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UNCLASSIFIED

Regional Rail Systems Support Project

690-0247

Malawi Component

August 1988

UNCLASSIFIED

REGIONAL RAIL SYSTEMS SUPPORT PROJECT
(690-0247)

MALAWI COMPONENT

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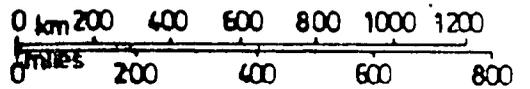
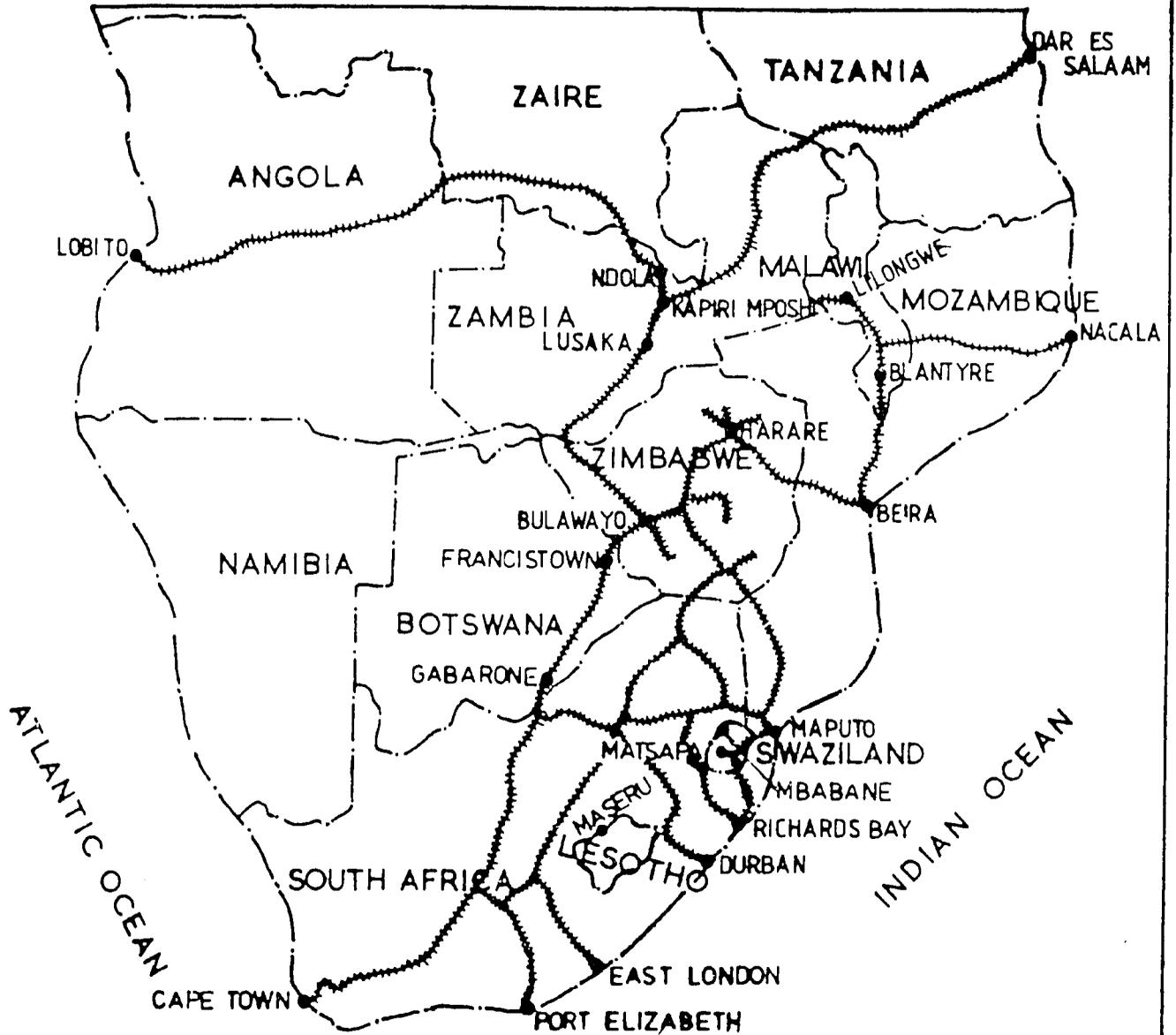
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LIST OF ACRONYMS

AEI	British-made locomotives, older part of MR fleet
DHS	Deloitte, Haskins & Sells
DE	Diesel Electric Locomotives
DH	Diesel Hydraulic Locomotives
EDF	European Development Fund
ERR	Economic Rate of Return
FX	Foreign Exchange
FY	Fiscal Year
FAA	Foreign Assistance Act
FRG	Federal Republic of Germany
GDP	Gross Domestic Product
GOM	Government of Malawi
HP	Horse Power
HRID	Human Resources and Institutional Development project
IDA	International Development Association (World Bank)
IBRD	International Bank for Reconstruction and Development (World Bank)
IRR	Internal Rate of Return
IEE	Initial Environmental Examination
IFB	Invitations for Bids
IQC	Indefinite Quantity Contract
K	Kwacha (Malawi's currency unit) - also written as MK
KFW	Kreditanstalt fur Wiederaufbau (FRG)
KM	Kilometres
MNR	Remamo- Mozambique political opposition group
MCTB	Malawi Central Tender Board
MOF	Ministry of Finance
MR	Malawi Railways
MT	Metric Tons
NRE	National Railways of Zimbabwe
NTC	Northern Transport Corridor
NTK	Net Ton Kilometer
ODA	Overseas Development Administration (UK)
OJT	On-the-job training
PACD	Project Assistance Completion Date
PBI	Parsons Brinckerhoff International, Inc
PID	Project Identification Document
PIL	Project Implementation Letter
PM	Person Month
PP	Project Paper
PSC	Personal Services Contract
RCMO	AID Regional Commodity Management Officer
RCO	AID Regional Contracting Officer
REDSO/ESA	AID Regional Economic Development Services Office for East and Southern Africa (Nairobi)
RFP	Request for Proposal
RLA	Regional Legal Advisor
RSA	Republic of South Africa
RFQ	Request for Quotations
SADCC	Southern Africa Development Coordination Conference

SARP	Southern Africa Regional Program, USAID Zimbabwe
SATCC	Southern Africa Transport and Communications Commission
UNCTAD	United Nations Conference on Trade and Development
USAID/M	U.S. Aid Mission to Malawi
USAID/Z	U.S. Aid Mission to Zimbabwe

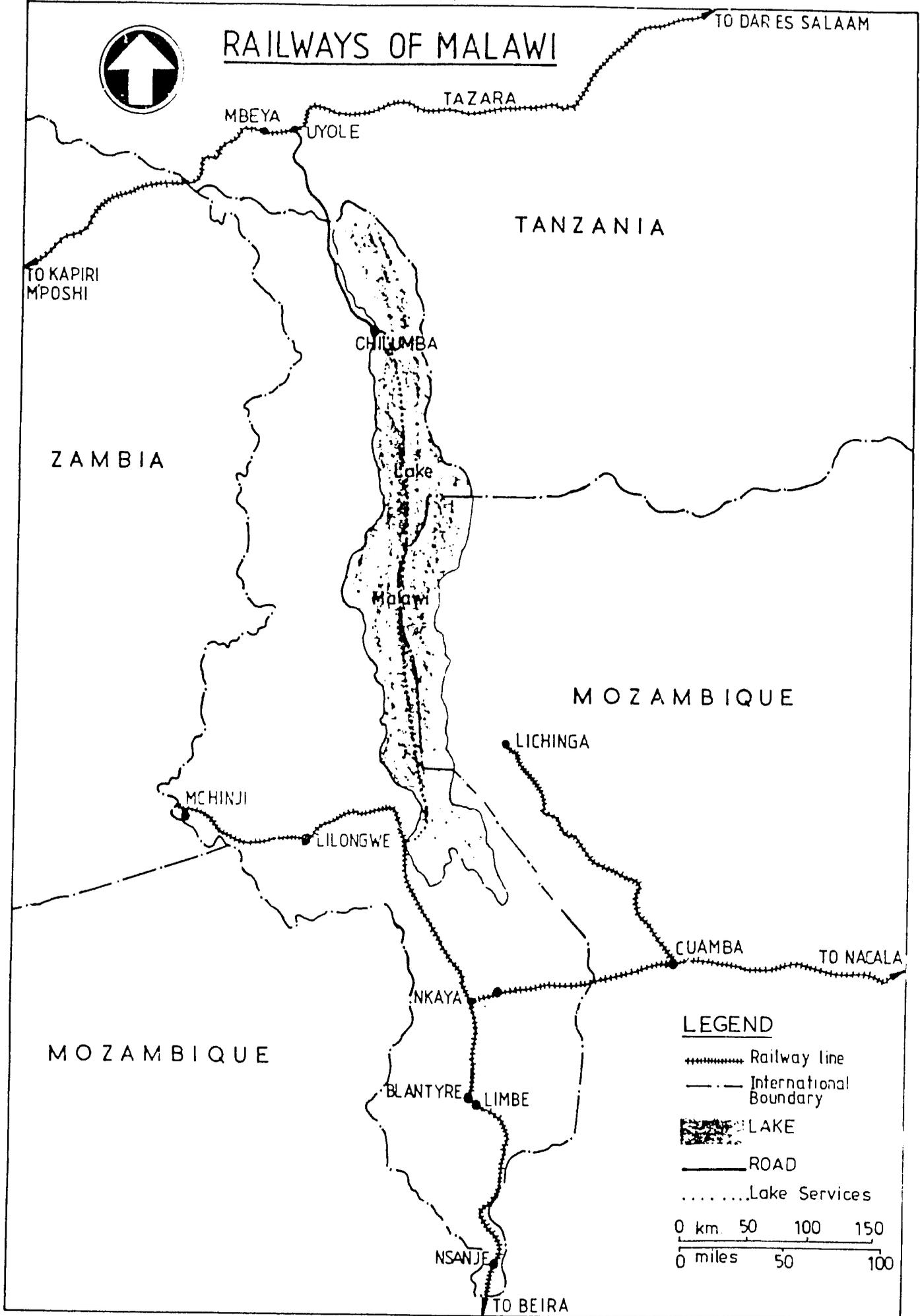
RAILWAYS AND PORTS OF SOUTHERN AFRICA



- Railway line
- International Boundary.

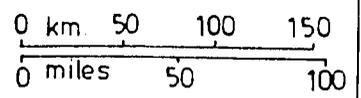


RAILWAYS OF MALAWI



LEGEND

- Railway line
- International Boundary
- LAKE
- ROAD
- Lake Services



I. BACKGROUND AND RATIONALE

A. Background

1. The Economy

Although the economy of Malawi has been generally well managed since independence in 1963, it suffered a severe blow when its main rail routes for external trade via the Mozambican ports of Nacala and Beira were rendered unusable by the MNR. Foreign Trade in 1987 comprised 530,000 tons of imports, principally fuels and fertilizer (63 per cent) and exports 290,000 tons, of which sugar (30 per cent) tea, tobacco (31 per cent) represented the main commodities. Trade with and through South Africa accounts for 73 per cent of the total volume. In 1987, 330,000 tons of foreign trade used South African ports. Growth in trade is not expected until exchange control restrictions are lifted which could be expected after the port of Nacala reopens.

The additional cost burden on the Malawi economy of using South African ports has been estimated to be US\$ 140 million per year. In recognition of this very severe burden, the World Bank renewed its financial adjustment loan of US\$ 110 million in 1987, and the Malawian kwacha was devalued by 30 per cent.

2. Trade Routes

Prior to 1983, all Malawi's overseas trade was conveyed by rail through Beira (75 per cent) and Nacala (25 per cent). At present, trade is roadhauled for transshipment to rail in Harare or Lusaka. Malawi Railways is therefore presently underutilised, since overseas traffic has not been conveyed by rail since 1983. However, the international community is strongly supporting rehabilitation and resecuring of the Nacala Route (807 km from Blantyre) and establishing a new corridor to Dar es Salaam (1772 km). These trade routes can be seen in fig. 1.

USAID is already supporting a vital section of the proposed Northern Corridor with a US\$ 19 million grant to improve services on the 470 km Lake Malawi. This multimodal Northern Corridor System comprises lake, road and rail modes and is designed to provide a secure but still expensive route for Malawi's trade to the port of Dar es Salaam. However, despite the urgently needed Northern route, the preferred corridor for Malawi will always be to the Nacala or Beira ports. Reopening of these lines is expected in 1991/92, although progress has been disrupted by hostile MNR actions.

3. Railways

Malawi Railways extends to the Mozambican border in the east for Nacala and South for Beira, and to the West via the capital Lilongwe to the Zambian border at Mchinji. The railways network is 765 km in length and is constructed to the Southern African Cape gauge. Its only connection to the main SADCC system is at Dondo on the Beira Corridor, and this has been cut for the past

five years. The Malawi system is consequently, isolated from the rest of SADCC.

Main line motive power is provided by a fleet of 32 locomotives comprising 13 British AEI units dating from 1963-67 and 19 Canadian Bombardier units, 3 of which were acquired in 1972 and 15 in 1980. Locomotives are maintained at Railway H.Q. in Limbe near Blantyre.

Generally, Malawi Railways is well-organized, operated and maintained. Unlike other SADCC countries locomotive availability is good (71.7 per cent for the Bombardier units) although utilization is low (31.3 per cent of total time), due mostly to lack of international traffic. Low utilization is also partly due to extended periods of delay from derailments because of the ineffectiveness of a single and very ancient steam-operated breakdown crane. In 1987/88, approximately 80 days of lost operating time was due to line blockages.

4. Future Traffic

Malawi's foreign trade is expected to grow once foreign exchange restrictions are alleviated following independence from RSA trade routes. The Northern Corridor's Route will handle 200,000 tons of foreign trade by the end of 1990, and rail will be needed to service the first link of 232 km from Blantyre to Chipoka port on Lake Malawi. By 1992 it is hoped that traditional routes through Mozambique will again be opened to traffic and by 2000 overseas trade levels will again be similar to those of 1980 when approximately 1.4 million tons of cargo traffic was carried on Malawi Railways. The present and future distribution of overseas trade is given in table 1.

Table I.1.

MALAWI - OVERSEAS TRADE DISTRIBUTION BY PORT

Port	<u>000'S TONNES</u>											
	1987			1990			1995			2000		
	I	E	T	I	E	T	I	E	T	I	E	T
All	171	232	403	273	228	501	341	253	594	373	271	644
Beira	0	66	66	34	80	114	79	90	169	77	100	177
Nacala	0	0	0	0	0	0	201	136	337	229	142	371
Dar	0	15	15	134	84	218	52	16	68	56	17	73
RSA	171	151	322	105	64	169	9	11	20	11	12	23

I - Imports, E - Exports, T - Total

Factors Bearing on Above Estimates

1. Nacala and Beira will not be directly accessible until 1992.
2. Beira is accessed via Harare by road through Tete.
3. Malawi and Mozambique signed agreement in 1985 that, once rehabilitated, the distribution between Nacala and Beira would be 2:1, although price will determine the final distribution.
4. Beira would take mostly bulk sugar exports and fertilizer imports.
5. Nacala would handle container traffic in both directions.
6. Note that the forecasts deviate from SATCC's, which assumed that Sena and Nacala lines would be operational by 1986.

B. Project Rationale

1. Locomotive Requirements

Up to 1994/95, Malawi will have sufficient locomotives to cope with estimated traffic levels because the present fleet is under-utilized. The analysis of Malawi Railways' future locomotive needs (Annex F-Economic Analysis) assumes that the present high standards of maintenance will continue and that availability of 75 per cent will be sustained, which is a fundamental objective of the project. The output from each locomotive is expected to increase fourfold as traffic builds up. After 1995 the fleet of British AEI locomotives will be nearly 30 years old, and lack of spares and obsolescence will require that Malawi Railways purchases 6 new locomotives. If Malawi Railways operates through services to the ports, it will need to purchase approximately 20 new locomotives by 2000. Through operations by both Malawi and Zimbabwe over short distances in Mozambique should be seriously considered in any regional planning. Although the present level of locomotive provision is satisfactory on Malawi Railways, the concern is that overall performance and specifically spare parts availability for maintenance will rapidly decline as a result of shortages of foreign exchange.

2. Role of the Project

The rationale of providing spare parts to Malawi Railways now in anticipation of procurement problems arising from foreign exchange shortages is based on the desire to prevent the development of a potential problem. the gradual deterioration of MR maintenance capability and standards, rather than to provide more difficult and expensive curative solutions later. Unlike the 1987 TAZARA project, this project will not provide additional locomotives, since they are not needed at this time. The supplying of spare parts to Malawi Railways seeks to avoid a locomotive maintenance situation currently experienced, for example, in Mozambique. The supply of a new breakdown crane to Malawi Railways will help ensure that locomotive utilization will be improved and time lost from accident and derailments greatly reduced. Overall, the project will ensure that Malawi Railways' future motive power and operating conditions are appropriate to the sudden increase in traffic volume anticipated once the international routes are reopened.

II. PROJECT DESCRIPTION

A. Project Goal and Purpose

The Regional Rail System Support project is in reality a regional umbrella project which comprises three distinct country-specific railway support and maintenance components in Mozambique, Swaziland and Malawi. The goal and purpose of this Malawi component parallel the two complementary components in Mozambique and Swaziland, which together constitute the overall Regional Rail Support Project. The goal is to support the development of a stronger economic foundation for growth in Southern Africa. The purpose of the overall project is to strengthen and enhance the capacity and operating efficiency of regional rail transport in SADCC countries. With specific application to Malawi, the purpose is to sustain the maintenance capability of Malawi Railway (MR) and improve its operational effectiveness. A combination of general foreign currency shortage and the high cost of trading through South African ports (required by the closure of traditional routes through Mozambique) has severely limited MR's ability to purchase locomotive spare parts. Emphasis is on preventing a deterioration in maintenance standard during the period of foreign exchange shortages and relatively low locomotive utilization. The mechanism for achieving this objective is the provision of specialized equipment and spare parts to enable MR both to sustain the current level of its locomotive maintenance program and to improve its performance in certain areas, such as derailment recovery.

B. Outputs

The project will lead to a number of specific outputs which will directly serve the primary objective (i.e. Project Purpose) of sustaining MR locomotive maintenance capacity and improving its operational effectiveness. These outputs, which are listed here in summary form, emerge from the various project components which are presented in more detail in section D below. (See also Annex A, Logframe).

1. Sustained maintenance capacity in MR for 19 Bombardier locomotives, comprising 3 levels of maintenance: periodic maintenance, general overhaul, and accident repair.
2. Improved derailment recovery capability and reduction of time and revenue lost from accidents.
3. Improved capability for repair of wagon superstructure and consequent increase in availability of serviceable wagons.
4. Efficiency of engineering support increased and transit time reduced for workers and supervisors to reach worksites along rail routes.

5. Storage building for Bombardier spare parts redesigned and refurbished for improved materials handling.
6. Computerized inventory system for workshop parts and supplies introduced.
7. Trained cadre of Malawian supervisors formed at MR workshop at Limbe.

C. The Project Setting

The territory covered by Malawi Railways extends to the Mozambique border and the port of Nacala in the east; to the Mozambique border and the port of Beira in the south; and to the Zambian border and Mchinji west from Lilongwe. MR is also in charge of shipping services on Lake Malawi and operations of the ports at Chilumba and Chipoka. Direct rail connection to Dondo, 30 kms from the port of Beira has been cut since 1983, but reconstruction from Dondo is underway. The rail connection to Nacala has been cut for 5 years, but is now being totally reconstructed inland from Nacala with approximately one third completed. The Sena line is expected to be fully restored and linked to the Malawi connection prior to 1993 and the Nacala line by 1992. UK (ODA) funding is assisting in rehabilitation of track in Malawi from Blantyre to the border.

ODA has also been providing technical assistance to MR in management, accounting and mechanical engineering. A.I.D. is financing a \$19 million project to upgrade two Lake Malawi port facilities to permit combined rail-truck-ship traffic along the Northern Corridor to the Tanzanian port of Dar es Salaam, as an option to the South African routes until the rail lines to Beira and Nacala are reopened.

Main line motive power for Malawi Railways is provided by diesel electrical locomotives, 13 British AEI, manufactured in 1963 and 1967 and 19 Canadian Bombardiers, four of which were acquired in 1972 and 15 in 1980. Maintenance is performed by MR's railway work shops in Limbe which is the headquarters of MR, located at the main Blantyre railway station.

D. Elements of the Project

1. Locomotive Spare Parts - The older British AEI fleet, which is in the process of being phased out by MR, is not covered by this project. The project addresses the maintenance of the newer Bombardier fleet (acquired in 1972 and 1980). Although these locomotives are of Canadian manufacture and assembly, they utilize engines made in the U.S. by Alco, a company owned by Bombardier. Therefore, according to MR estimates, approximately 65 percent of the spare parts to be used in the maintenance and repair of the Bombardier

locomotives are of U.S. source and origin. The project provides for a Code 935 waiver to procure from Canada those Bombardier spare parts not available in the U.S. Costs for spare parts have been based on normal maintenance requirements on the 19 Bombardier locomotives, plus general overhaul for 15 (approximately 4 per year over 4 years) and 4 for major accident repair. The 4-year program for locomotive maintenance by category and cost of spare parts is proposed as follows:

Periodic maintenance	14 x \$50,000	=	700,000
General overhaul	15 x 100,000	=	1,500,000
Accident repairs	4 x 150,000	=	600,000
Total			2,800,000

2. Wagons - There are approximately 900 wagons of all types in the MR fleet, but some 250 are presently unavailable to MR, as they are stranded in Mozambique on the Nacala and Sena lines. The remaining 650 wagons are generally in poor condition and have an availability factor of only 60 percent. Although some work on conversion of box cars to container wagons has taken place, a major constraint both to further conversion and the general repair of wagons is lack of sheet metal, which must be imported. Other resources (materials and labor) necessary for wagon repair can be supplied by MR from its own kwacha budget.

Under the project, sheet metal will be provided for a repair program of 60 wagons annually, as well as for the repair of locomotive superstructure.

Steel sheet metal for wagons and locomotives is priced at \$400,000. This procurement will be competed among U.S. firms and private steel producers in Code 941 countries.

3. Equipment - A 100-ton railway recovery crane is proposed to supplement, and eventually to replace, the existing 45-ton crane. The presence of only one smaller recovery crane in all of Malawi greatly complicates dealing with derailments, as the more effective procedure of having 2 cranes approaching from opposite ends cannot be utilized. As a result, weeks can be consumed by a single major derailment, with a serious loss of revenue for MR as well as other economic consequences for Malawi. With a 100-ton crane, greater flexibility is introduced, as the two can be used in tandem, and this crane alone should be able to lift all types of locomotives and fully loaded wagons.

The 100-ton railway recovery crane will cost \$2,000,000 delivered and assembled. The crane will be procured competitively in the U.S. among several manufacturers, with some customized specifications required.

4. Storage - The storage facility for Bombardier locomotives parts is a separate building from that of the AEI

locomotives, constructed with formed steel supports and shelving which totally support the extruded steel flooring above. The ground floor shelving is well stocked with parts. The floor above is approximately one third occupied with light steel sectional shelving, the remainder being empty. This building also contains the store records which are in card form.

Under the project, it is proposed to add a main entrance door at one end for interior and exterior access and to cut the upper floor at the aisles for transporting items by a mobile turning, high-lift, fork lift and to strengthen the floor as necessary, for which additional shelving will be required. Roofing must also be added to this area for weather protection.

Stores building renovation will be undertaken by MR. Shelving, loading equipment and building materials to be financed by A.I.D. are priced at \$100,000.

5. Civil Engineering Line Support - MR utilizes a number of 20-seat gang trolleys and 4-seat inspection trolleys needed to transport workmen and supervisors, respectively, to accident and repair sites along the line. The present self-propelled utility trolleys are over twenty years old and mostly worn out, with the majority non-operable. As traffic builds up, so too will the demand for these vehicles. It is therefore proposed to supply four 20-passenger gang trolleys and two 4-seater inspection trolleys for track oversight and repair, as well as 10 motor generators with water pumps for those new out-stations which lack both electricity and water.

4 - 20 seater self propelled gang trolleys	x 50,000	200,000
2 - 4 seater self propelled gang trolleys	x 20,000	40,000
10 diesel motor generator with water pump set	x 20,000	200,000
Total		440,000

6. Training - Generally artisan, technical and lower management skills have been taught by on-the-job training supplied by Sri Lankans hired directly by MR. This group of technicians, which numbered 40 some 5 years ago, has now been reduced to 20, who are expected to remain for another 5 years. Technical Assistance at the upper management level which has been funded by ODA and will continue at least up to 1991, includes the positions of General Manager, Financial Controller, Systems Analyst, Traffic Development Officer and Management Training Officer. Up until July, 1988, ODA also funded the position of Chief Mechanical Engineer. Additional long-term T.A. is deemed not to be needed and therefore is not addressed in this project. Long term training is provided satisfactorily by

OIA, but if necessary could also be offered separately by USAID/Malawi under its HRID project. The only training to be undertaken under this project is of a short-term nature, most likely at the Zimbabwe Railway School, for upgrading the skills of workshop supervisors in such areas as industrial safety and health, computerization, supplies and stores management, staff salary and incentive schemes, and audits and internal controls.

\$90,000 is budgeted for this item (\$3,000 per supervisor for 90 days).

7. Computerization of Workshop Inventory Systems - A problem has arisen from placement of the control of the inventory system in the hands of the Finance Officer of MR (a Coopers and Lybrand recommendation in 1982). Priority has been given to saving foreign exchange, and the reordering of spare parts was stopped to permit the drawdown of existing inventory. This has caused severe shortages and delays when critical parts are not stocked. Limited reordering, based on card records, has been on an ad hoc basis and will prove inadequate when normal ordering is resumed.

Since this project is directed at providing parts for a 4-year locomotive maintenance and repair program, a more operationally sound and consistent system of parts reordering must be introduced. This will require a more realistic division of labor between the Finance Office and the Office of the Chief Mechanical Engineer, whereby reordering decisions within fund availabilities are made by the engineer, while the vouchering and payment process is run by Finance. Under such an arrangement, each unit could exercise responsibility for its own functions regarding stores management without impeding workshop operations. The present card system will be inadequate for the inflow of orders which will be processed on an annual basis. Computerization of this function can easily be accomplished by 3 microcomputers (PCs), one each for the workshop planner, stores and purchasing. A program based on inventory with variations to suit the individual sections must be designed. The program will be Data Base III plus, with training, servicing and programming from computer firms in Zimbabwe.

3 IBM/Wang PCs with software supplies	30,000
Programs	30,000
Service, repairs	20,000
Training of operators	30,000
Total	110,000

III FINANCIAL PLAN

A. Budget

The financial plan and budget are based primarily on technical design and cost estimates made by the PP team in its review of equipment and commodity costs. Current (1988) prices were drawn from catalogues, supplemented by telex responses from various U.S. suppliers on such items as the derailment crane. Commodity prices and sources of procurement are discussed in Annex H. A full list of spare parts is not included because of its length and level of detail, but such a list, obtained from MR and adjusted by the PP team, is on file with the USAID/Zimbabwe Regional Engineer.

The budget includes a physical contingency factor of 10 percent to allow for omissions and errors in estimating requirements and costs, as well as a separate inflation factor of 5 percent, compounded annually. This will apply primarily to recurrent locomotive parts reordered annually, but even the first year's procurement could be subject to one year's inflation, depending on how soon the CPs can be met and orders placed.

1. Total Project Cost:

The total combined project cost to A.I.D and Malawi is \$8,750,000. The foreign exchange component which A.I.D is contributing is \$7,290,000 or 83.3 percent of the total project cost. A contribution of \$1,460,000 or 16.7 percent of the Malawi total is attributed from the Malawi Railways budget in local currency costs and in kind.

Costs of locomotive spare parts, and equipment are based on estimates obtained from Malawi Railways or U.S supplier price lists and include ocean transportation. The cost of local labor and materials are based on market prices obtained from Malawi Railways, and the training budgeted is based on actual Zimbabwe Railway School costs.

- a. A.I.D's contribution to the Malawi project is \$7,290,000. Table III.1 provides a summary of AID's contribution as follows: Locomotive parts \$2,840,000; wagon parts \$360,000; recovery crane \$2,000,000; stores equipment \$100,000; training \$90,000; computerization (workshop inventory) \$110,000; civil equipment \$440,000; monitoring and evaluation \$100,000; contingency \$1,250,000. Budget details for each component by year of planned expenditure are contained in Table III.3.
- b. Malawi Railways contribution to the project of \$1,460,000 represents 16.7 percent of the total

costs. Details are included in Table III.2, which includes the salaries of MR workshop staff, support staff over a 4-year period, plus in-kind contribution of workshop buildings, tools and equipment.

B. Recurrent Costs

Table III.2 lists MR's contributions to support activities under the project during the 4-year life of the project. Following this period, recurrent costs comprising maintenance and repair of inputs from this project will be solely the responsibility of Malawi Railways.

These recurrent cost include the periodic maintenance of the Bombardier locomotives after depletion of the A.I.D-funded maintenance parts, which will occur approximately one year following the end of the 4-year project; the maintenance and repair of the railway recovery crane; the continued maintenance of the workshop buildings, the service and repair of the PC computers; the maintenance and repair of the gang trolleys; and the maintenance and repair of the motor generator-water pump sets.

The main recurrent cost will be maintenance of the Bombardier locomotives, since it is anticipated that labor costs will not substantially rise as locomotive operations increase with expanded traffic demand. It is also anticipated that unit maintenance costs will be reduced as a result of economies of scale from a policy of locomotive standardization and the introduction of a computerized workshop inventory system. Training costs will continue at a relatively low level, but will increase as the Sri Lankan technicians are phased out and the ODA funded top management staff are replaced by local Malawians. It is expected that much of this training cost will be financed by the U.K under its ODA training program and thus will probably not be borne solely by the GOM.

Following the end of the project, MR's recurrent costs, associated mainly with continued maintenance of the 19 Bombardier locomotives, are estimated at approximately \$487,000 per year or approximately \$25,000 per locomotive. This amount is deemed to be manageable by MR, and it should be noted that because of efficiencies and economies introduced by the project, recurrent maintenance costs will be less than they would be for a similar standard of maintenance without the project.

TABLE III.1

SUMMARY OF AID'S CONTRIBUTION

<u>ITEM</u>		<u>COST IN U.S \$</u>	<u>PERCENTAGE</u>
1. SPARE PARTS FOR BOMBARDIER LOCOMOTIVES 4 YEAR PROGRAM			
A. Periodic Maintenance 14 x 50,000	700,000		
B. General overhaul (4 per year)			
15 x 100,000	1,500,000		
C. Accident Repair 4 x 150,000	600,000		
D. Sheet steel for loco superstructure	<u>40,000</u>		
		2,840,000	39.95%
2. WAGON REPAIR			
Sheet Steel for 180 wagons 180 x 2,000	<u>360,000</u>		
		360,000	4.94%
3. PLANT			
100 ton railway recovery crane	<u>2,000,000</u>		
		2,000,000	27.43%
4. STORES			
A. Building renovations by MR	0		
B. Shelving, floors, mobile fork lift, materials.	<u>100,000</u>		
		100,000	1.37%
5. TRAINING			
30 persons for 90 day period			
30 x 3000	<u>90,000</u>		
		90,000	1.23%
6. COMPUTERIZATION WORKSHOP INVENTORY			
A. 3 PC's with software, supplies	30,000		
B. Program	30,000		
C. Service, repairs	20,000		
D. Training of operators, engineers	<u>30,000</u>		
		110,000	1.51%
7. CIVIL ENGINEERING LINE SUPPORT			
A. 4-20 seater self propelled gang trolleys x 50,000	200,000		
B. 2-4 seater self f propelled gang trolleys x 20,000	40,000		
C. 10 - motor generators with water pumps x 20,000	<u>200,000</u>		
		<u>440,000</u>	6.04%
8. PROJECT MONITORING AND EVALUATION	100,000		
		<u>100,000</u>	1.37%
	<u>Sub-total</u>	6,040,000	
CONTINGENCY AND INFLATION			
		<u>1,250,000</u>	17.15%
	<u>Grand Total</u>	<u>7,290,000</u>	100.00%

TABLE III.2

SUMMARY OF MALAWI RAILWAYS CONTRIBUTION IN EQUIVALENT US\$000

CATEGORY OF ITEMS	ESTIMATED COST	PERCENTAGE
A. Direct		
Locomotive spare parts	30	
Stores building renovations	20	
Project Monitoring and Evaluation	<u>10</u>	
Sub-total	60	4.11
B. MR OPERATIONS 4 year period		
MR SALARIES of staff involved in maintenance and repair of diesel electric Bombardiers and support staff	800	
Tools and equipment	400	
Workshop buildings	<u>200</u>	
Sub-total	<u>1400</u>	95.89
	<u>1460</u>	100.00
Total Budget Cost		
USAID \$7,290,000		83.31
<u>1,460,000</u>		16.69
8,750,000		100.00%

TABLE III.3

FINANCIAL PLAN OF U.S CONTRIBUTION BY YEAR (EXPENDITURES)

(in U.S \$000)

ITEM	YEAR 1	YEAR 2	YEAR 3	YEAR 4	TOTAL
1. Spare parts for Bombardier Locos (19 locos)	750	780	820	860	3,210
2. Wagon Repair(180 wagons)	130	130	140		400
3. Plant 100 ton Recovery crane		2,130			2,130
4. Stores equipment	100				100
5. Training	30	30	30		90
6. Computerization	110				110
7. Trolleys, motor generators		470			470
8. Monitoring and evaluation		60		60	120
	<hr/>				
	1,120	3,600	990	920	6,630
Contingencies 10%	110	360	100	90	660
	<hr/>				
	1,230	3,960	1,090	1,010	7,290

Inflation built in at 5% compounded annually

IV PROJECT ANALYSES

A. Technical Analysis

The lines of Malawi Railways run from Lilongwe in the center of the country: 1) due west to Mchinji in Zambia; 2) south to Salima, Chipoka, Blantyre and Nova Fronteira (Mozambique) leading to Dondo and Beira Port; 3) east to Balaka, Entre Lagos (Mozambique) leading to Nampula and Nacala Port. The line from Nova Fronteira to Dondo in Mozambique was cut in 1983, but rehabilitation of the track with new rails and ties beginning at Dondo will begin late 1988, and the line is projected to reopen in 1993. The line from Entre Lagos to Nacala in Mozambique was cut in 1985, but rehabilitation of the track beginning at Nacala with new rail and ties began in 1986. Rehabilitation is one-third complete and the track should be open in 1991.

The Malawi railway network with South African region gauge of 1.067mm has a total length of 765km is at Limbe adjacent to Blantyre. The headquarters of Malawi Railways is also the location for the main workshop.

Rail traffic is presently limited by the broken lines to Beira and Nacala. Freight, consequently, apart from the North-South Lilongwe-Blantyre line, must normally be hauled by road to the Durban port in South Africa, or by road to Harare in Zimbabwe and thence to Beira by rail.

The long-term objective served by this project is to sustain the historically excellent maintenance capacity of MR during the current period of locomotive under-utilization, to ensure that MR will be ready to accommodate major increases in traffic to the ports of Dar es Salaam in the north, as well as to Nacala in the east and Beira in the south, as these routes become available.

Following is a rationale of various elements of MR's operation which relate to project outputs.

1. Locomotives:

The diesel locomotive fleet comprises 13 British AEI main line diesel electric manufactured in 1963 and 1967; 19 Canadian Bombardiers main line diesel electric manufactured in 1972 and 1980 and a series of different diesel hydraulic shunters. See table IV.1.

Traffic forecasts, from the present through the year 1994 indicate that projected traffic levels can be accommodated by the present fleet, but that traffic levels by the year 2000 will require partial replacement of the AEI fleet. For the present, factors such as cost effectiveness, standardization and the scarcity of foreign exchange for locomotive parts dictate the need to concentrate on the Canadian Bombardiers for main line and the Hunslet for shunters. This project deals only with the

Bombardiers, which are of recent manufacture and use Alco engines. The fact that the Alco engine is manufactured in the U.S.A, and that its components constitute MR's current locomotive major maintenance need, make this project appropriate for A.I.D. financing. The overall breakdown of parts for the Bombardier locos indicate procurement of 65 percent from the U.S. and 35 percent from Canada. CIDA of Canada has not expressed an interest in participation in the financing of spare parts for the Bombardier locomotives, reportedly at least in part because of the high percentage of U.S. componentry involved.

Maintenance schedules for the Bombardier locomotive are: A: Daily, B: Monthly, C: 6-Monthly, D: 48,000 miles or annually; and E: 200,000 miles. In addition, there is a general overhaul at 400,000 miles. For the 15 locomotives manufactured in 1980, major overhaul is needed now. The other 4 locomotives which were involved in major accidents require thorough rehabilitation.

A 4-year program can cover B,C and D periodic maintenance for all locomotives, plus general overhaul for 15 and rehabilitation for 4.

2. Wagons:

Of the approximately 900 wagons in the Malawi Railways fleet, 250 are presently stranded in Mozambique on the Nacala and Sena (Dondo) lines. The remaining 650 wagons are in relatively poor condition and have an availability factor of 60 percent. Of this number 80 box cars have already been converted to economically more productive container wagons. Further conversion is dependent upon MR receiving a supply of steel sheeting, which is to be procured under the project. This is also the main ingredient in wagon repair which MR cannot furnish itself or purchase because of foreign exchange constraints.

3. Equipment:

A 45-ton crane, in service for more than 25 years, is the only recovery crane owned and operated by Malawi Railways and is presently used for both railway and lake shipping needs. Derailments typically occur some 10 to 12 times a year. Delays in the recovery process can result in closure of a line for days or even weeks, while an 80- or 90-ton locomotive is partially disassembled, and wagons are unloaded because the existing crane cannot lift or drag them. The proposed new 100-ton crane will greatly reduce recovery time and will make the process much safer, especially if both cranes are used in tandem on opposite ends of the derailment.

4. Workshops:

The diesel locomotive repair and running shed are contained in one building, with a 2-bay standard running area for daily maintenance. The layout of the diesel repair shop is cramped, but its output is very good, considering its limitations. About 75 percent of the current machinery for the repair shop and the separate machine shop was supplied by West Germany in late 1987. The wheel shop used for wagons, coaches and locomotives has a 6-year old under-floor wheel lathe which works on both wheels at one time and is very efficient. The foundry, however, is in poor condition, with consequent low output and is inadequate with respect to raw material chemical composition. The coach and wagon repair shop are limited in capacity, but have adequate machinery.

All the workshops are served by 3 new air compressors in 2 locations. Bombardier parts are kept separately in one of two separate stores buildings. Both buildings have sectional steel pallet racks, which support the second floor. The building with Bombardier locomotive parts has a well stocked first floor, but the second floor is only one third occupied with empty light steel sectional shelving. It also contains a small office and store card records. Adjacent fenced areas contain large heavy items. Utilities are supplied by the city and are adequate.

5. Skills:

Generally artisan skills in the workshops have been enhanced by on-the-job training supplied by Sri Lankans paid for by Malawi Railways. Originally 40 some 5 years ago, the number of trainers is presently down to 20 who will continue for another 5 years. Some staff deficiencies have recently occurred at the senior and middle management levels, which should be correct in the near future. The ODA-funded Chief Mechanical Engineer, who has been running the maintenance workshop for 7 years, left in July 1988. This position is so critical to the effectiveness of the project that the naming of a qualified replacement is a Condition Precedent to disbursement. As of July 20, 1988, we understand informally that a new Chief Mechanical Engineer, a Malawian who was formerly the Chief Diesel Engineer of MR, has been appointed to this position. The General Manager position, now vacant, is expected to be filled by an ODA-funded expatriate, along with the MR Chief Financial Officer.

6. Civil Engineering Operations:

Tracks are in good condition, except for the Blantyre-Nova Fronteira line, where steady rehabilitation is continuing under funding from ODA. Deficient operations exist on work and inspection gang trolleys, which are presently over 20 years old and generally inoperable and mostly located at out stations which are without water and power. To correct this deficiency, gang trolleys and inspection trolleys will be provided, as well as 10 generators and pumps for the outstations.

7. Computerized Inventory:

Planning inventory, store systems and purchasing of spare parts have been conducted until now using a card system. However, with the growth in spare parts reordering, this inventory control is now inadequate and must be modernized to accommodate large increases anticipated. It will therefore be necessary to progress to simplified computerization of inventory parts to replace the card system.

Included will be a basic Data-Base program to suit the individual needs of Workshop Planning, Stores and Purchasing. A PC will be installed in each of the 3 locations complete with printer and basic hardware. The software program must be customized, but will remain simple in concept and application.

Proposed Equipment/parts Procurement Program (4 Years):

- a) To supply spare parts for total maintenance of the 19 Bombardier locomotives. Maintenance B,C,D,E (plus general overhaul).
- b) To supply parts for the 4 Bombardier locomotives requiring accident repair.
- c) To supply sheet steel for repair of 180 wagons plus required superstructure of Bombardier locomotives.
- d) To supply a self-propelled 100 ton railway recovery crane.
- e) To supply sectional steel palter racks, lifting equipment materials in the stores building to be renovated by MR.
- f) To supply 20-seater and 4-seater self-propelled gang trolleys.
- g) To supply 10 motor generators of 20 KVA capacity and water pumps for outstations.

- h) To supply 3 PC computers to planning, stores and purchasing departments of MR to modernize inventory control through computerization.

Training:

In addition to the equipment and parts procurement elements of the project, some training will be required to ensure proper use of project inputs and to upgrade supervisory and computer skills. Supervisor training is needed in the areas of work planning, supplies and store procedures, computer operations, cost centers and work controls. Accordingly, it is proposed that 30 supervision staff from MR receive training at Zimbabwe's National Railway Training School for periods of 60 to 90 days each. It is also proposed that engineers and computer operators be trained at computer schools in Harare in connection with inventory control and workshop operations.

Section 611(a) Requirements

Drawings, documents and cost estimates available at the time of the PP preparation are, for the major part, based on commodity items, including parts for locomotives. Documents and parts lists provided by Malawi Railways have been reviewed by the USAID/Zimbabwe Regional Engineer and PBI consultant engineers, together with price lists from the U.S. and are considered appropriate and applicable to the project. Cost estimates are deemed sufficiently firm to form the basis of the project budget.

B. Institutional Analysis

In contrast to the railways of Mozambique and, to a lesser extent Swaziland, the Malawi Railways (MR) is a well-managed property. The design team has noted the generally high level of organizational and managerial skills which exist within both the railways and the economy as a whole. MR's principal problems are financial, stemming from a five-year string of operating losses which have been funded by grants from the Malawi government. The losses result principally from significant reductions in traffic as a result of MR's international connections being severed. Indeed, as a purely national carrier, MR has made major gains in traffic carried and major reductions in total staff, resulting in sharply narrowing losses. A positive earnings posture is forecast in 1988. In summary, MR is a well run railway on a sound managerial footing.

Bolstering this finding is a recent assessment of MR by Deloitte, Haskins and Sells in July 1988, which found that adequate staff skills and management systems are in place to meet A.I.D. requirements on recording and control of granted funds and managing a host country procurement operation. However, in the short time since that report, the ODA Chief Mechanical Engineer has completed his tour of duty, and the Malawian Assistant General Manager for Technical Services, who participated actively in the design of the project, is also reported to have left Malawi Railways. There is concern that unless these key managers are soon replaced with qualified people, the high management standards observed to date may slip. Particularly important to the project is the early filling of the Chief Mechanical Engineer's position, which will be a Condition Precedent to disbursement. For this CP to be met, USAID/Malawi must be satisfied that a qualified and competent person has been appointed and is serving in the post.

General Management

MR has been given a clear mandate by GOM to "operate commercially". A recent tariff increase of 25 percent holds the prospect of an operating profit for 1988, even with the absence of international traffic.

MR has benefited and continues to benefit from donor aid in the managerial field. This aid has been quite fruitful due to the willingness and ability of MR staff to learn and adapt. As a result nearly all of the senior management positions are filled with competent Malawi nationals. Clear lines of authority exist as demonstrated in MR's organizational chart (Table IV.1). From discussions with MR staff, there appears to be a satisfactory level of understanding from both the individual and his superior of each person's function within the organization. Job descriptions are available and grading structures exist and operate.

The total number of people employed by MR has fallen 20 percent

from 5,480 in 1983 to 4,412 in 1987, as part of MR's policy of shedding labor. It is anticipated that this trend will continue as long as reduced traffic volumes persist.

Although this has helped MR to become more cost-effective, steps must be taken to ensure that staffing does not fall to levels which could have an adverse effect on the operations of MR. One problem which MR is currently facing is salary levels which in some cases are not high enough to retain trained workshop technicians, accountants, etc., who often leave MR for higher paid jobs in other parastatals and the private sector. Staff turnover levels are high, and this problem should be addressed by a serious study of comparable salary levels with a view to appropriate adjustments or the introduction of an incentive system to retain experienced technical and management personnel. MR is considering such a study outside the scope of this project.

General management of MR appears competent and receives enough information to ensure control of the organization. Any delay in receiving management information obviously impairs management's ability to identify problems and react quickly, and some room for improvement exists in timeliness of management reports.

Lake Services

MR operates both freight and passenger services, both by rail and on Lake Malawi by ship. At present the Lake services appear to be positive for MR group performance, as indicated by the following table:

	<u>Lake</u>	<u>Rail</u>
Percentage of Total Revenues	14%	86%
Percentage of Total Personnel	12%	88%
Percentage of Total Loss	9%	91%

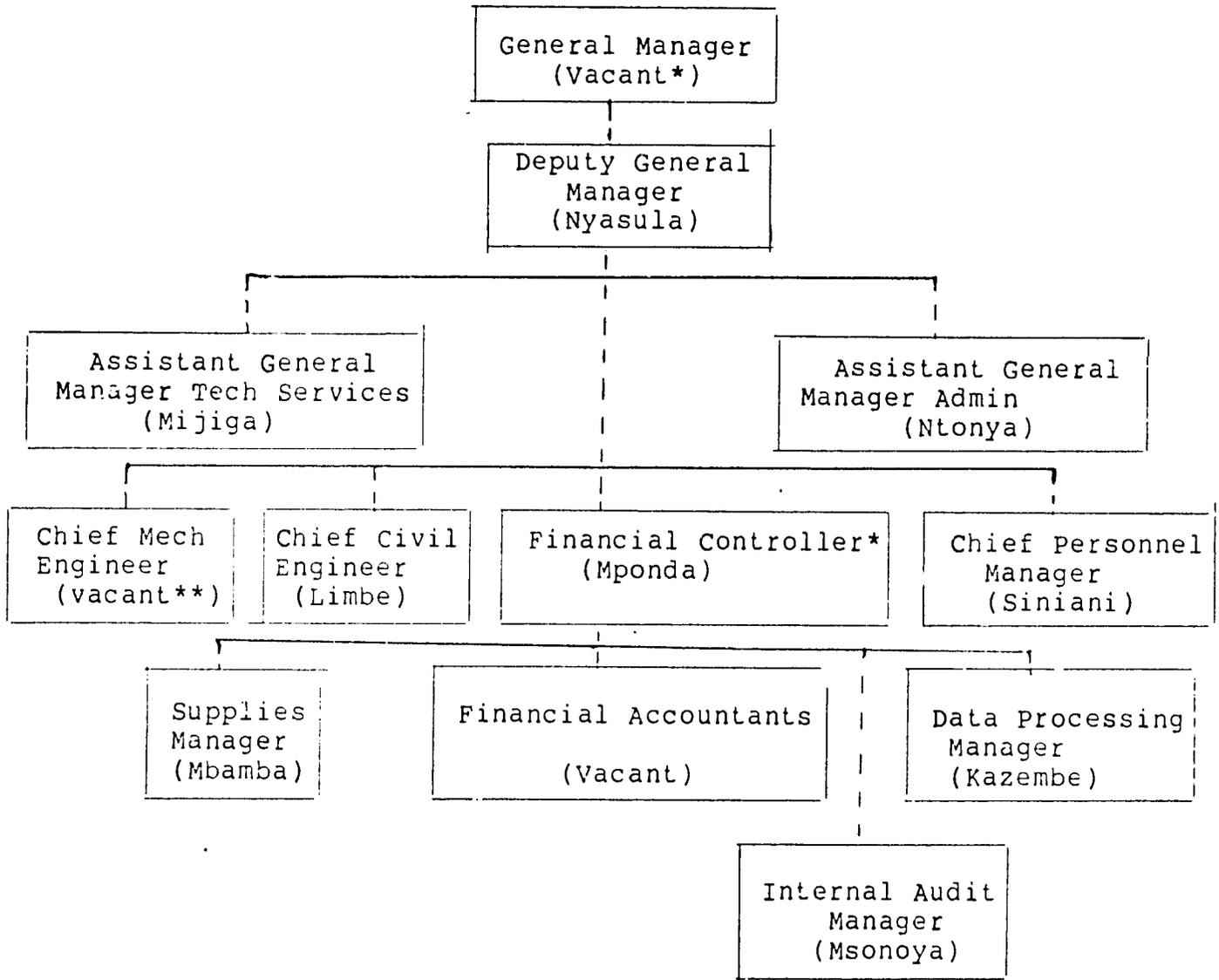
Source: MR Ltd Annual Report, 1986/87

Rail Workshops

MR's workshop at Limbe are well staffed and productive. Facilities are well equipped and relatively modern and are kept in good order and repair. Working conditions, employee productivity, quality of workmanship, and morale were all judged as good to excellent. The most serious problem is the potential shortage of spare parts for diesel locomotives, due to very limited foreign exchange availability (see below).

Table IV.2

ORGANIZATIONAL CHART OF MALAWI RAILWAYS



* ODA-financed positions to be filled later in 1988.

** Long-time ODA incumbent (Kent) departed in July, 1988. Position to be filled by a Malawian.

Stores

Stock levels have fallen over the last 2 years, declining by 12-percent in absolute terms. Stock turnover days have also fallen from 261 and 207. Given the devaluation of the Kwacha and the rate of inflation in Malawi (20 percent), this amounts to approximately 50 percent decline in stock levels. A purchase-on-request policy was introduced in 1985 due to MR's severe liquidity problems, and major purchases of spares were put off until they could be afforded. Although troublesome, the decreased level of utilization has prevented major operational problems as a result of this policy so far, but the situation is not sustainable, especially with the major locomotive overhaul now scheduled. Liquidity problems still persist due to continuing losses, underscoring the need for this project as a source of funding for spare parts during the interim period until traffic volume and revenues increase to normal levels. An appropriate division of labor between the MR Finance Office (responsibility for procurement documentation and payment) and the Chief Engineer's Office (responsibility for determining reordering levels) must be agreed upon. This situation must be monitored by USAID/Malawi to ensure that an efficient and equitable arrangement has been worked out regarding inventory reordering procedures within MR.

The stores accounting procedures are one of the few systems which benefit from written instructions on how the system should operate. The staff in the stores department are generally competent but would certainly benefit from having easy-to-use procedures, a personal computer and a certain amount of training. The system is comprehensive; maximum and minimum stock levels are set; requisitions are generated and approved; quotes are obtained; checking is done at several stages in the process.

Various reports are produced from the stores system, which also assists general management of MR and stores management. Examples of these are lists of slow moving stocks, price variance reports, buying variance report, annual stock ledger and master catalog.

Cash Management/Asset Management

Excluding an outstanding and unserviced debt of K2.8 million from Mozambique Railways owed to MR, debt payments to MR average 40 days, which is an acceptable level. However, certain government departments are slow payers and the policy is to put customers on cash terms once their credit limit has been exceeded. Nominal credit terms are 7 days with a maximum of 30 days.

A fixed asset register is maintained manually by the Fixed Asset Accountant. All fixed assets are recorded in this register, and depreciation is calculated manually once per annum. It is reconciled on an annual basis and regular checks are made on it by internal and external auditors. During the review of this Project Paper by USAID/Zimbabwe under the A.I.D. Southern Africa Regional Program, it was stressed that MR should treat the equipment received under the project as capital assets and record them as such in its financial records, including the creation of appropriate amortization schedules. The point was made that MR as a revenue-producing parastatal should not receive such assets as a free good, but that the cost of donor-provided capital equipment should be reflected in the fare structure.

Financial and Management Reporting

The management information and reports available to senior management of MR are comprehensive, although normally received between six or eight weeks after the month end.

The existing management information consists of the following:

- * Monthly statistics document. This document provides the actual results (monthly and year to date) and comparative budget amounts. Operating statistics for comparative purposes are also prepared (e.g., hours and kilometers by locomotive).
- * Monthly cash flow forecast and comparison with actual.
- * Quarterly reports for all major operating departments.
- * Financial quarterly report which includes:
 - balance sheet;
 - financial indicators document; (i.e., liquidity ratios, quick asset ratio, etc.);
 - profit and loss;
 - source and application;
 - debt management schedule;
 - cash flow.

C. Summary of Economic Analysis

A detailed economic analysis of the project is contained in Annex F. The analysis separately evaluates the project's main components of spare parts procurement for 19 Bombardier locomotives and the provision of a new high capacity breakdown crane. Other lower-cost items relating to storage facilities and management, the supply of materials for wagons and the supply of trolleys to the civil engineering department were not included in the analysis. The two main subcomponents will consume 80 percent of the grant.

Locomotives and Spare Parts

This component is designed to prevent a deterioration in the maintenance standards of the Bombardier fleet at a time when major overhauls are due, and utilization is expected to rapidly increase. Without the project, locomotive availability can be expected to fall to levels experienced in Mozambique, and even in Zimbabwe, when spare parts were not supplied in 1987 for their top-of-the-fleet D10's. From local experience and that of USAID Engineers, the present high availability of 70 percent plus, could easily fall to 40 percent in 3 to 4 years without the project. The need for donor action at this time is the result of acute shortage of foreign exchange in Malawi in general and MR in particular.

Assistance to provide spare parts to MR is, therefore, appropriate, timely, and as this economic analysis will demonstrate, cost effective.

Project benefits have been assessed as accruing only after surplus capacity has been utilized and the total fleet is in use in 1992 when it is viewed that the rail routes through Mozambique will again be in service. The benefits reflect the high costs of poor asset utilization if the locomotives were not available for traffic but awaiting maintenance due to spare parts shortages.

In the basic case, the project took into account the project capital costs which were spread over the 4 year implementation period; recurrent costs during the implementation period and after, making allowance for continued expenditure of inputs for regular maintenance, the extra costs after 7 years of the next series overhauls.

The result of the basic evaluation was that an Internal Rate of Return of 31.4 percent could be expected if the Mozambican international routes are, as anticipated, reopened in 1991/92.

If, however, the routes to Nacala and Beira are not opened until 1995 then, according to further analysis, the IRR would fall to 8 percent and the project might not be worth doing at present and should probably be delayed 3 years.

The GOM has been approached by MR to seek support from the international community to purchase new locomotives to replace the AEI units which were acquired 20 years ago. If action on this request results in new locomotive procurement before 1992, then it would seriously undermine this project by creating excess capacity.

The possibility that uneconomic decisions could be taken by the GOM or MR is of concern, and it is strongly recommended that the equivalent local currency costs of capital equipment provided under donor grant be budgeted by MR and reflected in their accounts, expenditures and in its revenues. This action will avoid inequities and distortions in the transport sector in Malawi.

The final sensitivity test applied to the locomotive project was to determine the effect of a 10 percent capital cost increase due to the budgeted contingency being, needed and used. The result was not significant, with the IRR reduced to 27 percent (from a basic 31.4 percent rate). The estimates of cost should be quite reliable, as they are based on detailed parts schedules and updated prices provided by MR.

Breakdown Crane

The acquisition of a second, larger (100-ton) diesel breakdown crane to work in tandem with and eventually replace the 30 year old breakdown crane will at least double the potential output. This means that the response time to emergencies will be much faster and total time and traffic lost as a result of derailment will be reduced dramatically by 50 percent and probably more. The new crane has twice the line speed and twice the capacity of the old crane. Average loss of operating time has been calculated as 0.6 days per million ton/km.

The benefits were calculated based on the traffic levels forecasted and a halving of lost time. Project costs estimated allow for the annualized provision cost and asset depreciation over a 30-year life and the recurrent cost of parts, labor and overhead costs similar to the locomotive component. The result of the analysis was an IRR of 29.4 percent for the breakdown crane.

Conclusion

Overall, the project's prospective economic impact is robust, the breakdown crane even more so than locomotive spare parts, due to much longer economic life and less sensitivity to the timing of traffic increases.

The project will benefit the Malawian economy by relieving pressure on foreign exchange in the short term, and in the medium term by ensuring that Malawi Railways has the capacity once again operate the routes to Beira and Nacala. If the project were not implemented and the supply and railway capacity

were thereby constrained, demand would switch to road transport which would cost the economy an additional \$5 to \$6 million per year. The conclusion is that the project is economically beneficial to both MR and the country and should, therefore, be implemented.

D. Social Soundness Analysis

The social feasibility of this project is sound and will serve a variety of beneficiaries at different levels. The most direct group of beneficiaries is Malawi Railways as an institution and its professional and technical staff. At least 90 percent of the project funding will be devoted to the procurement of commodities, parts, equipment and supplies aimed at sustaining or upgrading the locomotive maintenance capability of MR. As a result, the quality and effectiveness of maintenance at MR's workshop will improve. The physical materials provided under the project, along with the introduction of computerization in the stores branch and training provided to MR supervisors will all serve to increase efficiency and improve the quality of the working environment, especially in the area of cleanliness, orderliness and safety of the maintenance workshop.

Beneficiaries outside of Malawi Railways include passengers and commercial users of the railroad for shipment of cargo. For these beneficiaries, perhaps the most dramatic change brought about by the project will be the acquisition of the new 100-ton recovery crane, which as described in the Economic Analysis will greatly reduce time and revenue lost from accidents and derailments.

In light of the nature of the project, no spread effect or diffusion of new technology or innovation is to be expected, other than the generally positive effect of better railways maintenance, the avoidance of delays and a reduced economic and social impact resulting from accidents. The project does not involve physical expansion of lines or laying of additional track. However, an important objective is to enable MR to be ready for the sudden increase in traffic when the reopening of the lines to Beira and Nacala occurs in 1992.

E. Financial Analysis

Introduction

Malawi Railways Limited (MR) has a clear mandate to operate commercially by Government of Malawi who are the 100 per cent stock holders of Malawi Railways Holdings Company who owns Malawi Railways. Malawi Railways combined shipping and railway interests are budgeted to make a clear profit in 1988/89 despite the lack of international traffic. This will result from reducing staff by 20 per cent, imposing tight controls on expenditure, and maximizing revenues where possible. Freight traffic levels were halved from 1981 to 1983 and fell a further 25 per cent from 1983 to their lowest level in 1985/86. Passenger traffic has increased at over 6 per cent p.a. over the past ten years. The anticipated profit for FY 88/89 is a remarkable achievement considering that the revenue composition is freight 62 per cent, passenger 14 per cent and miscellaneous items 24 per cent. The latter includes sales of land and other assets.

The financial review by DHS for this project design generally concluded that MR is a well-run organization which has incurred losses resulting from reduced traffic levels because of the closure of the rail routes through Mozambique. Recommendations from the financial management review included clarification of Malawi Railways corporate strategy with Government of Malawi, given their social obligations to run certain unremunerative services; a salary review following years of cost cutting which is deemed necessary to stem the outflow of skilled staff; further computerization of MIS; further capital restructuring; more comprehensive revenue reporting; internal audit procedures and improving manpower development programs.

Malawi Railways shipping interests are also of concern to A.I.D. at the present time because of its ongoing \$19 million project to provide container handling equipment and to make general improvements to the Chilumba, Chipoka Monkey Bay ports. Although DHS did not review the shipping subsidiary, concern has been expressed by the MOT in Lilongwe, that the business might perform better if it were separated from Malawi Railways. This issue was identified during study of the "Northern Corridor Transport Systems" when a recommendation for a study was made.

Financial Performance

The financial performance of MR is shown in the 5 year profit and loss statement in Table E.1.

TABLE IV.3

MALAWI RAILWAYS

PROFIT AND LOSS ACCOUNT - 5 YEARS \$000's

(\$US 000's)

	15 months				
	1987	1986	1985	1984	1983
Turnover	9,416	7,759	7,438	7,045	8,646
Operating Costs	10,168	9,479	9,052	8,531	10,291
(inc dep + bad debts)	<hr/>				
Operating Loss	(752)	(1,720)	(1,614)	(1,486)	(1,646)
Investment Income	-	23	40	39	71
Other Interest					
Receivable	33	22	6	21	
Interest Payable	(98)	(69)	(1,148)	(1,270)	(1,022)
	<hr/>				
	(817)	(1,744)	(2,716)	(2,696)	(2,596)

The financial position shows decreasing losses which takes into account bad debts and depreciation. One of the main features of Malawi Railways expenditure characteristics is unusually low staff costs of only 38 per cent in 1987 (36 per cent in 1986). This reflects not only stringent cost control by Malawi Railways management but also the very low price of labor generally in Malawi.

The future viability of Malawi Railways depends on the Mozambican routes reopening. Prediction of Malawi Railways future financial performance depends on knowledge of the cost and revenue allocation to passenger and freight for rail and lake services. Prediction also depends on the extent to which costs will vary with traffic, so that fixed and variable costs can be projected. An estimation of the total, fixed and variable costs for freight and passenger services is produced in Table E.2 based on consultant's experience.

TABLE IV.4

ESTIMATE OF MALAWI RAILWAYS
COST AND REVENUE ALLOCATION
(\$US000's)

<u>RAIL</u>	Total Cost	Unit	Total Revenue	Unit
Total 100%	7,546	-	8,108	-
Fixed 40%	3,018	-	2,019	(other)
Variable 60%	4,528	-	6,089	(direct)
of which Pass 80%	3,622	2.7c/ntk	5,083	3.8c/ntk
Passenger 20%	906	55c/pass	1,006	62c/pass
<u>LAKE</u>				
Total	1,406	-	1,308	-
Fixed 60%	844	-	305	(other)
Variable 40%	562	-	1,003	(direct)
of which Pass 30%	394	\$8.9/ton	757	\$17/ton
Passenger 30%	168	85c/pass	246	1.25/pass

Note:

Exchange rate \$1.0 = K2.6.

(Costs exchange [depreciation and debts])

TABLE IV.5 Malawi Rail and Lake Services Traffic Forecasts

	<u>1987</u>	<u>1990</u>	<u>1995</u>	<u>2000</u>	
Rail freight 000's ntk		137,174	186,760	269,771	290,820
passenger 000's		1,639	1,952	2,612	3,496
Lake freight 000's tons		44	253	107	119
passenger 000's		198	207	223	240

Assumptions

- Rail freight from Annex F assuming that MR does not operate through to Beira or Nacala (to give a conservative financial forecast).
- Lake freight jumps in 1990 to take Northern Corridor traffic but declines again once the shorter Mozambican routes reopen.
- Local freight on rail and lake is assumed to increase at 3% p.a.
- Passengers (rail) to increase at 6% p.a.
- Passengers (shipping) to increase at 1.5% p.a.

TABLE IV.6 MALAWI RAILWAYS DIRECT REVENUE AND EXPENDITURE FORECASTS

(\$US000's)

	<u>1987</u>	<u>1990</u>	<u>1995</u>	<u>2000</u>
<u>RAIL</u>				
Freight Revenue	5,083	7,096	10,251	11,051
Freight Expenditure	3,622	5,042	7,284	7,852
Passenger Revenue	1,006	1,210	1,619	2,167
Passenger Expenditure	906	1,074	1,437	1,923
Total Revenue	6,089	8,306	11,870	13,218
Total Expenditure	4,528	6,116	8,721	9,775
<u>LAKE</u>				
Freight Revenue	757	4,301	1,819	2,023
Freight Expenditure	394	2,251	952	1,059
Passenger Revenue	246	258	278	300
Passenger Expenditure	168	176	189	204
Total Revenue	1,003	4,559	2,097	2,323
Total Expenditure	562	2,427	1,141	1,263
<u>RAIL AND LAKE</u>				
Total Revenue	7,092	12,865	13,967	15,541
Total Expenditure	5,090	8,543	9,862	11,038

TABLE IV.7 MALAWI RAILWAYS PROJECTED INCOME AND EXPENDITURE

	(\$US000's)			
	<u>1987</u>	<u>1990</u>	<u>1995</u>	<u>2000</u>
<u>REVENUE</u>				
Rail & Lake Services	7,092	12,865	13,967	15,541
Other	2,324	2,430	2,618	2,820
Total	9,416	15,295	16,585	18,361
<u>EXPENDITURE</u>				
Direct Rail & Lake Services	5,090	8,543	9,862	11,038
Indirect	3,862	4,220	4,892	5,671
Depreciation	1,118	1,799	2,400	2,850
Interest	98	200	200	1,200
Total	<u>10,168</u>	<u>14,762</u>	<u>17,354</u>	<u>20,759</u>
Surplus (deficit)	<u>(752)</u>	<u>533</u>	<u>(769)</u>	<u>(2,398)</u>

Notes:

1. An allowance is made to depreciate the USAID component as follows:

	\$ 000's		
Locomotive Spare Parts	3.21m	7y	= 458
Breakdown Crane	2.0 m	30y	= 67
Others	0.410	10y	= 41
Annual			= 0.566

2. Beyond 1995 an addition 6 locomotives will be needed to replace the AEI's and cope with the traffic assumed.
Financial Charges 6@ \$1.850m, over 25 years
Interest and Loan Repayments @ 10% \$1.194m (say \$1.20m)
Depreciation \$0.444m (say \$0.45m)
3. Estimates of future depreciation and interest have been included in the financial analysis.
4. Indirect costs are assumed to increase by 3 per cent p.a.
5. The effect of A.I.D. (and other investments) in Malawi Lake Services have not been taken into account. If properly accounted for, the proposed \$19 million on fixed equipment would add a further \$0.95 million on depreciation.

Conclusions

The financial analysis shows that Malawi Railways will earn a small surplus in 1990 when operating international goods services to Chipoka port on the Northern Corridor Route. After international routes are opened again through Mozambique, in 1995 the analysis shows that Malawi Railways will produce a small deficit. This is because the A.I.D. project is fully depreciated in the forecast, but that tariffs are not increased to reflect this cost. It will therefore be necessary for Malawi Railways to account properly for any investments made by A.I.D. (or other donors) as in any well-run commercial organization. The analysis also assumes that Malawi Railways will operate only to the Mozambican borders.

If Malawi Railways operates through services to the ports, as discussed in the economic analysis, then the small deficit of \$0.769m in 1995 could be turned into a profit of \$2.251m. By the end of the forecasting period; a deficit of \$2.4 million is predicted, due to depreciation and finance charges arising from the purchase of 6 locomotives needed to operate to the borders and to replace the old AEI units. If Malawi Railways operates trains to the ports, then a further 13 units will be needed at an extra cost of \$3.549 million for interest, loan and depreciation, payments, Revenue, however, would increase by \$6.5 million. The net effect would be that Malawi Railways would make a small surplus of \$0.556 million at the end of the forecasting period. The analysis shows that Malawi Railways' financial position is satisfactory and that sufficient revenue would be generated to cover adequately the project's impact on the Malawi Railways budget.

F. Environmental Concerns

An Initial Environmental Examination was submitted and approved by the Africa Bureau Environmental Officer at the time of the PID. The nature of the project has not changed since that time. Some 90 percent of the project's budget will go for the procurement of locomotive maintenance equipment and spare parts. No construction is involved, other than relatively minor refurbishing of the MR stores warehouse. The consumables procured under the project will be used for maintenance of locomotives and wagons already in the possession of Malawi Railways. Only existing roadbeds and track will be used in project operations.

The largest single piece of equipment provided by the project, the 100-ton breakdown crane, will have an environmentally favorable effect by greatly reducing the time and effort needed to recover locomotives and wagons following derailments.

The diesel-driven 22.5 KVA generators and water pumps will also produce environmental improvement, as they will be used at remote out stations which currently have no electricity or water.

No adverse environmental effects are foreseen from the project, and accordingly the Negative Determination made at time of the PID is hereby reaffirmed.

V. IMPLEMENTATION PLAN

A. Project Management

The Regional Rail System Support project is in reality a regional umbrella project which comprises three distinct country-specific railway support and maintenance projects in Mozambique, Swaziland and Malawi. Although implementation of the three components will be separate, there are important linkages. Successful achievement of the objectives of the Mozambican component will enhance and complement the Malawi component by facilitating the reopening of the rail routes to the Beira port. Overall responsibility for design and coordination of the project rests with the Southern Africa Regional Program of USAID/Zimbabwe.

The Malawi project will be implemented by USAID/Malawi and the Government of Malawi. The GOM's implementing agency will be Malawi Railways, which is generally regarded as a very well run organization. MR's main problem, and the reason for the project, is in the field of equipment and spare parts procurement, resulting from Malawi's chronic foreign exchange shortage. Section IV.B., Institutional Analysis, describes the capabilities and shortcomings of the MR organization, based in part on a recent study A.I.D.-funded study of financial management of the national railway organizations of the three participating countries by the U.S. management consulting firm of Deloitte, Haskins and Sells.

A.I.D. project implementation responsibility will rest with USAID/Malawi. However, since this is a small mission which lacks both a procurement officer and an engineer on its staff, some technical support will be required from other A.I.D. offices. The regional engineer, based in Harare, already makes regular visits to Malawi in connection with the Northern Corridor project, which also involves close contact with Malawi Railways. For the first year of this project, the regional engineer will be able to assist with technical matters which arise on the occasion of his regular visits to Malawi. However, in subsequent years, owing to planned staff reductions in A.I.D.'s Southern Africa Regional Office, this function may have to be performed either by the REDSO/ESA engineering office in Nairobi or by a local-hire PSC engineer recruited by USAID/Malawi. Project financing and payment procedures through letters of commitment to suppliers will be directed by the USAID/Malawi Controller.

Although procurement of the various commodities (the bulk of project activities) will be performed by MR under host country contracting provisions (see the Procurement Plan in the next section), some A.I.D. monitoring and counsel will be available from the Regional Commodity Management Office (RCMO) and the Regional Legal Advisor (RLA) in REDSO/Nairobi.

Despite the regional concept and design of the overall RRSS project, the involvement in implementation matters of the Southern Africa Regional Program office in USAID/Zimbabwe will be limited to the support described above by the regional engineer.

B. Procurement and Contracting Plan

1. Responsible Agency:

Malawi Railways (MR) will be the primary implementing agency for this project. The General Manager of the Railway, or in his absence the Assistant General Manager for Technical Services, will have overall responsibility for the procurement process. Specifically, the General Manager of Malawi Railways will be responsible for the following actions: a) drafting of procurement solicitations, b) selecting successful bidders, c) executing contracts with selected suppliers, d) keeping appropriate records on all contracting actions; e) acknowledging to USAID/Malawi receipt of equipment and commodities procured with AID funds. Although this is a host country procurement action, USAID/Malawi will assist in all aspects of the procurement process, as necessary, including technical inputs by REDSO/ESA's RCMO and RLA and the USAID/Zimbabwe engineer.

2. Equipment List:

Malawi Railways has requested A.I.D assistance in the procurement of the following:

<u>ITEM</u>	<u>ESTIMATED BASE COST</u>
1) Spare parts for overhaul/maintenance*	\$ 2,840,000
2) Sheet Steel for wagon repair	360,000
3) One self propelled 100 T recovery crane	2,000,000
4) Shelving and Mobile equipment for stores	100,000
5) Four 20 passenger work gang trolleys	200,000
6) Two 4 passenger inspection trolleys	40,000
7) Ten diesel generators and water pumps	200,000
8) Three IBM-compatible PC's	30,000
Total Estimated Base Cost of Procured Items	\$ 5,770,000

* See Annex H, Equipment List

3. Procurement Process:

All procurement of equipment and materials under this project will be conducted by Malawi Railways under the Host Country contracting procedures of AID handbook 11, Chapter 3. Malawi Railways with the help of AID-financed technical assistance will draft all solicitations (Invitations for Bids and Request for Proposals) for the procurement of equipment and materials. Draft solicitations will be submitted to USAID/ Malawi for approval. The solicitations will be reviewed by the USAID/Malawi Project Officer, the RESDO/ENGR, the RESDO/RCMO and the REDSO/RLA. AID-required changes and/or approval of solicitations will be conveyed to Malawi Railways by Project Implementation Letter. All procurements of goods or materials will be advertised in the AID-financed Export Opportunities Bulletin and in the U.S. Commerce Business Daily. Bids/offers in response to solicitations will be received and opened by the Malawi Central Tender Board and evaluated by Malawi Railways. After deciding on the contract award, Malawi Railways will make a written request to USAID/Malawi for A.I.D approval of the contract award and for A.I.D financing of the contract. A.I.D approval/disapproval will be by Project Implementation Letter.

Procurement of the 100-ton self-propelled recovery crane will be by formal competitive bidding procedures (an invitation for bids, IFB). Procurement of the spare parts for the overhaul and maintenance of Malawi Railways' existing fleet of Bombardier locomotives will be by competitive negotiated procurement procedures (a request for quotations RFQ). Procurement of the trolleys, and the diesel generators and water pumps for the out stations would also be procured by competitive negotiated procurement procedures. To the greatest extent possible, procurements will be consolidated and the number of solicitations kept to a minimum. At this time no more than four solicitations, as indicated in the procurement timing section below, are anticipated.

4. Procurement Source/Origin:

The authorized source/origin for commodities and commodity related services for this component of the Project is A.I.D Geographic Code 941. However, most of the equipment listed above is available from the United States. The Bombardier locomotives in the Railway's fleet were manufactured in Canada, and some of the spare parts necessary for the overhaul and maintenance of these locomotives are not made in the United States. However, these locomotives have U.S.-manufactured ALCO engines, and Malawi Railways estimates that approximately 65 percent of the required

spare parts for the locomotive overhaul and maintenance can be of U.S source/origin. The 35 percent manufactured in Canada will require a Code 935 source/origin waiver in the amount of \$1,000,000 (see Annex E).

5. Receipt and Utilization:

Malawi Railways will clear goods from customs within 30 days of arrival in Malawi. MR will then conduct an inventory of the goods received and within 45 days of clearance from customs acknowledge in writing to USAID/Malawi receipt of the goods. This receiving report will detail any shortages, overages, damage or discrepancies from that which should have been received and will report or propose any remedial action which has been or will be undertaken by the Railway to correct them.

6. Marking:

Any equipment financed by A.I.D under this component of the project will be appropriately marked with the A.I.D Clasp Hand Symbol. Major components of spare parts will also be marked. Suppliers will be required to mark goods prior to shipment from the United States.

7. Financing:

Since under the Malawi component, most of the suppliers will probably be from the United States and all of the contracts will probably exceed \$25,000 in value, AID direct letters of commitment issued by the Controller, USAID/Malawi, in conjunction with the A.I.D. Regional Financial Management Center in Nairobi, will be used to finance these contracts.

8. Procurement Timing:

The timing of the procurements for Malawi Railways will be dependent upon when funds are made available for of the Malawi component of the project. At this time, the PP design team believes that except for the locomotive parts which will be procured annually, most items, particularly the recovery crane, the largest single item, will be funded in the first year of the project. The following procurement schedule is based upon that assumption.

Contracting and Financing Methods

<u>PROJECT ELEMENT</u>	<u>IMPLEMENTATION METHOD</u>	<u>FINANCING METHOD</u>
Commodities, Equipment and Materials	HC Contract (HB11)	AID Direct Letter of Commitment
Construction	HC Contract (HB11)	AID Direct Reimbursement
Training	HC Contract	AID Direct Reimbursement
Evaluation	IQC or Mission Contract	AID Direct Reimbursement

<u>Action</u>	<u>Days after authorization</u>
a) For the 100 ton Recovery Crane	
MR submits draft IFB for recovery crane to USAID	90
USAID review completed	110
IFB for crane advertised	120
Bids received and opened by MCTB	180
Contract award for crane	210
Delivery and commissioning of crane in Malawi	500-600
b) For the spare parts for the Bombardier locomotives: (first year)	
MR submits draft RFQ to USAID	100
USAID review completed	125
RFQ advertised	140
Offers received and opened by the MCTB	200
Contract awards for the spare parts	230
Parts received in Malawi	300-450
c) For the rail trolleys:	
MR submits draft RFQ for rail trolleys	150
USAID review completed	170
RFQ advertised	185
Offers received and opened by the MCTB	230
Contract awards for trolleys	270
Delivery of trolleys in Malawi	410-530
d) For the Diesel Generators Water Pumps	
MR submits draft RFQ to USAID	150
USAID review completed	170
RFQ advertised	185
Offers received and opened by the MCTB	230
Contract awards	270
Delivery in Malawi	410-530

9. Participation by Gray Amendment Firms

Since the Malawi component of the project will involve no contracting for technical services, no opportunities will arise for the participation of Gray Amendment firms in this area. Moreover, with respect to procurement, the specialized nature of the commodities needed (locomotive spare parts and related items) will limit the type of firms which will be able to bid. It is possible, however, that non-specialized items, such as diesel generators and water pumps, can be procured from small business and Gray Amendment manufacturers and dealers.

10. Audit Provisions

In this component, audits will relate almost exclusively to procurement and end use. The USAID/Malawi Controller will arrange periodic audits by certified public accounting firms under IQC to ensure that the procurement process has been proper and in accordance with agency regulations and policies. The cost of these audits will be borne from the \$100,000 project budget line item covering audits and evaluations.

C. Schedule of Events

	<u>DATE</u>	<u>ACTION</u>
Project Paper completed	July 88	USAID/Z
Project paper reviewed and approved	July 88	USAID/Z AID/M
Grant agreement signed	Aug 88	USAID/M GOM
CP's meet by GOM	Oct 88	GOM
Recovery crane IFB submitted	Nov 88	MR
1st Year Loco spare parts list RFQ submitted	Nov 88	MR, REDSO, USAID/Z
IFB recovery crane advertised	Dec 88	REDSO
Loco spare parts RFQ advertised	Jan 89	REDSO
Training begun	Jan 89	MR USAID/M
Rail trolleys, diesel generators submitted	Jan 89	MR
PC's ordered	Jan 89	USAID/M
Rail trolleys, diesel generators advertised	Feb 89	REDSO, USAID/Z
Recovery crane bids if received	Feb 89	MR
Loco spares offer received	Mar 89	MR USAID/M
Recovery crane awarded	Mar 89	MR USAID/M
Rail trolleys, diesel generators offers rec	Apr 89	MR
Training ended	Apr 89	MR
Loco spares awarded	Apr 89	MR USAID/M REDSO
PC's arrive	Apr 89	MR
Rail trolleys diesel generators awarded	Apr 89	MR USAID/M
Loco parts delivered	Sept 89	MR USAID/M
Rail trolleys, diesel generators delivered	Oct 89	MR
Recovery crane delivered	Nov 89	MR USAID/Z
2nd Year Loco spare parts list submitted	Nov 89	MR, REDSO, USAID/Z
Loco spare parts, RFQ advertised	Jan 90	REDSO
Training begun	Jan 90	MR USAID/M
Loco spare parts offers received	Mar 90	MR
Loco spare parts awarded	Apr 90	MR USAID/M
Training ended	Apr 90	MR
Loco spare parts delivered	Sept 90	MR USAID/Z
3rd Year Loco spare parts list submitted	Nov 90	MR, REDSO, USAID/M
Loco spare parts RFQ advertised	Jan 91	REDSO
Training begun		
Loco spare parts offers received	Mar 91	MR USAID/M
Loco spare parts awarded	Apr 91	MR
Training ended		
Loco spare parts delivered	Sept 91	MR USAID/M
4th Year Loco spare parts list submitted	Nov 91	MR, REDSO, USAID/M
Loco spare parts RFQ advertised	Jan 92	REDSO
Loco spare parts offers received	Mar 92	MR USAID/M
Loco spare parts awarded	Apr 92	MR
Loco spare parts delivered	July 92	MR USAID/M
Project assistance completion Date (PACD)	Apr 92	MR USAID/M

VI. EVALUATION PLAN

Since the major activity in this component of the project is the procurement of railway locomotive equipment and spare parts, evaluations will focus chiefly on how smoothly and appropriately procurement has taken place and how effectively Malawi Railways has utilized resources provided by the project. Since audits by a CPA firm stressing all aspects of financial management will also take place (see final paragraph of Procurement and Contracting Plan, section V.B.), care should be taken to plan the scope of the evaluations so as not to duplicate work done by the audits.

Two evaluations are planned during the project's 4-year life. A mid-term evaluation will be scheduled for approximately September, 1990, by which time most of the major procurement will have been completed, except for locomotive parts which are ordered annually. The exact timing of the first evaluation will be determined by the delivery date of the recovery crane, the largest single item to be procured in the project. Estimated delivery time is about 18 months from date of order, and arrival and assembly of this major piece of equipment will constitute an important milestone in the project. As such, it is considered a good reference point for the initial evaluation. This evaluation will also examine workshop renovation completed and computerization of inventory records. Almost half of the supervisory training at the railway school in Zimbabwe will be completed by this time, and evaluators will interview returned trainees to assess the degree to which their training has been applied. The evaluation will also review any studies which have been completed at that time under the short-term TA element of the project.

A final evaluation will take place in 1992, after all procurement and training have been completed. At this time, an assessment will be made of the effectiveness of the MR locomotive maintenance program and the impact of project activities in MR's overall performance in the area of maintenance. Since this timing should coincide with the anticipated reopening of the Beira and Nacala lines, a transport economist should assess the adequacy of MR's then capacity to cope with greatly expanded traffic, with recommendations for further action by MR.

Both evaluations will involve outside consultants, including a railway management specialist, a railway equipment specialist and a transport economist. The project provides a total of \$100,000 for both evaluations and any audits determined appropriate by the USAID/Malawi Controller. To conserve both funds and manpower, some thought should be given to coordinating these evaluations with those of the companion projects in Mozambique and Swaziland under the overall RRSS project.

VII. CONDITIONS, COVENANTS AND NEGOTIATING STATUS

The Project Grant Agreement will contain the following conditions precedent to all disbursement under the project:

That GOM shall furnish to A.I.D. in form and substance satisfactory to A.I.D.:

1. Evidence that the key position of Chief Mechanical Engineer within Malawi Railways has been filled by a qualified person.
2. Evidence that Malawi's Railways has formally designated an individual at Malawi Railways who will act as Project Coordinator, to direct project activities for MR.

The Grant Agreement shall contain the following covenants:

1. The Cooperating Country shall make available railway workshop facilities and personnel to maintain and repair Bombardier diesel electric locomotives and repair on wagons.
4. The Cooperative Country shall ensure that appropriate provisions are made by Malawi Railways to list equipment provided under the project as capital assets and to take account of their costs in setting tariff structures.

Negotiating Status

Representatives of Malawi Railways have worked closely with the A.I.D. design team in developing the Malawi component of the project. MR is in accord with proposed project components, as well as implementation arrangements, and has accepted in principle the conditions and covenants to be included in the Project Grant Agreement for Malawi. USAID/M and the regional engineer have had a meeting with the Malawi Ministry of Transport and Communications on the basic project components, and it has been agreed that Malawi Railways will be the Implementing Agency and that MR will keep the Ministry of Transport and Communications fully informed of project progress.

USAID/M has held a meeting with the Malawi Ministry of Finance and has established that the MOF foresees no obstacle to the prompt signing of the Grant Agreement, since the project is part of the SATCC Nacala Port Transport Systems projects.

LOGICAL FRAMEWORK
MALAWI COMPONENT

GOAL	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	ASSUMPTIONS
To support the development of a stronger economic foundation for growth in Southern Africa	Lower total transport costs for Malawian imports and exports. Major saving in foreign exchange.	Malawi National Trade Statistics National Income Accounts	Transport sector will continue to be high priority for SADCC
PURPOSE	END OF PROJECT STATUS		
To sustain the maintenance capability of Malawi Railways (MR) and improve its operational effectiveness.	<ol style="list-style-type: none"> 1. Bombardier locomotives sustained at approximately 75% availability. 2. Downtime per derailment decreases by at least 50%. 3. Wagon availability increases from 50% to 70%. 4. Operating capacity of MR increases without additional locomotives, in time to meet needs when Nacala line reopens by 1992. 5. Cost effectiveness of locomotives maintenance program increases by improving efficiency of periodic maintenance, overhauls and accidents repairs. 	Malawi Railways traffic statistics	<p>Traffic on MR will increase four-fold by year 2000 to (112,000 NTK, from 33,000 NTK in 1987).</p> <p>Nacala and Beira lines not accessible before 1992.</p>

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OUTPUTS	MAGNITUDE OF OUTPUTS	MEANS OF VERIFICATION	ASSUMPTIONS
1. Sustained maintenance capacity in MR for 19 Bombardier locomotives, comprising 3 levels of maintenance : periodic maintenance, general overhaul, and accident repair.	1. Locomotive maintained over 4-years: periodic maintenance - 19 general overhaul - 15 major accident repair - 4	MR workshops & maintenance MR records on downtime and derailments. MR storage and inventory records.	1. MR's original 45-ton break-down crane remains in service for 5-10 more years.
2. Improved derailment recovery capability established through the procurement of a 100-ton crane.	2. Wagons repaired over 4 years - 180	NkZ training records on Malawi supervisors. USAID Project Evaluations	
3. Improved capability for repair of locomotive and wagon superstructure through provision of steel sheeting.	3. Trolleys will reduce transport time to and from worksite for crews and supervisors by at least 2/3 (67%).		
4. Efficiency of engineering support increased through supply of gang trolleys and inspection trolleys.	4. Redesign and alteration of parts storage building and computerization of inventory control will dramatically improve efficiency of stocking and reordering process.		
5. Storage building for Bombardier spare parts redesigned and refurbished for improved materials handling.	5. Supervisory effectiveness will increase markedly as a result of 60-90 day training courses at NR2 in Harare.		2. MR can implement planned structural changes in storage building with present personnel.
6. Computerized and inventory system for workshop parts and supplies introduced.			
7. Trained cadre of Malawian supervisors formed at MR workshop at Limbe.			Trained staff & supervisors will remain at adequate levels.

INPUTS	FUNDING TARGETS	MEANS OF VERIFICATION	ASSUMPTIONS
<u>AID</u>	(\$000)		
1. Spare parts for Bombardier locomotives.	2,840	Procurement specifications and documents	Procurement can be effected as planned in a timely fashion from US, Canadian and other authorized sources.
2. 100-ton diesel breakdown crane.	2,000		
3. Gang trolleys and inspection trolleys.	240	MR disbursement vouchers.	
4. Generators and pumps.	200		
5. PC computers.	110		
6. Storage equipment	100		
7. Training for MR shop supervisors.	90		
8. Steel sheeting for wagon repair	360		
9. Project Monitoring & Evaluation	100		
Sub-total	<u>6,040</u>		
Contingency (10%) & Inflation (5% compounded annually)	<u>1,250</u>		
TOTAL AID	<u>7,290</u>		
<u>GOM</u>			
Locomotive spare parts	30		
Store building renovations	20		
Monitoring and Supervision	10		
Project-related MR workshop salaries (4 years)	800		
Tools and equipment	400		
Use of workshop buildings	<u>200</u>		
TOTAL GOM	<u>1,460</u>		

Telegrams: FINANCE, Lilongwe
Telephone: Lilongwe 731 311

Communications should be addressed to:
The Secretary to the Treasury



MINISTRY OF FINANCE
P.O. BOX 30049
LILONGWE 3
MALAWI

15 July 1988

The Acting Mission Director
United States Agency for International Development
P O Box 30455
Lilongwe 3

(Attention : Dr Richard Shortlidge)

Dear Sir,

PROPOSED ASSISTANCE TO MALAWI RAILWAYS

I am writing in order to submit a Malawi Government's formal request to the USAID for the financing, on a grant basis, of a project that is intended to increase the capacity and capability of the locomotives fleet of Malawi Railways by providing parts for bombardiers, a railway recovery crane and other minor items.

We would specifically wish to request for funds amounting to US \$7 million for the proposed program which has already been discussed between Malawi Railways and a USAID sponsored design team.

Your favourable response to our request will very much be appreciated.

Yours sincerely,

H Maondo

for SECRETARY TO THE TREASURY

DATE:	7/15/88	
OFFICE	ACTION	INFO
D		
DD		
PDD		
PD	✓	
HPN		
ADD		
MO		
CONT		
GSD		
Chika	✓	
DATE DUE:	7/27/88	
NAN:		
ACTION TAKEN:	cable sent to Honore 7/27	

(B) PORT CAPACITY. THE PROJECT PURPOSE IS TO INCREASE THE CAPACITY AND EFFICIENCY OF RAIL SYSTEMS IN THE SADCC REGION. THE PROJECT EXPLICITLY EXCLUDES ASSISTANCE FOR PORT DEVELOPMENT, ALTHOUGH THE PID TEAM RANKED ONE PORT ACTIVITY (DEEPENING AND REALIGNMENT OF THE CHANNEL AT MAPUTO) AHEAD OF THE SWAZILAND TECHNICAL ASSISTANCE ACTIVITY WHICH IS PROPOSED FOR FUNDING UNDER THE PROJECT. THE PP SHOULD DISCUSS WHAT IS BEING DONE BY THE GPRM AND OTHER DONORS TO INCREASE THE CAPACITY OF MOZAMBIQUE PORTS TO ACCOMMODATE PROJECTED RAIL TRAFFIC FLOWS. BASED ON THIS ANALYSIS, THE PP SHOULD VERIFY WHETHER OR NOT PORT CAPACITY IS A POTENTIAL BOTTLENECK TO INCREASED TRANSIT OF IMPORTS AND EXPORTS THROUGH MOZAMBIQUE.

3. ASSISTANCE TO MOZAMBIQUE. SECTION 590 OF THE FY-88 CONTINUING RESOLUTION REQUIRES THAT, PRIOR TO OBLIGATION OF ANY FUNDS (BILATERAL OR SADCC) FOR THE GOVERNMENT OF MOZAMBIQUE, THE PRESIDENT MUST SUBMIT A REPORT TO CONGRESS ON THE EXTENT TO WHICH (1) THE GPRM HAS ENTERED INTO A DIALOGUE WITH THE CATHOLIC CHURCH ON THE RETURN OF CHURCH PROPERTY, (2) THE GPRM HAS TAKEN STEPS TO ASSURE AGAINST EXPROPRIATION OF PRIVATE PROPERTY, AND (3) THE NUMBERS OF SOVIET/EASTERN BLOC MILITARY/SECURITY PERSONNEL ARE BEING REDUCED. IN ADDITION, PRIOR TO OBLIGATION OF SADCC FUNDS FOR ACTIVITIES IN MOZAMBIQUE, THE SADCC APPROPRIATION PROVISION OF THE CR REQUIRES THAT THE PRESIDENT CERTIFY THAT SUCH ASSISTANCE IS IN THE NATIONAL INTEREST. THE REPORT TO CONGRESS IS EXPECTED TO BE SUBMITTED BY THE END OF MARCH. THE CERTIFICATIONS WILL BE FORWARDED AT A LATER DATE, PRIOR TO THE AUTHORIZATION AND OBLIGATION OF FUNDS.

THE ECFF ALSO DISCUSSED THE APPROPRIATENESS OF A.I.D. FINANCING OF TRANSPORT ACTIVITIES IN MOZAMBIQUE IN LIGHT OF THE SECURITY SITUATION. SEVERAL POINTS WERE MADE IN FAVOR OF PROCEEDING WITH THE PROPOSED PROJECT ACTIVITIES. FIRST, TRAFFIC IS NOW MOVING ALONG THE BEIRA CORRIDOR WHERE SECURITY HAS IMPROVED AND DOWNTIME

DUE TO ACTS OF SABOTAGE ALONG THE CORRIDOR HAS SIGNIFICANTLY DECREASED. SECOND, THE PROJECT ACTIVITIES WILL BE LOCATED IN MAPUTO AND BEIRA WHICH HAVE NOT GENERALLY BEEN TARGETS OF VIOLENCE. THIRD, THE ECONOMIC JUSTIFICATION FOR THE PROJECT DOES NOT REQUIRE GREATLY INCREASED SECURITY. IN FACT, THE PID STUDIES INDICATE THAT THE PROJECT WOULD SHOW A POSITIVE NET PRESENT VALUE AT CURRENT TRAFFIC LEVELS, DUE TO INCREASED EFFICIENCY AND REDUCTION OF TRANSPORT COSTS.

4. INSTITUTIONAL AND MANAGEMENT CAPACITY OF IMPLEMENTING AGENCIES. THE ECPR EXPRESSED CONCERN THAT THIS NOT BE

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VIEWS AS SIMPLY AN ENGINEERING PROJECT, AND THAT SUFFICIENT ATTENTION BE GIVEN TO THE DEVELOPMENT OF THE INSTITUTIONAL CAPACITY OF THE IMPLEMENTING AGENCIES IN MOZAMBIQUE, MALAWI, AND SWAZILAND. THE RECENT EXPERIENCE WITH TAZARA HIGHLIGHTS THE IMPORTANCE OF THIS CONCERN. A.I.D. SHOULD ENSURE THAT THE RAILWAYS HAVE THE UP-FRONT CAPACITY NOT ONLY TO IMPLEMENT THE PROJECT BUT, MORE GENERALLY, TO MANAGE THEIR OPERATIONS IN AN EFFECTIVE AND EFFICIENT MANNER. THIS WOULD ENCOMPASS SUCH AREAS AS PLANNING AND BUDGETING, PERSONNEL MANAGEMENT, FINANCIAL MANAGEMENT, PROCUREMENT, AND LOGISTICS MANAGEMENT.

THE PP TEAM SHOULD INCLUDE SUFFICIENT EXPERTISE TO ASSESS THE BROAD INSTITUTIONAL AND MANAGEMENT CAPACITIES AND CONSTRAINTS OF THE RAILWAYS, NOT JUST WORKSHOP OPERATIONS. THE TEAM SHOULD REVIEW OTHER DONOR ACTIVITIES IN THIS AREA AND DESIGN INSTITUTIONAL STRENGTHENING ACTIVITIES THAT WILL ADDRESS THE FUNDAMENTAL PROBLEMS IDENTIFIED. THIS ANALYSIS SHOULD COVER ALL RAILWAYS TARGETED FOR ASSISTANCE UNDER THE PROJECT BUT GIVE GREATEST ATTENTION TO MOZAMBIQUE RAILWAYS WHICH IS THE MAIN PROJECT BENEFICIARY. IT IS RECOGNIZED THAT, AS A RESULT OF THIS PROCESS, TECHNICAL ASSISTANCE AND TRAINING INPUTS MAY BE REQUIRED UP-FRONT AND IN SIGNIFICANTLY LARGER AMOUNTS THAN ENVISAGED IN THE PID. A LONGER LIFE OF PROJECT MAY ALSO BE WARRANTED.

THE ECPE LINKED THE DISCUSSION OF INSTITUTIONAL CAPACITY TO THE ISSUE OF RAILWAY TARIFF REFORM. IT WAS RECOGNIZED THAT, IF THE RAILWAYS ARE TO ATTAIN A REASONABLE DEGREE OF FINANCIAL VIABILITY AND EFFECTIVELY UTILIZE THE LARGE DONOR INVESTMENTS IN EQUIPMENT AND STAFF DEVELOPMENT, THEY MUST ADOPT APPROPRIATE TARIFF POLICIES. A NECESSARY FIRST STEP TOWARD IMPROVED TARIFFS IS TO IMPLEMENT FINANCIAL COST ACCOUNTING SYSTEMS WHICH CAN BE USED TO DETERMINE THE REAL COSTS OF OPERATING AND MAINTAINING THE SYSTEMS.

A SPECIFIC INSTITUTIONAL OUTPUT OF THE PROJECT, AMONG OTHERS, SHOULD BE FUNCTIONING FINANCIAL COST ACCOUNTING SYSTEMS IN THOSE NATIONAL RAILWAYS WHICH CURRENTLY LACK SUCH SYSTEMS. THE PP SHOULD DESCRIBE THE LINKAGE OF THESE FINANCIAL ACCOUNTING SYSTEMS WITH THE TARIFF STUDIES PROPOSED UNDER THE SATCC COMPONENT OF THE PROJECT (E.G., THE DATA GENERATED BY THE STUDIES WILL BE INCORPORATED INTO THE NATIONAL SYSTEMS). DURING PP DEVELOPMENT, THE MISSION SHOULD CONFIRM THAT THE NATIONAL RAILWAYS UNDERSTAND THE CONCEPT OF COST-BASED TARIFFS AND ARE WILLING TO IMPLEMENT THE PROPOSED ACCOUNTING SYSTEMS. THE MISSION SHOULD CONSIDER THE USEFULNESS OF CONDITIONS PRECEDENT OR COVENANTS IN THE PROJECT GRANT AGREEMENTS TO FORMALIZE THIS COMMITMENT. THE ECPE AGREED THAT CONDITIONS OR COVENANTS RELATING TO SPECIFIC TARIFF REFORMS BY NATIONAL RAILWAYS WERE NOT PRACTICABLE AT THIS EARLY STAGE. HOWEVER, THE MISSION SHOULD CONTINUE TO PROMOTE A UNIFIED DONOR POSITION WHICH ENCOURAGES SATCC AND THE NATIONAL RAILWAYS TO MOVE

IN THE IRRECTION OF COST-BASED TARIFFS. ADDITIONAL TIME FOR THE FINANCIAL ANALYST ON THE PP DESIGN TEAM WOULD BE REQUIRED TO CARRY OUT THE TASKS DESCRIBED ABOVE.

5. MANPOWER AND MAINTENANCE CAPACITY OF MOZAMBIQUE RAILWAYS. THE PID PROPOSES A HEAVY DOSE OF EQUIPMENT, TECHNICAL ASSISTANCE, AND ON-THE-JOB TRAINING FOR MANAGERIAL AND TECHNICAL PERSONNEL AT THE BEIRA AND MAPUTO WORKSHOPS TO IMPROVE LOCOMOTIVE MAINTENANCE. FACTORS OTHER THAN THE LACK OF HARDWARE AND SKILLS, SUCH AS INADEQUATE SALARY INCENTIVES, LOW LITERACY LEVELS, AND POOR MAINTENANCE POLICIES, MAY LIMIT THE PROGRESS THAT CAN BE MADE IN IMPROVING MAINTENANCE AND WORKER PRODUCTIVITY. THE PP SHOULD INCLUDE AN INVENTORY OF SKILLS IN THE TWO WORKSHOPS AND AN ANALYSIS OF THE FACTORS AFFECTING WORKSHOP PERFORMANCE. OTHER DONOR ACTIVITIES IN THIS AREA SHOULD ALSO BE ASSESSED. BASED ON THIS ANALYSIS, THE PP SHOULD PROPOSE AN APPROPRIATE STRATEGY FOR IMPROVING PERFORMANCE AND REALISTICALLY ASSESS THE GAINS THAT CAN BE EXPECTED DURING THE LIFE OF THE PROJECT. TO THE EXTENT THAT POLICY AND MANAGEMENT CONSTRAINTS ARE IDENTIFIED, THE PROJECT SHOULD ADDRESS THEM AS PART OF THE BROADER INSTITUTIONAL STRENGTHENING EFFORT DESCRIBED ABOVE.

6. MISSION MANAGEMENT CAPACITY. THE PID RECOMMENDS THAT EXPERIENCED USIA ENGINEERS BE ASSIGNED TO BOTH USAID/MALAWI AND USAID/MOZAMBIQUE TO ASSIST THOSE MISSIONS IMPLEMENT THIS AND OTHER TRANSPORT PROJECTS.

THE PID ALSO RECOMMENDS THAT THE VACANT FDC POSITION IN

USAID/MOZAMBIQUE BE FILLED AS SOON AS POSSIBLE. THE ECPR STRONGLY ENDORSES THESE STAFFING PROPOSALS.

7. PROCUREMENT.

(A) GEOGRAPHIC CODE. THE PP SHOULD SELECT THE APPROPRIATE AUTHORIZED GEOGRAPHIC CODE(S) FOR FOREIGN EXCHANGE COSTS AND THE "POST COUNTRY" FOR ICCAL CURRENCY COSTS, IN ACCORDANCE WITH THE GUIDANCE CONTAINED IN 86 STATE 74147 (WHICH MORE GENERALLY CONCERNS THE SOUTHERN AFRICA REGIONAL MANPOWER MANAGEMENT DEVELOPMENT PROJECT). THE EXEMPTION FROM FAA SECTION 604(A) AND SIMILAR PROCUREMENT REQUIREMENTS, APPLICABLE TO THE DEVELOPMENT FUND FOR AFRICA, DOES NOT APPLY TO THE SADCC APPROPRIATION.

(F) NEW LOCOMOTIVE PROCUREMENT. THE ECPR AGREED IN PRINCIPLE WITH THE PROJECT STRATEGY OF INCREASING AVAILABLE LOCOMOTIVE POWER THROUGH THE REHABILITATION OF EXISTING LOCOMOTIVES. THIS IS MORE COST-EFFECTIVE THAN BUYING NEW LOCOMOTIVES WHERE THE EXISTING UNITS ARE NOT EXCESSIVELY OLD, DAMAGED, OR INACCESSIBLE. IT WAS POINTED OUT THAT BOTH THE IBRD AND CIDA HAVE ALSO TAKEN THE POSITION THAT NEW LOCOMOTIVE PROCUREMENT IS NOT NEEDED AT THIS TIME IN MOZAMBIQUE. HOWEVER, THERE ARE TWO UNKNOWN FACTORS THAT COULD AFFECT THIS STRATEGY. FIRST, THE NUMBER OF LOCOMOTIVES THAT ARE ACTUALLY REPARABLE (CURRENTLY ESTIMATED AT 30-40) NEEDS TO BE VERIFIED. IT IS UNDERSTOOD THAT THE IBRD IS FINANCING A SURVEY OF THE MOZAMBIQUE FLEET. SECOND, THERE COULD BE A TIME LAG IN REHABILITATION OF THE LOCOMOTIVES UNDER THIS PROJECT, GIVEN THE NEED TO UPGRADE MANAGEMENT, TRAIN MOZAMBIKAN RAILWAY WORKERS, PROCURE SPARE PARTS, INSTITUTE NEW MAINTENANCE PROCEDURES AND POLICIES, ETC. THE PP TEAM SHOULD EXAMINE THE MOZAMBIQUE LOCOMOTIVE AVAILABILITY SITUATION IN A SYSTEMATIC FASHION, INCLUDING THE RESULTS OF THE IBRD SURVEY. THE TEAM SHOULD DEVELOP A REALISTIC TIMETABLE FOR REHABILITATION OF THE LOCOMOTIVES AND COMPARE THIS WITH PROJECTED TRAFFIC DEMAND. IF THERE APPEARS TO BE A SIGNIFICANT GAP BETWEEN DEMAND AND LOCOMOTIVE AVAILABILITY, THE FUNDING OF NEW LOCOMOTIVES COULD BE CONSIDERED AS ONE DESIGN OPTION TO BRIDGE THAT GAP.

(C) TECHNICAL ASSISTANCE AND TRAINING. THE ECPR ENCOURAGED THE MISSION TO CONSIDER OBTAINING TECHNICAL ASSISTANCE AND TRAINING SERVICES FOR THE PROJECT FROM EXPERIENCED, SUCCESSFUL RAILWAYS. IN ADDITION TO U.S.

SOURCES, THE MISSION SHOULD SEEK TRAINING INSTITUTIONS IN THE SADCC COUNTRIES FOR PROJECT PARTICIPANTS. TRAINING SHOULD NOT TAKE PLACE IN SOUTH AFRICA (UNLESS ABSOLUTELY NO ALTERNATIVE IS AVAILABLE) BUT IN INDEPENDENT BLACK STATES TO MEET THE PROGRAM OBJECTIVES AND CONTRIBUTE POSITIVELY TO THE LONG-TERM DEVELOPMENT GOALS FOR THE MAJORITY POPULATIONS OF SOUTHERN AFRICA. THE MISSION SHOULD BE AWARE THAT A WAIVER BY THE AA/AFR PURSUANT TO HANDBOOK 1B, CH. 51.10.A(2) AND 5D.10.D,

WOULD BE REQUIRED TO CONTRACT WITH A RAILWAY COMPANY WHICH IS GOVERNMENT OWNED. IF THIS APPEARS TO BE A DESIRABLE OPTION, THE MISSION SHOULD CONSULT CLOSELY WITH THE RIA TO DEVELOP THE APPROPRIATE JUSTIFICATION FOR THE WAIVER.

RELATIVE TO THIS, THE PP SHOULD ASSESS THE HOUSING AND OTHER LIVING CONDITIONS FOR THE PROPOSED CONSULTANT TEAM IN MOZAMBIQUE, PARTICULARLY IN BEIRA, AND THE IMPLICATIONS FOR THE SIZE AND WORKING ARRANGEMENTS OF THE TEAM. THE PP SHOULD DESCRIBE THE CAPACITY OF USAID/MOZAMBIQUE TO SUPPORT THE CONSULTANTS AND DISCUSS ANY STEPS THAT MAY NEED TO BE TAKEN TO ENSURE THE EFFECTIVENESS OF THE PROJECT FINANCED CONSULTANTS.

(D) SPARE PARTS PROCUREMENT. THE PP TEAM SHOULD CAREFULLY ANALYZE THE REQUIREMENTS FOR SPARE PARTS AND RELATED TOOLS AND EQUIPMENT FOR THE REHABILITATION OF THE GENERAL ELECTRIC LOCOMOTIVES IN THE MOZAMBIQUE RAIL. THE TEAM SHOULD MAKE A TECHNICAL DETERMINATION OF THE EXTENT TO WHICH SPARES COULD BE COMPETITIVELY PROCURED WITHOUT JEOPARDIZING THE PERFORMANCE OF THE REHABILITATED LOCOMOTIVES. THE TEAM SHOULD ALSO DETERMINE THE EXTENT TO WHICH TOOLS AND EQUIPMENT ARE AVAILABLE FROM THE U.S. AND OTHER AUTHORIZED GEOGRAPHIC SOURCES. FOR THIS PURPOSE, THE PP TEAM SHOULD INCLUDE BOTH A SPECIALIST IN LOCOMOTIVE MAINTENANCE AND AN A.I.D. COMMODITY PROCUREMENT OFFICER. IF A SOLE SOURCE WAIVER FOR SPARES IS DEEMED APPROPRIATE, IT SHOULD BE INCLUDED IN THE PP IF POSSIBLE. THERE MAY ALSO BE NEED FOR A CODE 935 WAIVER FOR PROCUREMENT OF SPECIALIZED

TOOLS AND EQUIPMENT. THE PP SHOULD ALSO CONSIDER
REQUIRING AN A.I.D. FORM 11 FOR SPARE PARTS
PROCUREMENTS, TO FACILITATE POST-AUDITS FOR PRICING.

IN LIGHT OF RECENT EXPERIENCE WITH TAZARA, THE MISSION
SHOULD CONSIDER INCLUDING FUNDING IN THE PROJECT FOR
SPECIALIZED LONG-TERM TECHNICAL ASSISTANCE SPECIFICALLY
TO HELP IN THE PROCUREMENT AND MANAGEMENT OF THE LARGE
QUANTITY OF PART PARTS TO BE FINANCED BY A.I.D.

8 OTHER LEGAL CONCERNS.

(A) E11(E) CERTIFICATION. GC/AFR ADVISES THAT A SECTION
E11(F) CERTIFICATION IS REQUIRED FOR THE MOZAMBIQUE AND
MALAWI PORTIONS OF THE PROJECT. THIS SHOULD BE
TRANSMITTED TO AA/AFR FOR HIM TO TAKE INTO CONSIDERATION
PRIOR TO FIELD APPROVAL OF THE PP. IN THE CASE OF
MOZAMBIQUE, THE CERTIFICATION SHOULD TAKE INTO ACCOUNT
THE ASSISTANCE THAT WILL BE PROVIDED DURING THE PROJECT
TO IMPROVE THE MAINTENANCE CAPABILITIES OF MOZAMBIQUE
RAILWAY.

(E) COMMINGLING. ALTHOUGH THERE IS NO REASON TO BELIEVE
A RECEIPT EXISTS, THE PROJECT TEAM SHOULD INVESTIGATE THE
NATURE OF ANY INVOLVEMENT BY COMMUNIST BLOC COUNTRIES IN
MOZAMBIQUE RAIL SYSTEM AND, WITH SUPPORT FROM THE RLA, DETERMINE WHETHER
A COMMINGLING WAIVER IS REQUIRED. THE
PP SHOULD INCLUDE A BRIEF DISCUSSION OF THE FINDINGS.

9. INITIAL ENVIRONMENTAL EXAMINATION. THE IEE CONTAINED
IN THE PID HAS BEEN REVIEWED BY THE BUREAU ENVIRONMENTAL
OFFICER AND SENT TO GC/AFR FOR CLEARANCE. A COPY OF THE
SIGNED IEE WILL BE POUCHED TO USAID/HARARE.

10. AA/AFR HEREBY DELEGATES AUTHORITY TO THE DIRECTOR,
USAID/HARARE, TO AUTHORIZE THE CAPTIONED PROJECT IN AN
AMOUNT NOT TO EXCEED DOLS. 50,000,000. THIS AD HOC
DELEGATION OF AUTHORITY SHALL BE EXERCISED IN ACCORDANCE
WITH ALL THE TERMS AND CONDITIONS OF DCA 551, EXCEPT FOR
THE DOLLAR AMOUNT LIMITATION. ANY WAIVERS REQUIRING
AA/AFR OR A/ID APPROVAL SHOULD BE FORWARDED TO AID/W
PRIOR TO PP APPROVAL.

11. AID/W UNDERSTANDS THAT OBLIGATIONS WILL OCCUR WITH
THE GOVERNMENTS OF MOZAMBIQUE, SWAZILAND, AND MALAWI,
AND WITH SATCC. WE SUGGEST THAT THE REDSO/E AND
SWAZILAND RLA'S COORDINATE AS TO THE RESPONSIBILITY FOR
THE MALAWI OBLIGATION. WHITEHEAD

BT
#2125

NNNN

FAA SECTION 611 (e) CERTIFICATION

As the officer serving as principal representative of the Agency for International Development in Malawi, having taken into account the maintenance and utilization of project capital assistance in Malawi previously financed by the United States, namely the Chikwawa-Bangual Road, the Lilongwe-Mchinji Road, the Blantyre-Mwanza-Tete Road, the Science Laboratory and Library at the Polytechnic, Agricultural Research Facilities, the Bunda College Projects, the Lilongwe School of Health, the Rural Piped Water Supply Project, The Malawi Northern Transport Corridor, and the performance of the Ministry of Agriculture and Natural Resources, Ministry of Transport and Communications, Ministry of Health, Ministry of Works and Supplies, Malawi Railways (Lake Services) with regard to previous and on-going AID projects in Malawi, I hereby certify that in my judgment the Government of Malawi has the financial and human resource capabilities to maintain and utilize effectively the capital assistance to be carried out under this project.

Richard Day
for Richard Shortlidge
Acting Mission Director
USAID/Malawi

Date: July ²¹/~~15~~, 1988

COMMODITY LIST

1. Spare parts for diesel electric locomotive scheduled maintenance	700,000
2. Spare parts for diesel electric locomotive overhaul	1,500,000
3. Spare parts for diesel electric locomotive accident rehabilitation	600,000
4. Steel plate & shapes for wagon rehabilitation & loco superstructure repair	400,000
5. 100 ton self propelled RR rescue crane	1,800,000
6. Stores building equipment	100,000
7. Training	90,000
8. Workshop inventory computerization	110,000
9. Short term TA	100,000
10. Line support equipment	
4 ea 20 seat gang trolleys	200,000
2 ea 4 seat inspect, on trolleys both types self propelled	40,000
10 ea 22,5 kva diesel generators with water pump	200,000

1,2 - The consumables parts listing is on file in the USAID office in Harare, Zimbabwe and is available for review on request.

. The quantities as listed cover a 4 year program.

. There should be 4 orders for spare parts and 1 accident repair listing should be combined with each.

. These should be annual orders, 1 for each year of the program.

- . Each annual order should be separated by possible source of parts: i.e. G.E., Bombardier, WABCO and ALCO.
 - . The first order should request 1/4 of the quantities shown except where the quantity is less than 4. Then order 1 each.
 - . The first set of purchase orders should go out as soon as possible.
 - . The follow on orders should be the same as the first order except that they should be modified by the use rates for the first year. That is quantities should be reduced if there are enough of any one type of spare still on the shelf.
3. Steel plate and rolled shapes needed for wagon rehabilitation and locomotive super structure repair follow.

Steel Order for Wagon Repair

<u>Mild Steel Sheets & Plates</u>	<u>Tons</u>
1500 x 3000 x 1.5 mm	12
1200 x 2400 x 3.0 mm	60
1200 x 2400 x 5.0 mm	50
1200 x 2400 x 6.0 mm	150
1200 x 2400 x 10.0 mm	5
1200 x 2400 x 12.0 mm	20
1200 x 2400 x 16.0 mm	5
1200 x 2400 x 19.0 mm	10
1200 x 2400 x 22.0 mm	<u>15</u>
	327

Rolled Steel Section

Channel (U) 152 x 76 x 8 mm	10
Channel (U) 120 x 55 x 8 mm	20
Channel (U) 75 x 40 x 6 mm	15
Tee (T) 101 x 101 x 10 mm	15
Angle (L) 120 x 120 x 10 mm	<u>15</u>
	75

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4. Crane Description and Contract Requirements:

The crane will be a rail mounted, self propelled unit capable of lifting its rated load at 10' from its center of rotation and 1/2 its rated load at 15' from its center of rotation.

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- . The crane shall be capable of a speed of 50km/hr forward or reverse on rail.
- . The crane shall be furnished with spares sufficient to maintain the unit for three years after the warranty expires.
- . The crane shall carry a 1 year parts and labor warranty with a response time of 14 days.
- . The crane shall be delivered, assembled and demonstrated to the accepting agency before final payment is made.
- . There shall be sufficient outstanding retainage to assure that warranty obligations are covered.
- . The crane clearance envelope shall not extend beyond the clearance envelope of the Bombardier Diesel Electric Locomotive.
- . The crane shall be capable of coupling to and towing a work train of not more than 3 cars.
- . The crane shall be equipped with work site lights and shall have all contour lights head lights, tail lights, warning horns and lights needed to make its operation on the mainline safe.

5. The stores building requires modifications to allow for more efficient use of the shelves that exist. It is intended that a large door be cut into the east wall and that a crane on a monorail be installed to facilitate loading and unloading of the palette racks.
6. The inventory control system in use is adequate for now but with the intended influx of many spares parts it is felt that some mechanization is in order. A properly programmed P.C. in purchasing the store room and in production will allow almost instant knowledge of parts status.
7. Line Support Equipment:
 - . 20 seat, self propelled gang trollies to transport MOW crews or Rescue crews.
 - . 4 seat, self propelled trolleys to transport line inspectors or supervisors.
 - . Diesel generator sets are needed to furnish power for housing and power for water pumps at remote sites along the line.

ECONOMIC ANALYSISIntroduction

The Economic Analysis is presented as follows:-

1. Discussion on evaluation rationale
2. Analysis and distribution of Malawi foreign trade.
3. Distribution of Malawi overseas trade by port.
4. Malawi Railways traffic forecasts.
5. Malawi Railways future locomotive requirements.
6. Evaluation of locomotive maintenance project basic case.
7. Locomotive maintenance project sensitivity tests.
8. Evaluation of breakdown crane project basic case.
9. Distribution of benefits.
10. Summary of results.

1. EVALUATION RATIONALE

The two project components, spares for locomotive maintenance and procurement of a breakdown crane, will be evaluated separately. The projects are linked through the utilisation of locomotives, once properly maintained and available for traffic. The evaluation rationale for the locomotive subcomponent is to avoid a deterioration in standards due to lack of spare parts. Deterioration can be rapid, as evidenced recently in N.R.Z. by a reduction in availability from 71% to 43% of their newest and best fleet of G.M. class D10 D.E. locomotives due to lack of parts.

The breakdown crane is intended to reduce operating down-time due to the slow response of its present aged crane. Operating time is valued highly and failure utilise to the capacity will result in substandard performance. Over 80 days of system time was lost last year due to line blockages. The new crane will reduce this figure substantially.

2. MALAWI FOREIGN TRADE

The 1987 composition of foreign trade is given in tables r1 imports and F2 for exports. It can be seen that imports consist of products, fertilizer and general goods, and exports are entirely agricultural:

Table F1 MALAWI IMPORTS 1987 000'S TONNES

Commodity	Total	Overseas	South Africa	Other Africa
POL Products	120	72	24	24
Fertilizer	120	24	96	0
Coal/Coke	18	0	0	18
Iron/Steel	20	2	9	9
Wheat/Flour	18	14	4	0
Paper/Pulp	10	4	6	4
Salt	16	0	16	0
Other	<u>206</u>	<u>55</u>	<u>54</u>	<u>97</u>
TOTAL	<u>528</u>	<u>171</u>	<u>209</u>	<u>148</u>

Table F2 MALAWI EXPORTS 1987 000'S TONNES

Commodity	Total	Overseas	South Africa	Other Africa
Sugar	100	75	0	25
Tobacco	70	69	1	0
Tea	40	36	4	0
Maize	20	0	0	20
Other Ag.	33	23	0	10
Other goods	<u>17</u>	<u>4</u>	<u>1</u>	<u>12</u>
Total	<u>280</u>	<u>207</u>	<u>6</u>	<u>67</u>
TOTAL (I + E)	808	378	215	215

The future pattern of foreign trade is given in table F.3. The table shows reduced dependence on RSA for trade and increased regional trading in SADCC. The overall growth trade in is estimated at only 1.2% p.a. to year 2000.

Table F.3 Malawi - Foreign Trade Distribution
000's tonnes

	1987			1990			1995			2000		
	I	E	T	I	E	T	I	E	T	I	E	T
Total	528	280	808	528	309	837	544	328	872	541	360	901
Overseas	171	207	378	273	228	501	341	253	594	373	271	644
Other Afr	148	67	215	128	73	201	141	67	208	159	81	240
RSA	209	6	215	127	8	135	62	8	70.	9	8	17

Source:- SATCC Demand forecast 1988.

Commentary: - The reduction of trade with RSA is contingent upon diverting Malawi's exports away from RSA. RSA exports to Malawi utilize the transport capacity that had been made available due to empty back hauling. Whether RSA imports will decline to the levels forecasted will depend upon alternative sourcing, which traditionally has not proved so obtainable in practice.

3. OVERSEAS TRADE DISTRIBUTION

Both projects obviously depend on demand which is presently suppressed due to:

- a) the lack of an international rail route;
- b) overdependence on trade routes through RSA;
- c) drain on foreign exchange due to the high cost of trade routes through RSA (\$140m in 1987); and
- d) The consequent effect on economic development.

The growth and distribution of Malawi foreign trade depends upon assumptions regarding the availability of Mozambican trade routes.

Reopening dates for the Nacala and Beira lines have successively slipped, and now are expected in 1991/92. The Northern Corridor is under construction now and is not dependent on security issues. Most work will be completed by the end of 1990 when it is expected that demand will be at around 200,000 tonnes. The distribution of Malawi's overseas trade is given in table F4.

Table F4 MALAWI - OVERSEAS TRADE DISTRIBUTION BY PORT 000'S TONNES

Port	1987			1990			1995			2000		
	I	E	T	I	E	T	I	E	T	I	E	T
All	171	232	403	273	228	501	341	253	594	373	271	644
Beira	0	66	66	34	80	114	79	90	169	77	100	177
Nacala	0	0	0	0	0	0	201	136	337	229	142	371
Dar	0	15	15	134	84	218	52	16	68	56	17	73
RSA	.171	151	322	.105	64	169	.9	11	20	.11	12	23

Comments and Assumptions

Sources - SATCC Demand Forecasts Feb. 1988. Distribution adjusted to reflect later opening of Beira and Nacala Lines.

1. Nacala and Beira will not be directly accessible until 1992.
2. Beira is accessed via Harare by road through Tete.
3. Malawi and Mozambique signed an agreement in 1985 that once rehabilitated, the distribution between Nacala and Beira would be 2:1, although price will determine the final distribution.
4. Beira would take mostly bulk sugar exports and fertiliser imports.
5. Nacala would handle container traffic in both directions.
6. Note that the forecasts deviates from SATCC because they did assume that Sena and Nacala lines would be operational by 1990.

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4. MALAWI RAILWAYS TRAFFIC FORECASTS

Present traffic levels on Malawi Railways have been low due to lack of international traffic. By the end of 1990, Malawi Railways will be expected to carry an extra 200,000 tonnes between Chipoka Port and Blantyre (232 km) on the first link of the Northern Corridor.

After 1992, both the Nacala and Beira lines are expected to be open. Malawi Railways would then operate either to the border stations with CFM(C) (Border) or CFM(N) (Nayuci). The traffic forecasts for Malawi Railway are given in table F5 in tonnes and table F6 in ntk for both operating scenarios. Growth in international traffic is based on the SATCC demand forecasts of February, 1988 although its distribution is different because of deferring the reopening dates of the rail routes through Mozambique. Local traffic has been growing at about 3% p.a. over the last five years, this trend has been extended.

Table F5 MALAWI RAILWAYS TRAFFIC FORECASTS 000'S TONNES

	<u>Total</u>	<u>Local</u>	<u>International</u>
1987	550	538	12
1990	817	587	230
1995	1 255	681	574
2000	1 411	790	621
(1980	1303)		

Table F6 MALAWI RAILWAYS GOODS TRAFFIC FORECASTS 000'S ntk

	<u>Total</u>		<u>Local</u>		<u>International</u>	
	1	2	1	2	1	2
1987	132,174	132,174	130 236		1,938	1,938
1990	186,760	186,760	136 184		50,576	50,576
1995	269,771	544,125	146 709		123,062	397,416
2000	290,820	880,074	158,048		132,772	431,206

NOTES:

Distances assumed: Blantyre to Beira 649 km
 Blantyre to Border 252 km (Moz. border CFMc)
 Blantyre to Nacala 807 km
 Blantyre to Nayuci 192 km (Moz. border CFM.N)
 Blantyre to Chipoka 232 km.

Local traffic growth 3%.

5. MALAWI RAILWAYS FUTURE LOCOMOTIVE REQUIREMENTS

The present fleet of 10 A.E.I. and 19 Bombardier locomotives is under-utilised. The average load/train was only 142 tonnes in 1987 and the output was also low reflecting utilization of only 25%. Analysis of present performance is given below:

LOCOMOTIVE FLEET SIZE AND UTILISATION

<u>PRESENT</u>		
1.	Goods Traffic Volume tonnes	550 000
2.	Present net tonne km x 1000	128 032 (revenue earning goods)
3.	Present train km	898 574
4 = 2/3	Present average net train load	142 tonnes
5 = 2/1	Present average haul	233 km utilisation 25%
6 = 4x5	Present output	33 086 ntkm/train
7 = 2/6x350	Present number of train movements per day =	11
8	Present availability	71%
9 = 7/9	Fleet size (excl shunting and station duties)	15
10	Extras for free haul, ballast and spare units	14
11	Total fleet	29

The future fleet requirements have been estimated for 1990 and for each operating scenario in 1995 and 2000 depending on whether Malawi Railways operate to the border stations or through to the ports. Assumptions included are that:-

- i) ntk/train/will increase by 400% from 33 000 ntk in 1987 to 112 000 ntk in 2000. Both utilisation and the load/train will increase;
- ii) the AEI locos will be slowly withdrawn and broken down for spare parts as they will be 30 years old in the early 1990's.

The future performance of Malawi Railways locomotives is estimated in table F7. For 1995 and 2000 two estimates have been prepared, the higher one assumes through operations to the Ports. The current locomotive fleet will be sufficient until about 1995, when, between 6 and 19 new locomotives will need to be purchased to replace the old AEI units and to cope with increased traffic. The higher number will be needed if Malawi Railways operates through freight services to the ports. Given the relatively short distances, this option should be seriously considered.

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Table F7

	<u>MALAWI LOCOMOTIVE FLEET</u>					<u>Future Performance & Requirements</u>					
		1990	1995	1995	2000	2000		1995	1995	2000	2000
1. Goods Traffic Volumes (tns)	817,000	1,255,000	1,255,000	1,255,000	1,411,000	1,411,000					
2. Net tonne km x 1000	186,760	269,771	269,771	544,125	290,820	880,074					
3. Proposed average net train load (tonns)		163	235	285	255	320					
4. Proposed average haul km		250	250	350	250	350					
Utilisation		32%									
5. Proposed output ntk	40,825	58,750	58,750	99,750	63,750	112,000					
6. No. of train movements/day	13	13	13	16	13	22					
Availability		75%		75%		75%					
7. No. of loco's required	17	17	17	21	17	30					
8. Extra duties	8	8	8	8	8	8					
9. Fleet size needed	25	25	25	29	25	38					
AEI	10	7	7	7	0	0					
Bombardier	17	19	19	19	19	19					
Shortfall/surplus	+2	+1	+1	-2	-6	-19					*

Note: AEI locomotives effective fleet size reduces due to lack of spares.
* through operations to the port.

5. ECONOMIC EVALUATION OF LOCOMOTIVE COMPONENT

The project is designed to:

- a) Provide spare parts to make general overhauls on 15 Bombardier Locomotives.
- b) Provide spare parts to rehabilitate 4 Bombardier Locomotives.
- c) Provide spare parts for regular and scheduled maintenance of the Bombardier fleet over 4 years.
- d) Supply stores, computers and T.A. to facilitate procurement and inventory control.

Project Capital Costs and spread of, USAID Expenditure for the Locomotive subcomponent is given in table F8.

Table F.8

Project Capital Costs and Spread of Expenditure

ITEM	US\$ 000'S				
	1989	1990	1991	1992	1993
Spare parts	250	780	820	860	500
Stores equipment	100	-	-	-	-
Training	10	30	30	20	-
Computers	110	-	-	-	-
ST T.A.	<u>50</u>	<u>60</u>	<u> </u>	<u> </u>	<u> </u>
Sub-total	520	870	850	880	500

Notes:

1 - Project implementation 4th quarter for 89 to 4th quarter 93.

Malawi Recurrent Costs

(\$ = K2.6)

Labor

a) Mechanical Engineering	
86/87 expenditure K110,000	
88/89 " x 22.5% - 134,750 inflation	
of which 50% on project.....	<u>K 67,375</u>
b) Diesel Engineering	
86/87 expenditure K 546,000	
88/89 expenditure x 22.5% - 668,850	
of which 50% on project	K 334,425
Subtotal	<u>K 401,827</u>
c) Admin 86/87	
Admin personnel costs/total personnel costs	
i.e. for 86/87 1866/6700 = 0.28 x 1.28	<u>K 514,338</u>
Labour total	K 197,822
say	<u>K 200,000</u>

Project Local and Recurrent Costs include modification to the stores, locally available spare parts, local labour costs of maintenance personnel and equipment.

	US\$ 000's				
	1989	1990	1991	1992	1993
Spare parts	2	8	8	8	4
Stores building	20	-	-	-	-
Management	2	2	2	2	2
Labor	50	200	200	200	200
Tools	25	125	125	125	125
Building Maintenance	<u>10</u>	<u>25</u>	<u>25</u>	<u>25</u>	<u>15</u>
	109	360	360	360	271

Post Project Recurrent Costs

To sustain availability at 75% after the project is complete in 1993 recurrent expenditure on parts and maintenance will continue for the 19 locomotives as follows:

	\$
Spare parts for routine maintenance 19 x 12,500	237,500
Labour including management and administration	200,000
Tools	25,000
Building maintenance	25,000
	<u>487,500</u>
Recurrent cost/locomotive	<u>25,658</u>

In 1997 the Bombardiers will require major overhauls again at an extra cost of \$100,000/unit. This has been taken into account in the summary table of Malawi Railways' recurrent costs as follows:

Malawi Railways Recurrent Costs
\$ 000's

Year	Project	Post Project	Over- heads	Total
1989	109			109
1990	150			150
1991	360			360
1992	360			360
1993	271	108		379
1994	-	487		487
1995	-	487		487
1996	-	487		987
1997	-	360	400	760
1998	-	360	400	760
1999	-	360	400	760
2000	-	360	400	760

Project Benefits

The project will sustain and increase the availability of the Bombardier locomotive fleet. Without the project availability will decline, which will be a waste of assets which would be reflected in locomotive provision costs. For the basic case availability is estimated to fall to 40% by 1993 if spare parts are not provided. The difference between the numbers of locomotives available for work with and without the project is given below:

	1989	1990	1991	1992	1993	
Total fleet	19	19	19	19	19	book fleet
Operational fleet	15	16	17	18	19	with project
Availability %	71	72	73	74	75	with project
Nos. available	11	11	12	13	14	with project
Operational fleet	15	15	15	15	15	w/out project
Availability %	71	63	55	47	40	w/out project
Nos. available	<u>11</u>	<u>9</u>	<u>8</u>	<u>7</u>	<u>6</u>	w/out project
Difference	0	2	4	6	8	

Locomotive Provision Costs

Capital cost ex-works cif \$1.85	
Annualized at 10% p.a. over 25 years	\$ 204,000
Depreciation straight line 25 years	74,000
Sub total	<u>\$ 278,000</u>

The benefit stream is the product of the provision cost savings per locomotive and the difference in locomotives available with and without the project. When locomotives cease to be available then maintenance expenditure is assumed to be zero. The benefits, however are not generated until all Malawi Railway's surplus capacity is utilized. This will occur in 1992:*

Benefit Stream Locomotive Project

<u>Year</u>	<u>Diff. in Locos.</u>	<u>Cost Savings</u>
1989	0	0
1990	0	0
1991	4	0
1992	6	1,668
1993	8	2,224
1994	8	2,224
1995	8	2,224
1996	8	2,224
1997	8	2,224
1998	8	2,224
1999	8	2,224
2000	8	2,224

* When Beira and Nacala corridors start operation.

Malawi Railways Locomotives
Project Investment Appraisal
Scenario : Basic Case

<u>Year.</u>	<u>Capital. Cost</u>	<u>Recurrent. Cost</u>	<u>Total. Cost</u>	<u>Cost. Saving</u>	<u>Net Benefit</u>
1989	520	109	629	0	- 629
1990	870	360	1,230	0	-1,230
1991	850	360	1,210	0	-1,210
1992	880	360	1,240	1,668	428
1993	500	379	879	2,224	1,737
1994		487	487	2,224	1,737
1995		487	487	2,224	1,737
1996		487	487	2,224	1,737
1997		760	760	2,224	1,464
1998		760	760	2,224	1,464
1999		760	760	2,224	1,464
2000		760	760	2,224	1,464

Internal Rate of return 31.41%
Net present value @ 10% p.a. \$4.092m

Sensitivity Tests

Opening of Mozambique Routes

The main assumption is the dates of opening of the Mozambiqian routes which have been continuously revised over the last 2 years due to the security problems there. In the base analysis 1991/1992 has been assumed and since Malawi Railway fleet utilization is likely to be sensitive to the availability of these routes, a pesimistic scenario of the reopening of the Nacala and Beira Lines only by 1995 is analyzed in this test. The effect would be to postpone the generation of benefits until after 1995 since Malawi Railway would have surplus capacity until that time. The effect of deferring benefits until 1995 would be to reduce the project rate of return to 8 per cent (basic 31.4 per cent). This does not mean that the project would not be worth implementing given a delay in the reopening of the Mozambican lines, but suggests that a postponement of the project start-up or extension of the implementation period would be appropriate.

Addition of New Locomotives

The next concern is that Malawi Railways plans to replace the aging AEI locomotives and has made an investment submission to the Government for 14 new locomotives. The timing affects this project because if it occurs too early, then there would be surplus capacity which would undermine the justification of sustaining a 75 per cent availability of the 19 Bambadiers. If the proposed 14 new locomotives arrive in 1992 as tentatively planned, then there would substantial over provision which totally undermine the project's impact and rate of return. If, however, the acquisition were properly phased between 1995 and 2000 to coincide with the planned obsolescence of the AEI fleet and the increase in traffic, there would be no adverse effect. This would be the correct course of action for Malawi Railways to take.

Malawi Railways Locomotives
Project Investment Appraisal
Scenario : Delayed Opening of Mozambiqian Routes

Year	Capital Cost	Recurrent Cost	Total Cost	Cost Saving	Net Benefit
1989	520	109	629	0	- 629
1990	870	360	1,230	0	-1,230
1991	850	360	1,210	0	-1,210
1992	880	360	1,240	0	-1,240
1993	500	379	879	0	- 879
1994		487	487	0	- 487
1995		487	487	2,224	1,737
1996		487	487	2,224	1,464
1997		760	760	2,224	1,464
1998		760	760	2,224	1,464
1999		760	760	2,224	1,464
2000		760	760	2,224	1,464

Interest Rate of Return - 8%
Net Present Value @ 10% p.a.- \$0.47m

Malawi Railways Locomotives
Project Investment Appraisal
Scenario : Capital Costs + 10%.
(\$US000's)

Year	Capital Cost	Recurrent Cost	Total Cost	Cost Saving	Net Benefit
1989	572	109	681	0	- 681
1990	957	360	1,317	0	-1,317
1991	935	360	1,295	0	-1,295
1992	968	360	1,328	1,668	340
1993	550	379	929	2,224	1,295
1994		487		2,224	1,737
1995		487		2,224	1,737
1996		487		2,224	1,737
1997		760		2,224	1,464
1998		760		2,224	1,464
1999		760		2,224	1,164
2000		760		2,224	1,464

Internal Rate of Return - 27.3%
Net Present Value @ 10% p.a. - \$3.523m

Increase in Capital Cost

Complete list of spare parts and current itemized costs have been supplied by Malawi Railway to USAID. Their accuracy is judged to be within 10 per cent. If costs increase by 10 per cent then the IRR reduces to 27.3 per cent (Basic 31.4 per cent).

Summary of Results

I.R.R. N.P.V.	
i) Basic case	31.4% \$4.092m
ii) Delayed opening of Mozambican Routes	8.0% -\$0.47m
iii) Capital cost + 10%	27.3% \$3.523m

The project shows a good rate of return because the capital cost of diesel locomotives is very high and lack of maintenance produces a rapid decline in performance.

It is interesting to record that steam locomotives do not suffer from the same problem because maintenance costs. Spares are a lot less expensive. Spare parts can be obtained or manufactured locally. Also, even when poorly maintained, steam locomotives can continue to run, even it is at very low level of efficiency.

8. PROVISION OF BREAK DOWN CRANE - INVESTMENT APPRAISAL

A new breakdown crane is to be supplied to Malawi Railways costing \$2.0 million to replace the one originally purchased in 1957 when the Malawi Railways network was only 60% of its present size. The crane is used to clear derailments and also work in the port of

Chipoka handling containers and other cargo. Operational records produced for the team indicate that the crane was used for 234 hrs in 1987-88 of which 40% of the time was in Chipoka Port. Records of derailments show that the line was blocked for a total of 84 days for 18 derailments. The evaluation is based on a reduction of the operational time lost to derailments taking into account the expected increase in traffic and likelihood of derailments occurring.

Project Costs

The capital cost of the crane is \$2 million c.i.f. including spare parts for 3 years. Expenditure is likely to occur in 1990.

Recurrent Costs

The recurrent costs are likely to be of a similar magnitude to locomotives (the technology is more complex but the wear and tear is less). Recurrent costs should also include depreciation and finance charges.

Breakdown Crane Annual Costs

	\$ p.a.
Capital Costs \$2.0m	
Annualised at 10% of 30 years	212,158
Depreciation straight line over 30 years	66,667
subtotal	<u>278,825</u>
Maintenance - Spare parts	12,500
Labor	10,000
Tools and equipment	1,500
Buildings infrastructure	1,500
subtotal	<u>25,500</u>
Operations	
Labor 2 x 4 men crew @ \$800/year	<u>6,400</u>
Administration at 20% \$31,900	<u>6,380</u>
Total annual costs 1993-2000	317,105
less spares x1.2 \$15,000 1990-1993	<u>312,105</u>

Benefits

Loss of operational time in 1987/88 84 days are one incident of 26 was unusual. Typical annual loss of time has been taken as 70 days per year. Traffic levels over the last three years averaged at 113 m.n.t.k. Assuming that the frequency of accidents and derailments is proportional to traffic levels then 0.6 days lost per m.n.t.k.

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The new crane's specification is twice the capacity and line speed of the existing crane. The improvement in efficiency is likely to be 100% and the loss of operating time would be halved. The loss of operating time would in future be 0.3 days per m.n.t.k.

The cost incurred when operating time is lost is most conveniently represented by the daily cost of an average train. This has been determined by Malawi Railways as being K21.78/train km or K5.619/day in 86/87 (assuming an average haul of 260 km). This would be equivalent to \$2,858/day in 1988, allowing for inflation at 15% p.a. and an exchange rate 1 : 2.6.

The benefit stream.

Year	Traffic Levels m.n.t.k.	Operating Time Saved with the Project i.e. x0.3 days	Benefits \$000/year
1989	171	0	0
1990	187	56	160
1991	203	61	174
1992	219	66	188
1993	327	98	280
1994	435	130	372
1995	544	163	466
1996	611	183	524
1997	678	203	581
1998	745	223	639
1999	807	242	692
2000	880	264	754

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Investment Appraisal - Breakdown Crane
Year Cost Benefit Net Benefit

1989	0	0	
1990	312	160	- 152
1991	312	174	- 138
1992	312	188	- 124
1993	317	280	- 37
1994	317	372	55
1995	317	466	149
1996	317	524	207
1997	317	581	264
1998	317	639	322
1999	317	1,954	1,637

Note

Residual Value of Breakdown crane in 2000 using straight line depreciation is 1.8 mill/20/30 = 1.2 million which appears as a benefit.

IRR = 29.43%
 NPV = \$0.915 m

Sensitivity and Results

The project will be sensitive to traffic projections and the reopening of the Mozambiquian routes, a delay in opening until 1995 would reduce the project performance similarly to the locomotive sub-component. However, the project life is much longer, at least 30 years, as opposed to just 7 years for the locomotive component, because of the internal between major overhauls. From a sensitively stand point, the crane component is stronger than the locomotive component.

Supply Effects

A reduction in the Malawi Railways fleet by say 8 units is effectively a reduction in Malawi Railways capacity, providing the fleet is fully utilized at that time. The fleet will not in fact be fully utilized until after the lines to Nacala and Beira are opened in 1992. From that time onwards, a reduction in the Malawi Railway fleet of 8 units would effectively reduce capacity by 8/25 or 32 per cent. The effects of this constraint on the supply side by 32 per cent will be to divert demand to more costly alternatives.

Demand in 1995 is estimated to be 270 million net tonne/km in Malawi rising to 290 million in 2000. Diversion of 32 per cent or 86 million net tonne/km in 1995 (93 m.n.t.k.) in 2000 will have a cost effect as follows:

Rail cost = 9.6t/ntk 1986/87 = 5c/ntk
 (in 1986/87 US\$ = K1.9)
 Source 1986/87 Malawi Railway Compendium of Statistics.
 Road cost = 27t/ntk for a class 3 H.G.V.
 Source Phanga - Nkchata Bay Road Study 9/87
 i.e. Road cost = 11.8c/ntk (US\$ = 2.3 in 9/87)

9/87

Difference in cost between road and rail = 6.8c/ntk.
The cost to the Malawian economy of a reduction in rail capacity would be \$5.85 million in 1995 rising to \$6.32 million in 2000.

10 SUMMARY

Regular locomotive spare parts procurement by Malawi Railways has been severely constrained by foreign exchange shortages. The project will alleviate this problem. The project seeks to prevent deterioration of standards by intervention rather than to allow the situation to decline further. Although the project has rates of return of about 30 per cent p.a. for each of the components, it is very sensitive to the date of opening of the lines through Mozambique and consequent restoration of traffic to levels experienced in 1980/81 shortly before disruption took place. The breakdown crane is less sensitive to this timing because of the much longer (at least 30-year) life of the investment, whereas the locomotives require overhaul every 7 years.

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