Grabs

10 with basically 100% AR

E. Payloaders

2 with 100% AR

F. Sideloader

1 with 50% AR

G. Trailers

159 of which only 80 or about 50% are working. Main
problems are tires, suspension system and damaged
hitches/tongues.

H. Prime Movers

9 of which only 2 are working. AR = 22%

I. Mobile Cranes

49 of which only 21 are working. AR= 43%

J. Portal Cranes

57 of which 47 are working but of which 34 are still
portable.
AR = 82% working
AR = 59% working/portable

K. Lighter Towing Tugs

6 of which 3 are working. Other 3 are in repair, but age of tugs is 16 to 17 years so it is unlikely that availability will improve.
AR = 50%

L. Motor Boats

10 of which 5 working. Other 5 in workshop but age of boats is 16 to 17 years so it is unlikely that availability will improve.
AR = 50%

M. Berthing Tugs

5 of which only 2 are in commission.
AR = 40%

N. Floating Crane

1 with frequent breakdowns. It was out for 3 years but has been reconditioned. Originally it had a capacity of 60 tons but now 45 tons is the maximum it can handle. Cannot rely on this crane being operational. Expectations for a new crane are uncertain.

O. Lighters

59 (3 taken to Tonga)
There are only 14 in service with covers. The others have had problems with warpage of the frames supposed to support the covers and need to be bailed out when it rains.

P. Pontoons

6, AR = 100%

tions in demand. Although precise figures were not readily available, the seasonal pattern has two lows and two highs. Operation in the spring is slowed by rains as well but there is a sharp fiscal year-end pick up in orders in June. (See Figure . Dar es Salaam: Port Waiting Time Idealized as a Function of Seasonal Demand.) The secondary source of variations in waiting time is a mix of the availability of equipment, especially forklifts, and cargo type.

In summation, the major problems restructuring port operation include:

- Deficiencies in the physical plan of the port, including inadequate warehouses, stacking areas, rail access, room for traffic flow, and limited channel depth
- Inadequate supply and/or availability of mechanical handling equipment;
- Declining labor productivity;
- Build-up of cargo in port.

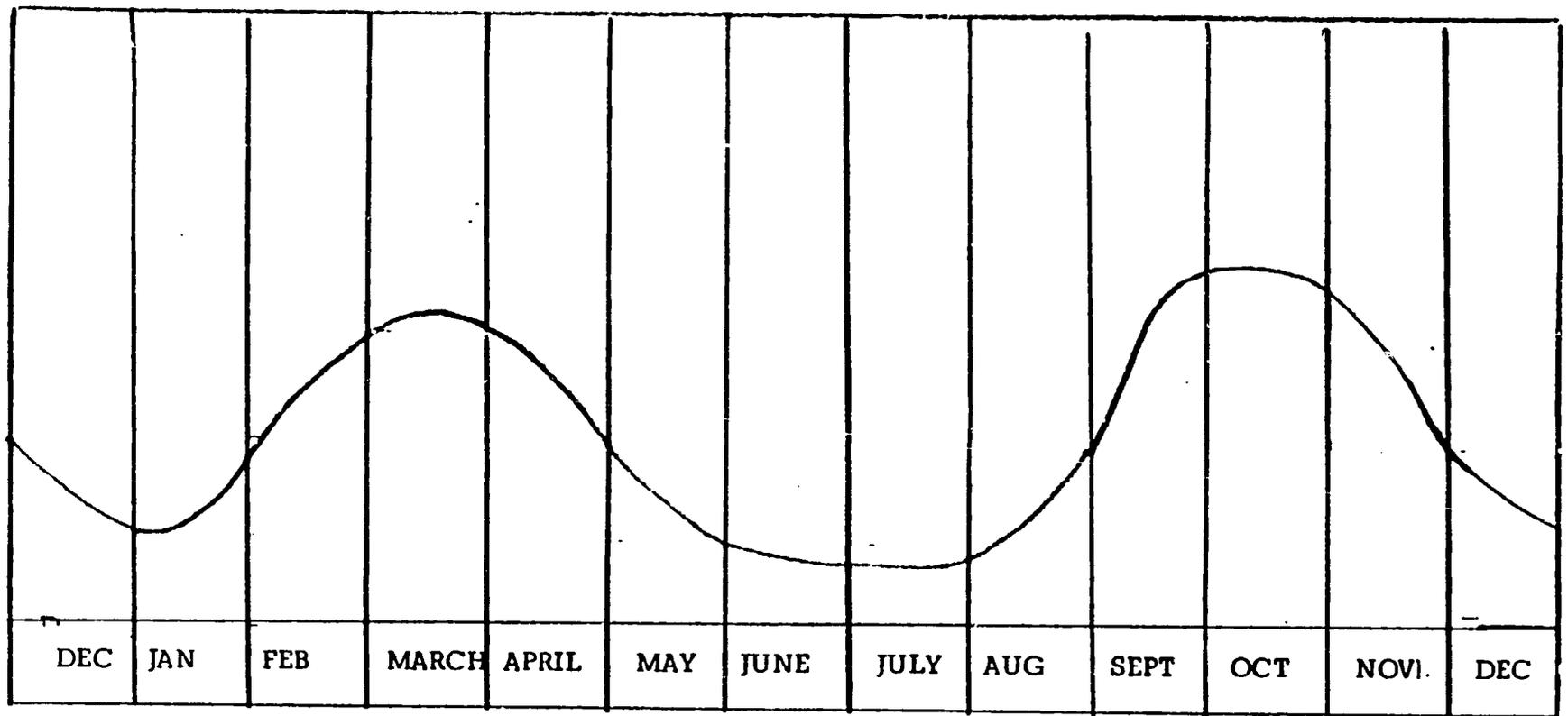
A project sponsored by the IBRD is starting up which will greatly assist the physical problems at the port. UNCTAD is administering a cargo documentation project which should help keep the port clear. Human productivity factors will be the most difficult to remedy, and will remain a restraint on maximal port operation.

II. Nacala

Nacala, the most northern of the three major ports of Mozambique, is basically a container-oriented port. Utilization of the port is somewhat restricted by rail service, but, with an increase in traffic for Zimbabwe passing over the route to Beira, it is expected that more and more of the traffic for Malawi will pass via Nacala.

Port facilities consist of four general cargo berths along the North Wharf and two container berths along the South Wharf. The two wharfs adjoin one another, but run at different angles to the shore. The South Wharf is served by rail. An extension to the North Wharf provides a 55 meter long berth for small craft and lighters; it is sometimes used for storage.

FIGURE 1 . Dar es Salaam: Port Waiting Time Idealized as a Function of Seasonal Demand .



There is both open and covered storage. There are eight warehouses, of which four are for transit storage. The others are for tobacco, tea, long standing cargo, and bagged cement. The last two were still under construction in 1979 but are believed to have been completed. The total storage provided by these warehouses is about 20,250 square meters. In addition to the covered storage there is about 68,800 square meters of stacking area behind the two wharfs. An additional 33,000 square meters is also available at but a short distance behind the South Wharf. None of the stacking areas are paved.

The port is serviced by a berthing tug and a smaller lighter tug which can also assist in berthing ships. There is one barge with a capacity of 400 metric tons and seven lighters each of which has a capacity of 100 metric tons. The North Wharf has about 20 portal cranes the capacity of which varies from 5 to 20 metric tons. Four 5-ton cranes and one 20-ton crane have been erected recently on the South Wharf. One of the 20-ton cranes was not operational in early 1980, but it was uncertain how long it would be out of service. There are also about 20 forklifts with 3-ton capacity and two with 20-ton capacity, as well as 16 mobile cranes of 2 to 7 ton capacity, 1 pay loader, and 3 rail wagon shunters.

Although the port is not congested at present, this is in part a reflection of the low level of present traffic. Several problems constrain increased traffic. Included are the need for:

- more modern methods of general cargo handling, reducing reliance on rail wagons and shunting operations and increasing the use of forklifts;
- a large, mobile ganting crane and surfaced shorting area for containers;
- increased rail capacity;
- improved documentation procedures;
- improved management and staffing.

Information about port capacity is incomplete. Traffic in 1974 was just over 800,000 metric tons, but during the late 1970s traffic averaged at only about 600,000 metric tons of combined import/export cargo. Under optimal conditions, this figure might be increased by 40 to 85 percent. This would require modifications in port management and operation as well

as increased rail service as mentioned above. Additional development of the port facilities themselves are included in a long-term development plan, but implementation of this plan is keyed to increased transit traffic. There are no space limitations on such development but there would have to be certain guarantees of use levels in order to justify the allocation of major resources to port development.

III. Beira

Beira is a tidal port located on the east bank of the Pungue River. Access to the port is via a 20 kilometer channel which requires a two hour pilotage. Vessels with a draft of more than 5.5 meters are restricted by tidal levels. Port administration and operation is under the Empresa CFM (Centro) in turn responsible to the DNPCF.

The port has ten berths running along the main quay for a distance of about 1,680 meters. Berth 1, however, is being used for fishing vessels, until the Chieve Basin where they usually dock is undeveloped. There are seven transit sheds along the berths, 4 adjacent sheds, and 10 warehouses in the port providing total covered storage of about 55,000 square meters. (See Table 13. Mozambique's Port Facilities, Beira, 1979/1980.) The opening shacking area represents about 310,300 square meters, but only a portion of this is paved. Berth 10 has bulk oil connection for the pipeline to Umbolic.

Mechanical handling equipment includes about 50 electric portal berth cranes, and about 50 forklift trucks. The availability rate for the cranes is about 70 to 80 percent, but is only about 50 percent for the forklift. There are also three berthing tugs and a pilot tug. There are no lighters for cargo or tugs for towing lighters.

In general port operations seem to have improved in recent months. There has been some congestion but, considering the outage of the rail line to Moatize, the back-up has not been bad. Much of this is cargo for Malawi (70,000 metric tons) a major portion of which consists of vehicles. Warehouses are being given birth maintenance and stacking and handling operations seem to have improved. The handling rates for bagging cargo is about 15 metric tons per gang hours. Bulk grain reportedly takes no longer but must be loaded into tubs in the hold by men with shovels and then the tubs are hoisted and tipped into rail wagons on the berth. Bagging times were not available. Palletized cargo is discharged at about

TABLE 13. MOZAMBIQUE PORT FACILITIES, BEIRA, 1979/80

PUNGUE WHARF INFORMATION

No.	MAXIMUM DEPTH IN FEET	LENGTH IN FEET	CRANES (ELECTRIC)	AREA OF	USE
1.	28	580	2 of 6 tons 4 of 3 tons	-	fishing
2.	29	530	2 of 6 tons 4 of 3 tons	1,560	general cargo
3.	29	530	3 of 6 tons 3 of 3 tons	1,800	general cargo
4.	30	530	2 of 6 tons 3 of 3 tons	1,800	general cargo
5.	30	530	2 of 3.5 tons 1 of 5 tons 1 of 3 tons	1,800	general cargo
6.	32	540	1 of 10 tons 5 of 5 tons	(6,440)	Meat and Fruit College, G.C.
7.	32	540	1 of 10 tons 5 of 5 tons	3,300	general cargo
8.	30	630	-	-	bulk ore, molasses, edible and G.C.
9.	30	550	1 of 10 tons 5 of 5 tons	2,500	G.C.
10.	31	550	1 of 20 tons 5 of 5 tons	2,500	G.C. and bulk oil

10 tons per gang hour, and break bulk cargo is handled at 5 tons per gang hour. Much of the cargo for Malawi is so it must be stuffed and unstuffed in port.

Recent statistics on port capacity are not readily available. Capacity in 1979 is estimated at about 1.7 million metric tons, exports and imports combined. This compares to the peak capacity to date of about 4 million metric tons in 1965 and about 3 million metric tons in 1973. Various factors have contributed to the decline in capacity. Included are:

- Silting: The port needs a major dredging project estimated at about US\$ 2 million. One of the dredges was blown up by guerrillas. A substitute has been brought. Even when dredged, the port will only accommodate 20,000 ton at high tide. It may also be necessary to relocate the channel.
- Loss of skilled and experienced staff since independence in 1976.
- Physical design of the port including:
 - narrow berth aprons at berth 2 through 5 and design and scale problems of the sheds associated with these berths
 - reliance on rail movement of cargo in port
 - inadequate road system in port
- need for better container handling equipment
- limited handling equipment and low availability rates for what equipment is on hand.
- maintenance/operation of all equipment is inferior
- scarcity of spare parts.

Improvements in dredging and handling could resolve capacity of the port to almost the 4 million peak in 1975. Increased production of Moatize coal and increased traffic for Zimbabwe would be expected to absorb most of any such increase in capacity.

IV. Maputo

Maputo is the most southern of the three major ports of Mozambique and is administered under the southern system of the DNPCF. The port is serviced by three Channels: the Matola Channel, the Polana Channel, and the Xefina Channel. The main wharf has berthage for about seven vessels and a total of about 23 warehouses or covered sheds. The oil jetty and bulk ore discharge are handled at the Matola Wharf. There are about 85 stationary cranes and several mobile cranes with capacities ranging from three to twenty tons. There are about fifty fork-lift trucks, but on an average only 15 of these are operational (Another 15 are expected.) A major problem arises from a shortage of shunting equipment. Containers are being handled at a special berth used primarily for Ro-Ro vessels.

The importance of this port for Zambian traffic is marginal. At present, with the closure of the Limpopo Route -- the opening of which should take at least 9 to 12 months --, all traffic for Zambia has to be routed through the RSA. Port capacity at present is about 9 million metric tons, imports and exports combined. Although it is hoped to increase this figure to about 16 million metric tons when the Limpopo route opens, such an increase would probably only meet the needs of the RSA and Zimbabwe and leave little or no allocation for Zambia via this port.

V. East London

The harbor at East London, the primary harbor allocated by the RSA for Zambian traffic, consists of parallel wharf facilities located along the east and west bank of the Buffalo River. The mouth of the river is sheltered from the Indian Ocean by the East and South Breakwaters. Maximum draft at the harbor entrance is about 10.6 meters. The wharfs consist of both general cargo quays, most of which are located along the east bank, and specialized wharfs including an oil tanker berth (see Table 14. East London Harbor Facilities, 1978/79). The port has a repair yard with a 198.5 meter docking length, precooling storage for fruit equivalent to about 1,700 cubic meters, and grain storage silos which have a storage capacity of 80,000 tons and a dispensing rate of 1,633 tons per hour through 4 elevator spouts. In the late 1970s the port had an average annual capacity of about 3.5 million metric tons.

In the late 1978, the port had cargo sheds with a total floor space of about 12,000 square meters or stacked storage of about

41,400 cubic meters. There were 42 wharf cranes and two mobile cranes; there were over 60 forklifts and two sideloaders. The port also had one 170-ton capacity lighter, two heavy duty tugs equipped to fight fires, and two pilot tugs.

Table 14. East London Harbor
Facilities, 1978/1979

Berths

General Cargo	8
Grain Elevator	1
storage capacity	75,000 metric tons
(10 spouts available but only 4 operate at the same time)	
Ro-Ro	under construction

Equipment

Wharf Cranes	42
(capacities from 3 to 20 tons)	
Mobile Cranes	1
(capacity, 75 tons)	
Tank Lifts	64
Side Loaders	2
<u>Maximum Draft</u>	
at Entrance	10.67 meters
for Tankers	9.9 meters

Sources: 1. Port Information, John T. Rennie and Sons.
2. South African Harbours and Railings Administration.

SECTION V - PROJECTED ZAMBIAN MAIZE SUPPLY

I. SUMMARY

Current data indicates that for 1980 the crucial transport time-frame will be May/June. Assuming an average monthly consumption rate of about 54,000 metric tons, in-country stock as of February would last until mid-April. Maize imports for which firm commitments exist would extend domestic supply until almost May. Imports from the RSA and USA will be necessary in order to fill the deficit until the domestic crop is in and to rebuild domestic reserves. The specific tonnages of shipments from the RSA and USA are under negotiation. These imports could cover the deficit but their arrival and distribution in-country will require highly efficient and coordinated transport operations and will be dependent upon access over the southern route through Southern Rhodesia (Zimbabwe).

II. CALCULATION BASE USED FOR PROJECTIONS

A. Rate of Consumption

Calculation of how long the in-country domestic supply of maize and projected imports will last varies with the rate of monthly consumption used. NAMBOARD and Contingency Planning (CP) are using average monthly consumption of 54,000 metric tons. This is based on projected annual consumption for 1980 of about 7.2 million bags or 648,000 metric tons of maize (648,000 divided by 12 = 54,000).

The use of 54,000 metric tons for average monthly consumption is relatively reflective of actual needs. Assessment of this figure is complicated by abnormal consumption in 1979 and inadequate statistics for 1978. Projections from 1977 are shown in Table 15, Zambia: Monthly Maize Consumption for 1980, Projected from 1977.

Total consumption in 1977 was 5,918,728 bags or about 532,686 metric tons, indicating an increase in projected consumption for 1980 of 21.6 percent over 1977. This represents an annual increase of just under 7 percent. Average monthly consumption in 1977 was 44,391 metric tons. Actual monthly consumption varies from 39,929 to 51,198 metric tons. Using the percentage of total consumption represented by actual monthly consumption in

1977, one can project variations in monthly maize consumption for 1980 which range from about 48,600 to almost 59,000 metric tons, depending on the method of rounding used.

Using these figures the projected consumption for February through June 1980 would indicate the need for at least an additional 6,000 tons of maize than indicated by the average monthly consumption rate of 54,000 metric tons. This represents a variation of only about 3.3 days' supply. For the purpose of the projections in this analysis, therefore, an average monthly consumption rate of 54,000 is used.

B. Date of Harvest

For the purpose of analysis a domestic harvest date of July 1 is used. Actually the transfer from reserves to maize from the new harvest is phased with some maize available as early as mid-June. The use of drying techniques could increase early harvest tonnage, but this approach is not being actively encouraged. The interface period here is assumed to occur during July as a safety margin. This generally conforms with the date being used by Contingency Planning.

TABLE 15. Monthly Consumption Projections 1977, 1979 by Month:

<u>Month</u>	<u>1977 Maize Consumption</u>			<u>Projected Monthly needs 1980 by Metric Ton (rounded to nearest .1)</u>		
	By Bags	% of Total	(rounded)			
January	470,043	.07941	.079	=	51,457.7	51,192
February	568,753	.09609	.096	=	62,266.3	62,208
March	536,523	.09064	.09	=	58,734.7	58,320
April	527,338	.08909	.089	=	57,730.3	57,672
May	443,659	.07495	.075	=	48,567.6	48,600
June	448,850	.07583	.076	=	49,137.8	49,248
July	447,035	.07552	.076	=	48,937.0	49,248
August	445,039	.07519	.075	=	48,723.1	48,660
September	486,111	.08213	.082	=	53,220.2	53,136
October	497,211	.08400	.084	=	54,432.0	54,432
November	538,095	.09091	.091	=	58,909.7	58,968
December	<u>510,071</u>	<u>.08617</u>	<u>.086</u>	=	<u>55,838.2</u>	<u>55,728</u>
	5,918,728	.99993	.999		647,954.6	647,352
			(lost in rounding)		<u>45.4</u>	<u>648</u>
					648,000.0	648,000
		Average Feb.-June Consumption			55,287.34	55,209.6
					<u>54,000.0</u>	<u>54,000.0</u>
		Difference over Projection			1,287.34	7,209.6
					<u>x 5</u>	<u>x 5</u>
		Total Difference			6,436.7	6,048.0

III. PROJECTED DOMESTIC SUPPLY

A. 1980 Harvest Interface

1. Assumption # 1:

On February 8, 1980 NAMBOARD showed total domestic maize stocks of 1,415,897 bags or about 127,430 metric tons. Assuming a monthly consumption rate of 54,000 metric tons, the present supply of maize should last until April 18, 1980. Another 10,000 metric tons remain under a previous agreement with the RSA. This maize is in fact coming into the country now. A portion of this shipment may be included on the February 8 calculation of domestic supply, but for the purpose of this analysis receipt of an additional 10,000 metric tons is used, carrying domestic supply until April 24, 1980. Another 7,000 tons--the actual amount may be as much as 10 percent higher--is expected yet under the triangular agreement with Tanzania, carrying domestic supply to April 27, 1980. Under a new agreement with the RSA sale of another 120,000 metric tons of maize has been arranged. Reportedly, the GRZ has negotiated a letter of credit for 36,000 metric tons, which would carry domestic supply to May 17, 1980. The GRZ is also seeking 114,000 metric tons of maize under PL 480 from the USA. Reportedly, NAMBOARD has been able to get bids on only 39,000 metric tons of bagged maize. Purchase of an additional quantity of bulk maize is under consideration. The shipment of 39,000 metric tons would take internal supply to June 8, 1980. Using July 1 as the date of harvest, there is a gap in demand and supply of 21 days (Assumption #1). Saudi Arabia is considering purchasing 10,000 metric tons of maize from Malawi for shipment to Zambia. This offer would extend the internal supply another 5.5 days. Since the arrangements for this agreement remain to be made, this shipment has not been used in the projections offered here. An additional 10,000 metric tons of maize will also have to be shipped from the USA to complete the 40,000 metric tons under the triangular arrangement. Again, this would extend supply by another 5.5 days.

Reducing the total deficit of maize would be possible within the context of the proposed maize imports from the USA and RSA respectively of 114,000 and 120,000 metric tons. The determination of maize tonnage to be

shipped from these two sources will depend on several factors. Imports from the USA will depend upon the availability of bagged maize versus bulk maize and the availability of ocean transport. Imports from the RSA will be largely determined by the ability of the GRZ to obtain letters of credit for the purchase. Projections of the most likely combinations of agreements for maize imports are shown in Tables to Zambia: Projected Maize Stocks, Assumptions #1 to #6.

2. Assumption # 2:

Assumption #2 varies from Assumption #1 in that maize from the USA is calculated at 82,000 metric tons; this would include another 43,000 metric tons of bulk maize. The internal maize supply would last until July 2, 1980 as a result of receipt of this amount.

3. Assumption # 3:

This is the same as Assumption #1 except that it assumes the receipt of a full 114,000 metric tons under Titles I and II from the USA. The internal maize supply would be taken to July 20, 1980, well into the domestic harvest interface.

4. Assumption # 4:

This is also the same as Assumption #1 except that it projects 120,000 metric tons from the RSA. This assumes that the GRZ is able to obtain additional letters of credit. It would take internal supply to July 25, 1980.

5. Assumption # 5:

Assumption #5 is the same as assumption #4 except that it assumes 82,000 metric tons from the USA. The internal maize supply would be taken to August 18, 1980.

6. Assumption # 6:

This is the same as Assumption #5 except that it assumes 114,000 tons from the USA. This assumes availability of the full amount authorized under Titles I and II and would take the internal maize supply to about September 5, 1980.

TABLE 17 ZAMBIA: PROJECTED MAIZE STOCKS.

ASSUMPTION # 2

FEBRUARY	DOMESTIC STOCK FEB 8 127 430 m tons		
	As per # 1		
MARCH	RSA Previous Agreement, 10,000 tons		
	170.5	As Per # 1	
APRIL	+5.55	Triangular Agreement, 7,000 tons	
	As Per # 1		
	April 18.5	+3.89	RSA New Agreement, 36,000 tons
	April 24.1		
April 27.99			As Per # 1
MAY	+20	USA, 82,000 tons	
		div. by 54 = 1.5185	
		x 30 = 45.56 days	
	May 17.99	May 17.99 + 45.56 =	
		July 2.55	
		May 17.99 - 31 = 13.01	
	June 1 - 30 = 30		
	July 1 - 2.55 = 2.55		
	45.56		
JUNE			
		+45.56	
		July 2.55	
DOMESTIC HARVEST INTERFACE			
JULY			

TABLE 18. ZAMBIA: PROJECTED MAIZE STOCKS.
ASSUMPTION # 3

FEBRUARY	DOMESTIC STOCK, FEB 8 127,430 m tons		
	As Per # 1		
MARCH	+70.5	RSA Previous Agreement, 10,000 tons	
		As Per # 1	
APRIL		+5.55	Triangular Agreement, 7,000 tons
			As Per # 1
	April 18.5		RSA New Agreement, 36,000 tons
	April 24.1	+3.89	
	April 27.99		
			As Per # 1
MAY		+20	USA, 114,000 tons
			div. by 54 = 2.1111
			x 30 = 63.33
			days
		May 17.99	May 17.99-31= 13.01
			June 1-30 = 30
			July 1-20.32= 20.32
			63.33
JUNE			
			+63.33
JULY	DOMESTIC HARVEST INTERFACE		
			July 2.32

TABLE 19 ZAMBIA: PROJECTED MAIZE STOCKS.
ASSUMPTION # 4

	DOMESTIC STOCK, FEB 9 127,430 m tons		
FEBRUARY	As Per # 1		
MARCH	+70.5	RSA Previous Agreement, 10,000 tons As Per # 1	
APRIL	+5.55	Triangular Agreement, 7,000 tons As Per # 1	
	April 18.5	+3.89	RSA New Agreement, 120,000 tons div. by 54 = 2.2222 x 30 = 66.67 days
	April 24.1	April 27.99	
MAY			April 27:99-30 = 2.01 May 1-31 = 31.00 June 1-30 = 30.00 July 1-3.66 = 3.66 66.67
JUNE			USA, 39,000 tons div. by 54 = .7223 x 30 = 21.67 days July 3.65 = 21.67
		+66.67	July 25.32
			July 3.66
JULY	DOMESTIC HARVEST INTERFACE		
			+21.67
			July 25.32

TABLE 20: ZAMBIA: PROJECTED MAIZE STOCKS,
ASSUMPTION # 5

FEBRUARY	DOMESTIC STOCK, FEB 3 127,430 m. tons		
	As Per # 1		
MARCH	+70.5	RSA Previous Agreement, 10,000 tons	
		As Per # 1	
APRIL		+5.55	Triangular Agreement, 7,000 tons
		As Per # 1	
APRIL	April 18.5		
	April 24.1	+3.89	RSA New Agreement, 120,000
	April 27.99		As Per # 4
MAY			
JUNE			USA, 82,000 tons
			div. bv54 = 1.5185
			x30 = 45.56
		+66.67	July 3.66 - 31 = 27.34
			Aug 1-18.22 = 18.22
			45.56
JULY		July 3.66	
	DOMESTIC HARVEST INTERFACE		
			+45.56
			August 18.22

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 TABLE 21: ZAMBIA: PROJECTED MAIZE STOCKS.
 ASSUMPTION # 6

FEBRUARY	DOMESTIC STOCK, FEB 8 127,430 m tons As Per # 1		
MARCH	+70.5	RSA Previous Agreement, 10,000 tons As Per # 1	
APRIL	April 18.5	5.35	Triangular Agreement, 7,000 tons
MAY	April 24.1	+3.89	RSA New Agreement, 120,000
JUNE	April 27.99		As Per # 4
JULY	DOMESTIC HARVEST INTERPOLICE		
AUGUST	July 3.66	+66.67	USA, 114,000 tons div by 54 = 2.1111 x30 = 63.33 July 1-31 = 27.34 August 1-31 = 31.00 Sept. 1-4, 99 = 4.99 63.33
SEPTEMBER		+63.33	Sept. 4.99

TABLE 22: ZAMBIA PROJECTED MAIZE STOCKS
ASSUMPTION # 6A

		Base date September 4.99	RSA 120,000 tons	
			USA 114,000 tons	
FEBRUARY		Domestic Harvest 1980 495,000 metric tons		
		25.1 x 54 div. by 30 = 48,180	Sept 4.9- Sept 30	
		54,000	October	
		54,000	November	
		54,000	December	
MARCH		207,180	year end	287,820 tons remain
		58,000	January	
	287,820 div by	58,000	February	287.820
	58,000 = 4.96 months	58,000	March	
		58,000	April	
		55,820	May 29.76	
			58,000 = .96	
		.96 x 31 = 29.76		
APRIL				
MAY				
		May 29.76		
JUNE				
JULY			DOMESTIC HARVEST INTERFACE	

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B. Adjustment for Storage/Transit Losses

The projections shown under Assumption # 1 to # 6 have not been adjusted for storage or transit losses. Using storage losses of 5 percent and transit losses of 1 percent internal domestic supply of maize in Zambia would be reduced as below

Assumption # 1	June 4.63, 1980
Assumption # 2	June 28.28, 1980
Assumption # 3	July 15.87, 1980
Assumption # 4	July 20.82, 1980
Assumption # 5	August 13.48, 1980
Assumption # 6	September .08, 1980

Increasing transit losses to 5 percent would result in the revised dates below:

Assumption # 1	June 2.59, 1980
Assumption # 2	June 25.28, 1980
Assumption # 3	July 12.16, 1980
Assumption # 4	July 16.9, 1980
Assumption # 5	August 8.6, 1980
Assumption # 6	August 25.52, 1980

TABLE 23 : ZAMBIA: ADJUSTMENTS FOR MAIZE STORAGE AND
TRANSIT LOSSES, ASSUMPTIONS # 1 -#6A.

ASSUMPTION # 1

Domestic Stock	70.5 days x .05 =	-3.52	
Imports	51.11 days x .01 =	- .51	
		<u>4.03</u>	adjusted date June 4.63

Domestic Stock	70.5 days x .05 =	-3.52	
Imports	51.11 days x .05 =	-2.55	
		<u>-6.07</u>	adjusted date June 2.59

ASSUMPTION # 2

Domestic Stock	70.5 days x .05 =	-3.52	
Imports	75 days x .01 =	-.75	
		<u>-4.27</u>	adjusted date June 28,28

Domestic Stock	70.5 days x .05 =	-3.52	
Imports	75 days x .05 =	-3.75	
		<u>-7.27</u>	adjusted date June 25.28

ASSUMPTION # 3

Domestic Stock	70.5 days x .05 =	-3.52	
Imports	92.77 days x .01 =	-.93	
		<u>-4.45</u>	adjusted date July 15.87

Domestic Stock	70.5 days x .05 =	-3.52	
Imports	92.77 days x .05 =	-4.64	
		<u>-8.16</u>	adjusted date July 12.16

ASSUMPTION # 4

Domestic Stock	70.5 days x .05 =	-3.52	
Imports	97.78 days x .01 =	-.98	
		<u>-4.5</u>	adjusted date July 20.82

Domestic Stock	70.5 days x .05 =	-3.52	
Imports	97.78 days x .05 =	-4.9	
		<u>-8.42</u>	adjusted date July 16.9

Assumption # 5

Domestic Stock 70.5 days x .05 = -3.52
Imports 121.67 days x .01 = -1.22
-4.74

adjusted date
August 13.48

Domestic Stock 70.5 days x .05 = -3.52
Imports 121.67 days x .05 = -6.1
-9.62

adjusted date
August 8.6

Assumption # 6

Domestic Stock 70.5 days x .05 = -3.52
Imports 139.44 days x .01 = -1.39
-4.91

adjusted date
September .08

Domestic Stock 70.5 days x .05 = -3.52
Imports 139.44 days x .05 = -6.95
-10.47

adjusted date
August 25.52

Assumption # 6A

Domestic Stock 70.5 days x .05 = -3.52
Imports 139.44 days x .01 = -1.39
1980 Harvest 495 x .05 div. by = -12.8
54 x 30 -17.71

adjusted date
May 12.05 1981

Domestic Stock 70.5 days x .05 = -3.52
Imports 139.44 days x .05 = -6.95
1980 Harvest 495 x .05 div. by = -12.8
54 x 30 -23.27

adjusted date
May 6.49 1981

C. Rebuilding Domestic Reserves

Under assumptions #3 through #6 domestic maize supply can be carried into the July harvest interface.^{1/} Such considerations as milling and distribution delays would justify a safety margin well into the harvest period. Additionally, however, the Zambians need to rebuild their domestic reserve stock of maize. UN sources indicate that in the past Zambia maintained about 120,000 metric tons of maize in reserve. Contingency Planning (CP) would ideally like to have a six-months supply of maize, or about 324,000 metric tons. There are insufficient storage facilities for this amount of maize, and a reserve of 180,000 metric tons or just over three months supply has been proposed. Preliminary estimates, however, indicate that any surplus carried into the July harvest interface will be absorbed by consumption needs for the first half of 1981. This would mean that Zambia would have to rely on the 1981 harvest as a means of building domestic reserves.

D. 1981 Harvest Interface

The outcome of the 1980 harvest remains uncertain. Variations in normal rain patterns may have negative results. A short dry spell may affect tasseling, especially for early planting. Seed maize may be seriously affected. Heavy rains may have also affected germination and washed out young maize plants. Commercial farmers have been optimistic about their crops, but information on small holders is not readily available.

The most recent (February 19, 1980) projections for the July 1980 harvest provided by the Ministry of Agriculture indicate that production may fall to only 5.5 million bags of maize of about 495,000 metric tons. Compared to consumption projected for 1980, this would mean a shortfall of about 153,000 metric tons or a decline of about 24 percent over

^{1/} Adjustments for transit and storage loss result in only Assumptions #3 through #6 carrying internal stocks into the harvest interface.

projected consumption for 1980. If consumption for 1981 is increased by 7 percent--matching the increase used by GRZ calculations for 1979-1980--average monthly consumption for 1981 would increase to 58,000 metric tons (57,780). Using the projections in Table 21, Zambia: Projected Maize Stocks, Assumption #6 as a base, the addition of the 1980 harvest would take internal maize supply to May 29, 1981. The result of this projection is a gap in supply of about 31 days or about 60,320 metric tons before the July 1 harvest interface. This is shown in Table 22, Zambia: Projected Maize Stocks, Assumption #6A. Adjustment for storage and transit loss of 5 and 1 percent respectively would reduce stocks by 17.71 days to May 12.05. Adjustment for storage and transit loss of 5 and 5 percent respectively would reduce stocks further to May 6.49.

Although the projections for the 1980 harvest provided by the Ministry of Agriculture basically conform with preliminary estimates by the commercial farmers, actual needs for 1981 will have to be adjusted on the basis of assessments in May and again at the time of harvest. For each variation of 10,000 metric tons on a yield of 495,000 metric tons, add or subtract 4.91 days to the projected date for internal stocks. (Calculation is based on average monthly consumption for 1981 of 58,000 metric tons plus 5 percent adjustment for storage loss.)

IV. ADJUSTED PROJECTIONS

On February 25, 1980 NAMBOARD reported domestic maize stocks of 1,271,081 bags or 114,392.3 metric tons, which they calculated would carry them six weeks only (until April 6, 1980). According to the preliminary projections in this study, the stocks reported on February 8 should have carried them to April 18, 1980. Adjustment for storage loss of 5 percent would have cut stocks to about April 15, 1980. These calculations were based on average monthly consumption for the months from February to July of 54,000 metric tons, whereas the NAMBOARD figures were based on actual consumption for the month of February.

The preliminary projections for this study used projected average monthly consumption because there was a high degree of correspondence between total consumption indicated by the two sets of consumption rates for the months of February through July. The projected actual monthly consumption figures presented in Part II of this Section indicated monthly consumption for February of 62,000 metric tons. Adjusting of this rate would advance the deficit date by 4.2 days to April 10.78 ($62,000 - 54,000 = 8,000$ divided by $54,000 \times 30 = 4.2$). This would bring the differential between the NAMBOARD and survey projections to just under 5 days or less than 10,000 metric tons. It was not certain whether the differential reflected errors in stock reports, divergent interpretation of what constitutes in-country stock, or simply an actual consumption rate higher than the projected rate. The figures were also distorted by imports of maize under the old RSA agreement and the triangular agreement.

In order to clarify the situation, a request was made for end-of-the-month figures for February. These were provided on February 29, 1980 by Mr. Mukumbuta, Grains Marketing Manager for NAMBOARD. The figures included provincial and total national consumption as well as maize stocks. The figures are presented in Table 24, Zambia: National Agricultural Marketing Board Maize Stock Position as of 29th February 1980.

Table 24. Zambia: NATIONAL AGRICULTURAL MARKETING BOARD

MAIZE STOCK POSITION AS AT 29TH FEBRUARY, 1980

To July 31

DEPOT/PROVINCE	MAIZE STOCKS AS AT 29/2/80	MONTHLY CONSUMPTION	AUTHORISED CONSUMPTION	SURPLUS (SHORTFALL) TO 31/7/80
Livingstone) Kalomo)	92,170	23,472	117,360	(25,190)
Choma) Tara)	223,795	25,200	126,000	102,795
Monze	110,000	20,280	104,400	5,600
Kaleya) Magoye)	25,649	7,440	37,200	(10,551)
Mazabuka)	39,057	6,424	32,120	6,937
SOUTHERN PROVINCE	496,671	82,416	417,080	79,591
LUSAKA	120,981	-149,840	749,200	(622,219)
Swana-Mkubwa Kitwe	23,191 4,998	215,568 126,360	1,077,240 631,800	(1,049,649) (626,802)
COPPERBELT	33,189	341,928	1,709,640	(1,676,451)
Kabwe) Natuseko)	27,202	72,592	362,960	(335,758)
Chisamba	128,912	3,000	15,000	113,912
Mkushi)	95,997	26,000	130,000	(34,003)
CENTRAL PROVINCE	252,111	101,592	507,960	(255,849)

DEPOT/PROVINCE	MAIZE STOCKS AS AT 29/2/80	MONTHLY CONSUMPTION	AUTHORISED CONSUMPTION	SURPLUS (SHORTFALL) TO 31/7/80
NORTHERN PROVINCE	22,492	17,100	65,500	(63,008)
North Western Province	13,042	10,000	50,000	(36,958)
Eastern Province	73,619	16,000	20,000	(6,381)
Lusaka "	41,903	21,800	100,000	(67,097)
Western "	40,013	23,540	117,700	(77,687)
	191,069	88,440	442,200	(251,131)
NATIONAL	1,100,021	765,216	3,826,000	(2,726,059)

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H.B.

The 25,216 bags above monthly consumption is allocation for stockfeeds

4th March, 1980

/vk.

M. W. Mukumbuta
M. W. MUKUMBUTA
GRAINS MARKETING MANAGER

According to the February 29, 1980 report, total maize stocks equalled about 1.1 million bags or about 99,000 metric tons. Consumption for the month of February was 765,216 bags or 68,869 metric tons. This included 25,216 bags or about 2,269 metric tons for stock feed. Previously this breakout had not been included in the data obtained from NAMBOARD. Subtracting the stock feed tonnage gives a monthly consumption of 66,600 metric tons or 4,600 metric tons higher than the projected actual figure used in the preliminary projections. ^{1/}

V. TRANSPORT CONSTRAINTS

A. Monthly Tonnage Requirements

Under the original transport strategy proposed by Contingency Planning (CP) the initial 36,000 metric tons purchase of maize from the RSA was to begin moving into Zambia in early February. Completion of this shipment was scheduled for the end of March. Had this happened, the GRZ would have had a buffer of another 15 to 20 days, depending on the consumption rate used. Imports during March, April and May of additional maize from the RSA would have carried internal stock well into June and could have been supplemented by imports of maize from the USA. Internal stocks would have been carried into the July harvest interface. May and June would have been crucial transport months requiring optimal performance. This situation was significantly altered by two situations:

- The inability of the GRZ to effect shipment of the proposed 36,000 metric tons of maize from the RSA; and
- Delays in negotiations for commercial purchases of maize under the PL 480 agreement.

As a result of these two situations, the GRZ lost any cushion for internal maize stocks. The implication of

^{1/} Note: figures provided by NAMBOARD two weeks later to the UNDP (WFP) indicated that consumption for February had been only 589,000 bags or about 53,000 metric tons. The difference between these two sets of figures had not been reconciled at the time this report was submitted.

the loss of a buffer was that as of the beginning of March, imports in each month would have to at least equal the projected actual consumption for the next month. During March there would also be the need to bring in a safety margin to two weeks supply in order to cover delays resulting from milling and distribution after the maize stock arrived in-country.

According to NAMBOARD, total need for consumption through July 31, 1980 would require about 3.8 million bags of maize or about 344,347 metric tons. This implied that consumption for the five month period from March through July would remain at the level of consumption in February. In previous years this had not been the case, and monthly consumption had declined as the July harvest interface was approached.

The preliminary projections for actual monthly consumption development are shown in column A of Table 25, Zambia: Adjusted Monthly Consumption, February 29, 1980. These figures show a declining rate of consumption from 62,000 to 49,000. According to these projections, imports in March would have to equal the projected consumption for April plus imports to cover the one or two week safety margin. If one uses the reported consumption in February of 68,000 metric tons instead of 62,000 metric tons and adjusts proportionately to the monthly ratios in the projections listed in column A, one obtains the monthly consumption figures shown in column B. Consumption in 1979 was skewed from normal patterns but adjusting the 68,000 metric tons for February to fit the ratios consumed monthly in 1979, consumption for 1980 is projected as in column C.

Table 25. Zambia: Adjusted Monthly Consumption, February 29th, 1980.

Using NAMBOARD Calculations for A Base.*

	A	B	C
	Preliminary Projections for 1980 using 1977 as a base	Figures in A adjusted to match reported Feb consumption	Projections for 1980 using 1979 consumption ratios actual Feb consumption as a base
Feb	62,000	68,000	68,000
March	58,000	64,380	64,860
April	57,600	63,270	66,620
May	49,000	54,000	65,900
June	49,000	54,400	68,200
July	49,000	54,400	64,230

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Consumption Patterns during 1979 are not generally felt to be reflective
Of typical consumption but are shown here for illustrative purpose.

*Figures rounded to nearest 10 tons

B. Monthly Import Capacity

Calculation of monthly import capacity for Zambia is almost as complicated as computations for monthly maize consumption. A survey made in mid-1979 by the World Food Program of the United Nations projected a monthly import capacity of 76,000 metric tons. (See Figure 2, Zambia: Total Projected Monthly Capacity for Imports, Mid 1979) Of this amount about 62,000 metric tons were included for the combined import of maize, wheat and fertilizer. This distribution is as shown below:

Via Dar es Salaam	
Rail	
Truck	25,000
Via Mozambique	
Rail	
Truck	14,000
Via South Africa	
Rail	23,000
	<hr/>
	62,000

(See also Figure 3, Zambia: Total Projected Monthly Capacity for Imports of Maize, Wheat and Fertilizer, 1979.)

The damage to the eleven road and rail bridges in Zambia in late 1979 severely restricted traffic for the remainder of the year. As a result, the average monthly capacity for the year fell to only about 63,000 metric tons for all imports combined. (See Table 26, Zambia: Imports by Month and Route, 1979 and also Figure 4, Zambia: Actual Monthly Imports, 1979.)

The discussion of projected monthly maize consumption in the preceding section indicated the need to import 60,000 to 70,000 metric tons of maize in certain of the months before the end of the July harvest interface. This tonnage is greater than the monthly average for combined imports of maize, wheat and fertilizer in 1979. The situation was further complicated by the fact that the only immediate supply of maize was the RSA, necessitating bringing in the entire tonnage of maize needed over the southern route.

Figure 2. Zambia : TOTAL PROJECTED MONTHLY CAPACITY

76,000

FOR IMPORTS, MID 1979

TAZARA
20,000

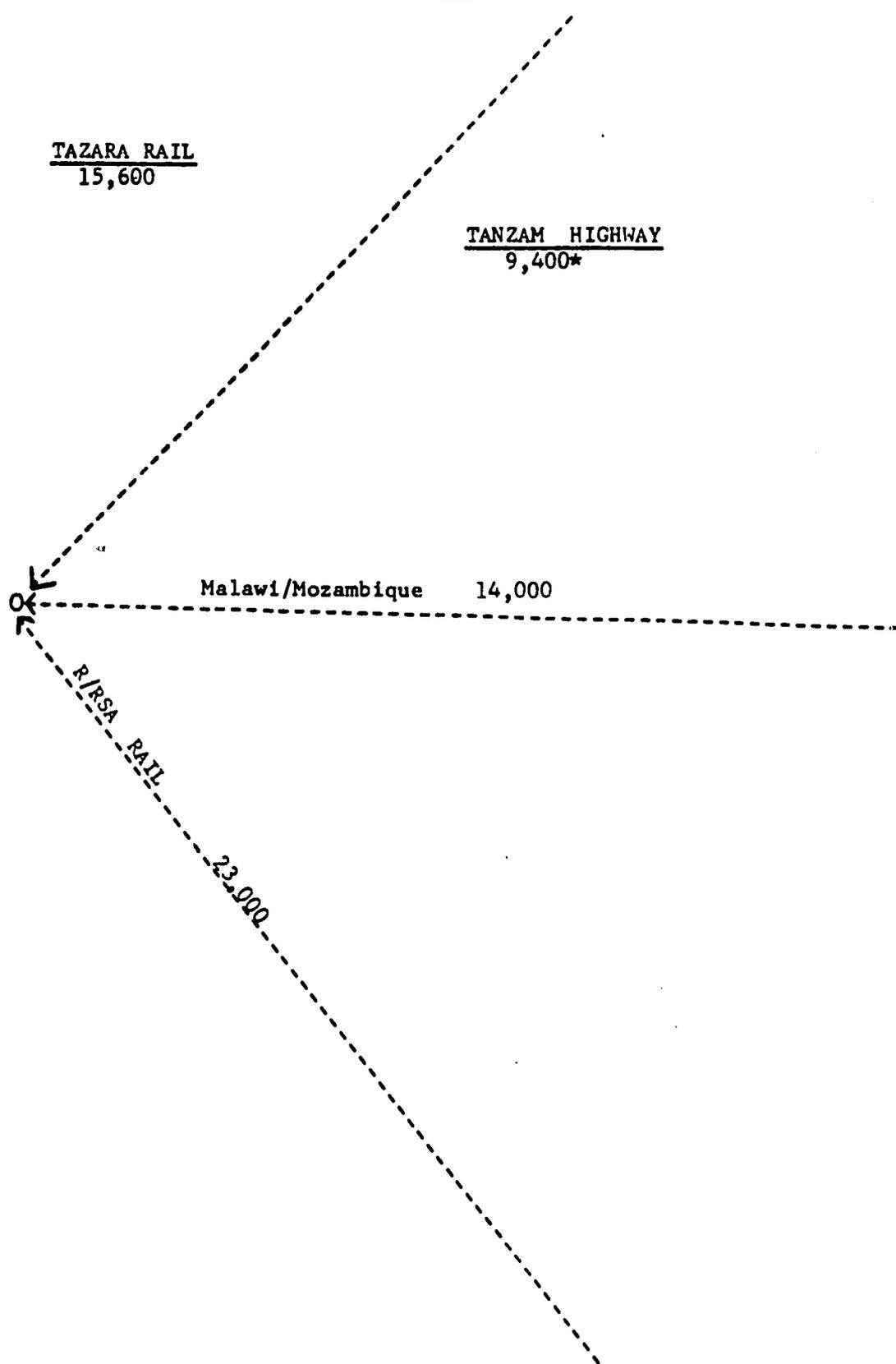
TANZAM
12,000

Malawi/Mozambique 14,400

JKT

RJBSA RAIL - 30,000

Figure, 3. Zambia: TOTAL PROJECTED MONTHLY = 62,000
CAPACITY FOR IMPORTS OF Maize, Wheat, and Fertilizer 1979



* Rounded

Table 26. Zambia: Imports by Month and Route, 1979.

ROUTES	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE
LCBITO - ZAIRE	-	-	-	118	-	75
DAR ES SALAM (ROAD)	3,338	10,262	15,633	13,299	10,256	10,955
DAR ES SALAM (RAIL)	28,375	25,917	15,307	15,303	4,176	21,160
MALAWI	1,978	1,637	977	5,139	11,080	5,646
MOZAMBIQUE	10,429	61	-	-	-	-
KAZUNGULA (BOTSWANA)	248	404	508	-	-	-
RHODESIA (SOUTHERN)	27,788	25,259	14,717	22,355	24,337	25,889
AIRFREIGHT	1,530	1,455	1,603	1,598	2,179	1,863
T O T A L	78,686	64,995	48,745	57,812	52,028	65,618
CRUDE OIL IMPORTS BY						
PIPELINE	54,969	64,076	-	66,204	34,221	45,807

Table 26 (Continued)

ROUTES	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER	TOTAL
LOBITO - ZAIRE	234	3	72	1	-	-	310
DAR ES SALAAM (ROAD)	9,090	9,863	9,921	12,080	15,732	15,357 ²⁾	140,813
DAR ES SALAAM (RAIL)	18,754	40,008	36,043	16,261	-	-	221,304
MALAWI	1,310	321	446	423	377	1,253	30,587
MOZAMBIQUE	202	2,752	5,382	2,139	-	-	20,965
KAZUNGULA (BOTSWANA)	-	-	-	-	-	-	1,160
RHODESIA (SOUTHERN)	40,533	35,124	34,882	31,707	27,856	32,281	342,728
AIRFREIGHT	2,439	2,268	1,785	1,851	2,067	2,927	23,665
TOTAL	72,562	90,339	88,531	64,572	46,032	51,818	781,738
CRUDE OIL IMPORTS BY							
PIPELINE	68,124	57,759	80,177	73,524	72,731	73,380	690,972

Notes: 1 Imported from Zaire

2 Lube oil included and 788 tonnes from Mwenzo by C.H.

SOURCE:

Figure 4 Zambia :

ACTUAL MONTHLY

IMPORTS 1979

63,033
(756,400 for 12 months)
63,033

TAZARA RAIL
18,442
(221,304 for 12 months)

TANZAM HIGHWAY 11,735
(140,816 for 12 months)

Malawi/Mozambique 2,549 (30,587 for 12 months)

R/ISA
28,561 (342,728 for 12 months)
(Moatize) 3,494
(for six months 20,965)

CP reasoned that this would be possible if the total tonnage over Victoria Falls were diverted to maize and if to this amount a nearly equal amount were railed to Lions Den at Zawi in Zimbabwe and then trucked to Zambia. The plan called for 31 wagons a day over the Victoria Falls route and 30 wagons a day to Lions Den. A trucking fleet of 80 vehicles, 40 per day each way, was to be used to move maize into Zambia. Each rail wagon was to carry 36 metric tons of maize. Total tonnage was to be about 1,100 metric tons over each route per day. Assuming operation for 26 to 30 days a month, capacity would range from 57,000 to 66,000 metric tons.

Information conflicted widely over the exact figures, but it was apparent by late February that performance over the southern route was not equalling the capacity projected by CP, and specific concern was presented by AID/Zambia to CP concerning this issue. End of the month figures for February, in fact, indicated that the total tonnage of maize over the southern route was only about 10,400 metric tons (6,500 over Lions Den and 3,934 by rail over the Victoria Falls route). For the period of March 1-12 only 66 wagons (an average of 5.5 wagons a day) carrying a total of 2,433 metric tons passed over Victoria Falls (see Table 27, Zambia: Summary for Food Imports, by Rail, Month of February, 1980).

The problem reflected low wagon traffic over the rail route and inadequate supply of trucks for pick-up at Lions Den. Rhodesian haulage which was to supplement Zambian haulage had, in fact, not yet been effected because of delays concerning:

1. Letter of credit;
2. Insurance; and
3. Transport licenses.

This situation prevailed into the first two weeks of March. On March 12 Rhodesian haulage began operation. (See Table 28, Zambia: Transit Summaries for Southern Route.)

Table 27. Zambia: Summary for Food Imports, By Rail,
Month Of February, 1980.

Victoria Falls

(Source, NAMBOARD)

1-12 March

Maize 2,433 tons, 66 wagons

Fertilizer 54 tons, 15 wagons

Wheat none

Flour 1,009, 20 wagons

Vegetable Oil 298 tons, 10 wagons

Salt 408 tons, 11 wagons

TAZARA

1-12 March

Maize 1,097 tons, 41 wagons

Fertilizer 30 tons, 1 wagon

Wheat 3776 tons, 104 wagons

Soya Beans 30 tons, 1 wagon

Salt 90 tons, 3 wagons

February (Entire)

Maize 438, 11 wagons

Fertilizer 90 tons 3 wagons

Wheat 5,252 tons, 131 wagons

Soya Beans 60 tons, 2 wagons

Veg. oil, 835 tons, 22 wagons

Rice 72 tons, 3 wagons

Table 28. Zambia: Traffic Summaries for Southern Route

	VICTORIA FALLS	LIONS DEN
PROPOSED	31 rail wagons a day with 36 tons each = 1,116 metric tons x 26 days = 29,016 mt x 30 days = 33,480 mt	30 rail wagons a day with 36 tons each = 1,080 metric tons x 26 days = 28,080 x 30 days = 32,400 Plus 40 trucks a day
RESTRAINTS	Only 10 wagons allocated a day as a result of slow turn-around time	border closed half of Saturday and all day Sunday Need to negotiate with Rhodesian Haulage firms for 50 % of trucks
PROJECTED TRAFFIC EARLY FEB	15 rail wagons a day at least 15,000 metric tons hope to increase	15 rail wagons 20 trucks from Contract Haulage for at least 14,000 metric tons
ACTUAL FEB	ENTIRE MONTH TOTAL TONNAGE = 3,934 (maize) Average daily rate less than 8 rail wagons a day	ENTIRE MONTH TOTAL TONNAGE = 6,500 (maize) 15- 20 some rail wagons No Rhodesian haulage some days less than 7 CH Trucks
March 12	Most current inform. indicates less than 50 % projection	Rhodesian Haulage Begin Haulage by C.H. still less than Less than 75 % projected capacity
End of Month Rate	6,000-10,000 projected	18,000 - 21,000
	26,000 to 31,000 combined	

C. Transport Strategy

In view of past performance it is difficult to see how the country will be able to avoid a major maize shortage for the months of May and June. By early March it was reported that there was inadequate supply of maize for milling in the Copperbelt. There were indications that CP was pressing for such emergency actions as diverting the flow of imports to just maize shipments, but the success of such efforts remains to be seen. If the rate of maize imports for the month of March remains at the same level as in February, total internal stocks would be exhausted by about April 6, 1980. If the rate is increased to slightly over twice or slightly over four times the rate in February (25,000 MTs and 50,000 MTs), then internal stocks would be carried to about April 11 and April 23 respectively. From these dates must be subtracted the safety buffer for milling and distribution.^{1/} Additional imports of maize will be transported, however, during April, rolling the deficit later in the month on an incremental basis. Assuming the higher rates of (either 25,000 or 50,000 for March and 50,000 metric tons for April) import and operation on a basis of seven days a week and foregoing the safety margin for milling and distribution, domestic stocks could be carried into early May or June. Projections for these dates showing the incremental increases in internal stocks are shown in Table 30, Zambia: Projected Accumulations in Internal Maize Stocks.

If the stock can be kept ahead of consumption until early May, the first shipment of U.S. maize should be arriving at East African ports. (See Table 31, Zambia: Scheduled Departures and Arrivals for PL 480 Maize.) It will take at least one to two weeks before this maize begins to filter into Zambian stocks. There would still be a crisis in early May unless the rate for maize imports in March and April were the full 50,000 metric tons a month. Achieving this level would be a major achievement in view of the level of imports in February.

Assuming that a total of at least 35,000 metric tons of U.S. maize could be brought into Zambia--20,000 through Dar es Salaam and 15,000 over the Wankie route, for example, or a re-combination of these and a possible increase

^{1/} Note: The milling capacity of major mills could also become a constraint. See Table 29, Zambia: Capacity of Major Milling Facilities, 1980.

Table 29. Zambia: Capacity
of Major Milling Facilities, 1980

<u>Facility</u>	<u>Location</u>	<u>Bags/Month</u>	<u>M.Tons/Month</u>
1. <u>Parastatals:</u>			
A. NMC	Livingston	16,500	1,485
	Kabwe	10,000	900
	Lusaka	12,000	1,080
	Malambo	100,000	9,000
		<u>138,500</u>	<u>12,465</u>
B. INDECO	Solwezi	5,000	450
	Ndola	75,000	6,750
	Mkushi	26,000	2,340
	Mansa	18,000	1,620
	Mongu	6,000	540
	Kabompo	4,500	405
	Chinsili	5,000	450
	Kaoma	5,000	450
	Luangwa	5,000	450
	Choma	5,000	450
		<u>154,500</u>	<u>13,905</u>
C. LIVONDAH	Kaoma	4,000	360
	Senanga	5,000	450
		<u>9,000</u>	<u>810</u>
	Total	<u>302,000</u>	<u>27,180</u>
2. <u>Private:</u>			
Olympic	Mufulira	60,000	5,400
Jomas	Kitwe	35,000	3,150
Antelope	Luanshya	30,000	2,700
Nkana	Nkama	10,000	900
Chimanga-Changa		60,000	5,400
Kabwe	Kabwe	30,000	2,700
Others	(8)	16,000	1,440
	Total	<u>241,000</u>	<u>21,690</u>
	GRAND TOTAL	<u>543,000</u>	<u>48,870</u>

Note: The allocation for private mills is normally only 213,000 bags or 19,170 metric tons.

Table 30. Zambia : Projected Accumulations of
Internal Maize Supply
Rate for March

- A. If rate equals February then 12,500 which takes to April 5.7
- B. If rate equals 2 X February then 25, 000 takes to April 11.4
- C. If rate equals 4 X February then 50, 000 takes to April 22.8

Rate for April

- D. If rate equals Feb and as March A then April $5.7 + 1.09 = \text{Ap } 6.79$
- E. If 2 X February and as March A then April $5.7 + 2.2 = \text{Ap } 7.9$
- F. If 4 X February and as March A then April $5.7 + 4.38 = \text{Ap } 9.55$
- G. If 2 X February and as March B then April $11.4 + 4.38 = \text{Ap } 15.78$
- H. If 4 X February and as March B then April $11.4 + 8.76 = \text{Ap } 20.16$
- I. If 4 X February and as March C then April $22.8 + 17.53 = \text{My } 10.33$

Carried over
April

- D. April $6.79 + .19 = \text{April } 6.98 + /-----$
- E. April $7.9 + 1.8 = \text{April } 9.7 + .69 = \text{April } 10.39 /-----$
- F. April $9.55 + 3.6 = \text{April } 12.91 + 2.58 = \text{April } 15.49$
- G. April $15.78 + 1.68 = \text{April } 17.46 + .68 = \text{April } 18.10 /-----$
- H. April $20.16 + 6.73 = \text{April } 26.89 + 5.17 = \text{May } 2.06$
- I. May $10.33 + 13.48 = \text{May } 23.18 + 10.36 = \text{June } 3.17$

Continued

- D. /-----
- E. /-----
- F. Then April $15.49 + 1.98 = \text{April } 17.47 + 1.52 = \text{April } 18.99$
- G. /-----
- H. Then May $2.06 + 3.97 = \text{May } 6.03 + 3.05 = \text{May } 9.08$
- I. Then June $3.17 + 7.96 = \text{June } 11.13 + 6.12 = \text{June } 17.25$

(Assumes monthly consumption 65,000 metric tons a month).

**Table 31. Zambia: Scheduled Departures and Arrivals
For PL480 Maize.**

NAME/FD/33/80

SHIPPER	SHIPPER NAME OF VESSEL	QUANTITY M.T.	EXPECTED DATE OF DELIVERY - U.S. PORTS	EXPECTED DATE OF DELIVERY - EAST & SOUTH AFRICAN PORTS	DISCHARGE	F P
	Progreso Argentino	10,907	20-4-1980	11-5-1980	Dar-es-Salaam East London	
	Foot	12,462	10-4-1980	1-5-1980	Dar-es-Salaam East London	
Devonia Shipping Co						
	Any out of Cape Bride/ Cape Mustang/ Cape Mandarin	5,000	28-4-1980	19-5-1980 (i)	Dar-es-Salaam Beira Nacale Maputo	
				(ii)	Durban East London	
- DO -		5,000	21-4-1980	12-5-1980 (i.)	- do -	
				(ii)	- do -	
- DO -		10,000	16-5-1980	6-6-1980 (i)	- do -	
				(ii)	- do -	
	Adabelle Lykes	5,000	14-4-1980	5-5-1980	Beira Maputo East London	
	Sheldon Lykes	3,000	14-4-1980	5-5-1980	Beira Maputo East London	
	Margaret Lykes	4,000	14-4-1980	5-5-1980	Beira Maputo East London	
	Sub total	<u>12,000</u>			Beira Maputo East London	

SHIPPER	SHIPPER NAME OF VESSEL	QUANTITY M.T.	EXPECTED DATE OF DELIVERY U.S. PORTS	EXPECTED DATE OF DELIVERY EAST AND SOUTH AFRICAN PORTS	DISCHARGE
	Margaret Lykes	1,500	5-5-1980	20-5-1980	Seire Naputo
	Eligaboth Lykes	6,200	5-5-1980	26-5-1980	East London Seire Naputo
	As per item II A	<u>4,300</u>	5-5-1980	26-5-1980	East London As per item II A(i)
	Sub total	<u>12,000</u>			(ii) As per item III (ii)
	As per item II A	12,000	16-5-1980	6-6-1980	(i) As per item II (i)
	SUB TOTAL	<u>79,369</u>			(ii) As per item IIA
	Options say	<u>3,131</u>			
	TOTAL	<u>82,500</u>			

In the case of Devonian Shipping Corporation, it has been assumed that the goods will be loaded at two ports

by 10,000 to 20,000 if ZTRS is used from Dar es Salaam and port conditions in Dar es Salaam are favorable-- internal stock would be augmented by about 16 days a month for both May and June. This would take internal stocks to about June 12 or July 16 depending upon initial rate for March via the southern route. By the last week of June, however, the rate through Zimbabwe would be affected by internal needs. Hopefully, imports could be supplemented by maize from the incoming harvest by this time.

The table is based on the assumption that purchases from the RSA are unlimited and continue on into May. If imports after March 1 from the RSA only equal 100,000 or if the GRZ is not able to obtain credit to buy all the 120,000 offered by the RSA--which is very likely-- internal stocks would run out before the arrival of maize from the USA. The projected arrival of maize from the U.S. between May 1 and 15 is for about 40,000 metric tons and for the entire month equals 57,000 metric tons. During June another 22,000 metric tons is scheduled to arrive. These combined totals would not cover domestic consumption for May and June. (Total imports currently projected for arrival from the United States would supply consumption for 1.2 months at a rate of 65,000 metric tons a month, or for about 1.5 months at a rate of 54,000.)

Declining rates of consumption can be expected for May and June which should ease the strain slightly, but shortages are likely to be severe in early May and during portions of June, and possibly even July. Likely shortages based on this scenario are shown graphically in Figure 5, Zambia: Projected Periods of Maize Shortages as Per Transport Constraints. These periods might be partially compensated by maize imports supported by the British and the EEC (13,000 and 16,000 metric tons respectively). Representatives of these two parties do not feel it is likely that their maize (13,000 metric tons respectively) will arrive before May 1, 1980.

A preliminary list of destinations has been prepared by NAMBOARD in conjunction with their forwarder for the arrival of PL 480 maize. The final selection of ports will depend upon additional consideration of port and route conditions in late April and early May. Until then the following strategy has been proposed:

- Encouragement of early delivery of maize from the 1980 harvest, including such actions as bonus prices for force-dried maize;
- Renewed efforts to obtain letters of credit for the full amount of maize from the RSA;
- Investigation of advancing the arrival dates of 10,000 to 20,000 metric tons of U.S. maize into late April;
- Strengthening and regularization of communication between all points within the GRZ--including provincial and central authorities--and their commercial agents involved in maize shipments. Weekly import reports similar to in-country stocks reports should be designed and every effort should be made to feed information about the condition of the maize flow into the information system;
- Placement of monitors at all ports where maize is expected, at all points of supply, at all points of transfer/transshipment, and at strategic milling and distribution points;
- Concerted effort to reduce milling and distribution time;
- Establishment of an emergency task force to assist the supervision of crews off-loading maize with particular emphasis on reduction in turn-around time for both trucks and railwagons;
- Diversion of import traffic to shipments of maize over the southern route and later over at least rail on the TANZAM Corridor once the PL 480 maize arrives;
- Intensification of truck haulage from Lions Den, and advance preparation for options calling for the use of ZTRS over the TANZAM Highway and haulage from Wankie to Zambia;
- Supplemental authority for Contingency Planning to deal with these issues. Technically the authority already exists, but priority is not given to directives by CP.

SECTION VI - THE IMPACT OF A POLITICAL SETTLEMENT IN
ZIMBABWE ON ZAMBIAN TRANSPORT

The decision by the Front Line States to close the border with Rhodesia after the Unilateral Declaration of Independence (UDI) had serious implications for such land-locked states as Zambia. This action cut the traditional route for the flow of both imports and exports for Zambia through Rhodesia to Beira. It created a major crisis in the supply of foreign currency from copper exports and limited the availability of consumer goods. Initially Zambia reoriented itself to transport via the Benguela Railway to the Angolan port of Lobito. With the closure of international operation by the Benguela, Zambia shifted to reliance on the TAZARA Railway and reoriented itself to the port of Dar es Salaam.

The decision by the GRZ to reopening the border with Rhodesia in late 1978 in order to facilitate shipments of fertilizer and maize brought a breath of fresh air to the Zambian consumer. With the flow of general cargo--ranging from food stuffs to electrical appliances--into Zambian stores and businesses began to resemble varying degrees of their former selves. The flow of imports over this route was also matched by the diversion of copper exports from Dar es Salaam to southern ports. The implications of this shift seemed to be that the Zambians were only too happy to resume their previous linkage over the southern route even if it were done at the expense of the northern route to Dar es Salaam. These developments had serious political and transport implications the resolution of which remains open at present. Central to these implications was the vulnerability of the Zambian economy and the seeming willingness to return to almost a client state status in relation to Rhodesia and the RSA.

It is still too early to assess either the meaningfulness of the settlement in Zimbabwe or the final tenor of relations between the new government and its neighbors. The following discussion does attempt, however, to break out some of the possible developments as they relate to transport.

I. PROJECTED LONG TERM NEEDS

There is no evidence that Zambia is either capable of or interested in becoming a self-contained economic unit. Although an interest in import substitution industries has been advanced, investment in the production of items at a cost higher than for imports of the

same items is not being supported. Increasingly, moreover, the economy has become dependent on imports of food in order to feed its increasingly urban population. Thus, Zambia expects to continue buying imports with profits from its mineral wealth.

During the late 1970's the combined import/export traffic for Zambia was about 1.4 million metric tons. Although it is difficult to project actual growth rates in the economy, several sources indicate that by the year 2000 the demand for combined traffic may be as high as 2.8 million or twice the present level. Although the basic pattern of industrial and mining activity is likely to remain similar to that of today, there will be a need for additional investment in both the domestic transport sector as well as in coastal links. The ability of port facilities to handle this nearly double demand will be a serious constraint, but system capacity for imports will probably be the most serious problem. Serious consideration must be given to transport development and management to insure maximization of the economic growth potential of Zambia.

II. ZAMBIA RAILWAYS AND INTERNAL DISTRIBUTION

Zambia Railways is about to become the recipient of major assistance under the IBRD-sponsored project discussed under Section II of this report. (See also the discussion in Annex I of this report.) The components included under this project are intended to insure efficient operation of the system. Although capacity will not be significantly affected as a result, the performance rates within the capacity levels will be increased. An additional investment of 100 to 200 million will be needed in addition to the present assistance package in order to introduce system improvements which again will not increase system capacity but will simply upgrade certain system components in accordance with contemporary innovations. Clearly Zambia Railways will not be able to handle the projected volume for the year 2000 of twice the present combined total for imports and exports.

There has been some hope that the costs of upgrading the rail system could be in part supported from the proceeds of a settlement of the assets of the former unitary rail system from federation days. Now that there has been an attempt at a political settlement for Zimbabwe, there can be a discussion of equipment

disbursal and cash claims for equalization of the ad hoc division which followed UDI. Discussions with officials of Zambia Railways indicate that negotiations with representatives of Rhodesian Railways will be difficult. The equipment inherited by Zambia, including wagons, is felt to have been inferior to what Rhodesia got, but it is uncertain that it will be possible to discount the value of this equipment. Zambia is not likely to obtain much from the negotiations unless considerable preliminary efforts are made to support Zambian claims. Thus, this is an unlikely source of funding for expanded rail capacity.^{1/}

III. DISAFFECTION FOR RELIANCE ON DAR ES SALAAM

The reopening of the southern route offered the GRZ a meaningful option to reliance on Dar es Salaam for import/export traffic. The inflow of consumer goods over this route has been matched by exports of copper ingots. The reduced amount of copper flowing over TAZARA has resulted in an increase in the number of empty TAZARA wagons on the return run to Dar es Salaam. TAZARA has already experienced an economic deficit as a result of the bridge outages and is seeking to compensate for empties by increased off loading at the end of line rather than carrying through to Zambia Railways.

The rapidity with which this shift has taken place is reflective of the general disaffection of the GRZ with the Dar es Salaam route. The shortage of foreign exchange in Zambia has clearly slowed payment on invoices of all kinds. The result has been a reticence on the part of handlers to get involved with Zambian cargo; those who do often charge exorbitant rates. The Zambians regard these attitudes as exploitive and unappreciative of Zambia's position as a land-locked state and as a leading Front Line State supporting the liberation effort for a black majority government in

^{1/} Note: A useful parallel to this situation is the dispute of charges for electric power generation at the Kariba Dam, jointly owned by Zambia and Zimbabwe.

Zimbabwe. The reaction is an emotional one which fails to see the real economic cause of the problem. Although it is unlikely that Zambia would turn its back upon the TANZAM road and rail corridor, disaffection with the situation clearly intensifies the appeal of the southern route and sets the stage for increased utilization of rail links through Zimbabwe.

IV. REESTABLISHMENT OF CLIENT STATE STATUS

The seeming ease with which the Zambian economy shifted back to the receipt of foods and consumer goods over the southern route reflected the commodity-starved state of the Zambian economy in 1978. Although there are still shortages of one item this month and another next month, it is difficult to see the economy returning to the position it faced before the reopening of the southern route when the supermarkets in Lusaka had only boxes of pasta and beef liver for sale. It is easy, therefore, to understand the concern raised before the recent elections in Zimbabwe that Zambia was about to resume its position as a client state of Zimbabwe and, indirectly in turn, of the RSA.

Under this scenario Zambia would place its interests in league with Zimbabwe in order to assure access to southern routes of supply. One could envision the reestablishment of commercial representatives in Zambia for firms with home offices in Salisbury; in certain cases these firms would be interlocked with firms in the RSA. With each month Zambia would become increasingly dependent upon her suppliers who on the basis of access, diversity of commodities, and efficient management and operation would be in a superior bargaining position vis-a-vis Zambia and its commercial sector. The end result would be a quasi economic hegemony which could exceed the limits of the political arena.

Certain developments in the transport sector already seem to support this scenario in the weeks before the elections. With the reopening of the border with Zambia, Rhodesian Railways was unable to handle both domestic and international traffic. South African Railways provided locomotives to handle international traffic first to Zimbabwe and then offered to negotiate arrangements with Zambia and Zaire to supplement their locomotive power. Although the terms of these agreements are regarded as confidential, such arrangements involve a two-week clause for the withdrawal of locomotives from the line and return to the RSA. This would give the RSA major

leverage in the region over not only rail transport but in other areas as well. Similarly, when the GRZ proposed to bring 60,000 metric tons of maize a month through Zimbabwe over a split route involving 50% by rail over the Victoria Falls route and 50% to Lions Den and then by truck to Zambia, several limits emerged:

- The allocation of wagons by the RSA;
- The availability of locomotive power;
- The demand by Zimbabwe that 50% of the haulage be done by Zimbabwean truckers;
- Total monthly tonnage allocations over Rhodesian Railways for Zambia.

The whole package seemed only too tight with the shift by Smith to support for Nkomo before the election. The sanctuary offered Nkomo by Zambia seemed to assure a strong link to Zimbabwe and only reinforce the opportunity for the reestablishment of Zimbabwe commercial interests in Zambia.

V. THE IMPACT OF POLITICAL INSTABILITY

Always presenting its shadowy presence, however, has been the potential for political instability. Everyone knew that there would be some violence even if the Lancaster House talks succeeded. The extent to which violence was to characterize settlement conditions was highly conjectural and remains so even at the time this report is being prepared. Throughout the period following the reopening of traffic over the border in late 1978, rail traffic has been limited by security considerations. Trains do not run at night and every effort is made to return train crews to their homes each evening. This restriction is rather mild compared to the possibility of a total disruption in service resulting from a full-scale civil war in Zimbabwe.

Zambia's survival in the midst of the present maize shortage, in fact, is absolutely dependent upon the retention of access to ocean ports via the southern route. Should this route close, the TANZAM Corridor would be unable to handle the transport demands necessary to fulfill the needs of the current situation. Even long-run demands could not be met without the southern route unless there were a major increase in capacity on TAZARA and at the port of Dar es Salaam itself.

The incredible passage of Zimbabwe into the framework of the national elections without major disruptions does not guarantee that the political system will survive in a full state of harmony. The preliminary euphoria will certainly pass leaving the potential for at least a reduction in system efficiency of not system disintegration. The impact of either development upon a dependent Zambian economy is difficult to appreciate in an isolated setting, but when tied to such basic commodities as maize imports, the implications are clearly grave.

VI. RAPPROCHEMENT: ZIMBABWE AND MOZAMBIQUE

Although the success of Mugabe in the recent elections does not preclude future political instability for Zimbabwe, it does lessen the chances of Zambia becoming a client state. It remains difficult to predict either the style or substance of a government led by Mugabe, but the very victory of Mugabe does, however, present certain limits on transport options for Zambia. In brief, these relate to two developments which are obviously interrelated and impact on each other:

- Hardline policies toward the RSA.
- Rapprochement between Zimbabwe and Mozambique.

Mugabe has always taken a hard stand on the RSA and its policy of apartheid. The basic tenor of his political philosophy has been more extreme than that of Nkomo--in terms of both domestic policies and attitudes towards countering apartheid--a fact which undoubtedly led Smith to shift his support to Nkomo. Little can be concluded yet from the few quotes from political leaders in Zimbabwe since the elections. In fact, some statements seem to be quite contradictory, running from commitments to press the RSA "into the sea" by any means, to assurance that pressure will be through established channels. The RSA is sufficiently worried, however, that it has called for an international conference of heads of concerned states. The election of Mugabe, thus, seriously dispells the concern of a return to a client state for Zambia--and Zimbabwe as well--as might have evolved with Nkomo or a Nkomo-Muzorewa coalition.

In recent months the RSA under the leadership of Prime Minister Botha has shown an openness to the termination

of certain of the more offensive aspects of apartheid. This position has caused an ever-widening rift in the ruling National Party. Assurances by the RSA over the future of Namibia and a meaningful independence policy has not been very promising. Pressure on the RSA at this time will have to be very skillfully applied in order to give Botha room to maneuver.

Now would not seem the time to push the RSA into a garrison state position, a situation for which the RSA has prepared, under which the RSA could probably survive and under which the present liberalization movement would have little grounds for survival. If Mugabe follows this line of reasoning, he will not cut ties with the RSA and will not close the borders to traffic with the RSA as has been suggested by certain extreme interests. The certainty of access over the southern route, however, is limited by many factors, including the fact that either side can close the border at any time. At least in the short run, it would seem in the interest of all parties to keep traffic flowing over the route to ports in the RSA. It is important to keep in mind that there is no guarantee that the transport or other interests of Zambia and Zimbabwe will always coincide.

One of the primary considerations which must be made in assessing the impact of a political settlement in Salisbury on transport is the tie between Mugabe and Mozambique. During the liberation struggle Mugabe was allowed to use the border areas of Mozambique for base camps. Before UDI, Beira was the major port providing service to Southern Rhodesia. Steps have already been taken to reestablish traffic over the routes linking Zimbabwe and the port. For example, a particularly strong interest has been shown in the movement of coal from Wankie to Beira.

Although the implications of this orientation toward Mozambique by Mugabe on the transport needs of Zambia are difficult to set forth tightly, the following developments can be foreseen:

- Traffic over the border between the RSA and Zimbabwe is expected to continue. The allocation of traffic for Zambia will remain about the same as a percentage of total volume. The initiation of 24-hour rail operation could

increase total traffic but total rail capacity could deteriorate, especially if there is significant departure by white personnel. Increased capacity could be absorbed by Zimbabwean demand.

- The RSA will be relatively flexible as long as it is not placed in the position of being a garrison state and as long as its sphere of influence over the rail to and port operations in Maputo is maintained. (This is a key port for the adjacent markets in the RSA; the RSA has and is providing both technical and capital assistance to Mozambique to insure effective operation and access to the port.)
- The demand for import/export traffic by Zimbabwe will absorb all the capacity of the routings to Mozambique and especially the capacity of the port of Beira.
- Mozambique is planning on cutting all transit traffic by truck through its territory between the RSA, Zimbabwe and Rhodesia. All such traffic will be redirected over rail routes.
- Import/export traffic for Malawi will be redirected eventually from Beira to Nainla and will be containerized
- Both Zambia and Mozambique are interested in opening the Katete/Cassacatiza/Tete route to year round traffic. Upgrading this road to paved standard will allow both traffic destined for end destinations in the other country and also would facilitate limited import-export flow. The route would also provide contingency access for Zambia in case of closure of the southern route.
- Dependence upon TAZARA and the TANZAM Highway will be a continuing reality and efforts should be undertaken to effect increased capacity over this route and through the port of Dar es Salaam.
- Reopening of international traffic over the Benguela is not likely until after a settlement of Namibia. This represents at least a two-year delay in efforts to reopen international traffic to Lobito and the condition of the rail and road bed will have to be assessed.

In summation, the immediate effect of the reopening of the border with Zimbabwe is not likely to substantially alter Zambian capacity for import/export traffic. Zambia will have to continue to rely upon and seek expanded capacity over the route to Dar es Salaam in order to meet the projected growth of Zambian import/export traffic.

SECTION VII - SUMMARY AND RECOMMENDATIONS

The following summary and associated recommendations are purposely presented in brief rather than detailed form. They are keyed, moreover, to continuing problems affecting coastal links for Zambian traffic rather than to the needs of the current maize crisis. A basic strategy relevant to the latter situation has already been presented at the conclusion of Section V.

I. CENTRAL PERSPECTIVES OF THE STUDY

Central to the development of this report has been the perspective that inadequacies in the transport sector are the major constraint on economic development in Zambia in general and on resolution of the immediate maize crisis in particular. The perspective has been reinforced at every level not only on the basis of direct observation, but also through discussions with government officials and representatives of international agencies and donors serving in the region. Resolution of transport problems must be accorded primary consideration in both Zambian and regional development planning.

The constraint of the transport sector on economic development is neither a new nor short-lived development for Zambia. The current crisis which Zambia faces in regard to inadequate maize stocks before the July harvest has origins which extend beyond the transport sector, but it is, in the end, the transport sector which constrains flexible response to the situation. Thus, although the food deficit situation may be less severe in future years, the constraining role of transport represents a continuous problem with multiple impact on the Zambian economy.

Finally, it should be stated that in reviewing the transport situation relative to Zambian coastal links, except for a very few cases, one sees little need for extensive investment in or assistance for such capital intensive projects as the construction of new roads or rail lines. Emphasis should be placed instead on maximizing existing infrastructure with inputs of equipment and skills. Increase modal options through support of road transport is not seen as an exception to this basic perspective. Major emphasis must also be placed

on the human aspects of transport capacity rather than on capital expenditure. It is only with such an approach that the transport systems of Zambia and Southern Africa can become self-generating, i.e., operate on the basis of internal funding rather than external assistance.

II. SUMMARY OF OBSERVATIONS

Throughout the transport sector there is a major shortage of equipment resulting from either inadequate absolute numbers or from low rates of equipment availability. Although there are clearly areas where additional equipment is needed as a base for efficient operation, in the majority of cases it is the interface between the equipment and human technicians that seems most crucial.

A. Equipment Operation

Low rates of availability are directly the result of equipment misuse. Operators are often poorly trained for equipment use in both general and specific terms, resulting in excess stress and wear, not to mention premature aging of equipment.

B. Equipment Maintenance

Equipment misuse is reinforced by inadequate maintenance. This problem extends from simple to complex machinery and in part reflects a failure to comprehend the very technology associated with the particular piece of equipment. Inadequate maintenance is the major cause of equipment breakdowns and results in the need for repairs far more complicated and expensive than the basic maintenance costs.

C. Equipment Repair

Once a piece of equipment needs to be repaired, extensive delays result before it is back in service. In part this is the result of a scarcity of spare parts, but it also reflects an inability to diagnose the cause of malfunctions and the failure to make the appropriate repair.

D. Management

Next to the interface between man and machine, management issues represent the most important problem faced by the transport sector. The importance of these two

areas is reinforced by the interrelationship between them. Zambian management--both private and public--is relatively open and honest in its self-appraisal. It should be emphasized, moreover, that the management problems cited below represent constructive criticism rather than categorical condemnation. Consideration of managerial inadequacies must be given major emphasis, always keeping in mind that it is far easier to fly in spare parts than to modify attitudes and impart skills. Managerial problems include:

- Placement of inadequately trained or experienced personnel in positions beyond their capabilities.
- Lack of on-the-job training programs.
- Disproportionate work loads.
- Transfers of personnel from one type of work to another type outside their area of expertise.
- Advancing personnel with scarce skills into general management positions.
- Intervention of personnel or social factors into management decisions.
- Intervention of political factors into management decisions.
- Intervention of bureaucratic considerations--especially national vs. provincial--into management decisions.
- Communication problems--ranging from precision to frequency--at all levels of management.
- Incomplete or divergent forms of record keeping and documentation.

E. Storage

Again, problems related to cargo storage are closely related to cargo handling, but they are broken out here to indicate procedural rather than skill inadequacies. Setting aside the lack of clean, dry storage facilities or sufficient paved stacking areas, major problems include:

- The use of damaged tarps;
- Improving stacking including stacking bags too high which results in splitting bottom bags;
- Extending piles of stacked goods beyond the edge of stacking areas;
- Use of split or rotten bags, damaged pallets or inadequate crating;
- Contamination;
- Water damage;
- Irregular weights for standard sized bags or containers;
- Inadequate documentation.

F. Cargo Handling

Problems relating to cargo handling in part are a function of a lack of equipment, especially fork lift trucks, or problems in the physical design and layout of ports, rail depots and other facilities where cargo is handled. In many cases, however, it relates to labor management and basic skills associated with the transfer of cargo. This is most readily seen in the excessive length of time for rail wagon turn-around and the low gang discharge rates for vessels, trucks, and rail wagons. It is graphically visible in the forms of piles of damaged cargo found at various points through the transport system. Particular concerns are supervision and equipment use.

G. Safety

Faced by a major food crisis Zambia might seem to have little resources to devote to the consideration of safety for the transport sector. Such is more than a luxury, however, and relates not only to operational rates and costs, but to cargo damage as well. Road safety is a prime example of the return on investment; major road traffic hazards include excessive speed and inadequate lighting of slow or disabled vehicles. Shunting operations in port areas and rail yards to not regularly follow such internationally accepted safety precautions as the use of warning bells, red flags or guards.

H. Distribution

Once items have been brought in-country, their arrival at a specific destination is delayed by inadequate distribution. This may be a crucial factor in the current food crisis, but at all times in Zambia the rural resident is cut off from the supply and goods and services available to the urban resident. There seems to be a bias in favor of gathering agricultural products for urban consumption at the expense of the distribution of consumer goods for rural consumption, and some evidence seems to support increased distortion of the distribution system in favor of the urban resident.

III. SUMMARY OF PROJECTED PORT UTILIZATION FOR ZAMBIAN TRAFFIC

A. Dar es Salaam

Immediate Utilization: The port is capable of handling either bulk or bagged grains but prefers bagged cargo. Bulk is best handled by bagging in storage. Port internal transport capacity can easily handle 20,000 metric tons a month, possible more dependent upon port conditions. (30,000-40,000 metric tons for May/June)

Long-Term: Dar es Salaam will remain an important port for Zambian cargo for both short and long-term traffic planning. Zambian traffic can be expected to represent 50 percent of total port traffic. Development of port facilities and maximization of port operation will be necessary in order to meet increasing Zambian demand relative to overall economic growth. Substantial support for such development can be expected under projects by the IBRD and UNCTAD.

B. Nacala

Immediate Utilization: The port is primarily keyed to containerized cargo. Its use as even a stand-by port for bagged maize is questionable and in no case should more than 3,000 to 5,000 metric tons be diverted here.

Long-Term: Although port expansion plans call for increased capacity for general cargo, this port is expected to be characterized by containerized cargo. International traffic will be primarily devoted to import/export traffic from Malawi.

C. Beira

Immediate Utilization: This port has considerable importance for the shipment of maize underway. Initial traffic of bagged maize can be sent via Umtali to Wankie in the empty rail wagons going there for coal. The GOM is most responsive to this. With drier weather, bagged maize could be diverted to Moatize/Tete. Both routes would require transshipment via road to Zambia. Preparation for truck haulage should begin well in advance of the first shipments over these routes. Routing through Zimbabwe and especially the use of Rhodesian haulage must take into consideration the internal needs for the July harvest. As the rainy season recedes, traffic can be carried by rail to Moatize for transshipment via road to Zambia. Again, the GOM is especially interested in this route for imports to fill the empties bringing coal from Moatize to Beira. Maize could also be shipped from Beira to Lilongwe via rail and then transhipped via road to Zambia. There may be problems obtaining guaranteed allocations for Zambia over Malawi Railways. About 30,000 tons could go to Wankie during May/June and another 15,000 could be split over the other routes depending on allocations.

Long-Term: Although the port offers immediate access via empties to Wankie and Moatize, capacity for exports is already filled by exports of coal. Import/export needs for Zimbabwe and Malawi, moreover, can be expected to dominate the port as well as all rail traffic via Umtali and Lilongwe. Opening the Katete/Moatize road would probably give access for imports long, and trucks serving the supper segment of the route would run empty on their southern run.

D. Maputo

Immediate Utilization: Use of this port would require use of the same route through the RSA and Zimbabwe as for East London. It is recommended that this port be used for stand-by access of no more than 10,000 metric tons for the May/June period. Bulk maize is best bagged in hold, but preference for bagged grains is strong.

Long-Term: Traffic through this port is expected to be primarily devoted to the import/export needs of

the RSA--which offers considerable technical and capital assistance for port operation--and for Zimbabwe. Little Zambian traffic will pass through this route as a result.

E. East London

Immediate Utilization: At present Zambian cargo is being passed through the RSA via this port. A mix of bagged and bulk maize could be sent through the port. This port could easily handle 20,000 to 30,000 metric tons for May/June.

Long-Term: The costs of transporting cargo all the way from East London to Zambia restrict the appeal of this route for import/export traffic. The port does provide reliable access and should be held open as a supplemental or secondary route for Zambian traffic.

IV. RECOMMENDATIONS

The time frame of this survey of transport relevant to Zambian coastal links prohibits both the enumeration of all problems identified with the transport sector and the discussion of specific solutions for each of these problems. More important, however, is the need to directly involve the GRZ in developments designed to remedy the general transport problems discussed earlier in this section. Resolution of transport problems in Zambia can come only when the government perceives the need for and allocates resources to such resolution.

It is recommended that AID/Zambia assist the GRZ in problem perception/resolution and resource allocation by:

- Suggesting major problems to be targeted for resolution;
- Designing in conjunction with inputs from Zambian counterparts a framework for project designs;
- Encouraging more regularized GRZ communication --internally and with other interested agencies and organizations--on transport issues;
- Identifying existing resources to maximize in problem resolution;

- Assisting the GRZ in obtaining relative guarantees of project funding.

Activity by AID/Zambia in assisting Zambian transport should become regularized on a long-term basis rather than structured in terms of meeting contingency situations. A permanent transport officer should be located in Washington under the Office of Southern African Affairs and effective liaison should be established with a local AID officer in Zambia. A substantial portion of this officer's time must be slated for transport issues. Field trips should be made by the transport advisor in Washington to Zambia at least twice a year. Consultation with other donors should also be given increased attention by USAID and made the responsibility of the transport advisor in Washington.

Solutions to specific transport problems may often be handled on a regional or functional basis but their inception should begin on site and modal specific considerations. Wherever possible, representatives of equipment suppliers should be utilized in the assessment, design, and implementation stages of project development. Training should be a key element in all transport projects. Particular attention should be given to the potential for AID assistance for the transport sector in Mozambique. The time may be politically opportune for introducing involvement by the United States; assistance for the transport sector would impact, moreover, on Malawi and Zimbabwe as well as Zambia.

A. Additional Assessment

Additional consideration needs to be given to several vital issues before recommendations relative to their resolution can be made. These issues included:

- An immediate appraisal of the transport situation in Zimbabwe and impact on Zambia.
- Opportunities for assistance to Mozambique.
- A feasibility framework for expanded utilization of containerization.
- An assessment of the adequacy of the distribution system in Zambia for non-urban areas.

- An impact study of the introduction of vacuators for bulk handling of grain (1) at ports, (2) points of transshipment, (3) within Zambia.

B. Preliminary Project Targets

- Technical assistance and training in transport rate and route negotiation and management keyed to assisting Zambian traffic via Zimbabwe and Mozambique.
- Technical assistance and associated training to upgrade management and operation of road transport. Selected associated capital assistance may also be included or added in a second phase.
- Technical assistance and associated training (1) in general transport management and operation, and (2) in specific modal considerations.
- Technical assistance and associated training in vehicle (1) operation, (2) maintenance, and (3) repair, as well as in the supervision and coordination of these activities. Some capital assistance may also be needed for training equipment and tools, but such assistance should not become a major element of the initial project.
- Technical assistance for labor incentive development for the port of Dar es Salaam.
- Technical assistance and training in rail wagon utilization, including operation and loading, to reduce turn-around times on rail systems, ports and storage areas throughout the region.
- Technical assistance, training and associated capital assistance for (1) road, and (2) rail safety programs including assisting road inspectorate programs for Zambia and the TANZAM Highway.
- Technical assistance and training in the (1) supervision and (2) performance of manual on- and offloading operations for low traffic areas.
- Technical assistance, training and associated capital assistance for fork lift operations in

high density traffic areas (1) within Zambia and (2) at Dar es Salaam.

- Technical assistance and training in grain storage, transport and management. The use of such a program as that offered by Kansas State University, which involves both in-country and overseas training and is country specific, is recommended.
- Capital assistance for selective upgrading of warehouses and stack areas in Zambia. (Consultation with the CIDA project is essential.)
- Capital assistance for the upgrading of the road from Katete to Cassacatiza to all-weather paved standard and associated capital assistance for storage facilities and handling equipment at Moatize as needed.

SECTION VIII

BIBLIOGRAPHY

The following bibliography is a selective list of materials relevant to this study which have not been cited in bibliographies contained in the reports previously referenced in the preface of this report. All figures and tables without source reference in the body of this study have either been prepared by the consultant on the basis of direct observation or from information provided by the GRZ. Special appreciation is extended to John Wood, Senior Advisor, UN/FAO WFP, Lusaka, for his assistance in gathering information from various GRZ sources for use in the analysis associated with this study. The majority of information provided by the GRZ came from Contingency Planning and NAMBOARD. Information on activities by other donors was obtained by direct interview of local representatives or visiting representatives of the respective organizations.

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ANNEX I

ACTIVITY BY OTHER DONORS

CANADIAN INTERNATIONAL DEVELOPMENT AGENCY (CIDA)

CIDA first became involved in transport in Zambia in the late 1960's. Major interest has always been in rail transport and rural development. The initial perspective was for short-term projects. By 1975, however, there was a complete shift from contract to aid programs for Zambia Railways, as well as a shift in perspective to long-term programs. Assistance for Zambia, Malawi and Mozambique are handled through the Canadian High Commission in Lusaka. Tanzania and Rhodesia are handled by representatives in Nairobi and Pretoria respectively.

When it comes to multi-donor funding, the regional CIDA office prefers projects with a small number of donors. Large scale projects with such donors as the IBRD or the Asian Development Bank (ADB) can become too complicated to effectively implement. Complications have also arisen over different comprehension by recipient and donor states about environmental issues.

TRANSPORT

1. Zambia - CIDA has been involved in several projects which have directly or indirectly involved the transport sector. Implementation has just begun on a US\$14.25 million Rural Fishery Roads Project in the Northern and Luapula Provinces. Implementation is scheduled over a three-year period. The equipment for the projects is to be provided by a loan of US\$12.75 million and is due to arrive at Dar es Salaam in early March. The staff has been set up at Makeni under a US\$1.55 million grant. There has also been some training for the transport sector under various programs primarily concerned with other sector development. Additionally, a US\$25 million line of credit has been extended for the purchase of road graders and rolling stock on the railway (approximately 400 wagons).

The major involvement by CIDA in the transport sector has been in the form of technical and related capital assistance for Zambia railways. The current project has a three year program and is valued at US\$5.5 million. It has provided for a number of technical specialists; currently the figure is 8. The project was to end February 10, 1980 but has been extended to June 30. It is expected that it will be renewed in July with salary support for about 15 persons. This assistance provides essential technical and managerial skills, including the position of the Assistant to the Director of Zambia Railways presently held by Mr. Richard Veenis.

STORAGE

CIDA is currently involved in a US\$18.1 million maize and fertilizer storage project for Zambia (US\$15.5 million loan for materials and US\$2.6 million for T.A. and other services). Some adjustments have had to be made because of delays in Zambian interest in proceeding with the project and inflating costs during these delays. The final report will be finalized in March, 1980. Preliminary plans, including the relocation of sites, will be presented in May and final plans should be ready and approved by July. Tender and awards are projected for August and October. Start-up is scheduled for November; completion is stated for September 30, 1982.

The capacity of the storage facilities to be built is 190,000 short tons for grain and 91,000 metric tons for fertilizer. The location of these facilities and their respective capacities has been tentatively agreed upon as shown in Table 32, Zambia: CIDA Grain/Fertilizer Storage Project Facilities.

TABLE 32, Zambia: CIDA Grain/Fertilizer
Storage Project Facilities
(by location and capacity)

GRAIN STORAGE

<u>Location</u>	<u>No. of Sheds (5,000 short tons each)</u>	<u>Capacity (Short tons)</u>
Choma	8	40,000
Monze	4	20,000
Kaleya	4	20,000
Lusaka	10	50,000
Mkushi	5	25,000
Petauke	1	5,000
Katete	1	5,000
Chipata	2	10,000
Lundazi	1	5,000
Mumbwa	2	10,000
Total	38	190,000

FERTILIZER STORAGE

<u>Location</u>	<u>No. of Sheds (3,500 metric tons each)</u>	<u>Capacity (Metric tons)</u>
Choma	5	17,500
Monze	2	7,000
Mazabuka	2	7,000
Matuseka	2	7,000
Mkushi	5	17,500
Mansa	1	3,500
Solwezi	1	3,500
Kasama	1	3,500
Mpika	1	3,500
Petauke	1	3,500
Katete	2	7,000
Chipata	2	7,000
Lundazi	1	3,500
Total	26	91,000

Source: CIDA, Canadian High Commission, Lusaka

FEDERAL REPUBLIC OF GERMANY

The Federal Republic of Germany (FRG) has been involved in assistance programs for Zambia since independence but has done so on a selective basis. Major emphasis is being given to rural development projects and the transport sector. The FRG feels that transport is a major constraint on all economic sectors and would welcome increased assistance by the United States and other donors for transport development. The major need is maintenance and management.

TRANSPORT

Previous projects have included:

1. Upgrading to all weather standard the road from Mbala to Mpulungu. This was begun in 1966 and completed in about two years. This 40 kilometer road provided linkage with Lake Tanganyika.
2. Commodity aid in 1973-74 was granted for the purchase of trucks with a value of about DM 20 million.

Current projects include:

1. Locomotives for Zambia Railways are being provided under the IBRD project umbrella. A loan of about DM 20 million will provide about 10 locomotives. All agreements and financial arrangements are ready, and the FRG hopes for delivery in August or September of this year.
2. A new telecommunication system for Zambia Railways is also being provided under the IBRD project umbrella.
3. Commodity assistance is also being provided under which a small number of vehicles are being provided.
4. Technical and capital assistance are being provided to Contract Haulage. The total package is worth DM 5.7 million. Of this, DM 3.5 million is a grant for six experts, some with technical and others with economic specializations. The remaining DM 2.2 million is for spare parts and workshop equipment.
5. The Zambians have asked the FRG for an expert in transport economics to advise the National Commission for

Development Planning on issues relevant to the transport system. The FRG expects to bring someone in-country in March 1980 to provide this service.

6. Assistance in the form of consultant services for NTS have already equaled DM 3.5 million. The FRG expects to provide another DM 3.5 million of such services.

Negotiations will begin some time in March for 1981-1982. The FRG expects that a substantial amount of total assistance offered will be for transportation, but at present they are not sure if it will be for vehicles or commodities.

STORAGE AND HANDLING

There are no current plans for additional assistance for storage and handling. In 1978-79 the FRG did, however, provide DM 2 million for portable storage units from England which bolt together to form a dome-shaped structure. These were provided for NAMBOARD for use in storage of maize.

FOOD AND AGRICULTURE ORGANIZATION (FAO)

During the 1970's the FAO has conducted food security surveys of 40 countries. These surveys present an assessment of conditions in each country and identify projects for priority consideration. The FAO does not have funds to implement these project, however, and must seek donors to support the assistance they propose. The final draft of the survey for Zambia was cleared at the end of February, 1980 and listed six projects with a total project cost of about US\$57.5 million.

Included were:

1. The construction of warehouses to replace hard standings.
2. Bag to bulk transfer facilities at Lusaka.
3. The strengthening of the Market Unit in the Ministry of Agriculture and Water Development.
4. An assessment of training needs in marketing and distribution.
5. The strengthening of crop forecasting and an early warning system.
6. The development of village mills.

Because these projects related to transport, storage and milling of maize, they are included here as they appear in the FAO report summary.

PROJECT IDEA

Project 1 - Construction of Warehouses to Replace Hard Standings (Plinths)

All covered warehouses at present in Zambia are currently being used to store agricultural production inputs such as seed, fertilizers etc. Consequently maize is stored on hard standings (plinths) covered with tarpaulins and where considerable storage losses are inevitable.

It is recommended that enough warehouses be provided to store all grain on hand in November for an average year. This would provide storage for the expected sales per month during the November to June period plus about a 5 - 6 month carryover.

Based upon anticipated 1980/81 sales, this will amount to a total of about 7.5 million bags (675 000 tonnes). The recent Canadian grant will provide about 2 million bags (180 000 tonnes) of storage capacity, of which silos will provide 1.2 million. New storage facilities required will be 5.5 million bags.

The requirements of this storage and estimated costs are discussed in Annexes IV and V.

Estimated Costs

33 warehouses (34 x 150 x 6 m) at

K 225/m² or K 6.65/bag

K 45 000 000

or

US\$ 56 250 000

PROJECT IDEA

Project 2 - Bag to Bulk Transfer Facility at Lusaka

Bag to bulk transfer at Lusaka silo is now handled through the main storage silos. Bags are dumped from trucks or rail cars, elevated and conveyed to the storage bins and then loaded out in bulk trucks for transport to the mill at Lusaka. This ties up and requires the use of more elevating and conveying equipment than would be required if the mill could receive bags. But mill receiving facilities are limited and congested and are used extensively for wheat.

As an alternative, consideration should be given to providing a simple bag to bulk facility at the NAMBoard storage area. This facility should have a storage capacity of about 500 to 1 000 tonnes. It should provide areas for unloading and dumping from either rail cars or trucks. An unloading and conveying capacity of about 30 tonnes/hr. should be adequate to service both rail and truck unloading simultaneously and keep the mill in operation. Basically the facility would consist of two dump pits, drag or screw conveyors to a bucket elevator. An elevated bin to load trucks directly from a hopper bottom bin through a slide gate would complete the installation. If separation of grain by grades is desirable then two or more bins would be required.

The estimated cost of this project is K 300 000 or US\$ 375 000.

PROJECT IDEA

Project 3 - Strengthening of the Marketing Unit in MLA

The Marketing Department which was once part of the Planning Section of the Ministry of Lands and Agriculture has been separated from that section and merged with the Cooperative Section to form a separate Department of Marketing and Cooperatives. Apart from the fact that the present structure tends to obscure the importance of marketing in the Ministry, the Marketing Section is also inadequately staffed.

To be able to advise MLA adequately on marketing matters and to liaise effectively with NAMBoard on marketing matters, it will be necessary to strengthen the Marketing Unit substantially with qualified and experienced marketing staff. This is considered vital in the context of Zambia's institutionalized marketing and the policy advice on pricing and crop marketing issues that MLA is expected to provide.

The estimated cost of the proposed project is as follows:

Expert	Duration	Cost US\$
1 Marketing Specialist (Price Policies)	2 years	100 000
1 Marketing Specialist (Marketing Policies)	2 years	100 000
	Total	200 000

PROJECT IDEA

Project 4 - Assessment of Training Needs in Marketing & Distribution

The adoption of a food security programme for any country adds a new dimension to skilled manpower requirements because the addition of grain reserves almost certainly involves increasing stocks of foodgrains to be permanently maintained. Not only will it require new financial and managerial disciplines, the situation will call for specially trained personnel beyond those engaged in normal cereal trading.

Since most of the responsibility will devolve on NAMBoard and its limited trained staff resources, a carefully laid out programme of personnel training will be required if NAMBoard is to be able to cope efficiently with the additional responsibility. Before any such programme can be meaningfully planned, it will be necessary to know precisely in which areas of NAMBoard operations these needs are mostly felt.

A study of the manpower requirements of the Board should therefore be undertaken with a view to planning for future needs.

An estimated budget for the project is as follows:

Expert	Duration	Cost US\$
1 Consultant (Financial & Management)	1 m/m	8 000
1 Consultant (Technical & Engineering)	1 m/m	8 000
	Total	16 000

PROJECT IDEA

Project 5 - Strengthening of the Crop Forecasting & Early Warning System

A reasonably efficient system for forecasting the maize crop already exists in Zambia. This is based on the system of mailing of questionnaires to various types of farmers although the response is variable. Crop intake by NAMBoard for 1977/78 has turned out to be substantially lower than the forecast mainly due to the incidence of disease and the late rains.

In the interest of national food security, it is essential to improve on a system which gives inaccurate forecasts. Therefore a sound and efficient system of crop forecasting based on continuous monitoring of crop situation in order to give early warning of an impending shortfall is considered necessary. The main elements will consist of (a) analysis of rainfall and other meteorological data by agroecological zones; (b) rapid processing of NAMBoard procurement and sales data, and (c) annual crop surveys by trained enumerators. The system should be based in the Planning Unit of MLA.

An estimate of the costs of the project is as follows:

Expert	Duration	Cost US\$
1 Agricultural Statistician	24 m/m	100 000
1 Junior Expert	24 m/m	65 000
Consultants	4 m/m	12 000
Equipment (jeeps, met. micro-computer etc.)		100 000
Others		50 000
	Total	327 000

PROJECT IDEA

Project 6 - Development of Village Mills

Considerable transport costs are involved in handling grain from rural areas to the line-of-rail and meal back to the point of origin. Also considerable grain is still hand pounded in rural areas. A project to develop the construction and use of small stone burr mills is recommended. These stone mills should be built in Zambia using local materials. They might use human power, oxen power or be mechanically driven in tsetse fly areas particularly.

The technology for building these mills is well developed in India. The first step of the project might be to import a few mills from India and introduce them in agricultural camps or community centres or larger villages. If the mills were accepted the second step of the programme would be to recruit about three artisans from India for a period of about one year to train Zambian artisans. The skills needed probably include: quarrying, stone masonry and carpentry.

An estimated budget for the project should be about:

Equipment	K 60 000	or	US\$ 75 000
3 Artisans for one year	50 000		62 500
Project Manager	50 000		62 500
Other	50 000		62 500
Total	<u>210 000</u>		<u>262 500</u>

IBRD RAILWAYS - PROJECT III

After negotiations of over a year, the IBRD and the Government of Zambia (GRZ) signed the preliminary loan agreement for Railway Project III in November, 1979. The final supplemental agreement should be signed Feb. 25 - Feb. 29. Negotiations were delayed for various reasons, but Zambian budgetary constraints were primary to the delay. The IBRD hopes for an effective date in mid-March or early April and proposes implementation for June, 1980. The Ministry of Power, Transport and Communications (MPTC) has yet to designate the local implementing agency, but it will be either ZIMCO or Zambia Railways (ZR), probably the latter. This decision has been delayed in part by the transfer underway of responsibility for ZR from the MPTC to ZIMCO. Both ZIMCO and ZR state that it is premature to announce an implementation schedule. A project life of 4 years is expected and invitations for bids will be staggered over this period with announcements in local and international media. The next call for tender will probably be by the end of March.

The project as such is loosely packaged. The local SIDA representative, for example, would not place SIDA assistance for ZR under the IBRD umbrella. The local representative of the IBRD says such assistance is under the project and lists it as such in Table 1 which he provided. Participation by ODA is still being defined, but the British are likely to assist with reconstruction of the Kafue Bridge.

The preliminary estimate for project cost was US\$ 195 million. The final cost, however, has been cut to US\$ 184.3 million, a reduction of about 5 percent. Financing will be co-financed by Zambia Railways and ten donors under the umbrella of the IBRD. The IBRD and IDA will contribute US\$ 40 million or about 22 percent of the total cost, and Zambia Railways will contribute US\$ 50.1 million or about 27 percent of the total cost. A breakout of financing by donors, amounts, and terms as well as donor participation in specific project components is given in Table 33. Railways Project III, Financing and Components.

TABLE 33. Railways Project III, by Financing and Components

<u>BODY</u>	<u>AMOUNT DUE</u>	<u>FINANCING TERM</u>
World Bank	US\$ 25.0 million	20 years at 7.95% interest (5 yrs. grace)
IDA (Credit)	15.0 "	50 years at 0.01% serv. charge (10 yrs grace)
EEC (SAAC)	5.0 "	" " " "
EEC	8.4 "	" " " "
KFW (GRMY)	23.3 "	30 yrs at 2% interest (10 yrs grace)
Japan	16.3 "	25 yrs at 4.5% interest (7 yrs grace)
SIDA	13.0 "	GRANT
AFDB	9.7 "	15 yrs at 8% interest (5 yrs grace)
ODA (UK)	14.0 "	GRANT
OPEC (SF)	4.5 "	20 yrs at 4% interest (5 yrs grace)
ZR	<u>50.1</u> "	
TOTAL	US\$ 184.3 "	

Components

To be financed under

Track	IDA/World Bank
Signals and Telecoms	KFW, IDA/World Bank, EEC (SAF)
Locomotives	IDA/Bank, KFW, SIDA, Japan, AFDB, EEC
Rolling Stock	AFDB
Spare Parts	IDA/Bank, KFW, Japan, AFDB
Workshops and Depots	Sida, IDA/Bank
Handling Equipment	OPEC (SF)
Staff Housing	OPEC
Technical Assistance	IDA/Bank, SIDA

IBRD, Port Development For Dar es Salaam

A major port development project supported by the IBRD has been proposed for Dar es Salaam. Design and implementation of this project has been delayed as a result of uncertainties about Zambian commitment to utilize this route and complimentary investment in TAZARA; Both of these actions would be necessary in order to justify the proposed levels of investment under the project. The major components proposed for this project include:

- ① Construction of at least one additional berth;
- ② Improved container handling facilities, including both equipment and discharge berthing;
- ③ Construction of mechanical bulk grain handling equipment and storage silos;
- ④ Relocation and expansion of the oil jetty;
- ⑤ Construction of a berth for harbor tugs;
- ⑥ Construction of a warehouse for storing imports destined for Zambia;
- ⑦ Construction of a stores depot;
- ⑧ Replacement of existing mechanical equipment for handling general cargo;
- ⑨ Purchase of mechanical equipment for port cleaning.

Additional information about the total anticipated cost for the project and details concerning the design and implementation of the project were not readily available from the local officials with whom it was possible to make contact during the field trip. Additional details can be best obtained from IBRD project documents.

NORWEGIAN INTERNATIONAL DEVELOPMENT AGENCY (NORAD)

NORAD is attempting to stress agricultural, rural, and water resource development and has not been involved in large-scale transport projects. The majority of assistance programs are in the Northern, Northwestern and Western Provinces. None of these projects are capital intensive. Some of these projects have included vehicles for the support of project personnel. Vehicles have also been provided to support personnel in other sectors whose salaries are assisted by NORAD grants.

NORAD has also extended commodity assistance to Zambia. It has been suggested to the GRZ that some of this could be used for transport, but to date most of these funds have been used for purchases of paper and wood. NORAD has considered special assistance to help the shortage of spare parts for vehicles. After an appraisal of the management and operation of facilities which would use these spare parts, however, it was decided that assistance for spares would be withheld until modifications in policies and procedures were made and there could be an assurance that spares would be effectively utilized.

When the Rhodesian security forces damaged the road and rail bridges in Zambia last fall, NORAD pledged K1.5 million for the reconstruction fund. It was suggested that this be divided between the costs of repairing the bridges and the costs of importing maize stocks, but no specific ties were made on this grant. (NORAD was quite concerned about the implications for maize stocks resulting from the damage and predicted a shortfall before the 1980 harvest.)

NORAD has not been active in storage projects and feels that other donors are better suited and predisposed to such projects.

OVERSEAS DEVELOPMENT ADMINISTRATION (ODA)

The majority of assistance provided by ODA is for agricultural and rural development projects, and assistance for transport has been marginal. Each year there is supplemental budget assistance offered for the support of expatriate salaries. At the present there are about 25 technical specialists in-country under this program. They hold three year contracts and the staff rotates so that each year some arrive and some depart. It is estimated that next year the number will increase to 28. A breakdown on the type of work involved by these technical specialists, including engineers, was not readily available, but the majority are involved in transport in one way or another.

Assistance for 40 Gloucester boggies for TAZARA Railways has been provided. This represents a cost of about £ 169,000. Of the total to be provided, 30 were sent by the end of December 1979, and the others were to come later.

With the destruction to the bridges, ODA offered to allow use of £ 2 million of the £ 10 million agricultural loan for the reconstruction fund. Initially the GRZ was interested in this but later changed its mind on the basis that such a practice could result in a run on the agriculture loan by other ministries who felt that they also had emergency needs.

In 1977 ODA provided funding for a feasibility study on the Kafue Rail Bridge. Implementation of this study has been complicated by security considerations, and it was not until March of this year that personnel were allowed into the area to take pictures and begin the study. The study will cost £ 320,000 and should be done in nine months or by about December 1980. There is a good chance that the costs of implementing the findings of the study will be carried by ODA, but there is no commitment at this time. The IBRD has been informed of this probable development, but they understand the flexibility involved. There are several options to be considered:

1. A completely new bridge may be needed.
2. A new site may have to be selected.
3. The old bridge may be able to be repaired.
4. Track on each side of the bridge may also need to be either replaced or relaid.

In March 1978 ODA consulted with the GRZ on the possibility of support for Zambia Railways. At that time the Government presented an initial "shopping list" of about K37 million (US\$46,250,000) for spare parts and equipment. ODA was probably thinking in terms of £ 10 million but would make no commitment. Neither party seems to have pushed concluding negotiations, and it is uncertain whether or not negotiations will proceed.

SWEDISH INTERNATIONAL DEVELOPMENT AGENCY (SIDA)

SIDA devotes its assistance to rural development programs, including agriculture, education and health. Assistance for the transport sector has been very selective, usually on the basis of special allotments, but the Zambians have also used a major portion of import assistance for commodity purchases related to transport. Assistance by SIDA is partially tied to Swedish commodities, etc., but this is very flexible and rather generous in actual practice. Present assistance for transport is intended to meet the current transport crisis; additional assistance for transport in Zambia is not expected except for import assistance.

SIDA is concerned about communications between donors and is interested in multidonor cooperation in project design, implementation and funding.

TRANSPORT

Previous assistance to the transport sector has included:

1. Assistance for construction of the TANZAM Highway.
2. The purchase of trucks to be used by Contract Haulage.
3. The purchase of 260 freight wagons and 20 some tank cars for a total of about 280 wagons. All of these have been delivered and are in use.

Present assistance includes:

1. Assistance for the purchase of 300 new wagons with a total value of about US\$15 million. These wagons are being assembled in Zambia with parts made in Sweden by AGV. The scheduled completion date for assembly is mid-1981.

2. During the conference on the Benguela reopening, SIDA pledged US\$1.5 million to Zambia (also the same amount to Angola) to assist with the costs of reestablishing service over this line. It was initially suggested that this be used for the purchase of rail wagons, but SIDA felt this was not the best use of the funds. In the end this amount has been used to purchase badly needed spare parts for G.E. locomotives from the USA. At that time 40 of the total 65 locomotives were out of service. These parts have been ordered and should be arriving soon.

3. With the maize crisis last year SIDA offered the services of a special transport consultant who gave particular attention to road transport. His report suggested

assistance to Contract Haulage. SIDA has extended US\$1.5 million. This is to include 4 trainers to be provided by Volvo, spare parts, physical facilities and tools. Although special attention is to be given to restoration of Volvo trucks, training will prepare mechanics for repairs for all kinds of equipment. The project will cost more than the US\$1.5 million allocation, and it is expected that some of the annual import assistance provided by SIDA will be used for some of the purchases necessary to implement this project.

Projected Assistance:

SIDA provided assistance for an overall survey of the transport sector in Mozambique and expects that it will be involved in follow-up projects resulting from this survey. They are very interested in the idea of a regional project focusing on Zambian/Mozambique transport and would welcome multidonor cooperation in funding such a project. Specific mention was made of storage and handling facilities.

UNITED NATIONS CONFERENCE ON TRADE AND
DEVELOPMENT (UNCTAD)

In conformance with resolutions 63(111) and 98 (IV) of UNCTAD calling for compliance with the general United Nations program of assistance for land-locked developing countries, UNCTAD initiated the Preparatory Assistance Mission in Transit Transport for the Land-Locked Southern Africa Sub-Region. This was financed by the UNDP since UNCTAD has no independent program budget. The main objective of the mission was to survey the transit transport system in Southern Africa, to analyze transit transport costs, to assess major system bottlenecks and to recommend future work. Included in the draft report for this mission was a regional follow-up project with an estimated cost of US\$1.3 million.

As a direct extension of this project, UNCTAD began a special port clearance project for Dar es Salaam. Cargo with green marking indicating a destination in Zambia had in many cases lost documentation. All cargo with such markings was gathered and shipped to Lusaka. If no further identification of consignee or purchaser could be found, the cargo was then put up for auction. The project began in June and by the time traffic was disrupted by the bombings of the Zambian bridges in the fall, nearly all had been eliminated. Congestion has since returned. UNCTAD is currently studying methods used and by Rene Pena in Chili for Bolivian cargo as a means of expediting shipping for Zambian cargo. Application of this technique to the situation in Dar es Salaam could significantly open the port for Zambian and other traffic.

ANNEX II

BRIDGE STATUS REPORTS

ANNEX II

BRIDGE STATUS REPORTS

Commando raids during October and November, 1980 by Rhodesian security forces left eleven bridges (nine road and two rail) either damaged or destroyed. Included were:

1. The Kaleya Road Bridge
2. The Chongwe Road Bridge
3. The Lunsemfwa Road Bridge
4. The Lunsemfwa Rail Bridge
5. The Chambeshi Road Bridge
6. The Chambeshi Rail Bridge
7. Two Road Bridges near Runfunsa
8. Three Road Bridges on the Chirundu Road

(See Figure 6, Zambia: Location of Damaged Road and Rail Bridges.)

The GRZ was concerned about both the cost of repairing these bridges and obtaining the materials necessary to make the repairs. The preliminary estimate of costs for repairs of these bridges was about US\$18.3 million. (See Table 34, Zambia: Estimated Cost for Road and Rail Bridge Reconstruction.) Of this amount the GRZ had received pledges by mid-December for US\$7.5 million from various international sources. A special fund was also established to receive contributions from parastatals and private organizations. This fund was targeted for about US\$1.9 million, leaving a deficit of about US\$8.9 million. By February 7, 1980 the GRZ reported that it had received private contributions alone totaling over US\$2.5 million from subgroups as labor unions and community organizations. The following reports provide an update of damage and progress with repairs on the basis of information provided by the Ministry of Power, Transport and Communications and by Contingency Planning.^{1/}

^{1/} There are indications that repairs are also needed for the road link over the Kariba Dam and for the Victoria Falls Bridge. Estimates for the cost of these repairs are not available, but the cost could be high. Since these repairs are not essential to the restoration of traffic to mid-1979 capacity and are not directly connected with the commando attacks in the fall of 1979, they are not given further consideration in this report.

Figure 6. Zambia: Location of Damage Road and Rail Bridges.

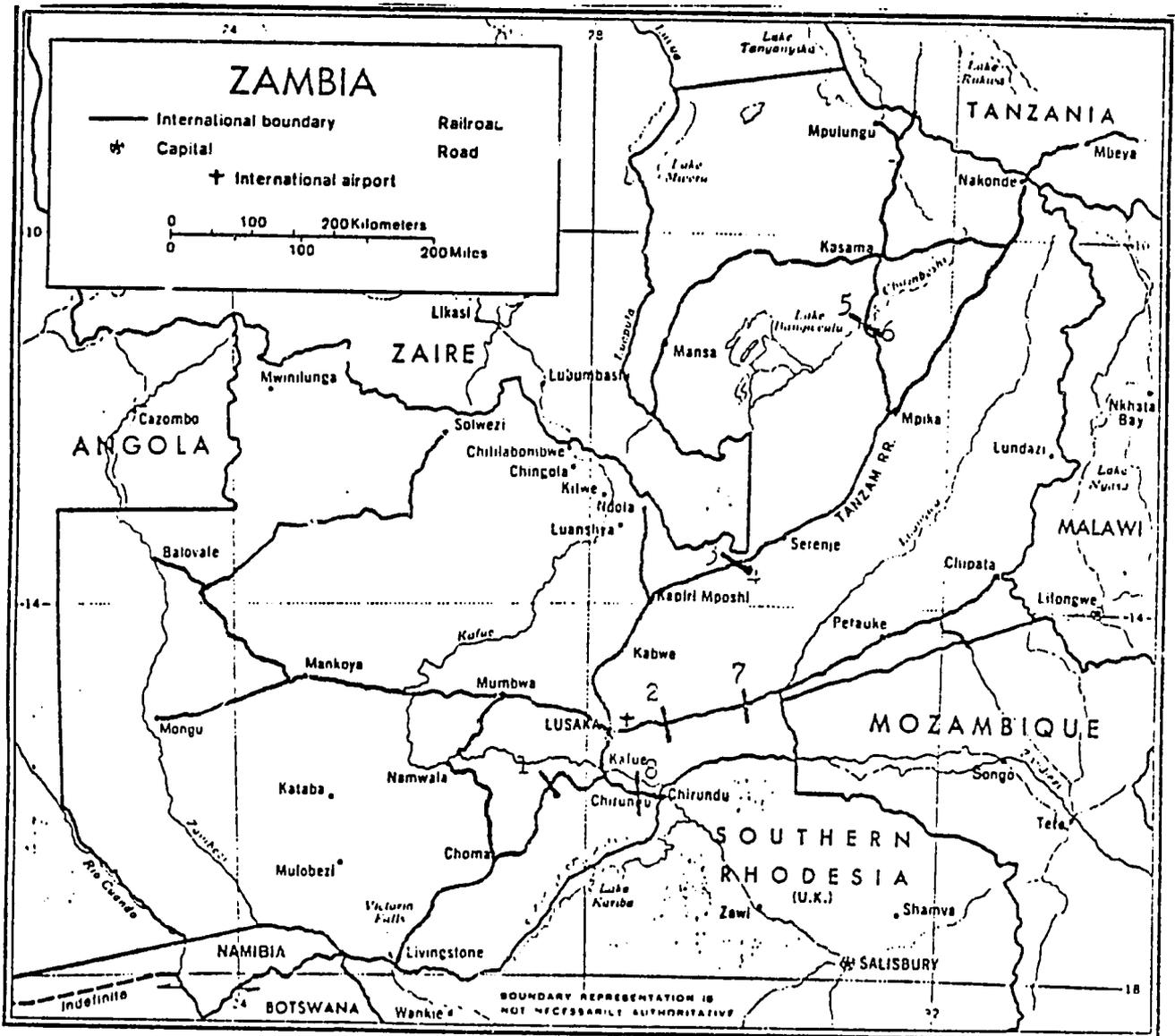


Table 34. Zambia: Estimated Cost for Road
and Rail Bridge Reconstruction
December 1979

	<u>Kwacha</u>	<u>US\$</u>
1. Kaley Road Bridge	1,020,104	1,275,130
2. Chongwe Road Bridge	493,526	616,907
3. Lunsemfwa Road Bridge	1,025,271	1,281,589
4. Lunsemfwa Rail Bridge	324,000	405,000
5. Chambeshi Road Bridge	2,992,500	3,740,625
6. Chambeshi Rail Bridge	3,442,000	4,302,500
7. Runfunsa Road Bridges	90,000	112,500
8. Chirundu Road Bridges	1,666,350	2,082,938
Sub-Total	11,053,751	13,817,189
15 percent for preliminaries and general items	1,658,063	2,072,579
Sub-Total	12,711,814	15,889,768
15 percent for contingencies	1,906,772	2,383,465
TOTAL	14,618,586	18,273,233

BRIDGE DAMAGE

STATUS REPORT

December 6, 1979

1. Kaleya Road Bridge

This bridge is south of the Chirundu Road turn-off on the Lusaka-Livingstone road which is not only one of the two road links to Southern Rhodesia, but is also a key access route to the Southern Province. Moving stocks of maize stored in this area to mills in the Copperbelt will be restricted by this outage. A contract has been awarded to a local private contractor for reconstruction at an estimated total cost of US\$1.3 million. A temporary bailey bridge and dirt road by-pass are planned. (See Figure , Zambia: Kaleya Bridge Damage.) The projected completion date is April or May.

2. Chongwe Road Bridge

This bridge is just east of Lusaka on the Great East Road which is the major link to Malawi. A bailey bridge and dirt road by-pass are believed completed and traffic should definitely be flowing over this route by the end of the week if not already. Capacity is not available, but the by-pass is expected to withstand normal rains. A contract has been awarded to a local contractor for reconstruction. Total cost is estimated at about US\$617,000. The projected completion date is April or May.

3. Lunsemfwa Road Bridge

This bridge lies on the Great North or TANZAM Highway between Kapiri Mposhi and Mkushi at the Lunsemfwa River crossing. This is a key road link to Dar es Salaam. A bailey bridge and dirt by-pass road are planned and they are expected to hold up under normal rains. A contract has been awarded to a local contractor for reconstruction estimated at about a total cost of US\$1.3 million. The projected completion date is April or May, but heavy rains could delay completion.

4. Lunsemfwa Rail Bridge

This bridge over the Lunsemfwa River is located on the TANZAM Railway between the end line terminal connecting with Zambia Railways at Kapiri Mposhi and Mkushi. The bridge is composed of three spans each of which is 60 meters long. The two central piers were damaged and need to be completely reconstructed at an estimated cost of about US\$400,000. Repair

costs could escalate to about twice this figure if the girders which are in usable condition get damaged during off-lifting. The Chinese will be repairing this and the Chambeshi Rail Bridge. Until the repairs are completed, offloading for TAZARA, upon the completion of temporary repairs to the Chambeshi Rail Bridge, will take place at Mkushi. Construction may be delayed by high water until March.

5. Chambeshi Road Bridge

This bridge over the Chambeshi River is a key link between Kasama and the Great North Highway. For the time being, road traffic will be diverted to pontoon ferry. The road bridge will be temporarily repaired with a bailey bridge, and a temporary rail link for TAZARA will be run over the bridge. Restoration of the road bridge will follow reconstruction of the rail bridge at an estimated cost of US\$3.7 million.

6. Chambeshi Rail Bridge

This bridge over the Chambeshi River is on the main line of TAZARA Railways between Kasama and Mpika and is a vital link between Zambia and Dar es Salaam. The bridge is composed of 5 spans each of which is 48 meters long. Three spans, or about 150 meters, were damaged cutting all rail traffic. Resumption of traffic over this route is of prime importance to Zambian survival. The Chinese have agreed to rebuild the two rail bridges and presumably the Chambeshi Road Bridge later on. As soon as a protocol agreement is signed by the three parties--i.e., Zambia, Tanzania, and China--a ship will sail from Shanghai. The ship is reportedly all loaded and will take two to three weeks to arrive at Dar es Salaam. The basic strategy is to restore communication immediately (the projected date is mid-December) by making a temporary repair to the road bridge with a bailey bridge and then running a temporary rail line over the road bridge. The capacity for weight will be restricted so locomotives will not cross the bridge, but rather train wagons will be uncoupled from the locomotive, shunted across for each side and then recoupled to a locomotive on the other side. It is not certain what effect this will have on the number of wagons in a train or the weight of each wagon load, but capacity will be reduced. The cost of permanent repairs is estimated at about US\$4.3 million. Offloading will be done at Kasama for transfer to truck over the pontoon ferry to the TANZAM Highway until traffic over the temporary rail on the road bridge begins.

The offloading will also take place at Mkushi until the Lunsemfwa Rail Bridge is opened. Work is scheduled for three shifts a day or 24 hour non-stop construction, but the projected date of completion is not certain.

7. Runfunsa Bridges (2)

There are two large culverts that have been damaged on the Great East Highway connecting Lusaka and Malawi. A contract is to be let to a local contractor. Assessment of the damage, estimated at about US\$113,000 has been delayed by security considerations.

8. Chirundu Bridges (3)

There are two bridges and a large culvert that have been damaged on the Chirundu Road to Salisbury. This is the other of the two road links to Southern Rhodesia and is also a key to access to and from the Southern Province. The Chirundu Road also is the route to the Kariba Dam. There is a road over the dam which rejoins the road to Salisbury about 50 kilometers south of the border. Vital security interests are involved in this route. Bailey bridges with temporary dirt road by-passes will be used and the culvert repaired. Total estimated cost of permanent repairs is about US\$2 million.

BRIDGE DAMAGE

STATUS REPORT

January 1, 1980

1. Kaleya Road Bridge

The temporary by-pass has been completed. It is expected that the route will not be affected by normal rainfall but capacity is not certain.

2. Chongwe Road Bridge

The capacity of the bailey bridge is 50 metric tons. Zambia has been pushing capacity with loads of up to 70 metric tons, but so far the bridge has not shown signs of stress.

3. Lunsemfwa Road Bridge

Installation of the 80-foot bailey bridge and construction of the dirt road by-pass are underway. A reported shortage of steel and cement may delay work on reconstruction of the permanent bridge.

4. Lunsemfwa Rail Bridge

Work reportedly is underway or about to start. Estimated completion date remains March.

5. Chambeshi Road Bridge

Currently serves as rail by-pass for TAZARA. Problems have developed with the pontoon ferry (see December 28 report) complicating offloading at Kasama.

6. Chambeshi Rail Bridge

Rail traffic is passing on the temporary rail by-pass over the road bridge. It is hoped that 80 percent of capacity can be reached, but this remains to be seen. Completion of the permanent repairs to the rail bridge is projected for May. Capacity over the route may be as low as 25 percent.

7. Runfunsa Bridges (2)

The mid-sections of the culverts have been destroyed, but traffic can move over the route by using the shoulder of the road; speed over the culverts obviously is limited. Estimated date of repair is by the end of January or early February. The cost of repairs remains as estimated in December, 1979.

8. Chirundu Bridges (3)

Information about traffic over this route remains uncertain, but the bailey bridges may be in place.

BRIDGE DAMAGE

STATUS REPORT

January 30, 1980

1. Kaleya Road Bridge

The bailey bridge and by-pass road are holding up, and maize has been passing north over this route. Construction of the two central piers has been completed. The materials for the main superstructure and surfacing are available. Minestone is the contractor and still projects a completion date of April or May.

2. Chongwe Road Bridge

Construction has begun on permanent repairs by local Yugoslav company, Partinziskput Zambia Ltd. They are clearing the debris and beginning construction on the piers. The projected completion date is still April or May, but reports of high water could delay the reconstruction until June.

3. Lunsemfwa Road Bridge

Installation of the bailey bridge and construction of the dirt road by-pass has been completed and traffic is moving over the route. Milestone is finished with construction of two piers and steel girders are in place. After casting of top section, concrete will have to cure. Project could be finished by the end of April.

4. Lunsemfwa Rail Bridge

Considerable progress has been made and the re-opening is ahead of schedule. The piers were reported ready by January 26 and finishing of the top was scheduled for the end of January. The first trial train is to run the first week of February with subsequent opening of the line by the middle of the month. (See Figure , Zambia: Lunsemfwa Rail Bridge.) This will restore traffic flow from Dar es Salaam so off-loading at Mkushi will be stopped.

5. Chambeshi Road Bridge

Permanent reconstruction of the road bridge will have to wait until after the rail bridge has been repaired. Then the

temporary rail line will be removed from the road bridge. This will not happen until fall. Then the bailey bridge can be removed and work begun on the reconstruction. Completion of repairs would not be finished until late 1980 or early 1981. Meanwhile, they will continue to use the pontoon ferry. A new pontoon ferry provided by Germany (FRG) has been in place since January 20 and is assumed to be in operation.

7. Runfunsa Bridges (2)

Repairs to the culverts are underway and in fact may actually have been completed.

8. Chirundu Bridges (3)

The culvert has been repaired and the two bailey bridges are in place. No immediate activity planned for permanent reconstruction, and bailey bridges will remain in use probably until next year.

Chambeshi Pontoon Ferry

February 22, 1980

Operation of the pontoon ferry serving road traffic at the Chambeshi crossing has apparently been complicated by overloading resulting in propeller damage. A visit to the area by TDY Food for Peace Officer Schayes revealed that one of the two propellers was broken. Spare parts were reportedly in-country and the pontoon was to be operating at full capacity early the next week (capacity of 45 metric tons). Operation was during daylight hours and it took 10 minutes to make the crossing.

On February 9, 1980 an FRG engineer attempting to cross by the ferry reported that again one of the propellers was out. Only cars were able to cross on the ferry, and there were over 50 trucks waiting to cross the river. As it was, the ferry drifted downstream and offloading could result in vehicle damage. Repairs were estimated to take at least a week.

It was subsequently determined that it was again the old ferry which was out of commission, and that the use of the new ferry, with only a 40 metric ton capacity, was being delayed by the need to construct a docking ramp. The propeller had in fact dropped into the water and was yet to be recovered. Certain parts had been broken and would have to be made in order to reassemble the propeller on the motor shaft once it was recovered. The main motor, moreover, also needed replacements. The decision was made, therefore, to concentrate efforts on building the landing ramps for the new pontoon ferry. The projected date for operation of the new ferry was shifted to February 22, and permission was obtained to use the ferry without first having the usual ribbon-cutting ceremony. Local officials of commercial food and beverage suppliers in Kasama were running low, and transport of maize was slowed by the outage. Local officials were concerned that overloading might cause damage to the new ferry and were discussing keeping a strict control on the 40 ton capacity limit of the ferry. This is 5 tons less than the capacity of the previous ferry, and it would mean a serious constraint on offloading and transport to and from Kasama.

(Operation began March 10/11.)

BRIDGE DAMAGE

STATUS REPORT

March 14, 1980

1. Kaleya Road Bridge

Materials for completion arrived on schedule as projected. Work has been progressing rapidly, and they are presently working on the deck composed of steel beams and concrete slabs. They hope to complete work on the bridge by the end of April. The design of this bridge represents an improvement over the old bridge, as is true of most of the reconstruction projects. Uniformly, weight is limited throughout Zambia to 50 metric ton capacity, but this bridge would certainly hold 70 metric tons.

2. Chongwe Road Bridge

The contractor has just started working on the deck slab for the bridge. The current at this point in the river is very strong, the result of two or three bends in the river upstream. The work has been delayed by high water as well. Completion is now believed not possible before some time in May.

3. Lunsemfwa Road Bridge

Work has proceeded quickly on this bridge. It is hoped that the bridge will be open in two weeks time. All that remains now is some touch-up work. (Usually allow minimum of 21 days for curing of concrete but prefer to wait full 28 days.)

4. Lunsemfwa Rail Bridge

The work was completed and the bridge was opened to traffic early in February.

5. Chambeshi Road Bridge

Nothing more has been done about repairs for this bridge. A preliminary engineering survey was made, but a final evaluation will have to wait until the rail line is removed. Additional stress may have resulted from running the trains over the bridge and there could be additional damage from removal of the temporary rail line and bailey bridge serving

as a patch. It is even possible that it will be necessary to completely relocate the bridge.

6. Chambeshi Rail Bridge

The status remains as reported January 30, 1980.

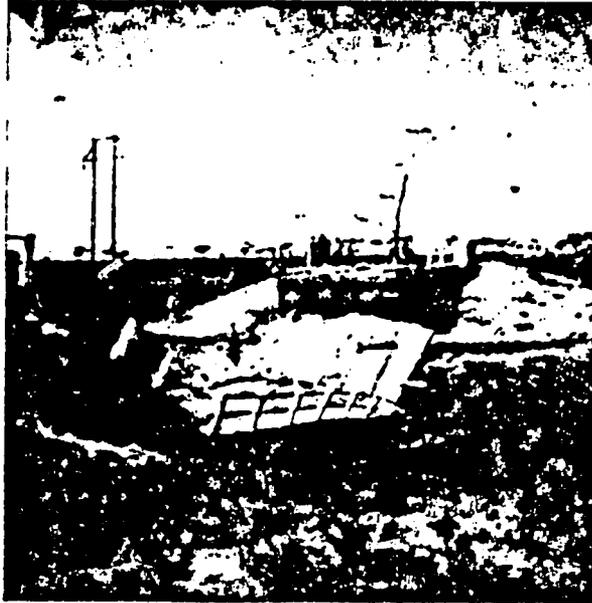
7. Runfunsa Bridges (2)

Work completed and traffic passing without any problems. (New culverts were installed by provincial crews.)

8. Chirundu Bridges (3)

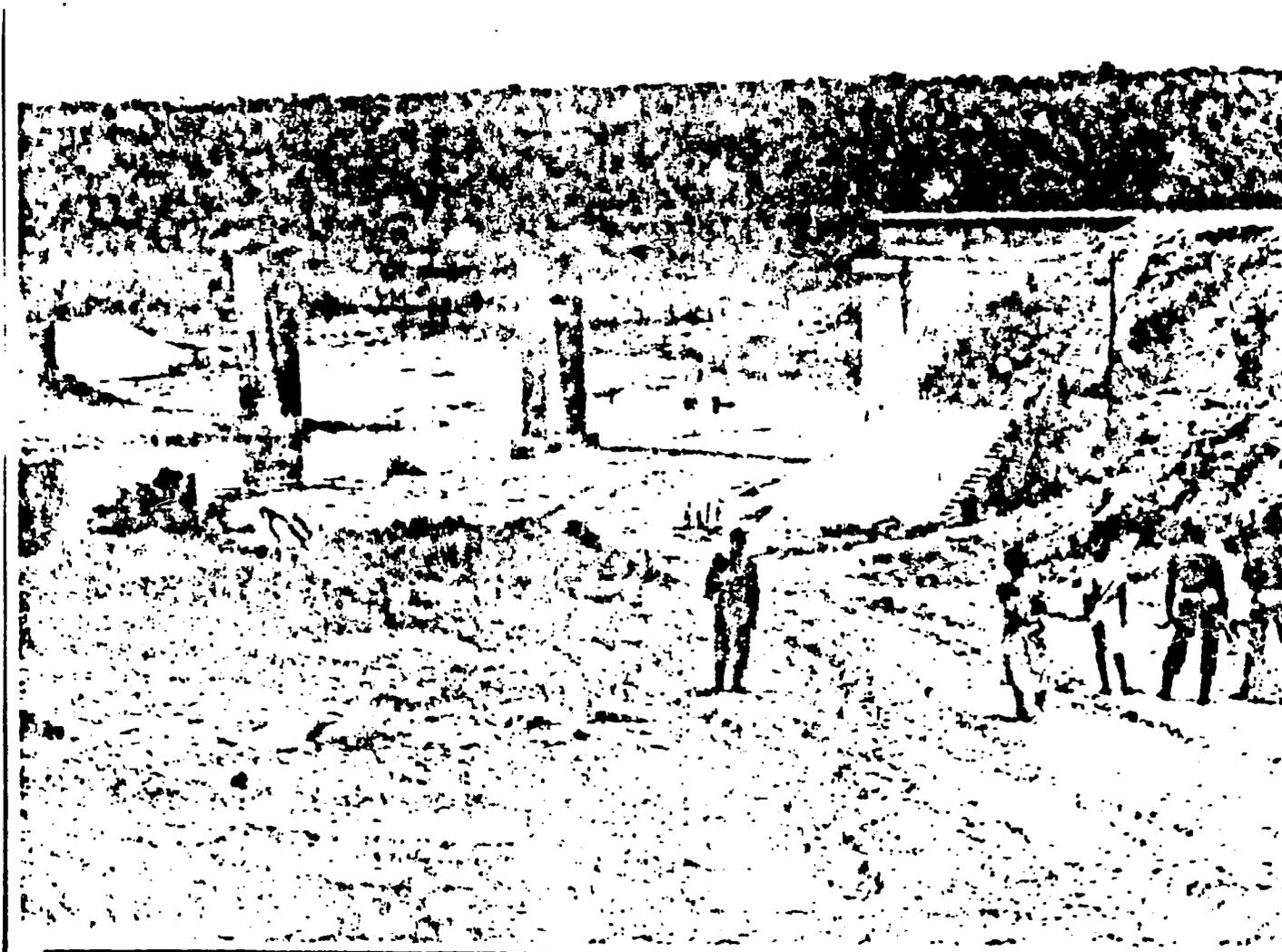
Effective March 8, 1980 work has begun on repairing the culvert and two bridges involved. Minestone is doing the work and hopes for completion within 24 weeks or some time in August. Work is to be done in a staggered manner. A dirt by-pass will be constructed for the culvert and then a new culvert will be set in place. Dirt by-passes linked by bailey bridges will also be used for the bridges. The bailey bridge now in use at Lunsemfwa will be set into place at the diversion for the first bridge and the bailey bridge presently in place will be removed so construction can begin. Meanwhile, they will take the removed bailey bridge and set it in place at the diversion for the second bridge. Then they can remove the bailey bridge in place there and begin construction at the second site.

Figure 7 . Zambia:Kaleya Bridge Damage,



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Figure 8. Zambia: Lunsemfwa Rail Bridge



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ANNEX III
FIELD TRIP/INSPECTION REPORTS

No. M-5

MEMORANDUM

February 5, 1980

TO : John A. Patterson, AID Representative, Lusaka
FROM : Philip Moeller, Transport Advisor
SUBJECT: Field Trip/Inspection Report # 1

A. Lunsemfwa Road and Rail Bridge

Background: (See Annex II, Bridge Status Reports)

(1) Rail Bridge: Although we were unable to see this bridge we had been told in Lusaka by Mr. Kaira, Assistant Director of Contingency Planning, prior to our departure from Lusaka that the bridge would be ready for a trial run the first week of February. We were surprised to hear this because earlier reports indicated that construction had been delayed by high water. During the visit to the Mkushi depot we observed that the trial run was chalked on the schedule board for any time.

(2) Road Bridge: We were able to view the new road bridge under construction as we passed over the temporary bailey bridge. The quality of the construction seemed to be of high standard. The piers had been poured and the main deck remained. Only a limited amount of concrete was visible and there was little activity on either crossing. Once the forms have been placed and the concrete poured, it should take a month for the concrete to cure. Assuming the availability of materials--an uncertain assumption--the bridge could be completed and ready for use by the end of March, 1980, well within the projected completion date. Soldiers may have been guarding the area but no security provisions were visible.

B. Mkushi Rail Depot

Background: (Ref: Schayes Memo of January 9, 1980)

Following the destruction of the Chambeshi road and rail bridges on October 11, 1980, NAMBOARD and Contingency Planning decided to initiate railwagon offloading at Kasama for transshipment via trucks. Priority was to be given to the offloading of Title II maize from Tanzania.

It was subsequently decided to shift offloading to Kasama. It was originally estimated that 39 wagons per day could be offloaded at Mkushi. In fact, average daily offloading was between 6 and 8 wagons. (See February 1980 memo by Schayes for details ref PL 480.) By the time Schayes returned with Johnson and me to inspect the facilities, all offloading had been shifted to Kasama. The following observations were made concerning depot facilities.

(1) The Rail Station: We met with Mr. Mushani, the Station Master, and briefly toured the Station. It is equipped with a standard control board for the main line and sidings. Some of the wiring appeared Jerry-rigged and we did not have an opportunity to observe the board in use. Security operations were under the supervision of an army officer. Several soldiers were present, but it was only later that one appeared in the yard with a rifle on guard.

(2) The Yard: In addition to the main line and bypass, there are two sidings running parallel to the warehouse and unloading platform. The concrete sleepers have some surface cracks but are sound, as is the road bed.

(3) The Warehouse/Platform: There is a metal and concrete warehouse with an estimated interior floor space of about 300 square meters. The building is on a raised concrete platform facilitating offloading from the train wagons directly into the warehouse on one side and onloading into trucks from the warehouse on the other side. The platform provides exterior space of about 550 square meters. A ramp along one edge enables trucks to mount the platform for direct offloading from the rail-wagons into the trucks. Capacity for this operation would probably be limited to no more than 2 or 3 trucks, however. There is no concrete storage pad or loading apron along side the siding beyond the warehouse platform. Trucks using this area had formed ruts which had caught water and blocked the drainage ditch.

Offloading: Although, admittedly, activity had slowed as a result of the shift to Kasama, while we were there only one railwagon was unloaded. There were, however, 55 trucks parked around the warehouse. These were tandem wheeled, four-axle trucks plus trailers (Volvo/Bauer Boln 15-18 tons) with load capacities of 45 tons. The majority of workers were gathered around on offloading further down the siding where a crane was being used.

Comments: The Station was adequate for normal traffic flow but was not designed to handle contingency operations as projected by NAMBOARD and TAZARA. Offloading operations were probably more of a limit on capacity than the facility itself which under optimal conditions could handle the offloading of 18-20 wagons of bagged cargo per six-hour shift. Use of this facility to handle increased volume over the average offloading of 6 to 12 cars per day would require improved coordination and management as well as improved supervision of the offloading operations.

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No. M-6

MEMORANDUM

February 6, 1980

TO : John A. Patterson, AID Representative, Lusaka
FROM: Philip Moeller, Transport Advisor
SUBJECT: 2/5 Field Trip Inspection Report No. 2, Bwana Mkubwa

BACKGROUND:

Bwana Mkubwa, taken in conjunction with the adjacent city of Ndola, is the major distribution center for the Copperbelt. The high percentage of the population engaged in industry and mining results in a major flow of food stuffs and consumer goods into the area. The provincial depot for NAMBOARD for the Copperbelt is located in Bwana Mkubwa as are several milling facilities. (See memo Schayes, January 29, 1980; Johnson, February 13, 1980.)

A. NAMBOARD

The NAMBOARD depot consists of an elevator complex with 20 silos with a combined capacity of 20,000 metric tons as well as storage and loading areas served by rail. The facility was built through assistance by Yugoslavia, and was designed to handle bulk shipments of maize. Deliveries by rail wagon are fed into the silos which then can dispense back into rail wagons or into trucks specially designed for bulk haulage. The silos are aligned in pairs with a conveyor belt/elevator system providing top loading and discharge through bottom hoppers. There is a central system for fumigating the silos, discharging grain dust, and for sieving foreign matter out of the maize; a central light board/control panel facilitates operation.

According to Mr. Kabwe (senior depot administrator for grain), the silos have begun to show structural stress; the extent of the problem could not be adequately assessed during our visit but seemed a minor consideration. Mr. Kabwe told us that there have been problems with the fumigating system for several months. The most serious problem is the result of an internal explosion in the conveyor belt/elevator system on December 10, 1979. The cause of the explosion has not yet been determined but it does not appear to be sabotage. There is a possibility that the blast was related to some welding which was in process.

The epicenter of the explosion seems to have been the fourth floor. The explosion carried over to adjacent floors, mainly 3 to 7, and there is no evidence of a confined blast such as would have resulted from a bomb. The force of the explosion was quite strong as shown in the stress on the steel welded sheathing for the belt system; once it had been square, now it is round and twisted apart. The bolts through the rubber belt were stripped in the explosion causing most of the buckets to fall off the belt.

The belt does not seem damaged but major portions of the belt are not visible for inspection. The blast shattered the windows in the stairwell and on most floors. No engineering assessment has been made of the damage, and most of the damage remains as found after the explosion. Once work is begun on the repairs, it could easily take nine months or a year. Clearly the facility will not be ready for the 1980 harvest, and it could be a year or even two before the repairs are completed.

The loading/storage area next to the silos consists of covered sheds and raised concrete storage platforms. There are two large truck scales for weighing in empty trucks and weighing out loaded trucks. The crews were loading bags on to truck/trailer units which weighed about 15 to 18 tons empty and about 60 tons loaded. Loads are kept under 45 tons in order to be within the 70-ton capacity of most small bridges. Both scales are not being used and it is not certain that both are operable. The weights are automatically printed on a card. The ribbon is worn out so the date is logged from a carbon copy. Bagged fertilizer is being held in sheds and there is a small amount of bagged maize. With the conveyor belt/elevator out of order, the depot has had to shift to bagged corn. In order to unload one wagon it takes a crew of eight to ten (the inclusion of a counter and sweeper adding an extra two workers), one hour with the aid of a mechanical stacker (there are eight stacking machines). Fork lifts are used only to lift rolls of jute bags.

B. National Milling Company

We toured the mill complex with Mr. Gupta, the chief engineer. The Facility operations were restricted by various factors. Primary among these were the overall reduction in monthly allocations and the shift to bagged maize necessitated by the explosion at the NAMBOARD depot. Again, they are used to receiving bulk shipments of maize directly from NAMBOARD by rail wagon or by the specially designed bulk trucks.

Now they are having to divert trucks usually used to distribute ground maize to wholesalers to maize pick-up from NAMBOARD. This has upset the usual marketing patterns and NMC is selling to whoever has transportation. The use of bagged maize is also disrupting feeding maize into the milling machine. As a result of these problems, the mill is operating at about 82% capacity and closes early each day. This is an improvement over average rates for December and January of 50%. Total capacity is 2,800 bags a day (250 metric tons). Since this is an average, there were some days when there was hardly enough maize to work the mill. The equipment is relatively new and in good repair. Internal management seems efficient except where constrained by the above mentioned transport constraints.

PM:ch

cc: PRC 3
Chron

No. M-12

-153-

MEMORANDUM

February 19, 1980

TO : John A. Patterson, AID Representative, Lusaka

FROM : Philip Moeller, Transport Advisor

SUBJECT: Field Trip/Inspection Report # 3:
Kabwe, Kapiri Mposhi

Departed at 0700 hours for day trip to visit headquarters of Zambia Railways (ZR) and the end of line terminal facilities for TAZARA.

I. Kabwe:

The morning was spent in Kabwe discussing problems and needs of ZR with Dick Veenis, Assistant to the Director and also currently Acting Director of ZR, and other staff members. Mr. Veenis is one of eight expatriates supported by assistance from CIDA. This assistance was to end on February 10, 1980 but has been extended to June 30, 1980. It is expected that the assistance program will not only be extended for another year or two, but will also be expanded to cover the costs of 15 staff members. I also met with other members of ZR including Bernard Chewe, Operations Manager, Ernest Ntalasha, Chief of Transportation, Herbert Mununkha, Chief of Yards.

We began our discussion with an overview of the IBRD Railway III Project. This project will basically cover the majority of investment needs for ZR for the next five years. It will provide for improvement of 112 kms. of rail north of Livingstone, new communications systems, equipment maintenance, and additional wagons and locomotives. The immediate need for locomotives is pressing. Wagon turnaround time is more serious than the number of wagons available.

Management is a particular problem. In part this stems from peer pressure on those in supervisory positions. Rotation to new sites upon the receipt of a promotion is not feasible. Supervisors, in many cases, were once on the same level as those they now oversee. They still live in the same house and want to keep the "good guy" image. In general, there is little motivation to perform and discipline is lax. Efforts to correct this during my visit had resulted in a temporary suspension of over 240 personnel. Major traffic movement through the system had also been seriously disrupted.

The UDI by Southern Rhodesia came without a settlement of unitary system assets. This remains to be effected. The opening of traffic through Southern Rhodesia has helped ZR in that locomotives and cars from the RSA have been sent north to help Rhodesian, Zambian and Zaire Railways. These are on loan in some cases on a two-week recall basis.

An inspection of the yard showed both layout and control mechanisms. The yard has one main line, with 15 sidings and 15 short segments for individual warehouses. Yard control is effected through an accounting system with wagon numbers, load and origin logged on cards filed according to each line. Wagon departures are fed into a computer and hand-logged as well. The printouts appear once or twice a week and are usually 10 and sometimes 30 days backlogged. (For a copy of one of the line cards, see Table 1.)

Under the new IBRD project there will be a new CTS for yard and line/block control. As it is now, only a portion of the yard is on the automatic board. Access is restricted to the main sidings by a relay switch in the yard which must be pressed in order for the control tower to be able to throw a switch. Inspection of one of these remote control boxes, however, revealed not only that the box was not locked, but also that the phone used for communication between the switch and the tower had been stolen.

Management and operations have been major problems, and efforts are presently underway to standardize procedures. A special manual is about to be published which will provide a guide to standardized procedures including documentation. Prior to receiving specialized training, all workers go through a basic orientation and training period to familiarize them with the basics of rail management and operation.

II. TAZARA, Kapiri Mposhi

The afternoon was spent touring the terminal yard for TAZARA at Kapiri Mposhi. The yard has 11 sidings, 5 of which are on the control board. Two different links connect with ZR depending on whether transit is for Ndola or Lusaka. Locomotives from ZR pick up wagons at this point brought by TAZARA locomotives. Going in the other direction, the process is reversed.

It takes about 43 hours for a regular train to reach Dar es Salaam. An express train makes the trip in 36 hours. Most trains used to have 20 cars, each of which weighed 13 to 18

tons and carried an average weight of 43.5 tons. Because the bridge is out at Chambeshi, trains have been cut to 15 to 16 cars. Because of the labor problems on ZR, there were five trains waiting for pick up by a locomotive from ZR.

When a train is seeking access from one system to the other, clearance is supposed to be obtained. There is a phone line connecting Kabwe and Kapiri Mposhi. The yard man of Zambia Railways--who had never seen the TAZARA facilities--was ~~amazed to learn that the phone provided access by TAZARA to~~ Kabwe but not vice versa. Trains sometimes arrive from ZR and have to wait until they can be picked up at the home signal between the two railroads.

Yard control is maintained by log cards similar to those used by ZR plus a glass sheet on which wagon numbers are logged.

The process is less complex than the one used by ZR and is less effective.

PM: ch

cc: PRC 3
Chron

Z. R.

YARD CHECK

Form No. 13/8839

ROAD No.

Foreman

Time

Date

	Int.	Type	Number	From	To	Consignee	Load	Contents	Shunt To
1									
2									
3									
4									
5									
6									
7									
8									
9									
10									
11									
12									
13									
14									
15									
16									
17									
18									
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21									
22									
23									
24									
25									
26									
27									
28									
29									
30									
31									
32									
33									

TZR SHUNTING LIST T.F.7

Date _____ Marshalling
 Train No. _____ Break up
 Shunting Loco No. _____ Scheduled

From _____ hrs _____ min
 To _____ hrs _____ min

Serial No.	Track No.	Wagons to be attached	Wagons to be detached	Remarks
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				
17				
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19				
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21				
22				
23				

No. M-16

-158-

MEMORANDUM

March 1, 1980

TO : John A. Patterson, AID Representative. Lusaka
FROM : ^{for} Philip Moeller, Transport Advisor
SUBJECT: Field Trip/Inspection Report #4
Dar es Salaam, Tanzania

Introduction:

The following report is based on site inspections made February 28 and 29, 1980 in Dar es Salaam. The primary concern of the trip was to assess port conditions but other contacts included:

1. Zambia High Commission.
2. ZTRS.
3. Maritime Forwarders.

Efforts to meet with officials of NMC proved unsuccessful as a result of demands being made by Tanzanian suppliers to negotiate deliveries.

The following comments include general observations as well as specific detailed information obtained during the visit. A general but more comprehensive overview of most of these operations and/or facilities is to be included in the main report for this contract. Considerable support was given by Mr. P. Sorongai (USAID/Tanzania) especially in regard to making preliminary contacts, setting up appointments and obtaining access to the port itself.

I. Airport Facilities at Dar es Salaam

The terminal and hangars at Dar es Salaam are indicative of the marginal investment made by the GOT in recent years and the deterioration of the transport system which has resulted. Facilities are generally congested with inadequate access and handling areas and minimal equipment. The open air hangars offer little protection for aircraft or their repair.

II. Zambian High Commission

I met with Mr. Sinyangwe, the Zambian Trade Commissioner, and briefed him on my mission. He informed me that there was an average arrival of 10,000 tons of cargo a month for Zambia at Dar es Salaam. At present there are 30,000 tons of wheat in port and 30,000 tons of general cargo. He feels the port can transmit 1,000 tons a day.

III. Tanzanian Harbours Authority (THA) and Port Facilities at Dar es Salaam

My visit at the port included direct observation of offloading and cargo handling and discussions with port officials. Panteleo Sorongai was able to obtain direct access for me to the main quay and warehouses.

Observations

A. Warehouses

There are 13 warehouses used for stacking cargo. Congestion varied from warehouse to warehouse but, in general, it was much clearer than previously reported, largely as a result of the UNCTAD project. There was a high rate of cargo damage and many stacks did not have pallets or had damaged pallets. About 75% of the goods were for Zambia. I found bags of both wheat and barley for Zambia; the latter had been offloaded on January 5, 1980.

B. Stacking Ground and Warehouse Access

The areas near the warehouses were cluttered with damaged and transit cargo making it possible to move at certain points only in a single lane one-way. There were 300 Rumanian Brasov tractors for Zambia which were clogging the docks (Rotation No. 082T180). Many of these tractors have flat tires and minor rust was evident. The tracks along the berth side were filled with dirt indicating little use. The same was true for the tracks of certain of the "movable" cranes. Forklift trucks were being used to move cargo, but several out of service fork lifts were evident and the operational approach of drivers using the serviceable ones was not likely to keep them in service long. Drainage seemed good; there was no standing water

and the drains were fairly open. The shunting of railwagons was being done without a flagman or warning of any kind.

Damaged Goods

Drums of chemicals, porcelain fixtures, electric parts, metal parts, plastic containers, glass, etc. were piled in mounds at various points. Some workers were sweeping up spilled grain for disposal and one was removing rubbish, but this was largely token activity.

J. M. Pantel

The majority of trucks owned by a private contractor were Pantel.

Stevedores

Work efficiency was not impressive. Time-motion patterns were very inefficient and a good deal of time was being spent resting.

C. Offloading: Bagged Refined Sugar from S.S. Aglass

I watched the offloading of refined sugar in jute bags fitted with plastic liners (50 kilograms each). The bags were being offloaded in lots of 40 without pallets. The pressure from the ropes was splitting some of the bottom bags. There was about 5 to 10% loss involved. The cranes could unload faster than the trucks could be loaded because:

- (1) There were not enough trucks;
- (2) The crews restacked the whole load so that often only the first lot of bags could be put directly on the truck.

Offloading had been going on for three weeks for 9,000 tons of sugar. Each truck had an 8 ton capacity but was being loaded with 9.1 metric tons. Damaged bags were dropped off the trucks onto the ground. Some of the bags from the ship were also set on the ground until a truck was ready.

Discussion with Mr. Lupato
(Cargo Manager for THA) and Staff

A. Equipment

Although the availability of certain items has increased, in part this represented the writing off of some equipment (see Table 35, Tanzania: Status of Port Equipment, Dar es Salaam, February 29, 1980). There is a particular problem with fork lifts and tractors. The motor boats and lighter towing tugs may be too old to really keep operable and should be replaced. THA would like to increase equipment for container handling including front loaders and larger fork lifts. The lack of spare parts remains a problem.

B. Constriction

The THA would like to purchase a small strip of land behind their storage area which would add possibly 15 to 25% to their total land area.

C. Waiting Time

Waiting time varies with seasonal demand, and daily figures are misleading. There were 5 ships waiting, 12 alongside and 2 at anchor in the harbor. Last week the wait was 17 days and next week they project 6 days. The average wait for 1979 was 3.6 days.

D. Labor Incentives

This is a major problem for port operation and the THA is seeking new approaches. This should be a major area for the attention of donors in the immediate time frame. The basic wage is really good compared to other workers (TSH 600 a month).

F. Bagging

They have 5 vac-u-vators and remove bulk grain to a storage area for bagging and reshipment. NMC has 2 extra. There is little local interest in investment in new silos but they would help operations. I am apprehensive about the rate for bagging in the hold (in an experienced port about 1,000 tons a day can be bagged; a realistic figure will be supplied by telex).

G. Port Charges

Imports are given free storage for four days (excluding Sundays and public holidays) from the date of ship's arrival. Thereafter, until final pickup, TSH 18 per metric ton is charged (rate was 12 in early 1979).

H. Stevedoring Charges

	<u>1979</u>	<u>1980</u>
1. Discharging or Loading	17.50	40
2. For transshipment cargo	17.50	40
3. Cargo loaded to a ship but not accepted carriage and discharged from ship to shore	35.00	80

I. Discharge Rates

The percentage of cargo having pallets or in containers is relatively high, but the discharge rate is low. This is reflective of the poor performance of stevedores. Last year the rate was reported as an average of 500-600 metric tons per gang/ship a day. This year the figure has dropped to 450-500 metric tons.

Future Improvements

Mr. Lupato was uncertain about the status of the IBRD project but believed some contracts had been let. Proposed port expansion includes work on the channel, relocation of the oil jetty, and the addition of two berths. Improvements to the lighterage area is already underway.

Table 35. Tanzania: Status of Port Equipment
Dar es Salaam, February 29, 1980

- A. Fork Lifts
Total of 150 of which 90 to 100 available on daily basis.
AR = 60-65%
60 ordered from Japan and expect another 61, probably from the UK, within 4 to 5 months. 186 of old units completely written off.
- B. Tractors
Total of 90 of which 28 work AR = 31%
- C. Vac-u-vators
5 with 100% AR
- D. Grabs
10 with basically 100% AR
- E. Payloaders
2 with 100% AR
- F. Sideloader
1 with 50% AR
- G. Trailers
159 of which only 80 or about 50% are working. Main problems are tires, suspension system and damaged hitches/tongues.
- H. Prime Movers
9 of which only 2 are working. AR = 22%
- I. Mobile Cranes
49 of which only 21 are working. AR= 43%
- J. Portal Cranes
57 of which 47 are working but of which 34 are still portable.
AR = 82% working
AR = 59% working/portable

K. Lighter Towing Tugs

6 of which 3 are working. Other 3 are in repair, but age of tugs is 16 to 17 years so it is unlikely that availability will improve.
AR = 50%

L. Motor Boats

10 of which 5 working. Other 5 in workshop but age of boats is 16 to 17 years so it is unlikely that availability will improve.
AR = 50%

M. Berthing Tugs

5 of which only 2 are in commission.
AR = 40%

N. Floating Crane

1 with frequent breakdowns. It was out for 3 years but has been reconditioned. Originally it had a capacity of 60 tons but now 45 tons is the maximum it can handle. Cannot rely on this crane being operational. Expectations for a new crane are uncertain.

O. Lighters

59 (3 taken to Tonga)
There are only 14 in service with covers. The others have had problems with warpage of the frames supposed to support the covers and need to be bailed out when it rains.

P. Pontoons

6, AR = 100%

IV. TAZARA

I met with Mr. Mtihire, the traffic coordinator for TAZARA. He was fairly optimistic about operations and felt capacity could be increased. This perspective does not conform with the one presented by the Goundry mission, and I feel there may be a need to adjust the optimism. The discussion covered the following items.

A. Wagons

The number of wagons owned by TAZARA has not increased over that for last year, but Mr. Mtihire reports availability of 90% (as compared to 75% for 1979). He says that this is because:

- There has been a shift to a greater inventory of spare parts.
- The lag in ordering time has been reduced.

The major problem with wagon use, and for the entire rail operation of TAZARA, is turnaround time. This had gone down during the beginning of the month but was up again at the time of my visit. He suggested the use of containers and more offloading at the terminal at new Kapiri Mposhi.

B. Train Schedules

As of March 1, 1980 TAZARA plans to run three regular trains and one pick-up train a day. This represents an additional 750 metric tons a day compared to the month of February (two regular and one pick-up). If the reconditioned Chinese locomotives test out okay, they may be able to do four regular trains a day. (I would discount this optimism.) Passenger service takes 36 hours, but freight takes as much as four days.

C. Capacity

Using the three regular trains at 16 cars x 30 metric tons = 480 metric tons per train for maize; and 16 x 43.5 metric tons for general cargo = 696 metric tons per train.

$$\begin{array}{rcl} 3 \times 480 = 1440 & \times 30 = & 43,200 \\ 3 \times 696 = 2088 & \times 30 = & 62,640 \end{array}$$

(Note these figures have not been adjusted for traffic for Zambia vs. total traffic.)

D. Rates

The rate for maize from Dar to new Kapiri Mposhi is:

TSH 458/90 per metric ton
K 43.80 per metric ton (about US\$55.00)

Rates are fixed except for copper, lead and zinc. The schedule has some 1,870 classifications and is supposed to be reviewed every two years. Application for special contract rates can be made directly to the Board of Directors.

F. Other Issues

Boggies and derailments, communications system and telephone connections with Z-R at Kapiri Mposhi.

V. ZTRS

On February 29, 1980 I met with three of the ZTRS officials in Dar es Salaam and the Assistant General Manager from Lusaka. Included were:

Mr. Kalaluka, General Manager
Mr. A. S. Mastrini, Deputy General Manager
Mr. N. S. Parthasarathy, Financial Manager
Mr. Robert M. Chomba, Assistant General Manager (Lusaka)

ZTRS can handle about 10-12,000 metric tons a month of general cargo, plus the same amount of foodstuffs without any problem. If the rate were favorable enough, they would divert all capacity to food. Total capacity is somewhat flexible because of the use of sub-contractors. They are adding a total of 300 new 30-ton capacity trucks to their fleet this year at a rate of about 10 trucks a week.

ZTRS is sympathetic to the news of the current maize crisis and is willing to assist transport of maize from the port. They were openly concerned, however, that they would be asked to gear up for something that might never materialize and stated that this had been their past experience with NAMBOARD. Although they feel they can respond within 24 hours to increased fleet capacity through sub-contracting, they would appreciate more lead time. In brief, if asked they can respond to serious interests in their service.

VI. Maritime Forwarders of Tanzania Ltd. (February 29, 1980)

Maritime Forwarders are the agents in Dar es Salaam for NAMBOARD. Their representative in Lusaka is Leopold Walford Ltd. which also has offices in Ndola, Kitwe, Chipata, Kabwe and Suanshya. I met with Mr. Chapeta, Office Manager, and other staff members that he called in. The following issues were discussed.

A. Documentation

Although NAMBOARD is better than many clients, documents are not always advanced to them before arrivals. I asked if they could play a greater role in advising on port congestion and other issues relevant to maize shipments. Mr. Chapeta replied that they could do such but would have to have a better idea in advance of quantity and arrival times. We discussed the basic documentation process, including:

- (1) Invoicing, bills of lading, and packing lists.
- (2) The Declaration and Disposal Orders to which the above items (in #1) are attached.
- (3) The Customs and Excise Form which need to be validated with an official stamp.
- (4) The Consignment note which gives authorization to claim the cargo to the consignee.
- (5) The Zambian Traffic form and associated rail and trucking documents.

(Samples of most of these forms are attached as an annex to this report)

Follow-up takes the form of telex messages to the consignee. There seemed to be little problem with the forms, although the result is a good deal of paper.

B. Shipping

Over two-thirds of all cargo goes by rail, largely because of cost. They have had no problem in dealing with ZTRS and feel that ZTRS is basically prompt and efficient.

C. Offloading

In many respects the use of barges for offloading can be more effective than use of the main quay. Larger vessels have to be handled this way, and there have been good results with bagged commodities. Probably 20,000 tons a month could be handled this way, but it is uncertain that the port could handle anymore without verifying expected offloading for a specific period.

There is a strong preference right now for bagged maize before bulk. NAMBOARD has almost 1 million bags, but bagging must be done after offloaded to a storage area. Special concern must be given by their surveyors to leaks or accumulation of rain in barges provided by the mother vessel.

Departed for Lusaka 5:55 February 29, 1980.

PM: ch

cc: PRC 3
Chron

**East African Harbours Corporation
DECLARATION AND DISPOSAL ORDER**

No.

Importers Agents	Ref. No.	D/O No.			ACCOUNT NUMBER :		
Place of Destination							
Shipper					Original : Green Duplicate : Yellow Triplicate : Pink Quadruple : Orange Quintuple : Blue		
Delivery to the order of:							
SHIP :		PORT OF LOADING	PORT OF DISCHARGE		SHIP'S NUMBER		
B/L No.	MANIFEST PAGE	POSTED DATE OF ARRIVAL		P. H.	ACCEPTANCE DATE		
COMM CODE	MARKS	NUMBER	TYPE OF PACKAGES	DESCRIPTION	WEIGHT	MEASURE- MENT	

-169-
ANNEX TO M-16

		C.I.F. VALUE		CHARGES										
Signature of Importer/Agent		Sht.		Wharfage										
		In words		Handling										
Customs Entry No. Date		Heavy Lifts										
Customs Entry No. Date		Ten Day Cargo										
Disposal Instructions <input type="checkbox"/> RAIL Local/Up-country <input type="checkbox"/> ROAD/AIR/LOCAL DELIVERY <input type="checkbox"/> TRANSHIPMENT		Weight on test		HEAVY LIFTS <table border="1" style="margin: auto;"> <tr><td>1</td><td></td></tr> <tr><td>2</td><td></td></tr> <tr><td>3</td><td></td></tr> <tr><td>4</td><td></td></tr> </table>			1		2		3		4	
		1												
		2												
		3												
4														
Measurement on test		Late Document Charge/Days												
Certificate No.		C.W.H. Handling												
.....		Total Charges _____												
Port Release Stamp		Checker		Tonnage _____										
				Customs Stamp		Port Acceptance Stamp								

**DATA FOR CUSTOMS VERIFICATION OF GOODS
TRANSFERRED TO EXAMINATION POINT**

PARTICULARS	DATE	TIME	SIGNATURE
Documents Presented at Shed			
Documents Transferred			
Goods Ready for Examination			
Merchant Attended and Goods Examined *			

Reason for delay, if any, to be stated

DELIVERY DETAILS

Marks and Nos.	Description	Ready for Delivery		Sig. of Delivery Clerk	Delivered		Gate Pass No.	Received in good order
		Quantity	Date		Qty.	Date		

EAST AFRICAN CUSTOMS & EXCISE

FORM C. 41 A
(IN QUINTUPLICATE)

ZAMBIA TRAFFIC		M. F. (T) LTD.		TRANSIT PASS		
Place of Destination						
Shipper						E. A. CUSTOM • REFERENCE
Delivery to the order of:						PORT: Dar es Salaam No.
						ROT No
SHIP :		PORT OF LOADING	PORT OF DISCHARGE			
B/L No.	MANIFEST PAGE	POSTED DATE OF ARRIVAL.				
	MARKS	NUMBER	TYPE OF PACKAGES	DESCRIPTION	WEIGHT	MEASURE- MENT

	C.I.F. VALUE	I hereby acknowledge receipt of the goods entered to this TRANSIT PASS and declare them to be in transit through TANZANIA for re-exportation at TUNDUMA <div style="display: flex; justify-content: space-between;"> DATE STAMP SIGNATURE </div>
	Shs.	
	In words	
	
	
• E. A. CUSTOMS & EXCISE	• E. A. CUSTOMS & EXCISE	• ZAMBIA CUSTOMS & EXCISE
Released for removal in transit through Tanzania	Re-exportation details	Received in full in Zambia
		• ZAMBIA CUSTOMS REFERENCE
• For Official use only		MARITIME FORWARDERS (TANZANIA) LTD. P.O. Box 4537 DAR ES SALAAM
		WAYBILL No. DATE
		T P No.
		VEHICLE/TRAILER/WAGON No.

ZAMBIA TRAFFIC

MARITIME FORWARDERS (TANZANIA) LTD.
 P. O. Box 4337
 DAR ES SALAAM

GOODS CONSIGNMENT NOTE

Place of Destination		
Shipper		
Delivery to (the order of:)		

SHIP :	PORT OF LOADING	PORT OF DISCHARGE
---------------	-----------------	-------------------

B/L No.	MANIFEST PAGE	POSTED DATE OF ARRIVAL	PLACE OF DESTINATION
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	MARKS	NUMBER	TYPE OF PACKAGES	DESCRIPTION	WEIGHT	MEASURE- MENT

No. M-19

-178-

MEMORANDUM

March 8, 1980

TO : John A. Patterson, AID Representative, Lusaka
FROM : Philip W. Moeller, Transport Advisor
SUBJECT: Field Trip/Inspection Report #5 - Lilongwe

Departure from Lusaka at 1300 hours March 4, 1980. The primary purpose of the trip was to see storage and handling in Lilongwe and to assess capacity over Malawi Railways from Beira and Nacala. I also met with representatives of the Malawi-Canada Rail Project to discuss their progress.

1. Preliminary discussions were held with Dave Nelson (REDSO/Nairobi) and George Rublee (serving in V. Anderson's place while she is in Washington).
11. Obtained transit visa for the RSA.
111. Malawi-Canada Rail Project

I met with Mr. Scudomore, the Acting Project Director, and Mrs. Ferris, the Personal Assistant to the Director. We discussed the constraint of the fuel shortage on project implementation and the resulting delays in the implementation schedule. The project is about half completed and is schedule for opening to Mchinji sometime in 1981. The decisions about the point for the end of rail and off-load facilities remain to be made, as do the financing obligations by CIDA. Zambia is pressing for taking the line to Chipata and is looking for a donor to support this. CIDA wants to build the offloading terminal just on the other side of the border. The demarcation of the border is uncertain and could delay locating the terminal. The earliest date for completion of the terminal has been adjusted for sometime in 1982.

IV. Storage Facilities

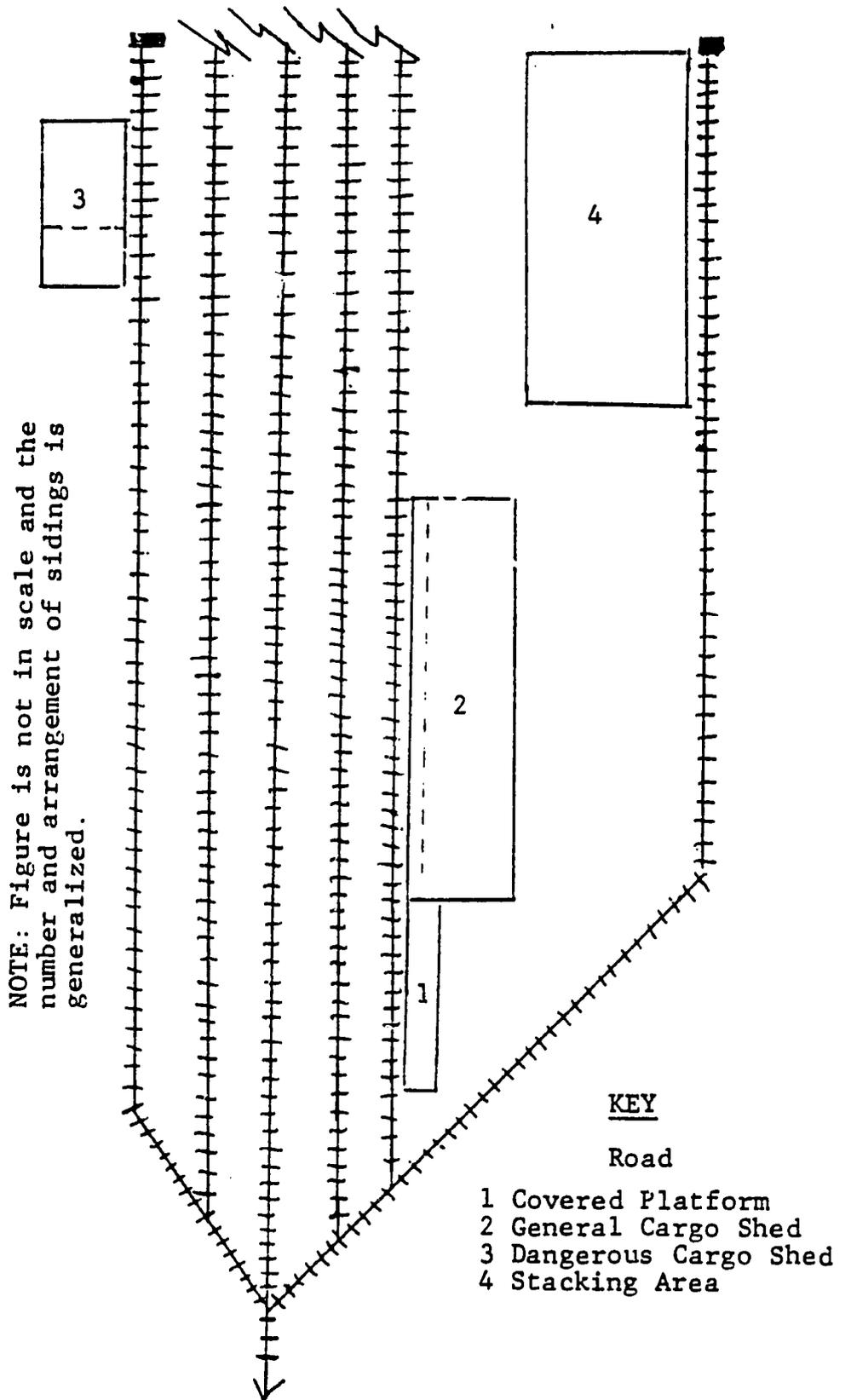
A. Malawi Railways Depot at Lilongwe (See Figure _____
Malawi: Cargo Transfer Area/Lilongwe.)

Mr. Gary Costello, field superintendent for the Malawi-Canada Rail Project met with me and took me to see the offloading and storage facilities built by CIDA in conjunction with the rail project. We met with Mr. D. S. R. Magonagona, Goods Agent for Malawi Railways in Lilongwe. He explained the documentation system they use. There is no color coding nor is there a rotation number system. Goods are booked according to wagon number, consignee, etc. in a warehouse book and on a WO-120 inventory form. An advice of goods received from or combined consignment form is also attached physically to the goods in the warehouse. (Sample of these forms are attached to this report). Goods are kept in separate areas according to destination.

There are four different offloading/storage areas on the spurs for the railroad:

(1) Offloading Covered Platform - This covered Platform is about 20 feet wide and runs along one of the sidings for over 100feet. It connects with the main cargo shed. The platform level corresponds with the level of the wagon deck. There is one fork lift in use but on-and offloading is primarily manual labor assisted by small hand cards. (Note: this facility

Figure 9. Malawi: Cargo Transfer Area, Lilongwe.



is sometimes referred to as the Umbrella Shed).

(2) The General Cargo Shed - This is a masonry (block and brick) warehouse which connects to the covered platform. It is about 460 feet long and 40 feet wide (or 18,400 square feet). Access on one side is by rail and on the other by truck. About 10 wagons can on or offload at a time. There are six primary bays.

(3) The Dangerous Cargo Shed - This shed is on the opposite side of the yard from the general cargo and offloading areas. It is about 40 feet wide and 200 feet long (or 8,000 square feet) and the remainder is open-sided providing a covered platform. Again, the levels of the floor and wagon decks conform. Two or three wagons can be handled at a time.

(4) The Stacking Area - Access to the stacking area is over a paved road which runs between the General Cargo Shed and the rail siding serving the stacking area. The base is concrete at least 10 inches thick. The area is 75 feet wide and 250 feet long. The platform slants and is well drained by ditches. Six wagons can be handled at a time. Overhead lights illuminate the area for night work.

Comment: This is the general size and layout which will be provided for the end of line terminal. It is clearly designed for rapid transit and not storage. The fertilizer that was shipped through this route was off-loaded onto the stacking area and covered with tarps until pick up by truck. This was possible since it was not during the rainy season.

B. The Agricultural Development and Marketing Corporation (ADMARC)

ADMARC is the Malawi counterpart of NAMBOARD. The Lilongwe ADMARC storage complex has four main sheds for storing bagged maize. Each shed is about 60 feet wide and 400 feet long (or 24,000 square feet each, total of about 96,000 square feet); bags can be stacked up to 20 feet (using 90/100 kilo bags). There are rail sidings on both sides and weigh scales for both trucks and wagons.

There is a new bulk maize storage area under construction which will have a capacity of 180,000 metric tons. The silos will vary in size (at least two different sizes) and will be serviced by an Otis elevator/conveyor system. The footings were already in place and major construction should be finished before the 1981 harvest.

V. Malawi Railways

Richard Watkins and I called Mr. Gillis at the headquarters of Malawi Railways to see about flying down to discuss rail capacity for Zambia

over the Beira-Lilongwe route. He advised us that negotiations were underway for contingency maize purchases for Malawi from the RSA. These purchases would probably come via rail to the junction near Beira and then up to Lilongwe. The movement of maize over this route to Malawi would close capacity for Zambian traffic until mid-June. There might then be an excess but possible purchases from the U.S. might absorb this.

VI. Malawi Fuel Crisis

I was briefed about the Malawi Fuel Crisis by:
Richard Watkins, Economic Officer, U.S. Embassy; and
Robert Maxim, DCM, U.S. Embassy.

The briefings were keyed to the fuel crisis which developed last winter but generally pertained to potential rail traffic for Zambia via Mozambique as well. Basically the problem concerns limit within Mozambique including:

- Low offloading rates at Beira
- Cargo rotation policies
- Poor operation and low maintenance of the rail system
- Capacity constraints as a result of insufficient wagons and locomotives.

The situation became better as a result of a combination of events:

- Malawi Railways sent officials to serve as cargo agents
- Dependence on the Malawi route to get fuel and goods to Tete/Moatize as a result of the damage to the bridge on the direct rail route from Beira.
- Intercession by the President of Mozambique who went directly to port officials.

VII. Malawi Food Situation

Malawi is in the same situation faced by most African countries in the region. Dry weather had left considerable doubt about the upcoming harvest. Information concerning the domestic stock is being assessed by the GOM for accuracy as are the preliminary projections of crop/yield. Malawi has been conservative in the past about maize stocks and can be expected to safeguard the population. This would seem to be a major factor in the delay of the Saudi Arabian purchase of maize from Malawi for Zambia.

Much of the details and specific events concerning negotiations are regarded as confidential by the GCM, but the situation is being openly discussed by various parties not directly involved. It is from such sources that this summary has been drawn.

Departure from Lilongwe 0830 hours, March 7, 1980.

PM:ldj

cc:PRC3
CHRON

WAGON NO. WO-120
TARPAULIN NOS.
.....
CHAINS
=====

FROM:
TO :

MALAWI RAILWAYS LIMITED

CONSIGNEE

DATE LOADED	CONTENTS

WEIGHT (Short Tons)		
NETT	TARE	GROSS

No. M-23

MEMORANDUM

March 25, 1980

TO : John A. Patterson, AID Representative, Lusaka
FROM : Philip Moeller, Transport Advisor
SUBJECT: Field Trip/Inspection Report #6 - Mozambique

Departed from Lusaka 1230 hours March 17, 1980 to join Peter Strong for departure March 18 to Maputo/Beira.

I. U.S. Embassy, Maputo

Pete and I met with Roger McGuire (DCM) and Howard Jeter (Econ/Consular). We discussed the arrest of the two key GOM men in commercial imports and the implications for PL 480/other transactions. We also discussed the general crackdown since January by President Machel and the implications of his 4½ hour speech delivered during the day we arrived. I was also able to verify that there had been a joint Zambian/Malawi mission to Mozambique the week before, but the details of what was discussed were not known.

II. Sociedade Geral De Superintendencia (SGS), Maputo

We met with Mr. Anthony de Graaf and Mr. Harry Freaker who will shortly take over when de Graaf moves to Durban. Their ability to handle bulk commodities is not good. There is a lot of spillage in offloading and in moving for storage/distribution (at least 1%). The best way to handle is to bag in the hold. They have no bags and no real bagging facilities, and the handling costs of trying to bag in a storage shed would be high. They can offload/bag 2,000 tons within 24 hours, 3 shifts (full crews).

We discussed Beira and Wankie route. They felt the shortage of wagons was a major constraint on use of this route. Obviously, use of this route is also dependent upon the ability of the GRZ to mobilize truck transport from Wankie to Lusaka.

III. John T. Rennie and Sons, Maputo

I talked to Mr. Clive Stringer who is the Managing Director for Rennie in Maputo. The two major problems for the port have been fork lifts and shunters. We discussed port operations as well as facilities. Mr. Stringer felt that with the reopening of the Limpopo

Rail Line facilities will be strained. Present capacity is 9 million metric tons a year, exports and imports combined. The increased demand for traffic generated by reopening the border could be as high as 16 million metric tons. He does not think the port will be able to handle this level and projects a lower capacity at least for 1981.

IV. Port Facilities at Maputo

I toured the main wharf of the port and observed unloading of ore on a rail wagon tilt lift. The port was basically orderly and clean. Barrels were stacked in neat rows, and the area along the quay and sheds was uncongested. The wharf and adjacent areas have been paved with bricks. The warehouses varied in age and condition but provided good storage space. Port expansion is limited by the rail yard and the city behind it, but there did not seem to be any need for expansion. Some of the cranes along the quay were old--some even had wooden sheds for operator cabs--but all were well lubricated.

The rail wagon tilt lift operations was being well handled. Groups of three or four wagons were shunted by a bulldozer to the cable hookup. Once attached to the cable, they were pulled into place one by one onto the elevator ramp, lifted and tilted. Each wagon was then released down an inverse ramp which used the momentum of the empty wagon to shunt it back into the main yard. The lift has a hopper receiver at the top which projects over the vessel and dispenses a steady stream of ore into the open hatch.

Wednesday, March 20, 1980 we flew to Beira at 0830 hours.

V. East African Shipping Agency (EASA), Beira (Agence Maritime Internationale)

We met with Captain J. A. Gillies, Assistant Manager, and Fernand Provis, General Manager for EASA. We discussed the major problems affecting flow through the port (Note: Gillis was the best contact on transport in Beira.)

- shortage of rail wagons
- shortage of fork lifts
- shortage of spare parts in general

- poor operation and organization of shunting

Other topics included:

- Cargo in port for Malawi has been reduced from 100,000 metric tons to about 70,000 metric tons.
- Anti frelimo activity is not dead and continues to restrict transport in southern areas and near borders with Zimbabwe. This group was once thought to be supported only by the Rhodesians, but it seems the group has more indigenous roots than was believed.
- Silting seems to have been stabilized as a result of moving in a dredge from Kilimani.
- Need to re-establish representatives for Zimbabwe in Mozambique.
- Some congestion has already developed on Beit Bridge route for road route.

We also were shown a report prepared by members of the company on rail, road and port conditions; however, the report was 12 months old and therefore very outdated.

VI. Sociedade Geral De Superintendencia (SGS), Beira

We met with Pedro C. Simango of SGS and discussed port conditions. He presented a perspective similar to but less detailed than that presented by EASA. Major problems discussed include:

- cranes
- fork lifts
- shunting
- spare parts in general

Only nine berths are available for operation at present, and of these only six were in use. Waiting time is usually minimal.

VII. Port Facilities, Beira

We toured the port area including the main wharf and adjacent storage areas. After President Machel

came to visit the port in early 1980 and complained about conditions, a major effort was made to clean up the port. The results were very visible. Stacking was neat and access was open to storage and handling areas. Crews were at work on basic maintenance.

The port is designed mainly for transit traffic. There is additional storage space outside the port, but the sheds along the wharf are adequate for most needs. Plans include building stacking areas, but at present there is little open storage. There are several open areas where expansion can be placed. The port is presently filled with about 70,000 tons of freight for Malawi, the majority of which was vehicles.

We saw the pipeline which runs to Zimbabwe and the oil tanks used for storage at port. Fuel remains the the pipeline from when the border was closed and access to the Umbali refinery was cut off. Five of the oil tanks were damaged in the fall 1979 raids by resistance forces --one collapsed totally--but repairs have been made to most if not all of them.

There was basically little activity going on in port. None of the cranes was working and no unloading was visible. We saw the refrigerated storage facility, the ore loading ramp, and the repair facilities but were unable to get extensive tours of these areas. In general the equipment and facilities in port looked newer than that in Maputo.

VIII. Caminhos de Ferro de Mozambique (CFM, Central System, Beira

We met with Mr. Ferreira-Mendes, Director of CFM, Centro. He is responsible for both the operation of the Central Rail System and the port of Beira. We discussed capacity of both the port and the railways. Mr. Ferreira-Mendes pointed out that present capacity is about 1.7 million metric tons. This compares to 4.5 million metric tons.

A. Rail Operation to Umtali

Traffic over the line to Umtali has begun again. One train makes a roundtrip every other day. It takes about 15 hours to reach the border, including stops. The route is divided into three sections according to terrain and a different kind of locomotive is used for each section. Each train is carrying about 1,200 metric tons. They

hope to double the number in 2 to 3 months, but efforts to do such will be restricted by the availability of locomotives.

B. Rail Operation to Moatize

Traffic over this line was closed as a result of guerrilla activity. (Note: attribution of which guerrilla forces depends upon with whom one is speaking). This has resulted in very limited stock of coal. Mozambique has been very interested in reopening traffic over this route. Repairs to the bridge had been completed by late February/early March but it is not certain whether all the repairs are permanent. At present each train consists of about 20 wagons each of which is capable of about 45 tons (wagons are uncovered, high sided). Wagons go up the line empty and return with coal. It is hoped that capacity can be restored to 35 or 40 wagons per train or about 1,500 tons. (See Summary Statement in Section VII of final report.)

IX. Embassy of Zambia, Maputo

I met with Mr. Mwale, the Trade Attache of the Zambian Embassy in Maputo, to discuss maize shipment through the ports of Mozambique. We discussed documentation and cable distribution in Zambia of information on port conditions he was sending back to Lusaka. Mr. Mwale plans to move to Beira as soon as facilities there have been prepared. I was impressed with the questions he asked and the answers he, in turn, gave.

X. Comments

Several factors needed to be considered in relations to transport via Mozambique. In brief, they include:

- Political conditions - Machel's campaign against inefficiency/sabotage and corruption has included the arrest of the two most capable officials involved in commercial import and the dismissal of three ministers (Health, Interior Commerce, and Works and Housing. Although this may ultimately increase efficiency, the immediate result is a reduction in the absolute number of sophisticated decision-makers at the top level and a reduction in the relative decision-making capacity of the government in general. This is a more direct

limit on the negotiation of commercial food sales for Mozambique but could also limit transit traffic.

- Security considerations include more than an overflow from Zimbabwe and need additional consideration.
- The rural areas of Mozambique are already entering a serious food crisis.
- The use of the Wankie route for food to Zambia is an option now; Moatize is not open until after June. Local distribution for Mozambique will need to be considered, however, and may limit the rail traffic available for maize for Malawi within 10 days or less.

Departed from Maputo at 1700 hours March 24, 1980.

PM:ch

ANNEX IV

ZAMBIA/MOZAMBIQUE ROUTE OPTIONS

ANNEX IV

ZAMBIA/MOZAMBIQUE ROUTE OPTIONS

A. Introduction

The above analysis of projected flows for Zambian imports over existing links to port facilities demonstrates the inadequacy of these links to meet either short term needs for essential commodities or long term development needs. Efforts to alleviate these problems will have a delayed impact and will still leave a shortfall in total capacity. The development of eastern links through the northern corridor of Mozambique to port facilities at Beira and Nacala, therefore, is proposed as a transport alternative to existing routes.

Theoretically there are at least ten route options which could provide transit from Lusaka to either Beira or Nacala. (See Figure B. Zambia/Mozambique Composite Route Options.) Economically feasible operation over these routes would require selective upgrading on certain sections, increased maintenance, upgrading of storage and handling capacities, and associated coordination and planning activities. (More detailed consideration of these activities is given in Section IV). For the purpose of route analysis, however, discussion is limited to one contingency route and the four least costly routes based on distance and required investment. (See Table 8. SUMMARY: Northern Corridor Route Options by Mode and Distance)

Development of the northern corridor routes to Beira and Nacala is dependent upon intermodal traffic, using a mix of road and rail routes. The contingency route and one of the four route options discussed (option D) rely on road transport alone. However, they give access only to Beira. The other routes are keyed to rail service and can reach either port facility.

B. Selected Route Option Analysis

1. Route Options A and AA, Lusaka/Nacala

Route Option A is an intermodal link from Lusaka to Nacala (See Figure C. Zambia/Mozambique: Route Option A) with a total distance of 1,102 miles. Of the total, 464 miles or about 42 percent are by road and the remainder are by rail. Intermodal transfer takes place at Lilongwe.

Route segments A1 and A2 (See Table 9. Zambia/Mozambique:

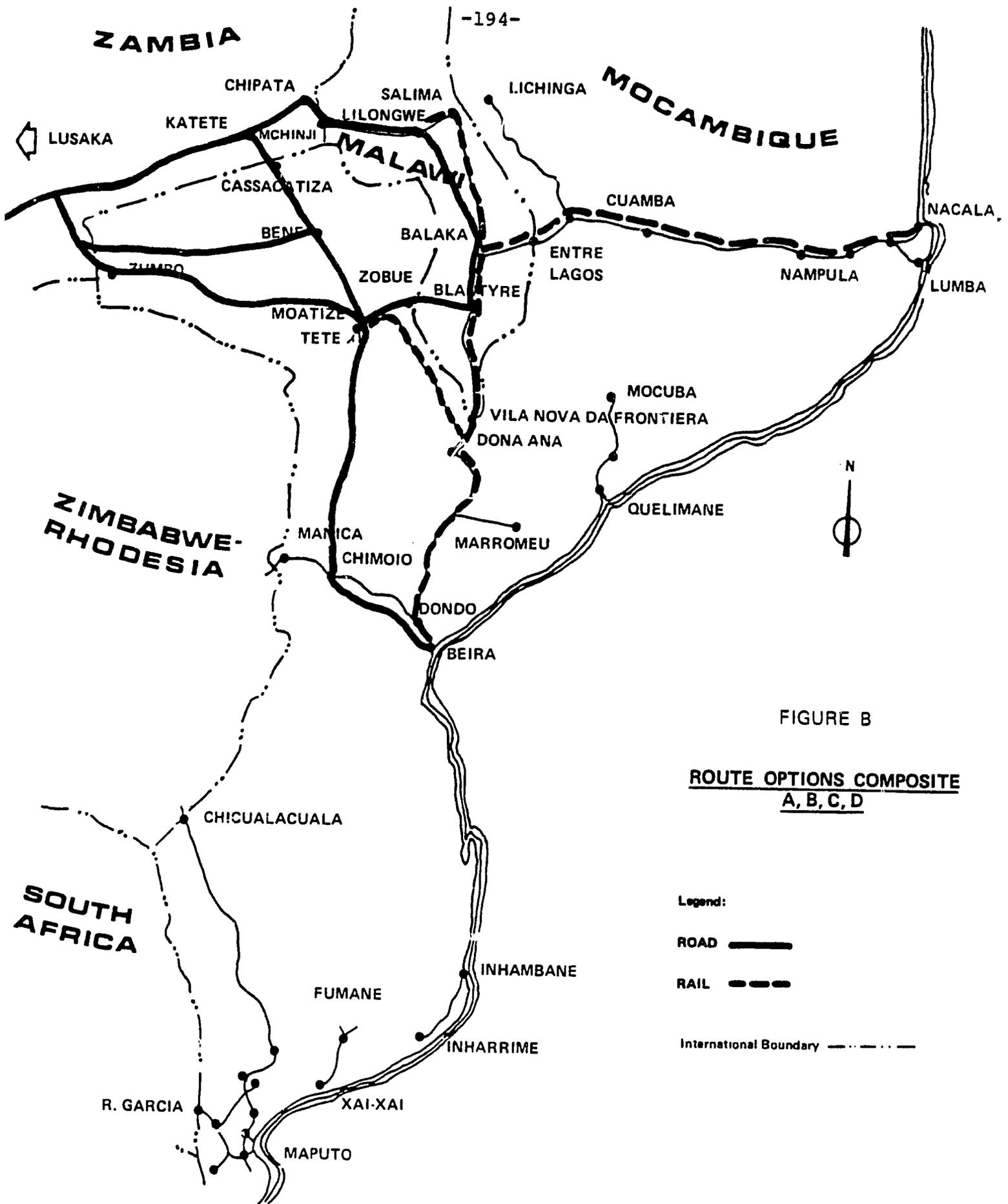


Table 8¹

SUMMARY: Northern Corridor
Route Options by Mode & Distance (miles)

Option	Road	Rail	Total
Contingency	1,226	---	1,226
Option A	394	708	1,102
Option B	394	535	929
Option C	585	401	986
Option D	875	---	875

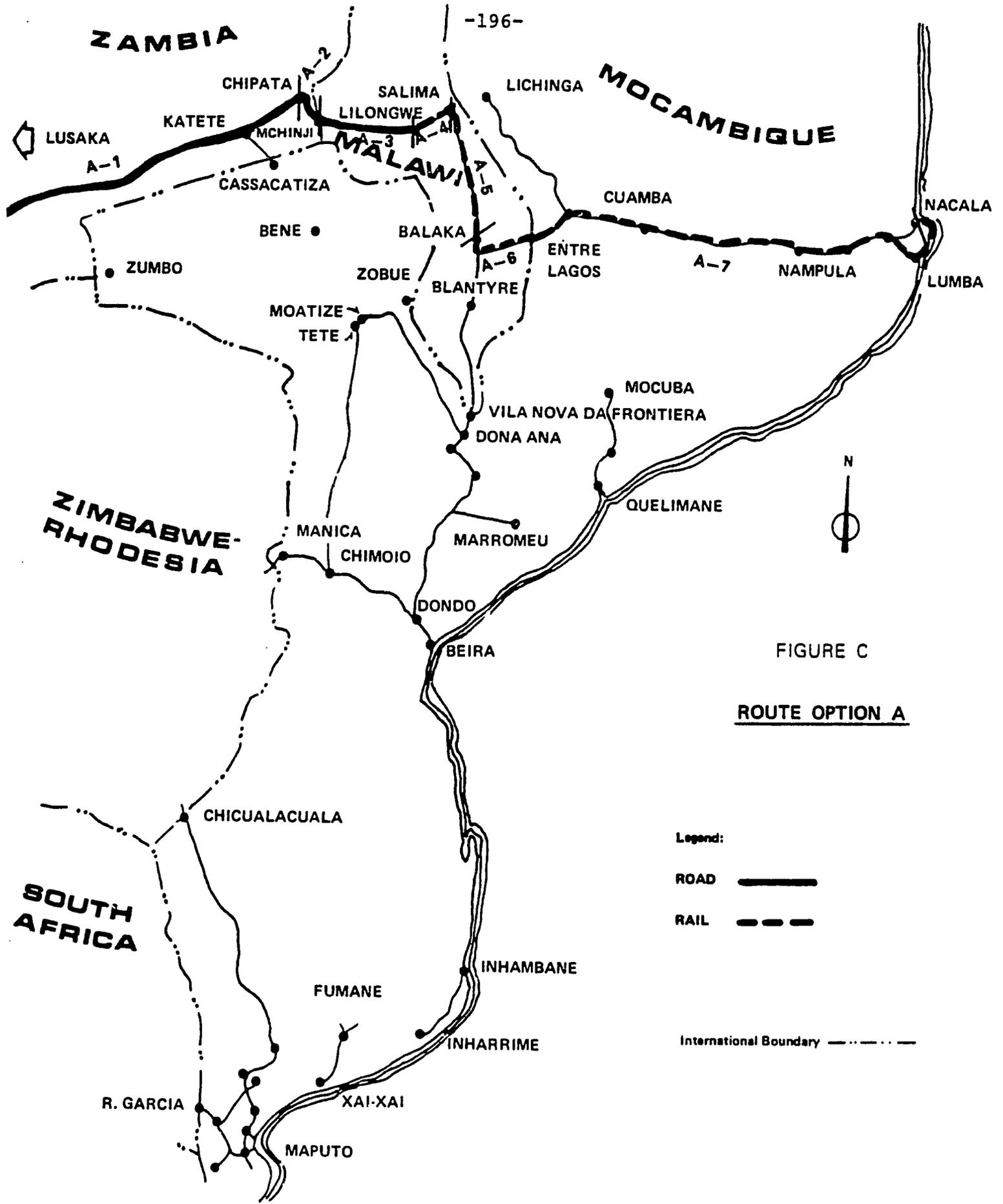


FIGURE C

ROUTE OPTION A

Legend:

ROAD —————

RAIL - - - - -

International Boundary - · - · - ·

TABLE 9¹ Zambia/Mozambique: Northern Corridor, Primary Route Options
Route Option A - Lusaka/Nacala

Number	Segment	Mileage	Mode	Comments
A-1	Lusaka to Chipata	374	Road	paved standard, spot repairs needed but but acceptable early 1979
A-2	Chipata to Mchinji	20	Road	paved standard, spot repairs needed
A-3	Mchinji to Lilongwe	70	Road	newly paved. possible increase in handling and storage facilities
A-4	Lilongwe to Salima	86	Rail	newly constructed line, good condition
A-5	Salima to Balaka Junction	130	Rail	acceptable condition
A-6	Balaka Junction to Border	55	Rail	acceptable condition
A-7	Border to Nacala	367	Rail	in need of upgrading, needs additional appraisal for long term use. keyed to containers so will need additional facilities for cereals and fertilizer.
		<u>1,102</u>		

Northern Corridor Primary Route Options, Route Option A. Lusaka/Nacala) are well constructed paved roads. Recent rains have left these roads in need of some spot repairs. Increased utilization will necessitate upgrading maintenance operations for these two segments.

Route segment 3 is a newly paved road leading to Lilongwe. Storage facilities at Lilongwe are not suitable for bagged cargo but considerable direct handling be maintained. There are excess storage facilities in Balaka, but this would probably prefer to use Lilongwe for transit traffic in order to maximize the return on its investment.

The remainder of the railway through Malawi (Segments 4 and 5) is adequate for the projected traffic, at least in the short run. Priorities related to switching and yard facilities may need to be given further consideration.

The condition of the rail link through Mozambique (Segment 6) to Nacala is uncertain. Unconfirmed reports indicate that the line may need upgrading in order to handle major increase in traffic levels. Additional information is needed before a full appraisal can be made. There is only a small amount of storage capacity in Nacala. The port was developed primarily as a container port, and there are no facilities for bulk cereals. Assistance in management is also needed to prevent port congestion.

Route Option AA is basically the same as Route Option A except that it would use the new rail link to Mchinji nearing completion under assistance from the Canadian International Development Agency (CIDA). The opening of this line has been delayed and is now scheduled for 1980/81. (See Figure D, Zambia/Mozambique: Route Option AA.) The route runs for about 1,102 miles, of which 394 miles or 36 percent is by road. (See Table 10. Zambia/Mozambique: Northern Corridor Primary Route Options, Route option AA, Lusaka/Nacala.)

2. Route Options B and BB, Lusaka/Beira

Route Option B is an intermodal link from Lusaka to Beira. (See Figure E. Zambia/Mozambique: Route Option B.) The route runs a total of 929 miles of which 464 miles or 50 percent are by road. The remainder are by rail. Intermodal transfer takes place at Lilongwe. (See Table 11. Zambia/Mozambique: Northern Corridor Primary Route Options, Route Option B, Lusaka/Beira.) Route segments 4 and 5 are within Malawi and are in relatively good condition. Segments 6 and 7 run from the border of Mozambique to the port at

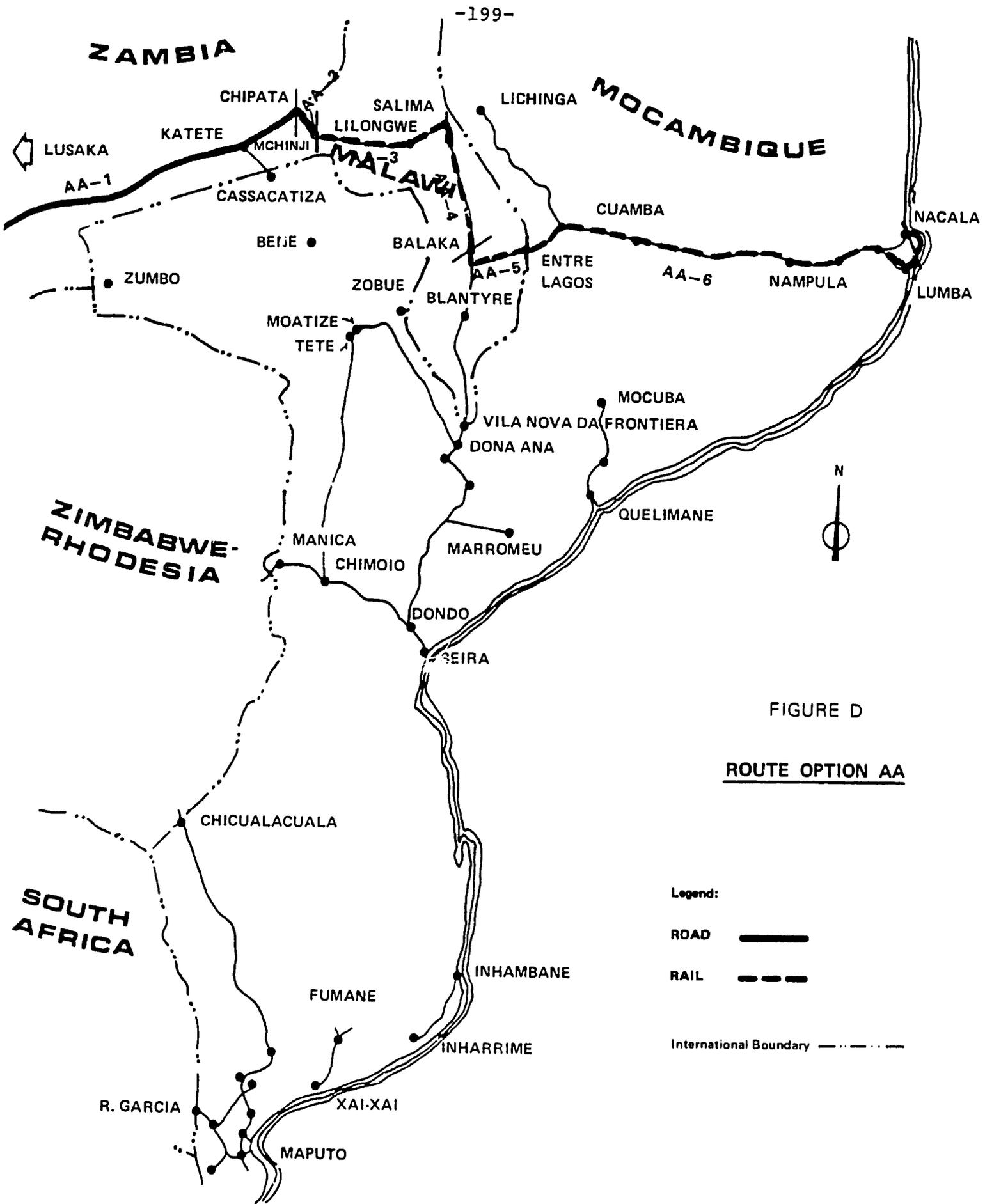


FIGURE D

ROUTE OPTION AA

TABLE 10 Zambia/Mozambique: Northern Corridor, Primary Route Options
Route Option AA- Lusaka/Beira

Number	Segment	Mileage	Mode	Comments
AA-1	Lusaka to Chipata	374	Road	paved standard, spot repairs needed
AA-2	Chipata to Mchinji	20	Road	paved standard, spot repairs needed, need for handling and storage facilities at Mchinji.
AA-3	Mchinji to Salima	156	Rail	newly constructed line, open by 1980/81
AA-4	Salima to Balaka Junction	130	Rail	acceptable condition
AA-5	Balaka Junction to Border	55	Rail	acceptable condition
AA-6	Border to Nacala	367	Rail	in need of upgrading, needs additional appraisal for long term use
		<u>1,102</u>		
		-200-		

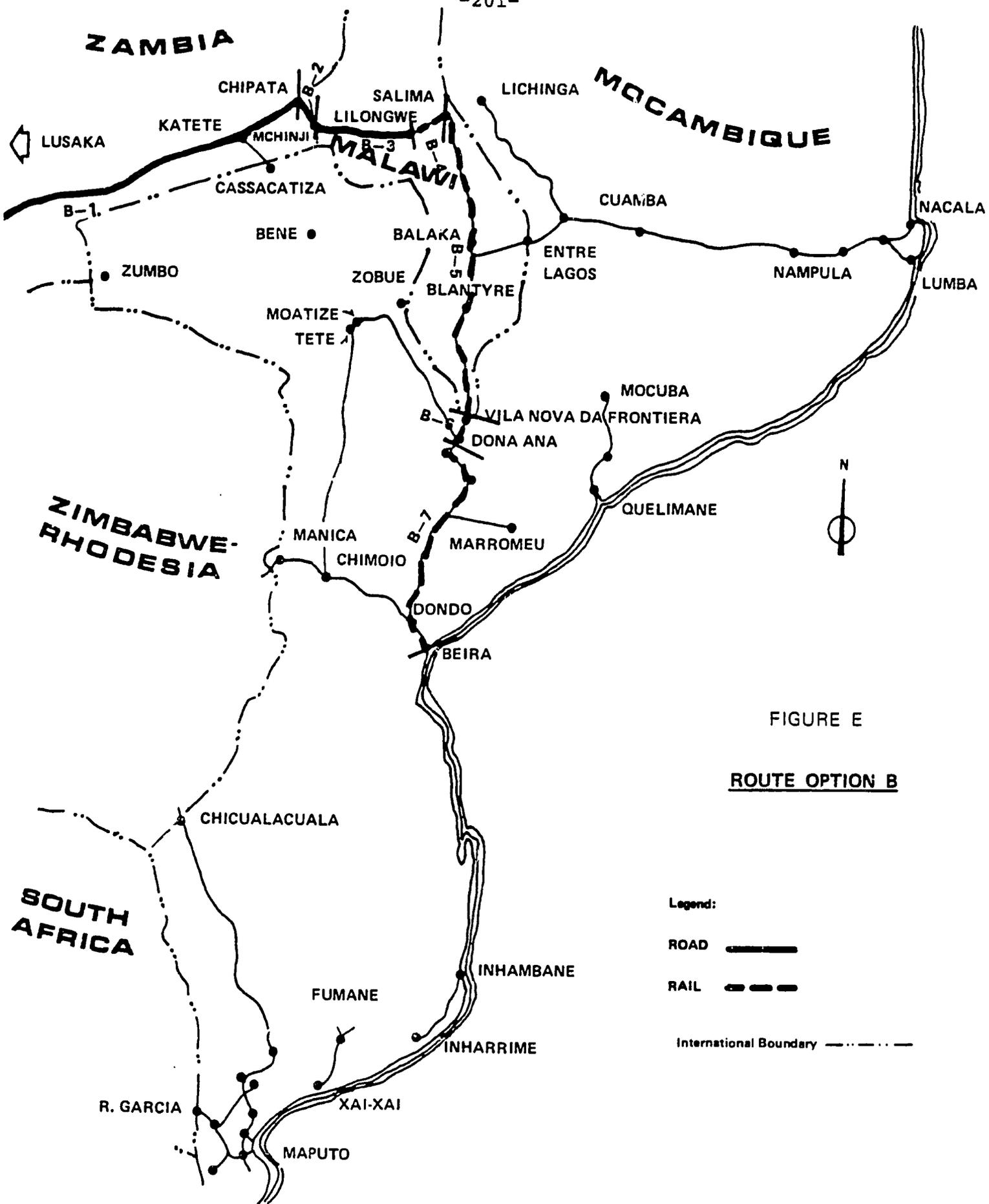


FIGURE E

ROUTE OPTION B

Legend:

ROAD 

RAIL 

International Boundary 

TABLE 11 Zambia/Mozambique: Northern Corridor, Primary Route Options
Route Option B - Lusaka/Beira

Number	Segment	Mileage	Mode	Comments
B-1	Lusaka to Chipata	374	Road	
B-2	Chipata to Mchinji	20	Road	
B-3	Mchinji to Lilongwe	70	Road	newly paved
B-4	Lilongwe to Salima	86	Rail	newly constructed line, good condition
B-5	Salima to Vila Nova da Fronteira	131	Rail	relatively good condition
B-6	Vila Nova da Fronteira to Dona Ana	32	Rail	acceptable short term but assessment of condition is needed
B-7	Dona Ana to Beira	216	Rail	acceptable short term but assessment of condition is needed, need to upgrade handling and storage at Beira
		<u>929</u>		

Beira. The condition of these routes is acceptable for short term capacity use, but maintenance problems may be developing. Storage facilities at Beira are adequate but do not provide for bulk handling of cereals. Bagged cargo is handled relatively well, and there is not major problem with congestion.

Route Option BB is basically the same as B but, as in the case of Route options A and AA, it would use the new rail link nearing completion. Transshipment would take place, therefore, at Mchinji. (See Figure F. Zambia/Mozambique: Route Option BB.) The route runs 929 miles of which 394 miles or about 42 percent are by road. (See Table 12: Zambia/Mozambique: Northern Corridor Primary Route Option, Route Option BB, Lusaka/Beira.) The remainder of the route segments match those under Route Option B.

3. Route Option C. Lusaka/Beira

Route Option C is an intermodal link from Lusaka to Beira (See Figure G. Zambia/Mozambique: Route Option C.) The route runs a total of 986 miles of which 585 miles or almost 60 percent are by road. The remainder are by rail. Intermodal transfer takes place at Moatize.

Route Segment 1 is paved standard road in relatively good condition by with the need for some spot repairs. (See Table 13: Zambia/Mozambique: Northern Corridor Primary Route Options, Route Option C, Lusaka/Beira.) Segment 2 and 3 are partially improved roads which are being improved to paved standard. The GOZ has reportedly started work Segment 2 but needs assistance in order to complete the route. Segment 3 is reportedly more close to completion. Segment 4 is reportedly completed.

Storage facilities at Moatize will need to be upgrading but there are some handling facilities. The GOM is interested in developing this route because of adjacent coal deposits. The projected volume of grain imports and coal exports would seem to justify investment in this route option. It would also take pressure off of Malawi Railways, facilitating a higher import capacity for Zambia.

Segment 4 and 5 are believed to be in acceptable condition for at least short term use. Storage and handling facilities at Beira will needed to upgraded as discussed under Route Option B.

4. Route Option D. Lusaka/Beira

Route Option D is a single mode link from Lusaka to Beira. (See Figure 4: Zambia/Mozambique: Route Option D.) This road route

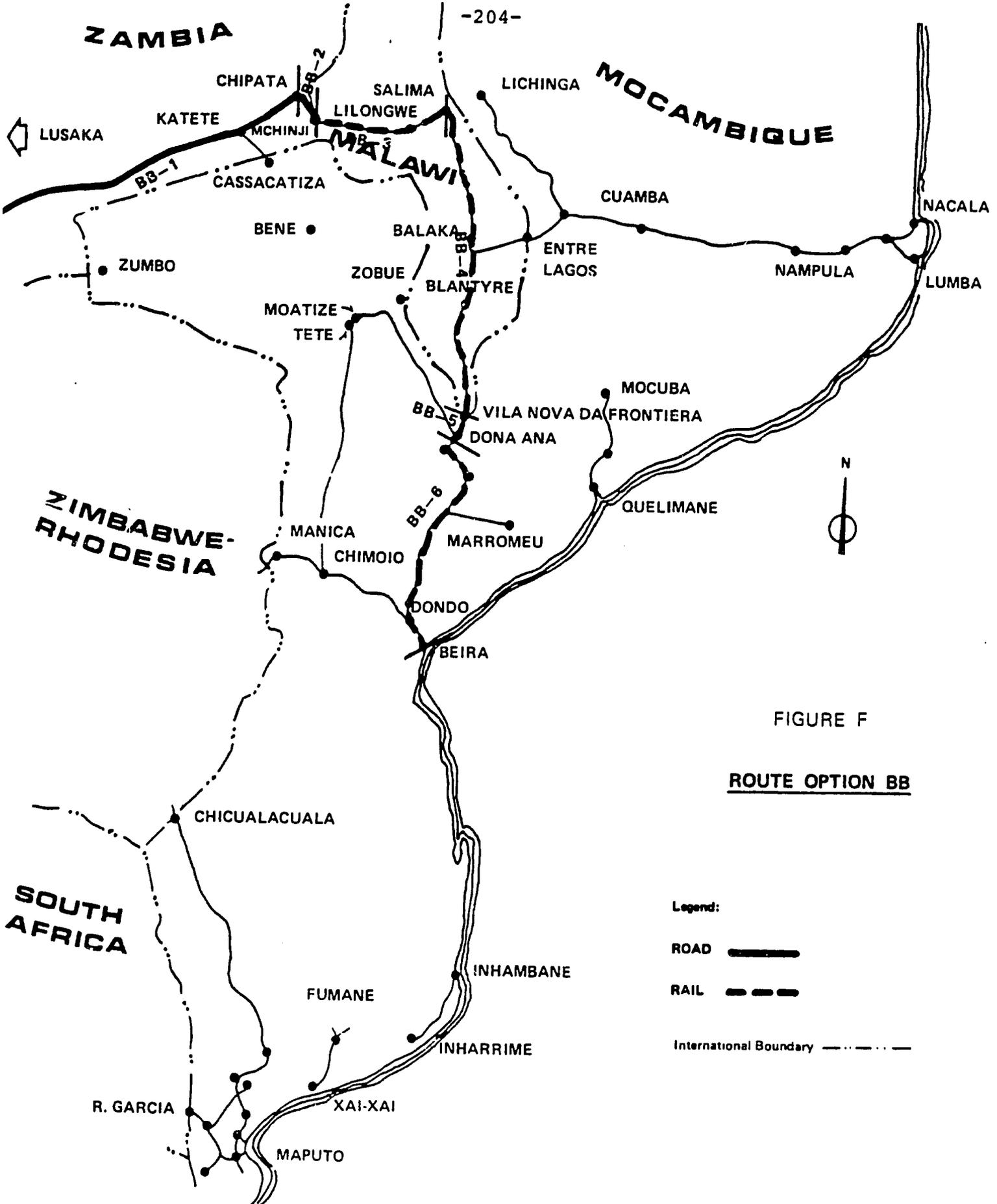


FIGURE F

ROUTE OPTION BB

Legend:

ROAD 

RAIL 

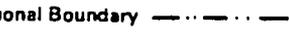
International Boundary 

TABLE 12. Zambia/Mozambique: Northern Corridor, Primary Route Options
Route Option BB - Lusaka/Beira

Number	Segment	Mileage	Mode	Comments
BB-1	Lusaka to Chipata	374	Road	paved standard, spot repairs needed but acceptable end 1979
BB-2	Chipata to Mchinji	20	Road	paved standard, spot repairs needed
BB-3	Mchinji to Salima	156	Rail	new route available only in 1980/81, see option A for immediate routing; need to upgrade handling and storage
BB-4	Salima to Vila Nova da Frontera	131	Rail	relatively good condition
BB-5	Vila Nova da Fronteira to Dona Ana	32	Rail	acceptable short term but assessment of condition is needed
BB-6	Dona Ana to Beira	216	Rail	acceptable short term but assessment of condition is needed, need to upgrade handling and storage at Beira

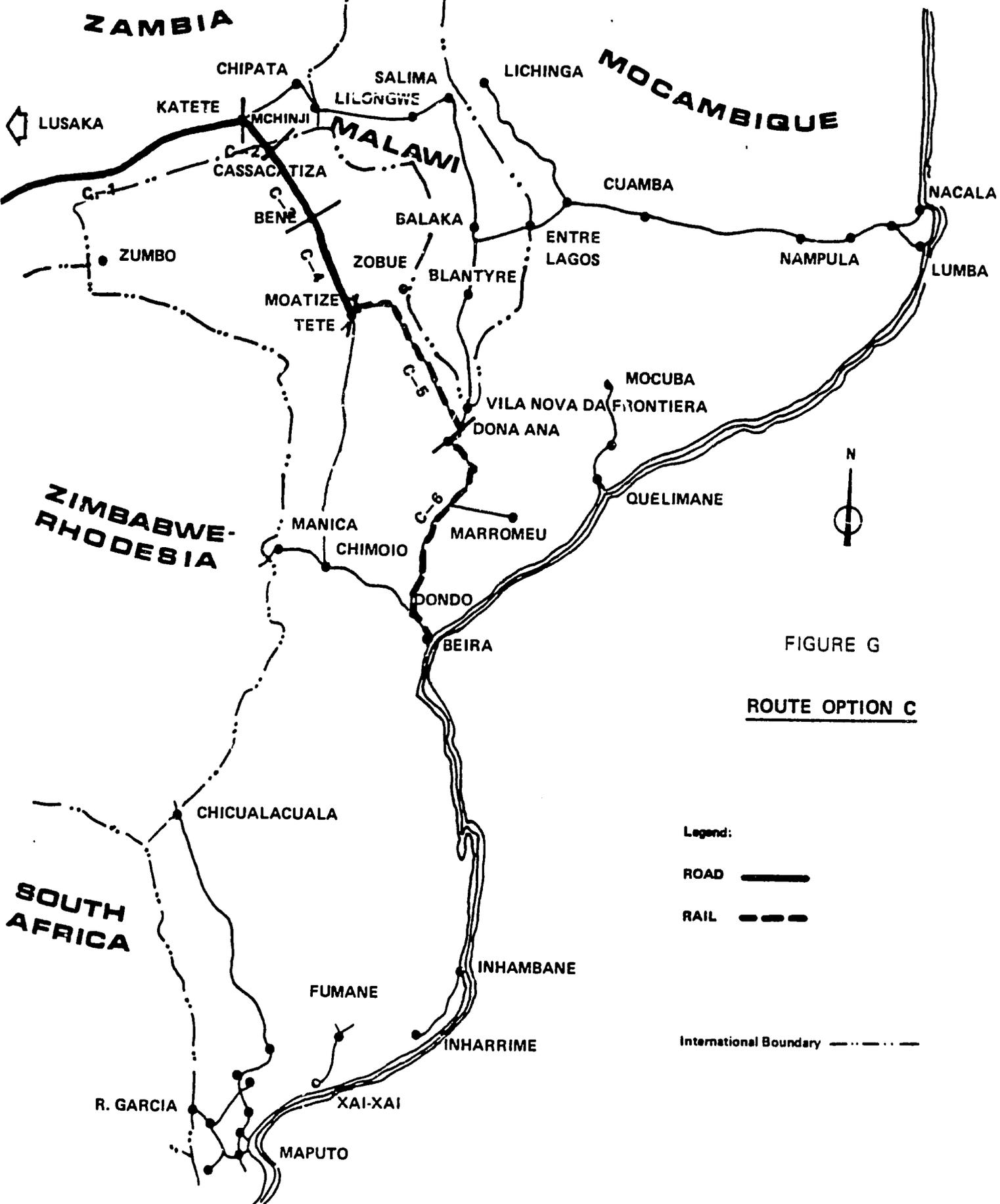


FIGURE G

ROUTE OPTION C

Legend:

ROAD ———

RAIL - - - - -

International Boundary ·····

TABLE 13. Zambia/Mozambique: Northern Corridor, Primary Route Options
Route Option C - Lusaka/Beira

Number	Segment	Mileage	Mode	Comments
-1	Lusaka to Katete	323	Road	paved standard, spot repairs needed but acceptable end 1979
-2	Katete to Cassacatiza	25	Road	road under construction to paved standard Start-up reported but progress uncertain and assistance needed. Closed wet season.
-3	Cassacatiza to Bene	85	Road	paving reportedly nearly completed, possible assistance needed.
-4	Bene to Moatize	152	Road	paving reportedly completed, storage and handling facilities need upgrading
-5	Moatize to Dona Ana	185	Rail	acceptable short term
-6	Dona Ana to Beira	216	Rail	acceptable short term, need to upgrade handling and storage at Beira
		<u>986</u>		

runs a total of 875 miles. Segments 1, 2, and 3 are the same as those used for Route Option C. (See Table 14: Zambia/Mozambique: Northern Corridor Primary Route Options, Route D. Lusaka/Beira.) Segment 4 diverts to Tete instead of Bene. Segment 5 and 6 are over paved standard main road. There may be need for spot repairs to these two segments. As stated under Route Option C, storage and handling facilities need upgrading at the port of Beira.

5. Route Option E. Contingency Route Lusaka/Beira

Route Option E is a contingency road route running from Lusaka to Beira. (See Figure I. Zambia/Mozambique: Route Option E.) This route is the longest of the options, running 1,226 miles. Segments 1, 2, and 3 are the same as for Route Option A. The route continues by road, however, from Lilongwe to Blantyre (Segment 4). The segment is paved but in need of repairs. Overlays and short section rehabilitation are planned for 1980. (See Table 15: Zambia/Mozambique: Northern Corridor Primary Route Options, Route Option E, Contingency Route Lusaka/Beira.)

Segment 5 runs from Blantyre to Zobue. This segment is paved only to the airport. It is very narrow as well and needs some overlay work. The remainder of the segment is improved road in need of paving. Passability in wet weather is not certain. Segments 6 and 7 run from Zobue to Beira. These two segments are the same as for Route Option D.

This route presents a contingency option for use during dry weather and possibly during the wet season until the road from Katete to Cassacatiza is completed. Although the first half of the route is somewhat shielded from possible impact should hostilities occur in Zimbabwe-Rhodesia, the last half of the route is just as vulnerable as other options. The route would allow for direct road haulage without intermodal transfer. This could be an initial advantage until storage and handling facilities for the intermodal routes are upgraded. The greater distance of the route makes it a more expensive option than the others discussed and it clearly should be considered only as a temporary option.

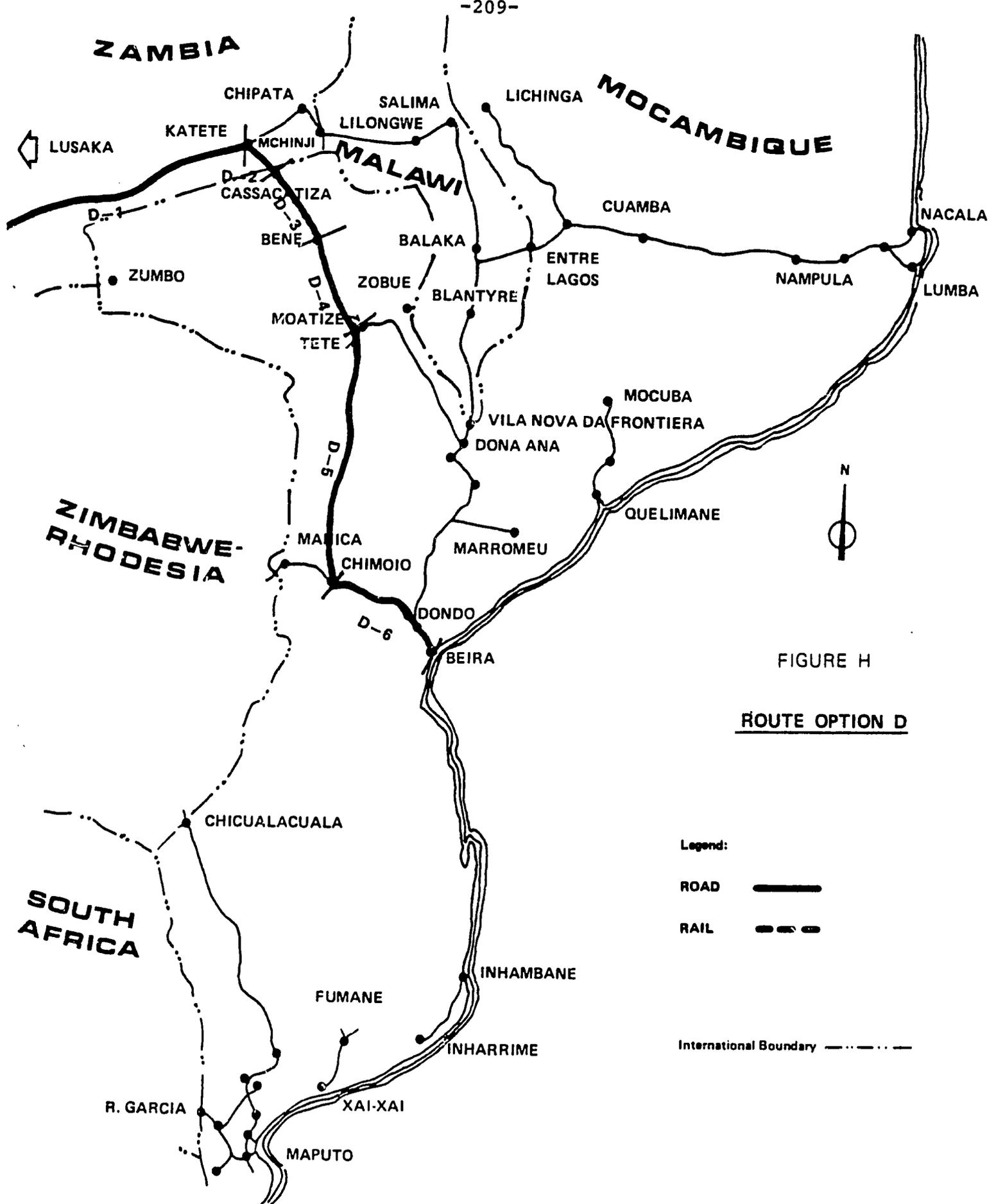


FIGURE H

ROUTE OPTION D

Legend:

ROAD ———

RAIL - - - - -

International Boundary - · - · - · -

TABLE 14'. Zambia/Mozambique: Northern Corridor, Primary Route Options
Route Option D - Lusaka/Beira

Number	Segment	Mileage	Mode	Comments
D-1	Lusaka to Katete	323	Road	paved standard, spot repairs needed but acceptable early 1979
D-2	Katete to Cassacatiza	25	Road	road under construction to paved standard start-up reported but progress uncertain and assistance needed. closes wet season
D-3	Cassacatiza to Bene	85	Road	paving reportedly nearly completed, possible assistance need
D-4	Bene to Tete	91	Road	paving reportedly completed
D-5	Tete to Chimoio	235	Road	paved standard, spot repairs
D-6	Chimoio to Beira	116	Road	paved standard, spot repairs storage are handling facilities need for Beira
		— 875		-210-

TABLE 15. Zambia/Mozambique: Northern Corridor, Primary Route Options
Route Option E, Contingency Lusaka/Beira

Number	Segment	Mileage	Mode	Comments
CNT-1	Lusaka	374	Road	paved standard, spot repairs needed but acceptable early 1979
CNT-2	Chipata	20	Road	paved standard, spot repairs needed
CNT-3	Mchinji to Lilongwe	71	Road	nearly paved
CNT-4	Lilongwe to Blantyre	222	Road	paved standard but in need of repairs overlays and short section rehabilitation schedule for 1980.
CNT-5	Blantyre to Zobue	63	Road	paved to airport only, needs wideing as very narrow as well as some major overlay work. Remainder of distance to Zobue needs paving.
CNT-6	Zobue to Chimoio	351	Road	Paved standard, spot repairs and possible overlays needed.
CNT-7	Chimoio to Beira	125	Road	paved standard, spot repairs and possible overlap needed
		<u>1,226</u>		

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ANNEX V

Source: John Wood

18 January, 1980

Port Status Report

<u>Port</u>	<u>Delay</u>
Cape Town	0 - 24 Hours
Port Elizabeth	fluid
E London	fluid
Durban	Working to Capacity
Maputo	Open
Beira	24/28 hours
Nacala	fluid
Dar es Salaam	10/12 days delay. Little chance for improvement

Port Status Report

February 12, 1980

Capetown: 0-24 Uncertain SA Rail Priorities
Port Eliz: Fluid Uncertain SA Rail Priorities
E London: Heavily engaged in Zambian traffic
copper out general cargo in
Durban: Working at capacity
Beira: Clogged over 100,000 tons import awaiting rail
35,000 for Malawi, rest is for Mozambique and Zambia
Maputo: Open
Nacala: Open but port operations and officials slow and inefficient
Dar: 10/12 days if you get priority from Zambians through
contingency planning

PORT STATUS REPORT

March 20, 1980

<u>PORT</u>	<u>DELAY</u>
CAPE-TOWN	0-24 hours
PORT ELIZABETH	fluid, but use for Zambian Cargo uncertain, over the Southern Route.
EAST LONDON	fluid, most Zambian cargo via Southern route continues to use this port.
DURBAN	working at capacity
MAPUTO	open, 0-48 hours wait
BEIRA	open, no wait
NACALA	fluid
DAR ES SALAAM	reported down to 6/7 days 1st/month but may have increased again to 10 by mid March.
SOURCE, VARIOUS	