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TANZANIA

PROGRAMME FOR TRANSPORT SECTOR RECOVERY

THE TRANSPORT SECTOR DONORS' CONFERENCE

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TECHNICAL WORKING PAPERS

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Trunk and Rural Roads Sector

I. Introduction and Direction of Change

1.1 This Technical Working Paper is divided into two sections: (1) Trunk Roads; and (2) Rural Roads; the latter covers regional, district and feeder roads. The main focus of the proposed 5-year (1987/88-91/92) Programme is to improve the conditions of the two road networks. The main institutional recommendation is for the Ministry of Communications and Works (MCW) to become directly responsible for managing the execution of road development, rehabilitation and maintenance programmes of all trunk and rural roads in mainland Tanzania. For rural roads, MCW would as a change in present practice, execute programmes prepared by district councils and regional administrations which, respectively, come under the Ministry of Local Government and Cooperatives (MLGC) and the Prime Minister's Office. This direct involvement by MCW will require strengthening of its regional offices which will manage contracts and provide practical support to road maintenance units working on rural roads. MCW, through a separate Rural Roads Division (RRD), will provide technical support to the regional offices and monitor implementation of agreed programmes. Details of the organizational arrangements, staffing and equipment requirements for RRD and MCW's regional offices to effectively manage the execution of rural road development, rehabilitation and maintenance will be determined in a study to be undertaken shortly.

1.2 The second change in present practice will require all workshops servicing equipment for trunk, regional and district roads maintenance to come under MCW's Department of Mechanical and Electrical Services, and that equipment assignment will be based on approved work programmes. Furthermore, Plant Pools will be set up in key regions, attached to zonal workshops, and operated along commercial lines to provide more extensive and reliable services to contractors.

1.3 The third matter common to all road programmes will be a reorientation of MCW's operations to improve its planning, supervisory and monitoring functions and to contain its force account activities. This change in emphasis will go in step with increasing participation of contractors in executing road development and maintenance projects. Local Contractors and Plant Pools will require foreign exchange assistance for purchasing spare parts for repairs and new equipment.

1.4 Regarding trunk roads, the 5-year Programme will accelerate rehabilitation of paved, gravel and earth roads carrying significant traffic volumes, and increase budget allocations to levels adequate to maintain the roads in acceptable condition. By 1992, about 70% of paved and gravel roads should be in good condition. In addition, the backlog of bridge and culvert rehabilitation will be completed under the programme.

1.5 Regarding rural roads, 6000 km of roads have been selected in 24 districts as being essential to assure access to agricultural areas producing export commodities. These roads will comprise the first phase of

Core Rural Roads Rehabilitation and Maintenance Programme. By December 988, an inventory of roads will be completed and the roads reclassified. ıe length of essential roads will be increased to about 10,000 km, ıcluding other districts and regions. Rehabilitation of priority rural ɔads under the Core Programme will be carried out: 1415 km in the first ıase and 1000-1200 km in the second phase. Other rural roads will receive ıly minimum maintenance to provide reasonable access. The Core Programme ill be additional to ongoing Donor-supported rural roads programmes.

.6 At the end of the 5-year Programme, by 1992, most of the roads equired for providing assured access from agricultural production centers ɔ railways, ports and principal markets should be in satisfactory ɔndition. Furthermore, MCW should be able to more efficiently manage the cecution of road development and maintenance programmes, and the local ɔnstruction industry should be participating more effectively in executing ıe various works.

.7 The total cost of the 5-year Programme (December 1987 Prices) is stimated at US$284.6 million: US$237.8 million for trunk roads and S$46.8 million for rural roads. Of these amounts, US$74.6 million is lready committed under the Sixth Highway Project. The government's budget ɔuld have to provide a further US$78.8 million, and the donor community S$131.2 million, in real terms.

.8 Initial foreign exchange requirements, for FY1987/88-89/90 ıounting to US$15-20 million are required for: (i) survey of bridges and easibility study for priority works followed by detailed engineering; (i) foreign exchange for equipment, spare parts and petroleum products for CW, Plant Pools and local contractors; and (iii) assistance to MCW for rganizing the new arrangements to manage rural road maintenance. With ıplementation of the 5-year Programme, the portion of the government's ıvestment programme for roads would increase from about 5% in 1986/87, ıich is extremely low, to about 15% in 1990/91/92, after which the road ıvestment budget should stabilize at around 12% of Tanzania's total ıvestment budget.

9 The government's annual contribution to the 5-year Programme in h will depend on devaluations against the US$. In December 1987 US$ ices, the annual budget allocations for the 5-year Programme including ıgoing commitments under the Sixth Highway Project, would be (TSh llions):

	87/88	88/89	89/90	90/91	91/92
nstant 1 US$ = TSh 68	830	1,224	1,265	1,353	1,068
15% annual depreciation	830	1,408	1,673	2,058	1,868

10 A joint steering committee of senior PMO, MLGC and MCW staff will set up early 1988 to (i) formulate the organizational arrangements for ecution of rural road works, and (ii) monitor progress of the 5-year ads Programme. Coordination of implementation will be the responsibility MCW's Project Coordination Office. By December 1989, progress under the ogramme will be reviewed, and adjustments made to take into account ysical progress, local budget allocations and Donor financing mmitments.

II. TRUNK ROADS

A. Present Management of Trunk Roads and Proposed Changes

1.11 The Ministry of Communications and Works (MCW) was formed in July 1984 by merging the Ministry of Transport and Communications and The Ministry of Works. MCW is thus presently responsible, either directly or through parastatals, for all transport and communications matters in mainland Tanzania. Regarding the roads sub-sector, MCW has direct responsibility for developing and maintaining the 10,000 km of trunk roads through its Construction and Maintenance Department (CMD). Furthermore, the Mechanical and Electrical Services Department (MED) maintains the ministry's plant, equipment and vehicles, and the Supplies Department carries out all procurement and managers MCW's stores.

1.12 MCW has the requisite organization to manage all aspects of road infrastructure and equipment maintenance; however, in the above three departments, only about 48% of the 2,950 authorized positions of engineers, technicians, mechanics, supplies officers, and accountants are filled. Consequently, MCW has insufficient staff to both programme, execute and monitor trunk road maintenance. The on-going concentrated effort to increase the number of professionals through fellowships for graduate courses in India, and to increase the output of technicians from the Dar es Salaam Technical College, will eventually assist in filling many vacancies. Although, considering the present low number of professionals and technicians graduating each year from Tanzanian institutions, as well as the extremely low government salary scales (US$35-55 per month), it is inconceivable that MCW will be able, in the foreseeable future, to satisfactorily maintain by force account all the trunk roads, as well as to increase its participation in rural road development and maintenance (Section III on Rural Roads).

1.13 In order to manage the road networks more effectively in the future, MCW staff will concentrate on planning, supervision and monitoring of road maintenance activities and, in step with the developing capacity of the local construction industry, will contract out most of the non-routine tasks, such as paved road resealing, unpaved road regravelling and reshaping, structures and major equipment repairs. Major road construction, upgrading and rehabilitation is expected to be undertaken by international contractors for some time to come.

1.14 The above reorientation of MCW's responsibilities is being supported under the Sixth Highway Project financed by IDA, AfDB, NORAD and DANIDA. However, further assistance is needed to accelerate road rehabilitation, and to assist local contractors in undertaking road projects through provision of foreign exchange facilities for repairing and purchasing equipment and vehicles. Furthermore, newly recruited graduates and technicians need continuous training in road maintenance management. This will especially require a greater effort to increase the capacity of MCW's Training Center at Morogoro.

1.15 The Sixth Highway Project is assisting in improving workshop practices by concentrating major repair work at seven zonal workshops.

Also, where practical, repair work will be contracted to established private garages. Further efforts will be required to consolidate workshops throughout the country and to bring all servicing of road plant, equipment and vehicles under MED, including units presently managed by the Regional and District Engineers.

1.16 In the future, MCW force account will concentrate on routine maintenance tasks, regravelling and reshaping of unpaved roads, and some resealing of paved roads. Consequently, MCW's equipment holdings will be consolidated to essential needs, and repair activities will be organized around the seven zonal workshops in order to provide more efficient services. On site servicing would be limited to preventive maintenance and minor repairs under the control of Regional Workshops. To implement this reorientation of MED's services, early procurement is needed for low-bed tractor-trailers, mobile workshops and lubrication units.

B. Recent Expenditures and Present Condition of Trunk Roads

1.17 Insufficient funding of road maintenance since the early 1970s has caused continuous deterioration of the trunk road networks. Less than half of the paved roads and only one quarter of the unpaved roads are presently in good condition. Although budget levels were increased in the early 1980s, recent sharp devaluations of the T Shillings have caused the allocations for road maintenance activities to drop in FY87/88 to about 35% of an adequate level.

1.18 About US$4.6 million appears to have been allocated in the FY87/88 budget for routine and periodic maintenance, and a further US$2.8 million for rehabilitation of roads and structures. However, these figures are only approximate because the presentation of approved road maintenance work programmes does not correspond to budget allocations. This matter will be addressed in future budget preparations, where budget allocations will be matched with realistic work programmes.

C. Ongoing Projects and Commitments

1.19 The list of ongoing and committed road projects are given in Annex 2-1. Trunk road rehabilitation is being supported by the Sixth Highway Project. This project includes rehabilitation of about 300 km of Tanzam Highway and about 800 km of gravel roads. In addition, about $3.0 million has been provided for equipment repairs at zonal workshops and private garages. The project also provides US$3.2 million for fellowships and training; and about US$8.5 million for technical assistance and studies to support MCW, local contracting and trucking industries, and Dar es Salaam Technical College. Physical execution is expected to be fully underway by FY88/89.

1.20 Other committed projects support rehabilitation of about 360 km of trunk roads, and 1144 km are being upgraded to paved road standards. The cost to complete these projects from FY87/88 amounts to about US$93 million which, if spaced evenly over three years, would absorb annually about US$31 million of the development budget.

D. Objectives of the 5-Year Trunk Roads Programme

1.21 The trunk road network carries about 70% of the country's road traffic. Consequently, the present poor state of many trunk roads is adversely affecting the efficiency, cost and safety of transporting goods and people. International research carried out in several developing countries, including neighbouring Kenya, has shown that every incremental dollar spent on maintaining the road pavement in good condition, saves about 3-4 dollars in transport costs, such as consumption of spare parts, tyres, fuel and replacement of vehicles; all imported items.

1.22 The 5-Year programme for trunk roads has two main objectives: (i) to reduce the km of roads in poor condition which carry significant traffic volumes; and (ii) to maintain the roads in acceptable condition. The programme will require an increase in funding from the present level of US$7.4 million in FY87/88 to an average of about US$57 million in each of the subsequent four years. Consequently, by 1992, about 70% of paved and gravel roads should be in good condition. Furthermore, about 1180 km or 25% of the earth roads will be rehabilitated and upgraded to gravel roads standard; thus increasing the gravel road network by 55% to 3,300 km. The remaining earth roads (3410 km), however, will receive limited maintenance because of their low traffic levels; very few of them will be in good condition.

1.23 During the 5-year period, MCW's activities in road maintenance will be modified by strengthening the programming, supervision and monitoring role of the ministry, and curtailing its present orientation of carrying out nearly all maintenance tasks by force account. To enable this shift in emphasis to take place, foreign exchange assistance will have to be provided to local contractors and Plant Pools to enable their procurement of equipment, and spare parts for repairing existing units. The amounts will be determined in the near future by the consultants assisting the local construction industry under the Sixth Highway Project.

1.24 MCW will assist contractors by increasing the number of Plant Pools throughout the country, which will hire out equipment. Furthermore, MCW in its programme to consolidate the organization of workshops based on the seven zonal workshops, will also contract out repair work wherever possible to established private garages. The Plant Pools will be attached to zonal workshops and will be operated on a commercial basis. The most suitable arrangements will be recommended by workshop consultants to be engaged under the Sixth Highway Project.

1.25 Because of staffing constraints and lack of experience of recent graduates, MCW will further boost its training programmes at its Morogoro Training Center, with greater concentration on practical courses and more emphasis on management of road maintenance activities. The functions of the various levels within MCW's organization will be reviewed and the number of staff positions consolidated to reflect the ministry's limited role in force account activities, and greater emphasis in road maintenance planning, supervision and monitoring.

E. Proposed Trunk Road Rehabilitation and Maintenance Programme

1.26 The proposed Trunk Road Rehabilitation and Maintenance Programme will complement and expand activities financed under the ongoing Sixth Highway Project and the road rehabilitation projects supported by various Donor Agencies. Particular emphasis will be given to rehabilitating paved and gravel roads and in instituting regular periodic maintenance such as resealing and regravelling. Annex 2-2 provides details, and Map 20671 shows the trunk road networks and roads already identified for rehabilitation.

1.27 Although the programme covers a 5-year period, little work will begin before the second year (FY88/89) when the rehabilitation works along Tanzam highway and high priority gravel roads should commence under the Sixth Highway Project. Consequently, over the four remaining years, the programme includes rehabilitation of 480 km (48%) of the Tanzam highway, 580 km (25%) of other paved roads, and 1,650 (25%) of gravel and earth roads; the latter will be upgraded to gravel standard. The total cost of trunk road rehabilitation is about US$142 million.

1.28 The 5-year programme will also include rehabilitation of bridges and culverts, which are increasingly causing traffic bottlenecks, and will complete the camps and facilities needed for MCW to manage road maintenance activities. Easily erected bridge units will also be procured to cope with emergencies. By 1992, all structural work should be substantially completed, costing about US$37 million.

1.29 In carrying out force account road maintenance and rehabilitation, MCW will require additional financial assistance to replace aged equipment and for importing spare parts, tires, petroleum products and materials for culverts and bridges. This is estimated at about US$4.0 million per year. Also, major equipment repairs to be started under the Sixth Highway Project would require about US$1.0 million per year for financing imported spare parts and contracted repair work.

1.30 As stated previously, MCW's main task under the programme will be to oriented its activities away from force account works towards management of works and services carried out by contract. Technical assistance is already being provided under the ongoing Sixth Highway Project to assist and train MCW staff. This will have to continue over the 5-year period. Consultants services for engineering studies are also covered under the ongoing project; supervision costs are included in the estimates of the works. Annex 2-3 shows the distribution of work expected to be carried out by MCW force account and by contract.

F. Summary of Financial Requirements

1.31 The 5-year Trunk Road Rehabilitation and Maintenance will require a high level of financial assistance from the donor community and at least a doubling of present government funding for trunk roads. The estimated financing requirement, in addition to present commitments, amounts to US$113.5 million in December 1987 US$ terms. Annex 2-4 provides details of the financing and budgetary requirements for 1987/88-91/92.

1.32 The present government funding for trunk road maintenance and rehabilitation (including the Sixth Highway Project, but excluding other Donor-assisted programmes) is estimated at US$7.4 million (1987/88). The increased budget allocations to support adequate maintenance of trunk roads and local component of donor-financed rehabilitation, resealing and regravelling projects, under the programme, will average about US$18.0 million per annum for 1988/89-91/92, including the Sixth Highway Project.

1.33 The ongoing Sixth Highway Project is providing about US$48.4 million (excluding contingencies) for paved and gravel road rehabilitation and equipment repairs. Feasibility studies have already been completed for other roads requiring rehabilitation, and consultants engaged under the Sixth Highway Project could prepare detailed engineering in a relatively short time. Consequently, the lead time for starting further road rehabilitation should be quite short. Well defined packages will be prepared for donor financing.

1.34 Preparation has yet to be undertaken for a bridge and culvert rehabilitation package. Immediate funding will be required for consultants to: (i) survey the structures along trunk roads, and prepare a list of priority works with feasibility studies; and (ii) undertake detailed engineering.

1.35 Financing is required from 1988/89 to cover foreign exchange costs of imported spare parts, petroleum products and materials for MCW force account maintenance operations. Also, the equipment replacement programme for MCW, Plant Pools and local contractors should start in 1988/89; the amount of foreign exchange required should be known by March 1988. Contractors will, of course, pay for the equipment and spare parts in Tsh.

III. RURAL ROADS

A. Present Management of Rural Roads and Proposed Changes

1.37 The term "rural roads" refers to all roads not covered by the trunk road network. Presently, there are three main classes of rural roads: regional, district and unclassified feeder. The upkeep of these roads are the respective responsibility of Regional Engineers, District Engineers and Village Governments. In addition, some roads fall directly under the responsibility of agricultural produce parastatals, such as tea and coffee producers. There are an estimated 21,000 km of regional roads under 20 Regional Administration, 14,600 km of district roads under 101 District Councils, and about 36,000 km of of unclassified feeder roads. Only a few km of rural roads are paved.

1.38 Since Independence in 1961, there have been several changes in distribution of responsibility of rural roads on mainland Tanzania. District roads have usually continued under district authorities, but the responsibility for regional roads and regional workshops have oscillated between the central ministry and regional administrations. Since 1985, the newly created Ministry of Local Government and Cooperatives (MLGC) became responsible for funding of district roads, although District Councils can also directly raise funds. MLGC is represented at the regional level by a Regional Local Government Officer. District Engineers (DEs) are employed

by the District Councils. The Prime Minister Office (PMO) coordinates development planning of rural roads in the 20 Regions through a Regional Commissioner; funding is provided under PMO's budget. Regional Engineers (REs) are employed by the Regional Administrations. Regional and District Engineers usually come from MCW, which provides ad-hoc technical training and advice. Their career path will generally be within MCW.

1.39 Regional workshops come under MCW, but in practice the REs and MCW's Resident Engineers, who are responsible for trunk road maintenance, run separate workshops and equipment. District Engineers manage their own fleet. The organization of the workshops, at all levels, is disoriented with generally poor mechanical services and an abundance of broken down equipment. Even MCW's central workshop at Morogoro is poorly equipped, and ineffective as MCW's principal provider of mechanical services.

1.40 The linkages and coordination among MCW headquarters (including Resident Engineers), Regional Engineers and District Engineers are almost non-existent. Under the present arrangements, it has proved difficult to provide a uniform focus on systematically developing and maintaining rural roads. Furthermore, engineers/technicians at district and regional levels do not effectively participate in the planning stages. Consequently, realistic road development and maintenance programmes, and their cost estimates, are seldomly prepared.

1.41 Although data available is incomplete, there appears to be only 20-25 engineers and about 180 technicians presently on RE and DE staffing lists; few districts have a qualified engineer. Consequently, for rural road maintenance planning, execution and monitoring to be carried out effectively, engineers/technicians will be regularly assigned to the districts and regions as part of their career development within MCW. Because of the present shortages of engineers/technicians in Tanzania, some posts will have to be filled by NGO volunteers or individuals provided from bilaterial sources.

1.42 For rural road development and rehabilitation programmes, PMO and MLGC, at headquarters and in the regions, will need to strengthen their capacity to prepare and rank projects according to socio-economic criteria. Moreover, the execution of agreed projects needs to be made more effective through better definition of functions and responsibilities at different levels of the three government agencies: PMO, MLGC and MCW.

1.43 Rural road planning, and preparation of cost estimates, are presently instigated at district level, coordinated at regional level and budgeted under PMO or MLGC votes. The present bottom-up planning system will be strengthened and the review process rationalized along the lines indicated in Annex 3-1.

1.44 Execution of rural road maintenance, rehabilitation and development projects will be managed by MCW's regional offices. This will require significant reorientation of MCW's regional organization and increased staffing levels. Procedures will have to be worked out between the regional offices and MCW headquarters. The main orientation of the required reorganization of MCW will be to delegate executive responsibility to its regional offices, as presently done for trunk roads through the

Resident Engineers, for implementation of all road programmes. At headquarters MCW through a separate rural roads division (RRD) will provide technical support in the planning and execution stages, and will monitor progress. Headquarters staff will comprise a small group of engineers, technicians and accounts officers. In the planning stages, MCW's Planning and Research Department will assist in reviewing socio-economic justifications of road rehabilitation and development projects. Annex 3-2 outlines the proposed organizational arrangements among MCW, PMO and MLGC.

1.45 A Rural Roads Engineer (RRE) in each regional office will have the overall responsibility for executing agreed programmes, and for coordination with MCW headquarters. In particular, the RREs will provide technical and costing advice in the regional and district planning and budgeting process. The RRE will have the authority to contract out and supervise road rehabilitation, regravelling and reshaping works, and will allocate equipment for force account routine maintenance operations and road brigades, through arrangements with the regional workshops. Contractors will be given every opportunity to tender for road works, renting equipment as needed from Plant Pools. Because of the present limited capacity of the local construction industry, MCW road brigades will also be used to undertake rural road rehabilitation, regravelling and reshaping. The number of these brigades will depend on the size of the agreed annual programmes, as well as the expected participation of local contractors.

1.46 Force account routine road maintenance operations will be carried out by field engineers/technicians under the RRE. They will be given the necessary autonomy to undertake their agreed programmes, and will be the first-line contact with the DEs and Village Governments. They will also be able to undertake petty contracts with individuals and village chiefs for execution of labour-intensive tasks. Priority in establishing the above procedures for executing rural road programmes will be given to the regions and districts participating in the Core Rural Roads Programme (para. 1.53).

1.47 The above reorientation for MCW to manage execution of rural road programmes will require a detailed study on organizational arrangements, personnel, equipment, and career development and training requirements. In particular, the study will have to determine (i) the level within MCW and functions of RRD; (ii) the lines of authority from MCW headquarters to regional offices and field teams, together with clear descriptions of functions and responsibility at each level; (iii) the linkages between MCW divisions involved in rural roads, trunk roads and workshops; and (iv) procedural arrangements among MCW, PMO, MLGC and Regional Administrations at the various levels and various stages of planning, budgeting and execution. The study will have to be undertaken as soon as possible in order to get the rural roads programme underway within the proposed timetable. Technical assistance will be required during the 5-year period at MCW headquarters and in the regions and districts participating in the Core Programme (para. 1.64).

B. Recent Expenditures and Present Conditions of Rural Roads

1.48 Recurrent and development expenditures for rural roads in FY86/87 are estimated to have been US$9.3 million. However, only US$3.5 million

($66/km) was allocated to routine maintenance (including salaries), about 78% of the remainder covered road programmes supported by Donor Agencies in a few regions. The low level of rural road funding, which has persisted over several years, has resulted in a general deterioration of the networks throughout the country. Furthermore, considering the overall FY86/87 budget allocations in the regions, only 7% of the recurrent budget and 22% of the development budget were allocated by PMO to regional roads. Also, MLGC's FY86/87 budget for District Councils, plus local revenues, amounts to no more than 3% of its overall recurrent expenditures and about 14% of its overall development expenditures.

1.49 The present condition of rural roads, except the few covered by Donor-assisted programmes, can only be described as poor. This is not surprising considering the low priority given in the past to the road vote. However, with about 50,000 km of rural roads (regional, district and about half the feeder roads) which should be maintained, the annual amounts required to bring all the roads to acceptable condition and to maintain them adequately are well beyond the short-term financial capacity and technical capability of Tanzania. Consequently, priority will have to be given to essential roads.

C. Ongoing Rural Road Projects and Commitments

1.50 Donor Agencies have actively supported rural road development through Rural Roads Projects and Regional Integrated Development programmes. Annex 3-3 provides an indication of ongoing programmes. Donor Agencies have developed individual approaches to implementation; in some cases works are carried out by equipment intensive means and in others by labour-intensive. Some Donors work through Regional Engineers and others through District Engineers.

1.51 In April 1985, a joint Government of Tanzania/Donor Agency meeting on Rural Road Improvement and Maintenance was held at Arusha to evaluate Donor Agencies' contribution to rural roads development in Tanzania. The meeting was organized by ILO, and from it several recommendations were made - all of which will be considered in improving the condition of rural roads over the next five years. The general conclusion at the Arusha and subsequent meetings is that the government of Tanzania has to develop a national policy for rural road improvement and maintenance.

D. Objectives of the 5-Year Rural Roads Programme

1.52 The Government's Economic Recovery Programme emphasises the need to stimulate the growth of export crops and to increase the production of food crops for which domestic supply falls short of demand. The 5-year rural roads programme will concentrate on the need to assure access from the key food and cash crop producing areas to the trunk road system and railways, for purposes of both crop evacuation and distribution of inputs to farmers. This means that resources for rural roads will be assigned mainly to areas of high agricultural production.

1.53 Consequently, the Government has decided to embark on a Core Rural Roads Programme which will primarily enable assured access to key agricultural areas. The Core Rural Roads Programme will initially be

limited to 24 districts in eight regions, and is in addition to the ongoing Donor-funded road programmes outlined in Annex 3-3.

1.54 The Core Programme will support adequate maintenance for essential rural roads, as well as rehabilitation of those roads which satisfy socio-economic criteria. This programme over the long-term is expected to encourage traders, businesses and small-scale industries to settle in the selected areas; thus providing a productive interaction between crop producers and commodity manufacturers, since availability of goods is a decisive incentive for farmers to expand production.

E. Proposed Rural Road Rehabilitation and Maintenance Programme

1.55 The proposed Core Rural Roads Programme will be based on the recommendations of the Agricultural Feeder Roads Study completed in September 1987. In the 24 districts selected, about 6,000 km of rural roads were identified as being essential to agricultural production. Of these roads, 1,415 km require urgent rehabilitation. Annex 3-4 summarizes by district the Core Rural Roads Programme. The locations of the roads are shown on Maps 20675, 20676, and 20677.

1.56 The 1,415 km of road rehabilitation in the first phase of the 5-year programme will be undertaken over 3 years, 1988/89-90/91. The second phase of the programme will add a further 4,000-5,000 km of essential roads and an additional 1,000-1,200 km of road rehabilitation. The list of second phase roads will be prepared and evaluated by June 1989 for implementation in the final 2 years: 1990/91-91/92. At the end of the 5-year programme, at least 10,000 km of essential rural roads should be receiving regular maintenance of which some 2,600 would be rehabilitated. The second phase is expected to include additional districts.

1.57 The Government will provide adequate funds to maintain the essential rural roads through central budget votes, supplemented by local levies for district roads. The total annual allocation for routine maintenance operations of essential roads will average US$175 per km, totalling about US$1.0 million for 6,000 km and US$1.8 million for 10,000 km.

1.58 In addition, annual budget allocations to provide minimum maintenance of the remaining 40-44,000 km of rural roads will be increased from the present US$66 per km to US$80 per km, for a total of about US$3.5 million. The annual allocation for road maintenance is not expected to exceed 6-8% of the recurrent expenditures of the District and Regional Councils. About US$1.0 million will also be required each year in foreign exchange for imported equipment, spare parts, materials and petroleum products.

1.59 The first phase road rehabilitation programme (1,415 km) is estimated to cost US$8.6 million, averaging about US$6,100 per km. All roads selected satisfy recognized socio-economic criteria and have an estimated economic rate of return (ERR) greater than 12%. The pavement width of the rehabilitated roads will depend on traffic levels, but will be no more than 6.0 m, with 5.0 m gravel carriageway.

1.60 Before the second phase roads are selected, MCW will undertake an inventory of all roads in, at least, the 24 selected districts and others to be included in the second phase. Also, MCW will undertake a reclassification of rural roads, based on criteria agreed with PMO and MLGC. Furthermore, MCW will complete by June 1988 the Road Manual which has been under preparation for some years. The proposals in the draft Roads Manual, July 1984, will be reviewed by a task force of international engineers and economists who are presently engaged in trunk and rural roads projects in Tanzania. In particular, greater emphasis will be given to economic evaluations in determining design standards, with adequate flexibility of design parameters for various road classes.

1.61 The second phase roads will be selected by District Councils and Regional Administrations and ranked according to agreed socio-economic criteria under the guidance of MCW's PRD in coordination with PMO. The second phase rehabilitation programme (1,000-1,200 Km) is estimated to cost US$7.0-8.0 million.

1.62 Routine maintenance of rural roads will be executed by field engineers/technicians under direct administrative and technical control of the RREs. Routine maintenance which comprises roadside clearing, drainage cleaning, pothole patching and minor repairs to structures is mainly labour intensive. Each field engineer/technician will oversee supervisors or headmen, and equipment mechanics and operators. Road maintenance tasks will generally be done by either hired casual labour from villages along the road or by contracting out well defined tasks to individuals, village chiefs or local contractors. Only a few semi-skilled labourers will be permanently on the district payroll.

1.63 The DRE's will require only a modest amount of unsophisticated equipment since periodic maintenance activities, such as road grading and supply of gravel and materials will be managed by the RRE. The present holdings of equipment and vehicles at both district and regional offices vary greatly, but are often inappropriate for the work, in poor condition, and especially vehicles (including motorbikes and bicycles) are completely inadequate to carry out road maintenance tasks.

1.64 Under the Core Rural Roads Programme, technical assistance to MCW will determine staffing levels, vehicle and equipment needs, work procedures, and training programmes for maintaining primarily, but not exclusively, the essential roads. The technical assistance will be supported by ILO which has been actively involved in rural road maintenance and rehabilitation schemes in Tanzania under various Donor programmes. Technical assistance will also include periodic evaluations and training support over the 5-year period, after completing the studies and initial implementation period.

1.65 In particular, ILO has been assisting in the development of labour-based road maintenance techniques. This effort will be expanded to all selected districts as well as to training of local contractors and MCW road brigades in the selection and use of appropriate equipment and cost effective labour/equipment mix for rehabilitating rural roads. About 500 km of first phase road rehabilitation programme will be set aside for labour-based construction both by force account and contractors. Although

most training will be carried out in the districts, MCW's training center at Morogoro will also be equipped and expanded to provide a focal point for conducting regular courses, covering classroom and practical field applications.

1.66 The consultants that carried out the Agricultural Feeder Roads Study, will prepare simple designs, specifications and tender documents for the first phase road rehabilitation programme. About four groups of roads totalling 400-500 km will be locally tendered as part of the Government's policy to increase participation of domestic contractors in road regravelling and unpaved road rehabilitation. This action will also be supported by the technical assistance and training programme for local contractors, which is about to start under the Sixth Highway Project.

1.67 The remaining 500-600 km of road rehabilitation will be carried out by MCW road brigades using mainly existing equipment and teams already carrying out similar work. The work will be supervised by the relevant RREs.

1.68 The experience obtained in the first phase road rehabilitation programme will help determine the mix between force account and contractor execution, and the extent and locations where labour-based work methods are appropriate. This experience will help determine the appropriate methods for carrying out the second phase work.

F. Summary of Financial Requirements

1.69 The 5-year Rural Road Rehabilitation and Maintenance Programme will require significant financial assistance from the donor community, in addition to ongoing programmes. The estimated financing requirement amounts to US$21.4 million, in December 1987 US$ terms. Annex 3-5 provides details of the financing and budgetary requirements for 1987/88-91/92.

1.70 The present government funding for rural road maintenance, excluding Donor-supported rural road programmes, is estimated at US$4.8 million. Increased budget allocations will be required to support adequate maintenance of essential rural roads and 10% the cost of road rehabilitation. The average annual government funding would be about US$5.1 million equivalent over the 5-year period.

1.71 Immediate funding is required for consultants to: (i) prepare tender documents for rehabilitation of 1,415 km of rural roads; and (ii) assist in the reorganization of rural road management. Also, financing is required to undertake repairs of existing equipment and procure new unsophisticated equipment for rural road maintenance. The list of equipment needed would be prepared by the consultants assisting in the reorganization.

TANZANIA
ROADS SECTOR
COMMITTED TRUNK ROADS INVESTMENT PROGRAM

LIST OF ROAD PROJECTS	DESCRIPTION	KM	COST TO COMPLETION US$ MILLIONS	DONORS
Kibiti-Somanga	Upgrading	65	12.0	SAUDI
Mwanza-Musoma Road	Upgrading	183	0.7	EEC
Mombo-Lushoto Road	Upgrading	38	1.3	FRG
Lusahunga-Bukombe Road	Upgrading	227	1.2	EEC
Songea-Makambako	Upgrading	295	3.3	ODA
Tanzania-Malawi Road[2]	Upgrading	6	1.0	EEC/NETH
Songea-Mabinga Road	Upgrading	100	24.0	EEC
Arusha-Menjinga	Upgrading	105	9.3	ITALY[3]
Dodoma-Mtera	Upgrading	125	29.3	ITALY[3]
Sub-Total		1144	82.1	
Songea-Masasi	Rehabilitation	300	5.0	NETH[3]
Mkomazi-Mombo Road	Rehabilitation	53	3.6	FRG
Kilombero Crossing	Rehabilitation	7	2.4	SWISS
Sixth Highway Project	Rehabilitation	1160	69.2	IDA, ADB, NORAD,DANIDA
Sub-Total		1460	80.2	
TOTAL ALL PROJECTS		2604	162.3	
TOTAL (excluding Sixth Highway Project)		1504	93.1	

1/ Rehabilitation, upgrading to paved road standard, new construction.

2/ 6 km in Tanzania and 45 km in Malawi

3/ These projects were not included in the government's 3-year (1986/87-88/89) Programme.

TANZANIA
ROADS SECTOR
TENTATIVE 5-YEAR TRUNK ROAD REHABILITATION AND MAINTENANCE PROGRAM

ACTIVITY	US$ UNIT COST	TOTAL LENGTH KM	DISTANCE (KM) 87/88 1/	88/89	89/90	90/91	91/92	ESTIMATED COST (US$ THOUSANDS) 87/88 1/	88/89	89/90	90/91	91/92	Actual Road Conditions (%) (1987) Good	Fair	Poor	Expected Road Conditions (%) (1992) Good	Fair	Poor
Asphalt Concrete Roads (TANZAM)		990											34	43	23	65	25	10
Routine	600		800	880	880	800	800	380	528	528	480	480						
Resealing	22,000		10	10	10	50	50	220	220	220	1,100	1,100						
Rehabilitation	168,000		2	100	100	140	140	336	16,800	16,800	23,520	23,520						
Subtotal	190,600							916	17,548	17,548	25,100	25,100						
Surface Dressed Roads		2,300											52	17	31	74	17	9
Routine	700		1,000	1,920	1,800	1,800	1,800	700	1,344	1,260	1,260	1,260						
Resealing	12,000		20	250	350	350	350	240	3,000	4,200	4,200	4,200						
Rehabilitation	44,000		20	130	150	150	150	880	5,720	6,600	6,600	6,600						
Subtotal	56,700							1,820	10,064	12,060	12,060	12,060						
Gravel Roads		2,120 in 1987 3,300 in 1992											37	40	23	70	19	11
Routine	600		1,000	1,900	1,900	1,900	1,900	600	1,140	1,140	1,140	1,140						
Regravelling	7,000		100	200	200	200	200	700	1,400	1,400	1,400	1,400						
Rehabilitation	22,000		20	120	120	120	120	680	2,640	2,640	2,640	2,640						
Subtotal	29,600							1,980	5,180	5,180	5,180	5,180						
Earth Roads		4,590 in 1987 3,410 in 1992											20	37	43	10	45	45
Routine	450		2,300	4,320	4,240	4,140	4,140	1,035	1,944	1,900	1,863	1,863						
Reshaping	4,000		50	50	100	100	100	200	200	400	400	400						
Rehabilitation	22,000		10	220	250	350	350	220	4,840	5,500	7,700	7,700						
Subtotal	26,450							1,455	6,984	7,800	9,963	9,963						
Structures rehab/const																		
Bridges	Lump							300	1,400	1,400	1,400	1,400	60	30	10	90	10	0
Culverts	Lump							300	5,700	5,700	5,700	5,700	40	40	20	80	15	5
Maint.Facilities/Camps	Lump							150	2,000	2,000	2,000	2,000						
Subtotal								750	9,100	9,100	9,100	9,100						
Equipment Replacement	Lump							480	2,000	2,000	2,000	1,000						
TOTAL		10,000						7,381	50,876	53,588	63,403	62,403						

1/ Estimated km. of roads expected to be fully covered under current budget allocations

2/ Current budget allocation (approximate)

ANNEX 2-3

TANZANIA
ROADS SECTOR
TENTATIVE FIVE-YEAR TRUNK ROAD REHABILITATION
AND MAINTENANCE PROGRAM
PHYSICAL PRODUCTION BY CONTRACT AND FORCE ACCOUNT

ACTIVITY	TOTAL KM	87/88	88/89	89/90	90/91	91/92
Asphalt Concrete Roads	990					
By Force Account:						
Routine (km)		600	880	880	830	800
Resealing (km)		10	10	10	10	10
By Contract:						
Resealing (km)		-	-	-	40	40
					(40)	(40)
Rehabilitation (km)		-	100	100	140	140
					(40)	(140)
Surface Treated Roads	2,300					
By Force Account:						
Routine (km)		1,500	1,920	1,800	1,800	1,800
Resealing (km)		40	50	50	50	50
By Contract:						
Resealing (km)		-	200	300	300	300
			(200)	(300)	(300)	(300)
Rehabilitation (km)		-	130	150	150	150
			(130)	(150)	(150)	(150)
Gravel and Earth Roads	6,710					
By Force Account:						
Routine (km)		3,300	6,220	6,140	6,040	6,040
Regravelling/Reshaping (km)		240	250	300	300	300
Rehabilitation (km)		40	100	100	100	100
By Contract:						
Rehabilitation (km)		-	240	270	370	370
					(80)	(370)
Structures Rehab/Constr.						
By Force Account (US$ x 1,000)		750	2,700	2,700	2,700	2,000
By Contract (US$ x 1,000)		-	6,400	6,400	6,400	6,400
			(6,400)	(6,400)	(6,400)	(6,400)

( ) External financing needed to cover about 85% costs (100% foreign + 50% local)

ANNEX 2-4

TANZANIA
Roads Sector
Financing and Budgetary Requirements For Trunk Roads Program
(US$ Millions)

Description	87/88 2/	88/89	89/90	90/91	91/92		Comments
Asphalt Concrete Roads							
Committed financing	0.3	16.8	16.8	16.8	-	50.7	IDA Hwy 6 (68% cost)
GOT budget	0.4	0.6	0.6	1.6	4.2	7.4	
Financing gap	-	-	-	6.5	20.8	27.3	Donors (85% cost)
Sub-total	0.7	17.4	17.4	24.9	25.0	85.4	
Surface Treated Roads							
Committed financing	0.9	-	-	-	-	0.9	
GOT budget	0.9	2.6	2.9	2.9	2.8	12.1	
Financing gap	-	6.8	8.7	8.6	8.7	32.8	Donors (85% cost)
Sub-total	1.8	9.4	11.6	11.5	11.5	45.8	
Gravel and Earth Roads							
Committed financing	0.9	5.3	5.9	6.4	-	18.5	IDA Hwy 6 (62% cost)
GOT budget	2.5	4.8	4.9	5.2	6.1	23.5	
Financing gap	-	-	-	1.5	6.9	8.4	Donors (85% cost)
Sub-total	3.4	10.1	10.8	13.1	13.0	50.4	
Structures							
Committed financing	0.8	-	-	-	-	0.8	
GOT budget	-	2.0	2.6	2.6	2.6	10.4	
Financing gap	-	5.5	5.4	5.4	5.4	21.7	Donors (85% cost)
Sub-total	0.8	8.1	8.0	8.0	8.0	32.9	
Imported Equipment, Parts & Materials for WCW 1/							
Committed financing	0.7	1.0	1.0	1.0	-	3.7	IDA Hwy 6
GOT budget	-	-	-	-	-	-	
Financing gap	-	4.9	4.9	4.9	4.9	19.6	Donors (100% cost)
Sub-total	0.7	5.9	5.9	5.9	4.9	23.3	
Totals							
Committed financing	3.6	23.1	23.7	24.2	-	74.6	IDA Hwy 6
GOT budget	3.8	10.6	11.0	12.3	15.3	53.4	
Financing gap	-	17.2	19.0	26.9	46.7	109.8	Donors
TOTAL	7.4	50.9	53.7	63.4	62.4	237.8	

1/ 30% of cost of force account road maintenance and rehabilitation activities will require imported spare parts, petroleum products, etc.
40% of cost of force account structural work will require imported materials.

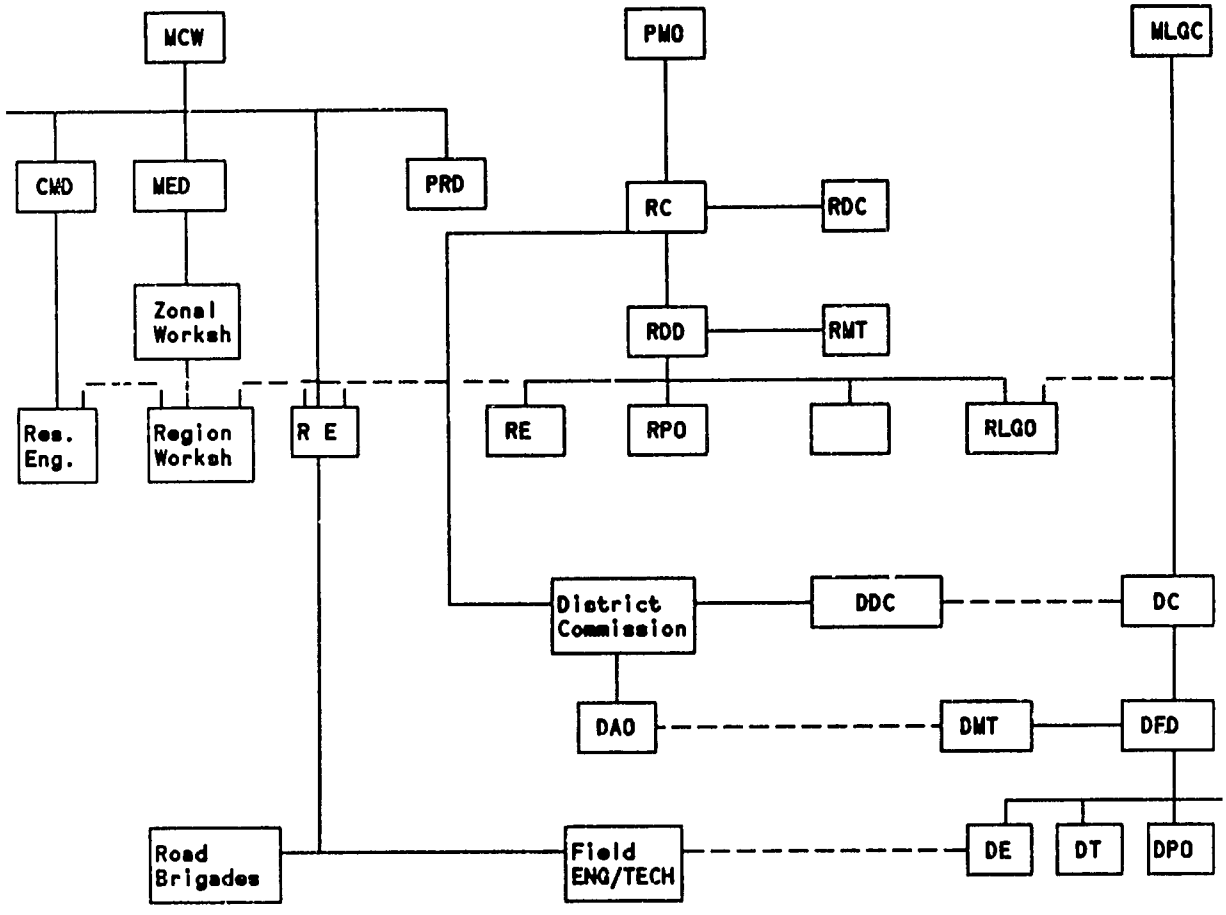
2/ Current budget allocation (approximate)

ANNEX 3-1

TANZANIA
Roads Sector
Planning and Budgeting for Rural Roads, Works and Maintenance

Function	Body and Key Officers
Financial assessment of National Rural Roads Maintenance Plan. Preparation of annual estimates of recurrent expenditure.	MFEAP-Treasury
Review of regional maintenance plans. Adjustment of budgets to individual regions and to the different road categories and priorities.	PMD and MLGC with technical and economic support from MCW
Preparation of cost estimates for regional roads. Compilation of all regional and district estimtaes in an annual, Regional Rural Roads Maintenance Plan.	RE with technical support from MCW's RRE.
Review of DC requests and cost estimates. Discussions with DE on regional priorities.	Regional Management Team, Roads Sub-team: RE, RLGO, DEs
Decision to request for new roads to be gazetted and for changes in the maintenance priorities among district roads.	District Council, Economic Services Committee
Review of district road network. Preparation of cost estimates for priority roads among major and minor district roads.	District Management Team, particularly the DE,DT and DPO

TANZANIA
Roads Sector
Proposed Organizational Arrangements for Rural Roads



LEGEND

MCW	Ministry of Communications and Works
PMO	Prince Minister's Office
MLGC	Ministry of Local Government and Cooperatives
CMD	Construction and Maintenance Department
MED	Mechanical and Electrical Services Department
RRD	Rural Roads Department
PRD	Planning and Research Department
RC	Regional Commissioner
RDC	Regional Development Committee
RDD	Regional Development Director
DED	District Executive Director
DE	District Engineer
DT	District Treasurer
DPO	District Planning Officer
RMT	Regional Maintenance Team
Res Eng	Trunk Roads Resident Engineer
RE	Regional Engineer
RRE	Rural Roads Engineer
RPO	Regional Planning Officer
RLGO	Regional Local Government Officer
DDC	District Development Committee
DC	District Council
DAO	District Administration Officer
DMT	District Management Team

ANNEX 3-3

TANZANIA
Roads Sector
Donor-Assisted Rural Roads Programs

Donor Agencies	Parent Ministry	Regions	District
NORAD/ILO	PMO	Mbeya	
Swiss Government	PMO	Morogoro	Klombero Ulanga
Irish Government	PMO	Morogoro	Kibons
Various 1/	PMO	Ruvuma Rukiva	
NORAD	PMO	Rukiva	Nkansi Sumbawanga
FRG/GTZ	PMO	Tanga	
French Government	2/	Lindi Mtwara	
Netherlands Govt.	MFEAP	Arusha Kagera Shinyanga	
Numeruous	MALD	Several regional integrated development programs.	

1/ DANIDA, Netherlands, FRG, EEC, UNDP, WFP, ILO

2/ Being negotiated.

ANNEX 3-4

TANZANIA
Roads Sector
Core Rural Roads Rehabilitation and Maintenance Program

Region	District	Essential Rural Roads (Km)			First Phase Rehabilitation	
		Regional	District	Total	No. of Roads	Km
Kagera	Karagwe	218.4	203.0	421.4	2	98.9
	Bukoba	56.2	142.5	198.7	3	115.7
	Muleba	54.0	113.7	167.7	3	35.4
	Biharamulo	85.6	189.4	275.0	1	18.0
Mwanza	Geita	128.4	81.0	209.4	-	-
	Sengerema	173.0	78.0	251.0	-	-
	Kwimba	77.5	142.0	219.5	6	148.3
Shinyanga	Shinyanga	126.7	359.4	486.1	6	226.2
	Maswa	145.4	318.2	463.6	4	170.2
	Kahama	42.2	487.2	529.4	3	45.0
Kilimanjaro	Hai	17.9	37.2	55.1	4	37.2
	Moshi	7.0	140.1	147.1	12	70.1
	Rombo	4.5	23.3	27.8	5	14.8
	Mwanga	88.7	25.0	113.7	1	5.4
	Same	541.0	38.0	579.0	-	-
Tanga	Korogwe	56.4	131.0	187.4	-	-
	Lushoto	51.4	109.0	160.4	-	-
Iringa	Njombe	109.5	196.4	305.9	4	29.4
	Mufindi	55.3	202.4	257.7	2	23.9
Ruvuma	Mbinga	79.0	163.9	242.9	12	119.9
	Songea	39.7	302.8	342.5	5	62.8
Mbeya	Mbozi	86.7	161.2	247.9	28	164.0
	Kyela	15.8	61.5	77.3	4	30.2
	Ileje	49.9	8.0	57.9	-	-
TOTAL		2310.2	3714.2	6024.4	105	1415.4

TANZANIA
ROADS SECTOR
TENTATIVE 5-YEAR RURAL ROAD REHABILITATION AND MAINTENANCE PROGRAM 1/

ACTIVITY	Distance (km)					Estimated Cost (US$ thousand)				
	87/88	88/89	89/90	90/91	91/92	87/88	88/89	89/90	90/91	91/92
Core Program										
Maintenance	-	6,000	6,000	10,000	10,000	-	1,000	1,000	1,800	1,800
Rehabilitation	-	500	500	800	800	-	3,000	3,000	5,000	5,000
Other Rural Roads										
Maintenance	50,000	44,000	44,000	40,000	40,000	4,800	3,500	3,500	3,200	3,200
Imports (equipment, spareparts and materials)						1,000	1,000	1,000	1,000	1,000
Technical Assistance (20 man-years)						500	500	500	300	200
TOTAL (total US$46.8 million)						6,300	9,000	9,000	11,300	11,200
Financing										
GOT Budget (total US$25.4 million)						4,800	4,800	4,800	5,500	5,500
Financing Gap (total US$21.4 million)						1,500	4,200	4,200	5,800	5,700

1/ Ongoing donor-supported rural road programs and their financing requirements have not been included in these estimates

CHAPTER TWO

THE ROAD TRANSPORT SECTOR

I. The Road Transport Market

A. Introduction

2.01 The road transport sector plays a vital role in the Tanzanian economy and is estimated to carry approximately 70% of total Tanzanian freight, about 1.7 billion ton-kms. The market for the industry can be considered as two main categories:

(i) Long distance inter-regional and international transport
(ii) Short distance intra-regional transport

2.02 The markets can be further sub-divided into transport for the private sector and transport for the publicly regulated sector of the economy, including the Government, parastatals and the cooperative movement.

2.03 Transport services are provided by both the public and private sectors but overall about 75% of trucks are operated by private owners. Private and public vehicles participate in all market segments but the private truck owners are least interested in short distance public sector work and consequently this is where public transport involvement is greatest.

2.04 Periodic shortages of fuel, tires and spare parts have affected all sectors of the transport industry but crop evacuation from the villages has regularly experienced the greatest difficulties.

B. Inter-Regional Transport

2.05 The private sector faces no major problems in obtaining long distance transport. Transport is available if the transport price is allowed to reflect market conditions. The Public Sector has problems, however, when it tries to impose unrealistic rates rather than using the tender system to fix rates.

2.06 Private and public transport companies report that demand is firm and most would like to expand. Liquidity problems prevent demand conditions being fully reflected in sales of new trucks. There has been, however, an inflow of secondhand heavy trucks and semi-trailers from the Middle East and Europe under the own import scheme. These large rigs are used both within Tanzania and upon transit routes to Burundi, Malawi, Rwanda and Uganda.

2.07 Long distance transport rates are generally set by the market and have risen to reflect the increase in input costs. Typical rates would be:

Dar es Salaam - Arusha	TSh 7.75 ton-km
Dar es Salaam - Mwanza	TSh 10.00 ton-km
Arusha - Tanga	TSh 10.25 ton-km

2.08 Rates reflect the length of haul, road conditions, and the likelihood of return loads: the expected response of a competitive industry.

C. Intra-Regional Transport

2.09 The major shortages of road transport capacity are encountered in the short distance market, particularly in the rural areas. There are, however, major differences in the scale of the problems faced by the private and government regulated sectors.

(i) The Private Sector

2.10 Although major cash crops are purchased, transported and processed by cooperatives and parastatals, the bulk of short distance transport is undertaken for the private sector. These include transport of:

- maize and other privately marketed food crops
- firewood and charcoal
- basic building materials
- consumer goods for private traders

2.11 Demand for transport has expanded with the revival of economic activity and transport costs have risen rapidly since devaluation started. The availability of transport is not considered, at present, a major constraint for movement of these commodities.

2.12 Many vehicles are operated in conjunction with trading activities and the rise in transport input costs would be reflected in commodity prices. Free market maize prices along the TANZAM highway indicate that transport costs strongly influence price. A substantial number of pick-ups have been imported under the own import scheme and these have increased the supply of short distance/small load transport. In Tanzania these vehicles are normally considered as urban based but they are also probably used for private agricultural marketing.

2.13 Reliable estimates of short distance private transport are difficult to obtain as own account transport predominate this market. The Regional Transport Corporation (RETCO) in Mwanza has recognized the potential and charges a ton rate of TSh1,800 for trips up to 100kms: during the same period the 'public' rate was fixed at TSh12 per tonkm (or over 30% below the market price). Other indications suggest that the private rate may be double the official public rate. Road conditions undoubtedly affect private rates and the TSh12 per tonkm between Arusha and Moshi reflects the reasonable standard of the paved road.

(ii) The Public Sector

2.14 The Public Sector faces major problems in many areas. Serious transport shortages are frequently reported, recent examples during September 1987 were:

- Tabora : 8,363 tons cotton purchased, 939 tons transported
- Tabora : 14,057 bales tobacco stranded in the villages
- Mwanza : 146,000 bales cotton purchased, 30,000 bales transported
- Rukwa : 11,054 tons purchased, 4,458 tons transported
- Shinyanga: 76,671 tons cotton purchased, 17,113 tons transported

2.15 It was perhaps inevitable that major increases in production would create some dislocation but it is possible that there could be a major crisis in crop evacuation this year. Some areas seem little affected, Dodoma, for example reports 21,471 tons purchased and 20,324 tons transported. Transport shortages may be particularly acute this year but crop movement from the villages seems to be a perennial problem.

2.16 This transport is now the responsibility of the Cooperative Unions which have taken over many of the functions of the crop marketing parastatals. Transport is arranged by the Unions using either their own vehicles or, more generally, vehicles contracted from the private sector and the parastatal RETCOs. For contracted transport the Regional Tender Boards establish annually the transport rates.

2.17 The private transport sector places a low priority upon crop movement and will concentrate upon private sector work when it is available. Consequently there is strong pressure to expand the transport capacity of the Cooperative Unions and the RETCOs. In previous years villages were allocated trucks but there is general agreement that this was very inefficient as the effective life of the trucks was very short.

2.18 Problems in crop marketing through the cooperative system undoubtedly exist and transport capacity is perceived as a major constraint. The following sections consider whether additional trucks are either a necessary or sufficient solution to the marketing problems faced by the sector.

II. The Intra-Regional Transport Problem

A. The Scale of the Problem

2.19 Tanzanian smallholders market a surplus of approximately 500,000 tons through the cooperative system. The truck fleet required to move the surplus depends not only upon the total tonnage but also the length of the movement season. Many roads are impassable or, at least, very difficult during the wet season and crop evacuation is largely confined to the dry season, after harvesting. The rehabilitation of a strategic network of rural roads is proposed but several years of sustained activity will be necessary before this constraint is removed. Storage conditions in the villages also encourage movement before the rains and some crops, such as coffee, must be processed soon after harvest.

2.20 In total a crop movement season of about 200 days is a reasonable estimate. Most movements are relatively short distance and, in most regions two round trips every three days should be possible. From these assumptions and estimates of average availability and load factors the total fleet requirement can be calculated:

Movement season	200 days
Truck load	6 days
Truck availability	60-65%
Truck productivity	480-520 tons/season
Fleet requirement	960-1,040 trucks

2.21 It should be possible to meet the crop movement demand with about 1000 trucks, rather less than 10% of the total truck fleet. This level of demand should not be a insuperable problem. Unfortunately several marketing and transport constraints have uneconomically expanded the demand for movement, restricted the movement season, thus increasing the demand for truck capacity during the shortened season, and reduced vehicle utilization:

Marketing Constraints:

* uneconomic demand for transport
* inadequate storage and processing capacity
* purchasing delays

Transport Constraints:

* inadequate road conditions
* shortages of vehicle inputs
* poor availability of public sector trucks
  reduced incentives for private sector participation

B. Non Transport Constraints

(i) Uneconomic Demand for Transport

2.22 Until recently Tanzania pursued pan-territorial and pan-seasonal pricing for agricultural crops. The situation has now been modified with premiums being paid for maize grown in agronomically favorable regions. These policies have increased both the overall and peak demands for crop transport.

2.23 Eliminating transport costs from crop pricing has distorted the pattern of production. Rukwa may be suitable for maize production but it is not ideally suited to supplying the domestic market, a fact reflected in the unofficial price.

2.24 Pan-seasonal pricing ensures that farmers will attempt to sell as soon after harvest as possible. There is no incentive for farmers to retain crops and every incentive to sell. The policy increases the demand for off-farm storage and intensifies peak demands for crop movement.

2.25 The introduction of transport costs into the calculation of producer prices, either at the national or regional level would assist in reducing the demand for transport by encouraging a switch from transport intensive crops in the more remote areas.

(ii) Storage and Processing

2.26 In several areas it has been impossible to transport crops from the villages because regional storage is not available. Conditions in the cotton growing areas are acute with stocks of 1986 cotton still held at both the ginneries and villages. Similar constraints affect other areas and transport problems are almost invariably reported in conjunction with storage shortages.

2.27 Adequate storage is essential to the marketing system and insufficient storage can result in high crop losses. Buffer storage will not necessarily provide a solution, however, if the fundamental problems are located elsewhere in the marketing and transport chain. Increased storage may alleviate temporary difficulties but will not provide a long-term solution to either inadequate ginning capacity or the lack of of domestic/export markets.

2.28 Additional storage is accorded high priority by the Government and the investment may be appropriate in some cases. Careful analysis is, however, required to diagnose the underlying constraints and distortions in the marketing and pricing system.

(iii) Crop Purchasing

2.29 Under the terms of the IMF Agreement strict credit limits have been imposed. Overdraft limits upon the Cooperative Unions, combined with late payment by the Marketing Boards, have created acute cash-flow problems in many regions. In most cases these problems have been resolved but they have delayed crop purchases and thus reduced the time available for crop evacuation before the rainy season. Additional difficulties have been created by the lack of basic marketing inputs, such as gunny bags, again delaying crop movement. Delays in the movement of crops increases the demand for trucks during the remaining period before the rains.

C. Transport Constraints

(i) The Rural Road Network

2.30 Conditions upon most rural roads in Tanzania are poor and transport to villages is both difficult and costly. In many areas transport can be largely restricted to the dry season. Rehabilitation and then continued maintenance of the rural road network would ease several of the present constraints upon the marketing and transport system, namely;

- reduce the private truckers'reluctance to operate in the rural areas;

- increase accessibility to villages and thus extend the length of the potential crop movement season;

- help increase vehicle availability by reducing maintenance needs and vehicle down-time; and

- reduce transport costs and reduce demand for spare parts and tires.

2.31 Unfortunately, rehabilitation of the road network, after many years of neglect, will take time and cannot provide a short-term solution to rural transport problems.

(ii) Shortages of Vehicle Inputs

2.32 The effective capacity of the Tanzanian truck fleet has been significantly reduced in recent years by shortages of fuel, tires and spare parts. In July 1986, for example, the Mwanza RETCO had 52% of its fleet grounded from a lack of tires and probably another 10% through shortages of spare parts. Many vehicles have thus been immobilized for extended periods and many truck owners were reluctant to risk their vehicles upon poor rural roads when neither spares, tires nor truck replacements were available,

2.33 The situation has improved considerably since mid 1986 as a result of the own import scheme, donor support and improvements to the fuel distribution system through the conversion of trucks to tankers. Further significant improvements can be expected with vehicle inputs financed by the Federal Republic of Germany, ODA, SIDA, USAID, Japan and the World Bank. The full effect of the increased supplies has not been fully felt and a further significant increase in effective truck capacity can be expected. The increased availability of inputs through franchised dealers should also help to stabilize prices in the secondary market.

2.34 While the supply of vehicle inputs seems assured for the next 12-18 months, it is crucial that an adequate inflow of fuel, spares and the raw materials for tires is maintained.

(iii) Availability of Public Sector Vehicles

2.35 All vehicles have been affected by input problems but the availability record of public sector transport fleets is particularly poor and this is reflected in low average vehicle productivity. Low productivity is not solely the result of input shortages but also results from operating and management constraints within the organizations:

- inadequate management and worker incentives
- inadequate vehicle maintenance
- uncommon vehicles and no secondary market for spares

2.36 Quantitative data are lacking but it is reasonably clear that parastatal transport can be productive with relatively new vehicles which require little more than routine maintenance. Keeping vehicles available is the critical problem for parastatal transport, as the vehicles age and maintenance demands increase their productivity falls significantly.

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2.37 The performance of the RETCOs illustrates the problem: with new vehicles availability and productivity are reasonable but as vehicles have aged average availability has declined dramatically. The difficulties are reflected in management's view of the economic life of vehicles. Vehicles are considered uneconomic after 4 - 5 years, very much earlier than is normal in the private sector for vehicles working short distances.

(iv) Role of the Private Transport Sector

(a) Private Sector Involvement

2.38 Despite the priority given to the public sector in recent years, private trucks still account for over 70% of total capacity. The majority of crop evacuation is still undertaken by the private sector: Shinyanga 55% of crops, Arusha 70-80% and in Iringa 95%. In Moshi, however, the Cooperative Union's own transport moved the majority of crop purchases.

2.39 It was suggested several times that the prices paid to private transporters were well below the costs of the Cooperatives and other parastatals providing their own transport. The limited evidence available tends to support the hypothesis although the comparison is often confused by parastatals using historic costs of vehicles and spare part inventories as the basis of cost estimation.

2.40 There is, however, considerable private sector reluctance to become engaged in crop transport from the villages and it is a common complaint that private truckers 'run away' when crops have to be moved. The reasons for this reluctance are understandable:

- bad condition of most village roads
- short hauls often with poor loading crops and few backhauls
- low transport rates fixed by Regional Tender Boards
- delay in payment by the Cooperatives
- administrative costs associated with the public sector.

2.41 Various inducements have had to be offered to obtain private sector transport :

- priority for the longer hauls and back hauls
- sale of inputs,by the Cooperatives, at administered prices
- payment for empty back hauls/minimum tonnage rates
- payment of rates above those set by the Tender Boards

2.42 While these inducements work in some areas, Regional Authorities still have to respond to emergency conditions by co-opting vehicles and directing them to assist in crop evacuation.

(b) Private Sector Potential

2.43 The overall size of the Tanzanian truck fleet is probably between 10,000-12,000 trucks with payloads over 5 tons. The private sector

accounts for at least 75% of effective capacity and transport shortages in the rural areas would be largely solved if more of this capacity were mobilized effectively to assist with crop movement.

2.44 The private truck owner finds, however, long distance transport and private trading more profitable. The RETCOs also find inter-regional transport profitable and cross-subsidize their intra-regional work from long distance profits. Despite the apparent shortages of intra-regional transport, therefore, over 75% of the capacity in the recent NTC truck tender will be 15 ton trucks, too large to be effectively used for crop evacuation from the villages. The larger private transporter would not undertake such cross-subsidization and the small regional transporter could not.

2.45 One solution to the present rural transport shortages would be the provision of additional transport capacity to the cooperative and parastatal sectors. If combined with sufficient technical assistance for management and vehicle maintenance sufficient capacity could be created. The costs of the solution would be high with the likelihood of low vehicle availability and utilization. An alternative is to encourage the private sector to take a more positive role in crop movement. A necessary condition for such participation is that crop movement should be a profitable activity.

(c) Commercial Transport Rates

2.46 It is clear that one of the main constraints is the lack of financial incentive for the private trucker. The peak nature of the crop movement season is not recognized and simplistic ton-km rates are universally established if not always applied. Even where RETCOs can provide detailed cost information, Regional Tender Boards set rates which are too low to be attractive for the private sector.

2.47 Annex considers intra-regional trucking costs and argues that a simple ton-km rate cannot meet the diversity of haulage conditions. When average rates are applied there is the obvious incentive for truckers to concentrate upon the routes with above average profits and ignore the unprofitable. Unfortunately the RETCO rate proposals are directed toward average ton-km rates with costs averaged over all vehicle sizes, short and long hauls and all commodities. Recalculating one proposal to obtain realistic costs and rates gives the following (details are given in Annex 1).

Transport Price Differences
(TSh/ton-km)

Different Rate Offers		Length of Haul 40km	70km	100km
* Proposed Official Rate:		18.25	18.25	18.25
* RETCO:	maize	26.00	19.80	17.30
	cotton	33.10	25.20	22.00
* Realistic Rate:	maize	28.60	21.80	19.00
	cotton	36.40	27.70	24.20

2.48 A realistic rate required to move seed cotton from village to ginnery, with an average haul of 40kms, is double the proposed rate. Total private sector transport costs are similar to those of the RETCOs and consequently the proposed rate would be totally unacceptable. With better loading crops and longer hauls the proposed and realistic rates converge and this may explain why some regions find less difficulty in attracting private transport than others.

2.49 To obtain private transport in the rural areas a much more flexible approach to rate setting is required. The fixing of transport rates by the Regional Tender Boards should be ended and rates should be set by market conditions. Where transport is in short supply rates will be high to attract transporters from neighboring regions and to encourage the creation of additional local capacity.

2.50 It is inevitable that transport rates will have to rise if private transport is to be mobilized. Increased transport rates may have a negative impact upon producer prices but, for major cash crops, intra-regional transport is a relatively small proportion of the producer price:

Intra-Regional Transport Costs
% of Producer Prices

Mild Coffee		Hard Coffee		Other Crops	
Moshi	1.3%	Kagera (I)	7.3%	Cotton	5.1%
Ruvuma	12.1%	(Magenda)	14.7%	Cashew	5.3%
Mara	8.4%			Tea	13.4%

2.51 Crop movement to the regional centre accounts for less 15% of the official producer price and for most crops/regions the costs is about 5% or less. Even if the higher transport prices were passed back the impact upon producer prices would be limited. It is not inevitable, however, that higher private sector transport prices would increase total marketing costs. Private transport could substitute for high cost cooperative and parastatal transport and more efficient crop evacuation could significantly reduce crop losses.

2.52 Crop evacuation costs are large in relation to official producer prices for basic food crops. On average intra-regional transport costs 25% of the producer price for maize but there are considerable regional variations. In Iringa Region, for example, the transport margin used to calculate the 'in store' price is only 10% of the producer price. Raising transport rates could have a significant impact upon official producer and/or consumer prices for maize but many farmers are already selling upon the free-market at prices which fully reflect transport costs.

(d) Flexible Marketing

2.53 Simply raising the transport rates may not be sufficient, in the short-term, to generate the necessary additional private capacity as many trucks are used in private trading, including food crop marketing. Opening all crop marketing to the private sector would provide an additional stimulus to increasing transport capacity as traders probably have easier access to funds than small transporters.

2.54 Flexibility could be introduced into the marketing system by allowing individuals or primary cooperative societies to deliver direct to the regional store, ginnery or other processing centre. The present marketing and transport margin used to calculate the in-store price would act as the incentive for private traders to enter the market.

2.55 Fundamental revision of crop pricing, to ensure the economic distribution of production, is desirable but is not essential to introduce flexibility into the system. Farmers would be faced with an number of alternatives:

- the official producer price, at the present buying points
- the in-store price, delivered at the regional centre
- the private trader price

2.56 A more flexible system, with greater private sector incentives, can thus be introduced while safeguards, through official producer prices, for the small farmers.

(v) Overall Transport Capacity

2.57 Many factors contribute to the problems of crop marketing and it is possible that there is an overall road transport capacity is insufficient to meet the peaks demands of both agriculture and the rest of the economy. Annex 2 provides an assessment of the present fleet capacity. There is no suggestion that substantial excess capacity exists but there is no real evidence that major crop losses have, in the past, been caused by a lack of transport.

(a) Increase in Rural Transport Capacity

2.58 It is felt that major net additions to the fleet may be unnecessary if more effective use is made of present capacity. New trucks have only indirect relevance to the small rural transporter. The cost of new trucks and the difficulties in obtaining credit mean that the small owner relies upon purchasing and operating older, secondhand vehicles. The present demand for such vehicles is strong but the supply is limited. Consequently prices in the secondhand market are high, 8 year old vehicles are being sold for TSh 1 million.

2.59 To provide additional regional transport capacity the supply of secondhand trucks must be increased. There is significant potential for generating this supply from the public and parastatal sectors. Many vehicles in these sectors are not operated, considered beyond economic repair. Other vehicles are under-utilized, considered as uneconomic to operate. All these vehicles should be sold to the private sector as soon as possible. The increased availability of spares and improved financial incentives should result in the rehabilitation of these vehicles.

2.60 In addition the rationale for truck ownership among the parastatals and government departments should be re-examined. Where the arguments for own account transport are weak, the fleets should be sold. There are already some moves in this direction with National Transport Corporation undertaking a study of the role of the RETCO truck fleet.

2.61 The re-activation of private trucking for crop movement will take time and to avoid dislocation the maintenance of some public sector transport capacity is essential during the re-adjustment period. Such support should be selective and concentrate upon maintaining rather than expanding the role of these fleets. There seems little justification for public sector involvement in long distance operations when the major problems are experienced in intra-regional transport.

2.62 Vehicle re-equipment support for these fleets should be made conditional upon the sale of equivalent numbers of old vehicles to the private sector. The public fleets would then be equipped with new vehicles that would be used quite productively. The small private operators would have the opportunity to acquire and operate productively the older vehicles. The Nordic program already makes this a stipulation of vehicle support and this example should be followed by others.

(b) Vehicle Replacement

2.63 Maintenance of vehicle capacity requires the eventual replacement of old vehicles. Vehicle rehabilitation projects can delay the date of replacement but the scale of present projects is insufficient to provide the replacement capacity required. There is also reluctance among some private sector operators to invest heavily in vehicle rehabilitation and there is a preference for new vehicles.

2.64 Annex 2 examines the size and probable age structure of the fleet and concludes that 1800 - 1900 new or rehabilitated trucks are required annually until 1990. When account is taken of the recent and proposed rehabilitation projects a minimum annual import program of about 1600 trucks is necessary.

2.65 Sustained economic growth will, however, demand additional transport capacity and it is unlikely that some investment above simple replacement would result in a serious misallocation of resources. As far as possible the conditions need to be created to allow the market demand to determine the scale of additional investment.

2.66 Transport demand is strong and long distance trucking, at least, is profitable. Transport companies would like to re-equip/expand and the government vehicle allocation system has been abandoned. The opportunities exist but the main vehicle importers are finding trucks difficult to sell. The situation varies between makes and models but there is general agreement that the rapid rise in vehicle prices combined with credit restrictions are major obstacles. New vehicles for the RETCOs were financed by new government equity and import duties are being paid by instalment. Such options are not available to the private sector.

2.67 If support is to be provided to the private trucking sector serious consideration must be paid to the provision of credit for the purchase of new vehicles. In view of the likely further devaluation of the Tanzanian Shilling any financing arrangement for new vehicles should be denominated in foreign exchange.

III. Support for the Truck Sector : Recommendations

A. Policy and Institutional Changes

(i) Pricing

2.68 The system of fixing transport rates by Regional Tender Boards should be ended. The present system is a major impediment to the participation of the private sector in intra-regional transport. Rates, based upon average ton-km costs, will almost inevitably result in transport shortages in some areas. Transport rates should be set by the characteristics of the haul and prevailing market conditions.

(ii) Crop Marketing

2.69 Flexibility in crop marketing and movement should be introduced with private traders allowed to buy all crops from farmers and sell at the regional centres. Private sector trading would act as a supplement to the existing cooperative system with official producer prices.

2.70 The policies of pan-territorial and pan-seasonal pricing should be reviewed with the objective of adjusting producer prices to reflect actual transport and storage costs.

(iii) Role Of Public Sector Transport

2.71 While maintenance of public sector transport fleets is necessary in the short-term, their role should be restricted to meeting the most immediate shortages. Their activities should concentrate upon intra-regional transport, leaving long distance transport to the private sector.

2.72 Essential public sector fleets should be restricted to their present capacity. New capacity should be balanced by the sale of older vehicles.

(iv) Effective Utilization of Existing Capacity

2.73 There is an urgent need to increase the productivity of existing transport capacity. Substantial potential capacity exists within the public sector and this capacity should be exploited by the sale of unused or under-used vehicles to the private sector. Immediate action is recommended to:

- streamline the disposal of 'uneconomic' RETCO capacity
- undertake an inventory of all cooperative and public sector fleets and sell all non-operational vehicles
- study the rationale for all public sector fleets and recommend disposal or reorganization of the fleets where recommended.

B. Material Support to the Truck Sector

(i) Additional Storage Capacity

2.74 Support for the provision of additional storage is recommended when it clearly provides a solution to marketing bottlenecks. Careful analysis is recommended to ensure that storage constraints are the real constraint rather than a symptom of more fundamental problems.

(ii) Rehabilitation of the Rural Road Network

2.75 Improvements to the rural road network will help to ease many of the constraints faced by the road transport industry. Such rehabilitation will not, however, remove the constraints in the short-term.

(iii) Provision of Essential Inputs and Truck Replacements

	Item	Annual Support
1.	Fuel	$ 34 million
2.	Tires	11 million
3.	Spare parts	30 million
4.	Truck Rehabilitation	3 million ECU
5.	Replacement Trucks	48 million
6.	Total Costs	

1. Fuel : annual fuel consumption for fleet of 13,700 trucks, 170,000 metric tons per annum; cost of diesel $200 per metric ton
2. Tires : average demand per truck 9 tires
   foreign exchange cost of materials $90 per tire
3. Spares : average cost per truck $2,500
   costs new and rehabilitated trucks negligible in Year 1
4. Rehabilitation: 250 trucks rehabilitated annually
5. Replacements : 1,600 trucks annually
   average cost $30,000 per truck

RURAL TRANSPORT RATES

A. Intra-Regional Rates

1. Where they operate, the RETCOs play an important role in determining the rates set by the Regional Tender Boards. The RETCOs can produce detailed cost information and calculate rates which would supposedly generate a fair return. Unfortunately the rate structures established are an unrealistic basis for attracting private truckers into public sector transport. A recent example of a RETCO proposal is examined below.

RETCO Proposal: Mwanza, August 1987

		Truck Size		
		7 ton	9 ton	15 ton
Variable costs (TSh/km)	Fuel	12.50	12.50	18.75
	Oil	1.25	1.25	1.87
	Tires	9.75	9.75	18.34
	Repair	9.50	9.50	12.50
	Other	7.50	7.50	7.50
	TOTAL	40.50	40.50	58.96
Fixed costs (TSh/annum)	Insurance	75	100	150
	Crew wages	60	60	75
	Depreciation	625	875	1125
	Overheads	250	250	500
	TOTAL	1,010	1,285	1,850
	perkm	28.05	35.70	44.04
Total average/km costs		68.55	76.20	103.00
Average load (tons)		3.5	4.5	9.0
Total Cost per ton-km		19.59	16.93	11.44

Average cost per ton-km, based on fleet mix	16.51
Profit margin 10%	1.65
Freight Rate	18.16
Proposed Rate	18.25

2. In some respects the assumptions are realistic. Vehicle depreciation is based upon replacement costs and allowance is made for future increases in fuel costs. Overall, however, the analysis seriously distorts the probable costs, and consequently, rates of short distance transport.

(i) Unrealistic Vehicle Utilization

	Annual Utilization	
	Assumed	1986/7
7 ton	36,000km	23,500km
9 ton	36,000km	33,400km
15 ton	42,000km	28,000km

The 1986/7 rate is based upon upon serviceable vehicles only and thus is an overestimate of actual fleet utilization.

(ii) Average Fleet Cost

3. The costs of the large long distance trucks are average with the smaller trucks which will operate intra-regionally. Even with RETCO's own costs the proposed rate is not sufficient to cover the full costs of the 7 ton truck:

Total costs : 7 ton truck	TSh19.60 tonkm
Proposed rate	TSh18.25 tonkm

(iii) No Distance Adjustment

4. It is generally impossible to obtain high distance utilization when operating short distance trips. The constraints introduced by loading/unloading times and restrictions usually limit utilization to one round trip per day. In the context of rural transport around Mwanza an 80km round trip is likely to take a day and a 200 km trip would also be feasible. An average ton-km rate cannot compensate for these differences.

5. A more useful way of cost analysis is to differentiate between running and time costs. Using the RETCO costs for the 7 ton truck and an assumed 250 day operating year the following costs are calculated:

Running costs	TSh40.50 per km
Time costs	TSh4,040 per day

With these costs the minimum cost recovery for various length trips can be calculated. The costs assume no return load, the normal situation for short distance transport.

Cost Recovery: 7 ton truck

One way distance	40km	70km	100km
Running costs	3,240	5,670	8,100
Fixed cost	4,040	4,040	4,040
Total	7,280	9,710	12,140
Per ton-km	TSh26.0	TSh19.8	TSh17.3

(iv) Crop Loadability

6. The rate structure is based upon empty back hauls which is realistic for crop movement. No allowance is made for poor loading crops such as cotton and for consignments of less than truck load. A maximum of 5.5 tons of seed cotton can be carried in a 7-ton truck and this difference raises the minimum cost recovery for the 40km haul to TSh33.1 per tonkm.

(v) Road Condition

7. Average costing makes no distinction between travel upon good paved and bad earth roads. Costs upon the Mwanza-Musoma road would be much lower than on the rural road network. This may be a small distortion at present but, if the road rehabilitation program is successful, could become more important in the future.

(vi) Overall Distortion for Short Distance Transport

8. The Mwanza RETCO has proposed a rate of TSh18.25 for intra-regional transport. Based upon the RETCO costs and allowing a 10% mark-up for profit, the following minimum rates would be more appropriate:

Haul Distance	40km	70km	100km
Cotton	TSh36.4	TSh27.7	TSh24.2
Maize/beans	TSh28.6	TSh21.8	TSh19.0

9. For short hauls with poor loading crops a rate double the proposed rate is necessary. With better loading crops and longer haul distances the required and proposed rates converge.

B. National Milling Corporation

10. NMC contracts transport for both long and short distance transport and prepares a rate book which covers the main routes. In some respects the rate structure is conceptually advanced than the intra-regional transport rates set by the Regional Tender Boards:

- different rates are applied to paved and unpaved roads
- rates vary according to the pavement quality
- rates change according to the availability of back-hauls

Unfortunately, in practice, the rates calculated are unrealistically low, especially for short trips:

(i) Costs are based upon NMC trucks, most of their trucks are fully depreciated upon historic cost and consequently the depreciation element is negligible.

(ii) The assumed annual utilization rates are high, probably much higher than the average for NMC vehicles and are probably too high for short distance private transport.

(iii) Assumed tire costs are unreasonable low, equivalent to only 1.5 tires per annum for a 7-ton truck.

(iv) Repair and maintenance costs look and possibly do not reflect recent changes in spare part costs.

(v) An overhead allowance of only 0.2% of total annual costs is included. This is unrealistically low even for the private sector : for the RETCOs the administrative costs are, at least, 20%-25% of cost, even higher if technical assistance is included.

(vi) Costs are estimated for 7-ton, 13-ton and 25-ton trucks. The basis for the rate is a simple average of these costs. Consequently the base rate of TSh4.13 per tonkm is significantly lower than the cost calculated for the 7-ton truck, TSh6.23.

(vii) The rates are then applied to all routes irrespective of distance. The same ton-km rate is thus applied to 30km as well as 2,000km hauls.

11. The rates are very significantly below either the RETCO or private sector charges.

	TSh per ton-km		
Short Distance	40km	70km	100km
NMC	7.33	7.33	7.33
RETCO (proposed)	18.25	18.25	18.25
Private (minimum)	27.5	20.4	17.6

Long Distance	NMC	Private
DSM - Arusha	4.54	7.75
DSM - Dodoma	4.13	8.00
Arusha - Tanga	4.58	10.25

12. It is not surprising that NMC finds difficulty in attracting private sector transporters, especially when other cargo is available. The rate book concept may be a necessary basis for NMC to negotiate rates but, to be useful, it must be revised to reflect realistic costs and assumptions.

13. Private Sector Transport Costs: Intra-Regional Transport

Private trucking companies are always reluctant to reveal detailed cost information, often they have a very good knowledge of total costs but keep few records of specific cost items. Rates are set by what the market will pay, subject to a minimum level of out-of-pocket expenses. The estimates, detailed below, are based upon reasonable assumptions and contain no allowance for expectations of future cost increases. For long term contracts it would be unreasonable not to expect some mark-up for such price rises.

7 ton Truck

Running Costs	TSh/km	Fixed Costs	TSh/year
Fuel	7.8	Insurance	3,000
Oil	1.2	Licence	5,000
Repair	21.2	Depreciation	500,000
Tires	4.8	Interest	400,000
Misc	3.5	Crew	100,000
		Overheads	150,000
TOTAL	38.5	TOTAL	1,153,000
		Per day	4,630

	Minimum Average Rates		
	40km	70km	100km
Running Costs	3,080	5,390	7,700
Fixed Cost	4,630	4,630	4,630
TOTAL	7,710	10,020	12,330
Rate : Maize/beans	27.5	20.4	17.6
: Cotton	35.0	26.0	22.4

The total costs are not dissimilar to those of the Mwanza RETCO rate proposal and confirm that their proposed rate of TSh8.25 per tonkm is simply inadequate for short hauls and for poor loading commodities.

Cost Assumptions

(1) Fuel: 0.4 liters/km, TSh19.5 per liter
(2) Oil and lubricants: 15% of fuel costs
(3) Tires: average tire life 25,000kms, TSh20,000 per tire (67% purchased -General Tire)
(4) Repair: calculated from RTIM2, average roughness 7,000mm/km, new vehicle cost TSh4 million, hourly labor charges TSh200
(5) Miscellaneous costs: assumed at 10% of other running costs
(6) Insurance: public liability only
(7) Depreciation: straightline 8 years at replacement cost
(8) Interest: 20% on average value of vehicle
(9) Overheads: assumed to include entreprenurial return
(10) Utilization: 250 operating days per year

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TANZANIA TRUCK FLEET

A. Truck Fleet 1987

1. The size of the present truck fleet is not known with precision. Vehicles are registered and licensed but the information was not collated for several years. In 1983, the National Institute of Transport (NIT) estimated a national fleet of 8,300 heavy trucks (payload over 4 tons), a very significant reduction from 1971 when a fleet of 16,000 heavy trucks was licensed.

2. NTC estimate that the minimum size of the fleet is 8,000 trucks and the probable size is about 10,000. The Central Transport Licensing Authority in Dar es Salaam has begun to assemble licensing data. Unfortunately the data only relate to DSM but if the results are expanded on the basis of previous statistics a total heavy commercial fleet of about 15,000 trucks can be calculated. This is a very much higher than other estimates.

3. An alternative approach has been adopted in this Annex . Estimates of the inflows of new trucks have been prepared from import statistics and new registration statistics. These estimates have been combined with a vehicle survival profile, estimated by the TRRL from Kenya data. This approach generates a total truck fleet of 13,729 trucks (payload over 3 tons). Adjusting for the inflow of the light 3.25 ton trucks gives a total heavy truck fleet of 12,500, midway between the NTC probable estimate and the fleet inferred from the CTLA data.

4. Truck survival rates from Kenya may not be totally appropriate to Tanzanian conditions and survival rates could be lower :

- shortages of spare parts
- lower road standards
- greater public sector participation

On the other hand, lower vehicle utilization and restrictions upon vehicle imports may raise survival rates.

B. Fleet Replacement Requirements

5. Truck replacement needs are estimated in the following Table from the inflow of vehicles and the survival profile.

Tanzanian Truck Fleet and Replacement
(Trucks with payload >3tons)

	New Vehicles	Survival Rate	Fleet 1986	Fleet 1987	Fleet 1988	Fleet 1989	Fleet 1990
1971	2,089	1.5%	31				
1972	1,240	4.5	56	19			
1973	2,223	7.5	167	100	33		
1974	3,343	13.0	435	251	150	50	
1975	1,389	20.0	375	181	104	63	21
1976	1,112	27.0	199	222	146	82	49
1977	1,994	35.5	712	536	399	261	148
1978	3,032	46.0	1,392	1,082	816	606	397
1979	3,375	54.5	1,843	1,549	1,205	908	675
1980	1,386	64.5	893	757	636	495	373
1981	1,690	73.0	1,230	1,088	923	776	603
1982	842	81.0	680	613	542	460	386
1983	856	86.5	742	692	623	551	467
1984	1,851	91.5	1,692	1,605	1,496	1,348	1,192
1985	1,987	94.5	1,880	1,816	1,723	1,605	1,447
1986	1,335	97.5	1,302	1,263	1,220	1,157	1,079
Replacements				1,955	1,912	1,771	1,777
Fleet Size			13,729	13,729	13,729	13,729	13,729

6. Maintaining the fleet at its present size will require the replacement of 1,800-1,900 trucks annually. This sustained inflow of trucks will be greater than has been achieved since the late 1970's.

7. Truck rehabilitation projects, such as those funded by the EEC, will provide some of the effective replacement capacity. Truck rehabilitation should delay the need for complete replacement by 4-5 years. Assuming that the EEC objectives are met a total of approximately 1,100 trucks will have been rehabilitated by the end of 1990.

8. There will be the need to import about 6,300 trucks over the period, 1,550-1,600 trucks annually. Depending upon the import source and the size of truck the annual foreign exchange requirement will be $40-45 million.

C. Additional Truck Capacity

9. It is extremely difficult to judge whether major expansion of the fleet is necessary. There is some evidence which suggests that the total fleet is significantly smaller than in the early 1970's but, on the other hand, the fleet meets most demand without great difficulty. Where problems are experienced the constraints may be largely institutional.

10. The regular provision of tires, spare parts and fuel should increase the effectiveness of existing capacity. Redistribution of capacity from the parastatal sector to private owners should increase the incentives to maximize vehicle utilization. Overall, therefore, major expansion of the fleet may not be necessary.

11. The Tanzanian fleet is not large, however, in comparison with other countries in the region and in Sub-Saharan Africa generally. The statistics published by the International Road Federation suggests that the truck fleet is below the median level in terms of trucks per capita, per $ million GDP and 1,000sq km.

	No. of Trucks		
	'000 pop	$million GDP	'000km
Tanzania	1.39	4.95	29.33
Kenya	1.87	6.75	58.14
Malawi	2.13	14.90	122.48
Zimbabwe	3.08	5.70	66.08
Median SSA	1.51	5.76	34.80

12. The IRF estimate of the Tanzanian fleet (1982) is 27,720 trucks, twice the size of other estimates. It is probable, therefore, that not only trucks but also pick-ups are included. This may be true for some other countries in the sample.

13. Early international comparison should not be the basis for decision but the above statistics indicate that there is probably no excess capacity in the fleet. Some expansion of the total fleet would be unlikely to cause a major misallocation of resources. If the economy continues to expand then additional trucks will be necessary to prevent serious transport bottlenecks developing.

CHAPTER THREE

TANZANIA RAILWAYS CORPORATION

I. BACKGROUND

3.01 Tanzania Railways Corporation (TRC) was formed in 1977 to operate the Tanzania segment of the defunct East African Railways Corporation (EARC) railways and allied activities. TRC currently operates a 2,580km length single track railway system. The system consists of a Central Line linking Kigoma port on Lake Tanganyika to Dar es Salaam, the Mwanza-Tabora line linking Tabora--a major station on the Central Line--to Lake Victoria, the Link Line connecting the Central Line to points in the Kilimanjaro area and three branch lines connecting the secondary port of Tanga and major maize, tobacco and coffee growing areas to the south of the Central Line to the main network. The system enjoys a strategic geographic location traversing regions estimated to account for about 40% of Tanzania's agricultural output as well as being one of the major access routes to coastal seaports for the international trade of Zaire, Burundi and Rwanda (ZBR countries) and Uganda. This strategic location is reinforced by distribution of economic activity in Tanzania which imposes significant reliance on long distance haulage of goods and the relatively under-developed nature of the trunk roads network.

II. ASSETS ENDOWMENT AND USE

3.02 TRC has a fleet of 81 mainline locomotives ranging in age from 20 years to 5 years and of 5 different classes. The number serviceable currently is 46, and the average number operational is 34.8.

The current wagon position is as follows:

Type Wagons	No. in Books	Number in Service 1987
Covered	2,497	1,765
Open	962	571
Petrol Tanks	391	183
Cattle Wagons	137	44
TOTAL	3,987	2,563

In addition, there are 25 modified wagons for phosphate traffic. The present serviceable stock of passenger coaches is 85 out of a fleet of 191. Fifty-seven coaches are slated for scrapping, and 47 are awaiting repairs.

3.03 Asset availability has historically been poor. Main line locomotive availability, for example, has declined from 58% in 1981 to 46% in 1986. For shunting locomotives, the decline in availability has been equally precipitous with only 11 out of the fleet of 29 now in service. Wagon and coach serviceability records indicate a similarly poor trend.

TRC's track is also in rundown condition with a significant backlog of deferred maintenance built up over the years. The history of poor asset availability has been the result of a number of factors, the most important of which are:

(i) breakdown of maintenance systems and capability--on disintegration of EARC, TRC inherited physical assets but few people skilled in the operation or maintenance of a railway; the problem was exacerbated by the fact that most of the facilities for maintenance or the management of maintenance were located in the other countries of the EARC;

(ii) resources constraint--TRC has lacked both foreign exchange resources to import spare parts and the domestic resources to acquire domestic goods and services for maintenance.

3.04 These factors have been self-reinforcing with deferred maintenance leading to subsequently lower availability, reduced use of assets for revenue generating purposes and reduced resources for maintenance.

3.05 Paralleling the poor history of asset availability has been a patchy record of use of available assets in operations; for example, general purpose wagon cycle times are now estimated by TRC at 31 days whilst tank cars and livestock cycle times are estimated at 20 days in a system with average leads (origin-destination distances) of about 800km. More appropriate cycle times which still imply inefficiencies in the use of assets would be 20 days for general purpose wagons and 10-15 days for tank and livestock wagons. The poor utilization of available assets can be attributed to a number of key inter-related factors:

i) poor management;

ii) inadequate operations information system compounded by poor availability of timely information;

iii) inadequate and obsolete telecommunications facilities.

3.06 The result of the poor history of maintenance and use of assets has been a progressive decline in the effective freight haul capacity of TRC. From a peak of about 1.6 million tons in the early 1970s, originating freight traffic on the TRC system had declined to 0.93 million tons in 1982 and 0.88 million tons in 1986. Passengers carried, in contrast, have increased from 1.5 million in 1981 to 3.1 million in 1983, declining to 2.3 million in 1986. The contrast reflects a number of factors:

i) TRC's freight haulage capacity appears to have been increasingly constrained by wagon utilization (see paras. 23-24);

ii) Passengers have been willing to tolerate exceptionally high coach occupancy rates as service provision has stagnated or decreased;

iii) Given the level of freight demand that can be accommodated, surplus locomotive power has been available to cater to passenger services at a relatively high level although since 1984, continuing erosion in locomotive availability has progressively reduced the level of service.

III. ECONOMIC IMPORTANCE OF TRC

3.07 Despite this poor record of use of its assets, TRC still has the characteristics of an important economically strategic transport system for long haul movements. An analysis of the incremental cost of movement of passengers and freight by TRC has been made based on the following:

(i) Capital Costs: the annual equivalent cost of the present value of replacement (in perpetuity) of the fleet of locomotives, wagons, coaches and track based on asset replacement profiles derived from the 1984 fixed asset register, current asset replacement costs, the cost of planned asset rehabilitation programs and, in the case of track renewal, the assessed cost of a program of work necessary to sustain track conditions at an acceptable standard;[1]

(ii) Traffic: for proration of capital costs of freight movement a system capacity of 1.5 million tons at current average haul distances is assumed--this is consistent with estimates of the systems capacity after implementation of rehabilitation programs currently planned and with moderate increases in operating efficiency; proration of passenger services assets costs is based on the system's estimated passenger services performed in 1985 when a full service was implemented

(iii) Other variable costs: these are estimated based on TRC's 1985 financial statements and assumed variability of the costs provided in these statements; the allocation of these variable costs between passenger and freight services are based on TRC operating statistics or appropriate proxies (e.g. relative number of trains run); the derived unit movement costs are updated to current 1987 costs assuming cost increases of 30% in 1986 and 52% in 1987 (40% on local costs and 75% on imported inputs).

3.08 The results of this analysis, which is indicative rather than robust because of the quality and nature of data available, are summarized below and detailed in Annexes 1 and 2.

1/ There are discrepancies between the asset counts as reflected in the accounting records and those of the operating departments; the cost of rehabilitation to coaches to sustain capacity before their due dates for replacement--where such rehabilitation is justified--is not taken into account.

TRC: Estimated 1987 Long-Run Incremental Costs of Movement

	Average Haul (km)	Long-Run Incremental Cost (LRIC) (TSh/tkm)	(TSh/pkm)	Capital Cost Component of LRIC (TSh/tkm)	(TSh/pkm)
Freight	800	1.33	-	0.66	-
Passengers	400	-	0.46	-	0.22

3.09 Comparable truck operating costs for long distance freight movements are about TSh9 per ton-km. This implies that rail transport is about TSh 8/ton-km cheaper than trucking in terms of the direct resources used in its provision. Shadow-pricing the foreign exchange component of the incremental costs of operations for both road and rail transport will not substantially alter the differential in favor of rail movements. Comparable data for road passenger transport is not available. However, the per passenger-km cost of controlled road transport operations--which significantly understates the long-run costs of such operations--is substantially greater than that for the railways passenger services (e.g. Dar es Salaam to Moshi by ordinary bus service costs TSh400 per passenger or about TSh 0.67 per passenger-km). From the foregoing it is clear that, in general, the cost to the economy of enforced diversion of long distance traffic to roads because of underutilization of TRC's inherent capacity are substantial.

IV. FINANCIAL PERFORMANCE

3.10 TRC's overall financial performance has been very poor. Details of its historic financial performance are shown below. TRC's cumulative cash flow from operations amounted to TSh774 million between 1979 and 1986. Net of investments in stocks (in principle necessary to sustain operations), cumulative cash generation amounted to TSh133 million. This compares to cumulative interest obligations on debt of TSh1,801 million over the period. As a result, TRC has had to rely on substantial external financing to underpin its financial viability. The result of such support against a background of progressively worsening profitability has been a massive erosion of TRC's financial position exemplified by the increase in debt as a proportion of its total capital employed from 36% in 1979 to 109% in 1986 and the current ratio deteriorating from 2.32 in 1979 to 0.31 in 1986. TRC is currently awaiting the formal capitalization of debt. Pending this capital restructuring it is technically insolvent.

3.11 TRC's revenue yield per ton-km of freight traffic and per passenger-km were respectively TSh 0.85 and TSh 0.19 in 1985 and TSh 1.22 and TSh 0.20 in 1986. These yields are compared to the estimated long-run incremental costs of movement for passenger and freight traffic in the table below:

TRC: Comparison of Revenue Yields and Long-Run Costs of Movement

	Passenger Service		Freight Service	
	1985	1986	1985	1986
	(TSh)		(TSh)	
Revenue Yield:				
Per ton-km	-	-	0.85	1.22
Per passenger-km	0.19	0.20	-	-
Estimated Long-Run Incremental Costs				
Per ton-km	-	-	0.47	0.74
Per passenger-km	0.16	0.26	-	-
Net Contribution:				
Per ton-km	-	-	0.38	0.48
Per passenger-km	0.03	(0.06)	-	-
Contribution Margin (%)	16%	-30%	45%	39%

3.12 Although the contribution margin from freight services (and passenger services in 1985) are reasonably high, they have not been sufficient to cover TRC's other costs of operation. The main sources of TRC's poor performance are easy to identify against the background of the above comparison.

(i) low actual traffic density on system relative to its capacity: the derivation of the long-run incremental costs of movement assumed that the railways capital costs were prorated over its effective capacity rather than its actual transport performance. In the case of passenger services, actual performance and effective capacity were probably quite close in 1985 but started to diverge in 1986. In the case of freight services however, actual performance has been much worse than estimated traffic capacity. The impact of this underutilization of capacity is to worsen the contribution margins actually attained. The underutilization of capacity also worsens the effect of a poor debt structure (debt term and cost relative to matching assets' useful lives);

(ii) high fixed costs relative to traffic density: the major portion of TRC's operating costs not directly related to any unit traffic movement are labor costs; some proportion of these costs are clearly unavoidable for its operations; although it is difficult to identify this unavoidable portion without detailed study, a broad pointer is the unfavorable comparison of TRC in staff productivity vis-a-vis a reasonably efficient regional railway: TRC's railways employees (about 15,000 out of a total force of 16,000) productivity in 1986 was 84,000

traffic units per employee compared to the reference railway's productivity of 338,000 traffic units per employee;[2] the lower than system capacity traffic density compounds the financial effect of what appears to be a high level of staffing by reducing the overall contribution towards coverage of fixed costs.

(iii) inflexible tariff regime: cumulative tariff increases for TRC between 1979 and 1986 amounted to 378% (25% p.a. on average) compared to cumulative inflation (CPI) of 526% (30% p.a. on average). Overall, this level of increase has been much less than compensatory for unit cost increases. Moreover, the timing of tariff approvals has been poor with significant lags in awards (e.g. a gap of 26 months between tariff increases in 1981 and 1984 and 22 months between 1984 and 1986). The underlying reason for delays in approval of tariff increases has been bureaucratic. However, such delays generally increase the resistance to award of the subsequently greater increases necessary. A contributory factor to this history of inadequate tariff awards has been TRC's inability to make a convincing case for tariff increases due to lack of timely and accurate operating statistics and the deficiencies of its accounting system.

3.13 In response to TRC's deteriorating financial performance, Government has agreed to capitalization of a significant proportion of its debt which are either obligations to it or guaranteed by it. Although debt capitalizations are useful in relieving liquidity pressures on an entity, they are not necessarily a panacea unless the structure of debt is inappropriate (i.e. significantly shorter in duration than the economic duration of the underlying asset) or the underlying asset is non-productive (in which event it should be written off together with the asset and be assumed outside of the balance sheet of the entity). The inherent problems in TRC are more to do with (i) the low utilization of capacity; (ii) the appropriate level and structure of costs; and (iii) the inflexibility of the tariff structure. Debt capitalization that is not an integral part of a package of restructuring to address the problems will be likely to have only a transitionally favorable effect on financial performance--as past debt capitalizations in TRC have proven.

2/ TRC figures are based on traffic units defined as: 1 traffic unit=1 ton-1km + 2 passenger-km; the reference railways traffic units are defined excluding passenger-km, for which data is not available.

TRC: Historic Financial Performance[a]/
(TSh million)

	1979	1980	1981	1982	1983	1984	1985	1986
Net Income	(47)	(43)	(50)	(110)	(199)	(382)	(36)	(1,781)
Free Cash Flow from Operations[b]/	(125)	29	46	(12)	(71)	(84)	231	117
Interest Obligation	-	(33)	(46)	(59)	(106)	(179)	(138)	(1,240)
	(125)	(4)	-	(71)	(177)	(263)	93	(1,123)
Capital Expenditure	(456)	(383)	(223)	(167)	(262)	(313)	(379)	(310)
Total Financing Requirement	(581)	(387)	(223)	(238)	(439)	(576)	(286)	(1,433)
Net Capital Infusions (Debt and Equity)	556	351	244	167	438	327	296	789
Overdraft Financing	48	16	24	(2)	12	96	(16)	169
Net Trade Financing[c]/	5	25	(10)	86	41	107	38	1,120
Total External Financing	609	392	258	251	491	530	318	1,478
Internal Financing	-	(7)	(21)	(6)	(10)	66	(31)	(45)

a/ Figures are derived from TRC financial statements; discrepancy between total financing and financing requirement reflects prior year and other accounting adjustments;

b/ Working income net of net acquisition of stocks;

c/ Net change in creditors (including change in accrued interest) less net change in debtors.

3.14 In summary, TRC is both a geographically and economically strategic asset. However, its operating performance has been poor and this has been largely reflected in its financial performance. TRC's economic cost of movement of freight and passengers are significantly less than competing modes and this is reflected in its much lower tariffs. It is possible for TRC to make up the substantial part of its cash flow requirements by charging appropriately high tariffs, given the current costs of competing modes. However, this would be largely at the cost of transferring the cost of unused capacity and low staff productivity to users.

V. STRATEGY OF ASSISTANCE

3.15 The basic strategy of assistance should, from the above, be informed by the need to enable TRC to fully and efficiently utilize the capacity of its existing assets. This is the most effective way to ensure that TRC's strategic importance is fully realized. TRC's competitive advantage resides primarily in its existing endowment of assets. Deferral of asset replacement as much as is economically justified reduces TRC's capital charges as well as the cost to the economy per unit of TRC haul capacity. The strengthening of TRC's institutional base is an important and critical complement to such a fixed assets strategy. Good management of operations, stringent cost control premised on timely availability of appropriate cost information and a sound marketing strategy are, among other factors, crucial to ultimately effective use of capacity.

3.16 Prior to the TRC Washington Donors' Conference in February 1987, assistance to TRC although also partly focussed on helping to rehabilitate its asset base, was too diffused and not coordinated sufficiently to ensure that the overall result would not be an imbalance in the capacity of various assets (including manpower) comprising the system's asset base. The TRC Emergency Recovery Project (EP) which was formulated at the Donor's Conference sought to provide an integrated program of assistance targeted mainly on rehabilitating existing assets and strengthening operating and information systems to enable haulage of about 1.2 million tons. This program is also consistent with TRC being able to maintain enough motive power capacity to ensure continued efficient maintenance of track and an acceptable level of passenger services. Details of progress on recent ongoing projects and the EP are provided in the table overleaf.

VI. TRC NEAR TERM CAPACITY

3.17 A recent World Bank mission undertook a preliminary analysis of TRC's haul capacity currently and post-implementation of the EP. An in-depth analysis of TRC's capacity will be undertaken through the TRC Development Study to be financed under the EP. The results of this preliminary analysis are however, useful in indicating whether or not the basic strategy of assistance is still valid and in identifying supplemental high priority investments.

A. Traffic

3.18 Estimates of TRC's haul capacity are derived based on projections of traffic for TRC over the next three years. For analytical simplicity, only one set of forecasts is used. Likely variations around these forecasts in any one of the three years are not expected to be significant. The projections of traffic potentially available to TRC and its seasonality are outlined in Annex 3. Annex 4 illustrates the density of traffic on TRC's various track sections based on this projection. This is an important facet of the exercise since variable topographic and track conditions call for different locomotive types.

3.19 The total traffic potentially on offer to TRC during the period 1987-1991 has been estimated on the basis of separate projections for:

a) major agricultural crops and fertilizer;

b) local bulk and general cargo; and

c) transit traffic.

The total freight traffic per annum is projected at 1.22 million tons. This is broadly consistent with the total traffic projections used in the EP analysis.

3.20 Agricultural Movements--Major Crops and Inputs: The assessment of traffic on offer for the major cash crop--coffee, cotton and tobacco--is based on projections of crop production and processing capacity during the period. In the case of these cash crops, output for the period 1988-1991 is expected to be at about the same level as in 1987. TRC moves all cotton bales destined for export and similarly all coffee from the processing centers to the ports and from the major Southern depot at Mikumi to Moshi for processing prior to export. Tobacco is hauled predominantly by rail from the growing centers to Morogoro for processing. TRC does not undertake transport of processed tobacco for export via Dar es Salaam. Fertilizer transport for Western Tanzania and the Lake Victoria area is wholly undertaken by TRC. Demand for fertilizer haulage to these regions vary from 3,000 to 4,000 tons per month which after adjusting for seasonality in offers implies an average flow demand of about 40,000 per annum. Maize output has expanded significantly nationally in the recent past. Major maize growing areas through which TRC rail traverses account for about 40% of national production. However, maize movements on TRC depend on the balance between surplus and deficit areas. Although the estimate may be conservative, even doubling it will not affect the results of the capacity analysis for which these forecasts are derived.

3.21 Non-agricultural Local Movements: The major commodity moved by TRC is petroleum products. Currently TRC undertakes all bulk haulage of Dar es Salaam--originating fuel movements to the Lakes area and Western Tanzania. The assessed movement of fuel for local use in these areas is deemed to match the flow demand per annum. However, TRC's service reliability record has frequently been poor and this has led to periodic shortages of supply in these regions (made up in the Lake Victoria area by periodic imports from Kenya). A small amount of fuel (mainly jet fuel) is transported by TRC from Dar es Salaam to the Kilimanjaro area. Fuel movements to this region are dominated by road tankers at significantly higher prices than TRC tariffs. A significant proportion of the road-borne movements could be diverted to TRC provided the capacity and service reliability was available. TRC estimates the offer it cannot accommodate at about 40,000t p.a. Prima facie, there would be economic gains in diverting this movement to rail. However, this needs closer study, taking account of the sea-borne-rail alternative available and from TRC's commercial point of view, capital cost sharing arrangements that could be entered into with the highly concentrated group demanding such transport services to optimize the use of its own investment resources. This 'unsatisfied demand' is not included in the traffic projection. Overall, the increase in the demand

for movement of other commodities (mostly originating in Dar es Salaam) is expected to be largely dependent on increases in the level of income upcountry which in turn will largely depend on agricultural activity and crop prices. For purposes of this analysis, an increase of about 10% on TRC 1986 tonnage movements has been assumed for each of the years 1987-1992.

3.22 Transit Traffic: The significant elements in the projection are the diversion of additional coffee exports from Uganda to Dar es Salaam and the diversion of Zaire metal exports from the route to South African ports. The metal traffic from Zaire can be expected to be sustained at the projected level until Zaire's own internal route to the sea is streamlined to handle greater volumes more expeditiously. This is not expected to be before 1992. The level of transit coffee traffic from Uganda represents diversification of routing away from Kenya. The economic as distinct from the political motive for such diversification is not clear. Nonetheless, the sustainability of this level of traffic in the projection period is probably indicated by Uganda Railways loan of locomotives (2) to TRC to assist with such traffic. Other transit traffic depends mainly on economic prospects in Burundi, for which no significant changes are expected in the medium term. The prospects for diversion of Rwandan traffic to TRC via the proposed transhipment terminal at Isaka are not considered in the projections. Ownership operating responsibility and supervision of construction of the terminal is still the subject of discussion between the EEC and the concerned parties.

B. Mainline Locomotive Requirements

3.23 An assessment of locomotive requirements was made based on the traffic forecast above and assuming a peaking factor of 1.33 for coffee, cotton and fertilizer traffic and 2.00 for tobacco to take account of such traffic's seasonality. Taking account of the seasonality factors, the effective installed transport capacity required to handle the traffic forecast of 1.22 million tons p.a. is 1.33 million tons. Detailed workings of the locomotive requirements are presented in Annexes 5.1 to 5.4. The key assumptions used in these computations are:

i) existing permissible train loads and actual sectional speeds;

ii) provision of passenger services at the level envisaged in TRC's working timetable plus an adequate provision of locomotives as a maintenance allowance;

iii) provision of locomotives (including adequate maintenance allowance) for six engineering trains--one locomotive for each of the four regions and two for track renewal works;

iv) one pick-up train every other day on each of the main sections;

v) effective utilization of every serviceable locomotive (i.e. excluding wrecked locomotives and locomotives awaiting rehabilitation) of 47.8% (75% out-of-maintenance availability * 75% out-of-shed availability * 85% out-of-terminal availability).

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3.24 Based on these assumptions and the traffic forecast, the projected locomotive requirements relative to available serviceable locomotives are as follows:

	Locomotive Class			Total
	87/88	64	73	
Projected Traffic, Engineering and Passenger Services Requirements (units)	30	24	14	68
Shortfall (surplus)				
Currently (units)	3	8	11	22
Post EP-1990 (units)	(8)	5	(1)	(4)
Post EP-1991 (units)	(12)	2	(1)	(11)

3.25 The effect of the current shortfall of 22 locomotive units is to force TRC to:

i) reduce passenger services by 50%, thereby freeing nine locomotives;

ii) limit engineering trains to a maximum of four, thereby freeing four locomotives;

The combined effect of these TRC actions would be to increase motive power-governed freight haulage capacity in 1988 to 1.0 million, rising gradually to 1.22 million in 1990 as locomotives are released after rehabilitation under the EP. A side effect of the shortfall in available motive power capacity is an increase in cycle times of wagons due to greater detentions in sidings/yards awaiting locomotives.

C. Shunting Locomotive Requirement

3.26 TRC's present assignment of shunting locomotives is 23, and, including maintenance spares, the requirement totals up to 29. The current fleet is 29, of which only 15 are serviceable. By the end of the EP, 22 locos are expected to be serviceable, and all the 29 about a year thereafter. The requirements will, no doubt, be reviewed in the Development Study, but, considering the fact that there is going to be no surplus based on current requirements even by 1991 to take case of any slippages and failures, as well as the urgent need to improve operations and wagon turn-around, it would be advisable to invest in five shunting locos as an emergency measure. This would, in addition to avoiding the use of main line locos on shunting duties and releasing them for hauling traffic, also bring in returns in terms of reduced wagon detentions.

D. Wagon Requirements

3.27 The requirements for wagons are governed by wagon 'cycle' times on the system, which in turn depend crucially on operations management, including, inter alia, the effective utilization of available motive power,

the close monitoring of wagon positioning on the system, wagon allocation practices and marshalling yard operating practices. The present wagon cycle times on TRC are as follows:

Wagon type	Cycle Times
Covered and open wagons	31 days
Tanks and livestock	20 days
Phosphate	15 days

3.28 The daily loading requirements for the projected traffic (peak adjusted as appropriate) based on commodity loadability, and appropriate matching of commodity to wagon types is given in Annex 6. Based on these factors, TRC's wagon requirements and wagon-governed haul capacity are as follows:

Type of Wagon	No. Required	No. Available		Haul Capacity	
		1987	End EP	1987	End EP
	(units)	(units)		('000t)	
Covered	2,170	1,765	1,751	526	522
Open	837	571	658	230	265
Hopper	29	25	25	22	22
Tank	292	183	251	100	137
Livestock	92	44	65	24	35
Total	3,420	2,588	2,750	902	981

3.29 As the table indicates, the size of the wagon fleet, given the operational efficiency of TRC, is currently the binding constraint on TRC's freight haulage capacity. After implementation of the EP, wagon capacity would be an even more severe constraint on TRC's haul capacity if current operating practices prevail. However, a modest improvement in cycle times (covered and open wagons: from 31 days to about 25 days; tank cars and livestock wagons: from 20 days to 17 days; phosphate hopper wagons: from 15 days to 13 days) will enable the system to cope with the projected traffic levels.

E. Coaches Requirement

3.30 The requirement of coaches, based on the services in the Working Timetable have been estimated at 122, including 10% for contingencies and 15% for maintenance spares. Details are given in Annex 7. The present serviceable stock of TRC is 85 coaches out of a fleet of 191. 57 coaches are slated for scrapping, and 47 are awaiting repairs. If the 47 are repaired, the requirements would be fully met. TRC already has an agreement for supply of 20 coaches on French Credit; this number would augment the availability to enable increases of train loads and frequencies as required. The Development Study would be addressing the subject of passenger traffic projections, and the financial implications of augmenting the services, as well as their economic justification. Based on the results of the Study, investment decisions on the rolling stock, as well as any needed infrastructural arrangements for their maintenance, can be taken.

VII. CAPACITY EXERCISE: LESSONS

3.31 A number of pointers can be drawn from this exercise. In more general terms these are essentially the following:

i) TRC has sufficient overall restorable capacity (basic asset infrastructure) at present to meet an overall demand of up to about 1.4-1.5 million tons;

ii) Prima facie, the cost of restoration is much less than the cost of acquisition of new assets and is therefore a preferred option;

iii) Realization of this capacity requires concerted efforts at improving operational performance, particularly with respect to the utilization of motive power when made available and the use of the stock of available wagons.

In more specific terms:

iv) Main line motive power is not a restriction on capacity in the near term; however, a number of the locomotives currently in use or targeted to be rehabilitated are nearing the end of what would normally be deemed to be their useful lives; rehabilitation even under these circumstances is still a viable economic option: nonetheless a closer study of the technical and economic merits and the timing of replacement locomotive acquisitions may be merited at this stage; such a study would support the more detailed analysis of traffic prospects to be undertaken in the development study;

v) Shunting locomotive availability is severely constrained; in the interim period to 1991 when a full assignment practice can be pursued or any recommendations of the development study in respect to yard operating practices can be fully implemented, a modest investment in shunting locomotives can be undertaken. this can be justified economically;[3] The risk of this asset's redundancy exists but it can be diverted to mainline work if a sufficiently powerful version is chosen;

vi) Wagons: overall wagon sufficiency for traffic depends crucially on operations management and any improvement in this area would constitute a major savings for the economy as well as hold out the prospect for improved financial performance by TRC (as a rough measure of the magnitudes of savings involved, every one day reduction in currently prevailing cycle times for covered wagons would enable carriage of an incremental 22,000t of freight saving an incremental resource resource cost of about

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3/ Cost of 5 units = us$3.5 million; assume conservatively that its use reduces wagon cycle times and frees mainline capacity to enable movement of 40,000t at an average haul of 800km; savings in road diversion costs based on analysis above = us$3.5 million p.a., yielding a 1-year err of about 100%.

US$1.9 million, assuming full diversion of such traffic to the roads); there may be merit in additional investment in tank and livestock wagons; however, in our view, such additional investment would require closer study of the alternative transport modes and TRC's capacity for significant improvements in its service capability.

vii) Coaches: maintenance of passenger services capacity at recent levels into the future appears to be barely feasible financially or economically for the railways at current tariffs (para. 9). Additional investments in coaching stock need to be carefully weighed against the appropriate cost recovery policies to ensure that the railways can cover the short term costs of its operation as well as earn a sufficient return to ensure its ability to replace the services assets.

VIII. ADDITIONAL REQUIREMENTS

3.32 In addition to an analysis of TRC's capacity in the near term, and consideration of the implication of such an analysis for investment assistance and donors' existing strategy, the World Bank mission also undertook a review of other items that were omitted from the EP. These items are essential infrastructural and basic maintenance items, which would be needed to be provided as early as possible, and which would, of necessity, have to find a place in the Development Plan, by their inherent nature and essentiality. In addition, provision of these items supplementary to the EP will be in areas where the absorptive capacity of the TRC will not be overtaxed by their provision. These items are listed and evaluated below:

i) Bridges: The first priority lot of 23 bridges has been completed and TRC has received in July 1987 a preliminary report on urgent remedial measures for bridges on the Central Line from the consultants. This report brings out the necessity of undertaking essential and urgent remedial measures on 22 bridges and renewal of 23 bridges. These bridge works are expected to cost US$9.0 million. Of the latter 23 bridges, 5 are situated in the Luiche river basin, where seasonal flooding has repeatedly inundated embankments, overflowed bridges, and caused serious interruptions to traffic, which included vital international transit traffic. For these five bridges, the renewal has to be preceded by hydrological and soil surveys and studies to determine the optimal solution to the problem. These studies, as well as a program to attend to the remaining (22 + 18)--40 bridges need to be started urgently, and TRC would need donor assistance for the same. A study of bridges on the Link Line and Tanga-Moshi Line is also called for.

ii) Trolleys and Tractor Cranes for Track Maintenance. TRC's stock of serviceable trolleys for transport of men and material for track maintenance and renewal is inadequate, and urgent action is needed to supplement the stock to ensure the required level

of productivity, supervision, inspection, and efficiency of the Permanent Way and Signal/Telecommunication Engineering Departments. The following number of trolleys would be required:

Light Motor Trolleys	4
Flying Gang Trolleys with trailers	18
Inspection Trolleys	18

In addition, there is the need to provide at least two tractor cranes which, as well as handling permanent way material, would be capable of hauling four to five wagons. This would reduce the total dependency on locomotive tractive power for track maintenance and rehabilitation. The total outlay on the trolleys and tractor cranes is estimated at US$1.5 million.

iii) Technical Assistance (Operations): While the Development Study has a component for the development of an Operational Plan, TRC needs technical assistance for day-to-day operations, to optimize utilization of the existing serviceable assets and to improve its operational performance continuously during the course of the EP. The T.A. unit for this purpose could be of 24 to 36 man-months, spread over a period of two years.

iv) Technical Assistance: (Management Information Systems and Statistics: There is urgent need to develop a workable, effective and reliable Management Information System, and to this end, there is a need to compile a Manual of Statistical Information indicating the types of basic data, data sources, data flow, processing and format, frequency, levels of presentation and scrutiny. Without adequate, reliable and effective statistical information, the Management's efforts to improve performance are hindered. TRC needs Technical Assistance to formulate the system and prepare the Manual.

v) Continuation of Track Renewal Program: TRC is in possession of material or has commitments from donors for the following track renewal program'

(a) 38 km on the Link Line
(b) 72 km on the Central Line
(c) 64 km of rails only for the Central Line.

Items (a) and (b) are slated to be carried out in the EP and TRC estimates that this work would take about 18 to 20 months. Track renewal of the over-70-year-old Central Line, of which 755 km would still require renewal after the EP has to be a continuous phased program so that the work is completed before sections of the line become unusable and lead to stoppage of traffic. With a long term program of 75 km per year, the work could be completed in 10 years by which time the last bit of track to be renewed would be over 80 years old. This program is the minimum necessary and funding for the 64 km length for sleepers and fastenings (around US$4.3 million) is necessary to

be planned for at this stage so that the completion of the EP could be followed by continuation of the track renewal component without a break. The large incidence of accidents on the Central Line (173 in 1986 and 95 in the first six months of 1987) calls for prioritizing the renewal program so as to cover the critical vulnerable sections as early as possible.

vi) Ballast Quarry Study: One of the biggest weaknesses in the railway infrastructure is ballast deficiency, and this has to be addressed in a systematic and intensive manner. TRC currently has two quarries, on at Tura on the Central Line east of Tabora, and the other at Pangani on the Link Line. The logistics of transport of ballast to the Kigoma and Mwanza sections present formidable problems and add very substantially to the cost of ballasting work, and even affect timely completion of the work. A study to determine the optimum number, capacity, location and type of quarrying and associated equipment needs to be carried out, in preparation for the provision of the equipment itself and installation thereof.

vii) Permanent Way Workshop: TRC currently does not have a workshop for repairs and manufacture of points and crossings, track maintenance machinery and equipment, and for providing facilities for bridge repairs and maintenance. A Permanent Way and Bridge Workshop is necessary, and a techno-economic study at this stage will help in determining details and timing of the necessary investment.

viii) Telecommunications: The present works on the cards deal with basic telecommunications on the Central Line. They do not cover the Link Line and the Tanga-Moshi line, and they also do not cover the present-day and future needs of voice and data transmission between principal stations for control and management. A techno-economic study of these aspects will be necessary, in preparation for the consideration of the details and timing of the investments. The Study could take into account present and future facilities of the Government Telecommunications Department and tie in the Railways channel requirements wherever possible.

ix) Tanga-Moshi Corridor: This is an important coffee export corridor, and a German-funded feasibility study for the Tanga port is in the offing. It would be in place for TRC's requirements of terminal and handling equipment at Moshi, and other balancing facilities to also be studied so that an integrated project could be conceptualized.

IX. GOVERNMENT REGULATORY AND OWNERSHIP ROLES

3.33 Government discharges two roles in relation to TRC: (i) the agency for regulation of transportation activities in particular; and (ii) TRC's shareholder. The requirements for the discharge of both roles are quite often contradictory, imposing on Government the difficult task of balancing different constituent interests.

3.34 Regulatory Role: Government's regulatory role in relation to TRC is explicit in the area of tariff setting. In principle, this role should be discharged against the background of ensuring that TRC is as efficient as possible and allocates its services to its customers in a way that fully reflects the economic cost to it of its services. This means that tariff policy should at the minimum be flexible enough to allow the railways to cover its long run variable costs at an acceptable level of utilization of its capacity. In addition, since the railways has to incur costs which are unavoidable for its operation but are not directly related to the cost of moving any particular type or class of commodity, overall tariff policy should be flexible enough to allow recovery of as much of these costs as is justified by productive efficiency (see para. 10(iii)) in order to avoid forcing the railways into inappropriate choices of expenditures (a classical case observed in most railways is the deferral of maintenance expenditures in order to meet payroll expenses). The tariff setting objectives have however been often in conflict with general Government economic and social objectives:

(i) Owing to the shortage of transport capacity (including rail capacity) in relation to demand (particularly peak demand), Government has often dictated the use of TRC's available capacity for movement of goods considered to be a priority--the cost to the railways in relation to its tariffs involved in such operations are not considered;

(ii) The level of manpower costs--a substantial proportion of fixed costs--is significantly governed by Government labor policies; an important facet of Government policy has been the preservation of employment levels and this has inhibited TRC's ability to adjust its cost structure to changing circumstances;

(iii) Increases in tariffs have been granted with great lags as a result of Government fears of such increases impact on users costs and, indirectly on income levels. However, from 1986 a more flexible policy has been adopted with the Minister and the Board of TRC having discretion to increase tariffs by up to 30% per annum.

3.35 Shareholder Role: The Tanzania Railways Corporation Act 1977 provides that TRC should conduct its business in such a manner as to earn a reasonable rate of return on its net assets as defined by its parent Ministry. An appropriate rate of return has never been determined. The Act also provides that, in effect, TRC should be financially self-sustaining, i.e. should be sufficiently cash generative to enable it to meet all its cash obligations. Subject to the rate of return objective set, these objectives are mutually consistent. In practice, TRC has never been financially self-sufficient due to (i) its inability to use its assets effectively; (ii) restrictions on its ability to increase tariffs; (iii) managerial inability or unwillingess to restructure operating costs. As a result, Government has had to continuously fund its capital requirements, without any return either in form of cash payments or internally generated growth in TRC's asset base, guarantee a high level of short-term borrowings and provide revenue grants. Cumulative support by Government to TRC is effectively the foregone return on the increments in TRC's asset base since

its inception plus the sum of revenue grants plus the value of the overdraft guarantees. This level of support is the cost of the manner in which TRC is regulated and the lack of definition of a financial objective for which TRC management, due allowance given to the regulatory framework in existence, can be held accountable. An additional cost of the regulatory framework and indeterminate financial objective is the consequential lack of incentive for efficient operations reflected in a declining utilization of available capacity.

3.36 A judicious mix of regulatory and ownership policies is essential to the effective discharge of TRC's role as a transport services provider and its efficient use of its resources. An appropriate mix would have the following characteristics:

i) Financial objective: clearly defined financial performance targets based on cash generation or rate of return on assets (with the asset valuation basis clearly defined);

ii) Autonomy: definition of the limits of TRC's autonomy with respect to labor policy, tariffs and investments;

iii) Ownership support: since (i) and (ii) may be in conflict and TRC may, because of internal efficiencies or external factors outside of its control, underperform its targets, there is need for a clear definition of the limits of shareholder support, the timing of payment of such support and the condition for such support;

3.37 The attainment of an efficiently operating railways guided by an appropriate regulatory and ownership framework takes time. However, a simple approach that integrates Government ownership and regulatory objectives and highlights the cost of adjustment is a corporate financial plan over a defined period based on one set of traffic projections and two scenarios: (a) maintenance of existing tariffs and personnel policies, operating policies, expected assets availability based on current rehabilitation and investment programs, etc.; (b) an alternative scenario based on specified changes in these policies and aimed at attaining financial self-sufficiency for the railways over the plan period. Such an approach will clarify for Government the areas meriting improvements and the cost or benefit of its actions. The Development Study to be financed under the EP will provide sufficient information to enable such a corporate planning exercise to be undertaken towards the end of 1988.

TRC: Fixed Assets Replacement Analysis a/

a/ All values in 1987 US$'000

TRC: Fixed Assets Replacement Analysis

ANNEX 1.2

LOCOMOTIVES		1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
MAINLINE LOCOS:	UNITS																
CLASS 64		0	0	0	0	0	0	0	0	0	0	0	0	0	8	14	0
CLASS 72	UNITS	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0
CLASS 73	UNITS	0	0	0	0	0	0	0	0	0	0	0	15	0	0	0	0
CLASS 87	UNITS	0	0	1	0	0	0	0	6	0	0	0	0	0	0	0	0
CLASS 88	UNITS	0	0	0	0	0	0	0	11	0	0	0	0	0	0	0	24
REP.REQMENT (UNITS)		0	0	1	0	0	0	0	19	0	0	0	15	0	4	7	24
(VALUE)		0	0	1400	0	0	0	0	26600	0	0	0	21000	0	5600	9800	33600
PV OF REP.COSTS		21639															
ANNUITY:REP.		2597															
:REHAB		1590															
:TOTAL		4188															
SHUNTING LOCOS																	
CLASS 35	UNITS	0	0	0	0	0	0	0	0	4							
CLASS 36	UNITS	0	0	0	0	0	0	0	0	0	11	0	0	0	0	9	
CLASS 37	UNITS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5
REP.REQMENTS (UNITS)		0	0	0	0	0	0	0	0	4	11	0	0	0	0	9	5
(VALUE)	700	0	0	0	0	0	0	0	0	2800	7700	0	0	0	0	6300	3500
PV OF REPLACEMENT COSTS		4634															
ANNUITY:REPLACEMENT		556															
:REHABILITATION		223															
:TOTAL		779															

TRC: Fixed Assets Replacement Analysis

ANNEX 1.3

PASSENGER COACHES		1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
FIRST CLASS	UNITS	0	0	2	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	15	0
	VALUE	0	0	800	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4125	0
SECOND CLASS	UNITS	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	21	4	0
	VALUE	0	368	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7843	1440	0
THIRD CLASS	UNITS	3	5	0	0	0	0	0	0	0	0	0	0	15	0	0	0	0	0	15	15	0	7	8
	VALUE	1290	2150	0	0	0	0	0	0	0	0	0	0	6450	0	0	0	0	0	5590	6450	0	3010	3440
RESTAURANT CAR	UNITS	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	10	0
	VALUE	0	0	0	0	0	0	0	0	0	0	0	0	250	0	0	0	0	0	0	0	0	3500	0
TOTAL REPLACEMENT VALUE		1290	2518	800	0	0	0	0	0	0	0	0	0	6800	0	0	0	0	0	5590	6450	7843	[illegible]745	3440

TOTAL P.V. 8917.054

ANNUITY:REPLACEMENT	830
:REHABILITATION	0
:TOTAL	830

TRACK RELAYING

E.P REHAB PROG.	3646
FIRST-E.P REHAB	42580
TOTAL	46226
PV OF REHAB.- EVERY 30YRS	46386
ANNUAL EQUIV.	5868

ANALYSIS OF OPERATING COSTS

ANNEX 2.1

	ANALYSIS OF OPERATING COSTS	VARIABLE		VARIABLE COST ALLOCATION				
				FREIGHT	PASSENGERS	FREIGHT	PASSENGERS	FIXED COSTS
PERMANENT WAY		(%)	(TSh000)	(%)		(TSh000)		(TSh000)
TRACK MAINTENANCE	90865	60	54513	70	30	37949	16364	51162
BRIDGES/CULVERT MAINTENANCE	694	20	139	70	30	97	42	555
TELECOMS/SIGNALS/TELEPHONES	21127	20	4225	70	30	2958	1268	16902
WORKSHOPS/BUILDINGS	8097	20	1619	70	30	1134	486	6478
ADMINISTRATION	50164	20	10033	70	30	7023	3010	40131
LOCO/ROLLING STOCK MAINT.								
LOCO MAINTENANCE	14669	80	11735	75	25	8801	2934	2934
COACHING STOCK MAINT	9540	80	7630	0	100	0	7630	1910
WAGON MAINTENANCE	16491	80	13193	100	0	13193	0	3298
MACHINERY MAINT.	6146	60	3689	75	25	2767	922	3689
LOCO RUNNING REPAIRS	38857	90	35046	75	25	26286	7512	8759
COACHES RUNNING REPAIRS	12639	90	11375	0	100	0	11375	1264
WAGON RUNNING REPAIRS	10298	90	9268	100	0	9268	0	1030
MAINT.:ELECTRICAL INSTALLATIONS	14801	20	2960	75	25	2220	740	11841
PRINTING/STATIONARY	3955	20	791	75	25	593	198	3164
ADMINISTRATION/SUPERINTENDENCE	15644	20	3129	75	25	2347	782	12515
TRAFFIC EXPENSES								
FUEL	133671	100	133671	70	30	93570	40101	0
LOCO.STAFF	14484	90	13036	55	45	7170	5866	1448
RUNNING ROOMS	1410	20	282	55	45	155	127	1128
OTHER RUNNING STAFF	11270	90	10107	55	45	5559	4548	1128
STATION STAFF	22812	50	11406	55	45	6273	5133	16906
YARD STAFF	9540	80	7634	0	100	0	7634	1908
STATION LIGHTING/WATER	2060	20	772	55	45	425	347	2060
CARRIAGE CLEANING	4092	100	4092	0	100	0	4092	0
HIRE OF BUSES	302	100	302	0	100	0	302	0
ELECTRICAL MAINT.	0	20	0	55	45	0	0	0
PRINTING/STATIONARY/PR	3564	50	1782	55	45	980	802	1782
COMMUNICATIONS	2967	20	1562	55	45	859	703	1065
STATION STORES	9350	80	7480	60	40	4488	2992	1872
OTHER	534	80	427	100	0	427	0	107
ADMINISTRATION/SUPERVISION	14121	20	2824	55	45	1553	1271	11297
SUBTOTAL	550665		364930			236367	128563	185735
HEADQUARTER/CENTRAL EXPENSES	201692	20	40378	55	45	22208	18170	161314
TOTAL	752477		405308			258575	147733	347149

TRC: LONG-RUN INCREMENTAL COSTS

	1985	1986	1987
TOTAL FREIGHT SERVICE PERFORMED(000TKM)	761600		
VARIABLE OPERATING COSTS/TKM(TSh)	0.34	0.44	0.67
VARIABLE CAPITAL COSTS	0.13	0.30	0.66
ESTD.PASSENGER SERVICES PERFORMED(000PKM)	1216000		
VARIABLE OPERATING COSTS/PKM(TSh)	0.12	0.16	0.24
VARIABLE CAPITAL COSTS	0.04	0.10	0.22

YEARLY PROJECTED TRAFFIC: 1987-1992

Local Traffic

Commodity	Origin - Destination	Seasonality	Tonnage (tons)	Estimated Av. haul (km)
Coffee	Mikumi-Moshi }	May-Oct.	20000	
	Bukoba-Tanga }	May-Oct.	15000	
	Moshi-Tanga }	Year round	46000	
			81000	554
Cotton	Mwanza }			
	Shinyanga}-D'Salaam	June-Feb	85000 +	1040
	Other }			
Fertilizer	Tanga-Moshi }		10000	
	Dar-Mwanza }	Year round	20000	
	Dar-Tabora }		15000	
			45000	880
Maize	Mpanda-Mwanza }		12000	
	Mpanda-Tabora }	May-Aug.	5000	
	Arusha-Dar }		12000	
	Dar-Mwanza }		0	
			29000	640
Tobacco	Tabora-MOR }		10000	
	Mpanda-TBR }	May-July		
	Shinyanga-MOR }		1000	
			11000	822
Livestock	MZA area-DAR	Year round	50000 ++	1000
Subtotal:Major Agr.Output/Input Movements			301000	
Cement	Tanga-Moshi }		30000	
	Tanga-Kigoma }		10000	
	Tanga-Dodoma }	Year round	10000	
	DAR-Mwanza }		20000	
	DAR-Kigoma }		5000	
			75000	800
Phosphates	ARS-Tanga	Year round	25000	330
Petroleum Pr.	DAR-Mwanza }		100000	
	DAR-Tabora }	Year round	21000	
	DAR-Kigoma }		40000	
			161000	1180
Other Local	Various	Year round	450000	720

Subtotal:Non Agr. local			711000	822
Total:Local Traffic			1012000	
TRANSIT TRAFFIC				
Coffee	Uganda-DAR	Year round	36000	
	Burundi-DAR	Year round	40000	
			76000	
Cement	DAR-Burundi	Year round	15000	
Fertilizer	DAR-ZBR	Year round	15000	
Coper/Zinc	Zaire-DAR	Year round	60000	
Other:G.Cargo	DAR-ZBR	Year round	45000	
Subtotal:Transit Traffic			211000	1256
Total: All Traffic			1223000	826

NB. * Equivalent to469000 bales
** Assumed equivalent to 100000 heads

ptr.2

TRAFFIC FLOW PER SECTION (000t)

Commodity	Est. Net tkm.	Branch Line		Central Line				Mwanza Line	Link-Line			
	(000)	MPO-KAL/TBR	KID-KIL	DAR-MOR	MOR-DOM	DOM-TBR	TBR-KGM	MZA-TBR	DAR-MOR-MAU	MAU-TAN	MAU-MOS	MOS-ARS
A1:Local Traffic												
Coffee	44874	0	20	0	35	15	0	15	35	61	46	0
Cotton	88400	0	0	85	85	85	0	85	0	0	[illegible]	0
Fertilizer	39600	0	0	35	35	35	0	20	0	10	10	0
Maize	18560	29	0	12	0	0	17	0	12	0	12	12
Tobacco	9042	10	0	0	11	11	0	1	0	0	0	0
Livestock	50000	0	0	50	50	50	0	50	0	0	0	0
A1:Subtotal: Major Agr.	250476	39	20	182	216	196	17	171	47	71	88	12
Cement	60000	0	0	35	45	35	15	20	20	50	30	0
Phosphate	8250	0	0	0	0	0	0	0	0	25	25	25
POL	189980	0	0	160	160	160	40	100	0	0	0	0
Other local	324000	0	0	300	260	180	60	170	75	25	100	100
A2:subtotal Non-Agr.	582230	0	0	495	465	375	115	290	95	100	155	125
A3:Total:local	832706	39	20	677	681	571	132	461	142	171	243	137
B:TRANSIT TRAFIC												
Coffee	95456	0	0	76	76	76	40	40	0	0	0	0
Cement	18840	0	0	15	15	15	15	0	0	0	0	0
Fertilizer	18840	0	0	15	15	15	15	0	0	0	0	0
Copper/Zink	75360	0	0	60	60	60	60	0	0	0	0	0
Other Gen Cargo	56520	0	0	45	45	45	45	0	0	0	0	0
B1:Total Transit	265016	0	0	211	211	211	175	40	0	0	0	0
C:Total All Traff	1097722	39	20	888	892	782	307	501	142	171	243	137

TANZANIA RAILWAY'S CORPORATION
SECTIONAL TRAFFIC FLOWS (000 TONNES)

Section (DN Sense) Length)Km= Commodity	DSM-MOR 202	MOR-DOM 258	DOM-TBR 383	TBR-KGM 418	DSM-RUV 79	TRS-MZA 376	MZU-RUV 186	MZU-TAN 64	MOS-MZU 349	ARS-MOS 87	MPN-TBR 333	KDU-MOR 196	REMARKS
• Coffee (local)	35(47)DN	15(20)DN	15(20)DN	-	-	15(20)DN	35(47)UP	61(81)DN	46(61)DN 20(27)UP	-	-	20(27)DN	
Coffee (transit)	76 DN	73 DN	76 DN	40 DN	-	36 DN	-	-	-	-	-	-	Uganda 23 Burundi 40
• Cotton	85(113)DN	85(113)DN	85(113)DN	-	-	85(113)DN	-	-	-	-	-	-	
Maize	12 DN	-	-	17 DN	-	-	12 UP		12 UP	12 UP	29 DN	-	
•• Tobacco	-	11(22)DN	11(22)DN	-	-	1(2)DN	-	-	-	-	10(20)DN	-	
• Fertilizer(local)	35(47)UP	35(47)UP	35(47)UP	-	-	20(27)UP	-	10(13)UP	10(13)UP	-	-	-	
Fertilizer(transit)	15 UP	15 UP	15 UP	15 UP	-	-	-	-	-	-	-	-	To Zaire Burundi
Phosphate	-	-	-	-	-	-		25 DN	25 DN	25 DN	-	-	
Cement (local)	35 UP	35 UP	25 UP	5 UP	-	20 UP	20 DN	50 UP	30 UP	-	-	-	
Cement (transit)	15 UP	15 UP	15 UP	15 UP	-	-	-	-	-	-	-	-	To Burundi
Livestock	50 UP	50 DN	50 DN	-	-	50 DN	-	-	-	-	-	-	2 heads = 1 tonne
Matale (Zairean)	60 DN	60 DN	60 DN	60 DN	-	-	-	-	-	-	-	-	
General Cargo (transit)	45 UP	45 UP	45 UP	43 UP	-	-	-	-	-	-	-	-	To Burundi
Petroleum Products	160 UP	160 UP	160 UP	40 UP	-	100 UP	-	-	-	-	-	-	
Other Cargo	300 UP	260 UP	180 UP	60 UP	75 UP	160 UP	75 DN	25 UP	100 UP	100 UP	-	-	
TOTAL - UP	605(617)	565(577)	475(487)	180	75	300(307)	47(59)	85(88)	172(182)	112	-	-	
TOTAL - DN	318(358)	282(321)	297(341)	117	-	187(221)	95	86(106)	71(86)	25	39(49)	20(27)	
GRAND TOTAL	923•975)	847(898)	772(828)	297	75	487(528)	142(154)	171(194)	243(266)	137	39(49)	20(27	

CODE INITITIA' OF STATIONS:
DSM: DAR ES SALAAM
MZU: MRUZAI
MOR: MOROGORO
DOM: DODOMA
TBR: TABORA
KGM: KIGOMA
RUV: RUVU
MZU: MRUAZI
MZA: MWANZA
TAN: TANGA
MOS: MOSHI
ARS: ARUSHA
MPN: MPANDA
KDU: KIDATU

• Figures in brakets take into account peaking factor of 1.33 (9 months traffic per year)
•• -do -do 2.00 (6 motnhs traffic per year)

TANZANIA RAILWAYS CORPORATION
FREIGHT LOCOMOTIVE REQUIRMENTS

SECTION	LENGTH (KMS)	RULING GRADIENT (%)	ADJUSTED ANNUAL RULING NET	CLASS OF LOCO	HAULING CAPACITY (GROSS TONNES)	HAULING CAPACITY (NET TONNES)	NO. OF TRAINS PER YEAR EACH WAY	AVERAGE SECTIONAL SPEED (KPH)	AVERAGE JOURNEY TIMES (HRS.)	LOCO TRAIN HOURS PER PAIR OF TRAINS	LOCO TRAIN HOURS PER YEAR	NO. OF LOCOS NEEDED	REMARKS
DSM-MOR	202	2.0	617(UP)	87 OR 88	1200/2	800/2	771	22.6	8.93	35.72	27540	6.58	
MOR-DOM	255	1.0	573(UP)	87 OR 88	1200	800	716	23.5	10.95	21.90	15680	3.74	
DOM-TBR	383	1.0(DN) 1.8(UP)	487(UP)	87 OR 88	1200	800	609	27.4	13.98	27.96	17028	4.07	Banked between MUP-AGH
TBR-KGM	416	1.0 (UP) 1.43(DN)	180 (UP)	87 OR 88	1200	800	225	25.8	16.12	32.24	7254	1.73	Banked between KGM-KZM
DSM-RUV	79	2.0	75(UP)	73	700	467	161	22.6	3.50	7.00	1134	0.27	
TBR-MZA	376	1.25(UP) 1.0 (DN)	307(UP)	87 OR 88	1000 (UP) 1200 (DN)	670(UP) 800(DN)	458	26.0	14.46	28.92	13245	3.16	
MZU-RUV	189	1.5 (UP) 1.0 (DN)	95 (DN)	64	850/2	567/2	167	14.2	13.31	53.24	8891	2.12	
MZU-TAN	64	2.0 (DN)	106(DN)	64	560/2	373/2	284	22.0	2.91	11.64	3305	0.79	
MOS-MZU	349	2.0	182(UP)	64	560/2	373/2	488	37.0	9.43	37.72	18407	4.40	
ARS-MOS	87	2.3	112(UP)	64	400/2	270/2	415	15.0	5.60	23.20	9628	2.29	
MPN-TBR	333	0.9 (UP) 0.5(DN)	49(DN)	64	485(UP) 595(DN)	323(UP) 397(DN)	123	15.0	22.20	44.40	5461	1.30	
KID-MOR	198	1.0(UP) 1.05(DN)	27(DN)	73	595(UP) 425(DN)	397(UP) 283(DN)	95	19.0	10.30	20.60	1957	0.47	

SUMMARY

CLASS OF LOCO:	REQUIRE.	16%ALLOWANCE FOR UNDERLOADING	TOTAL REQT.	
87 OR 88 CLASS LOCOS:	19.28	1.93	21.21	(=21)
64 CLASS LOCOS:	10.90	1.09	11.99	(=12)
73 CLASS LOCOS:	0.74	0.07	0.81	(=1)

(FOR CODE INTITIALS OF STATIONS, PLEASE REFER TO ANNEX I.)
ADDITIONAL CODE INTITALS OF BANKER STATIONS USED IN ANNEX II:
MUP - MAKUTOPORA
AGH - AGHONDI
KZM - KAZURAMIMBA

ANNEX 5.2

TANZANIA RAILWAYS CORPORATION
TOTAL LOCOMOTIVE REQUIREMENTS
(MAIN LINE LOCOS)

CLASS OF LOCO	87/88	64	73	TOTAL
A. Passenger Services				
DSM - KGM	4			
TBR-MZA	2			
DSM-MOS		4		
KOR-TAN		1		
TBR-MPN		1		
KID-MOR			1	
ARS-MOS		1		
TOTAL (Bare Reqts) For Pass. Services	6	7	1	
SPARE (Maintenance)	2	2		
TOTAL FOR PASS. SERVICE	8	9	1	18
B FREIGHT SERVICES:				
From Annex III	21	12	11	
Pick-up trains				
DSM-MOR;MOR-DOM			4	
DOM-TBR;TBR-KGM				
TBR-MZA,DSM-KOR		3	8	
-TAN-MOS	1			
Banker				
TOTAL: (FREIGHT)	22	15	5	21
C. DEPARTMENTAL SERVICES:				
P. Way Maintenance			4	
Track Renewal			2	
Spare (Maintenance)			2	
TOTAL (DEPARTMENTAL)			8	8
D. GRAND TOTAL	30	24	14	68

*included in freight.

TANZANIA RAILWAYS CORPORATION
MAINLINE LOCOMOTIVE REQUIREMENTS VS. CURRENT AND PROJECTED HOLDING OF SERVICES

CLASS OF LOCOMOTIVE	87 OR 88	64	73	TOTAL
1. Requirement for 1.222 mn tonnes of freight and time-tabled passenger services, as well as departmental services	30	24	14	68
2. Currently serviceable locos	27	16	3	46
3. Current shortfall (surplus)	3	8	11	21
4. Projected servicable locos (1990) (post. EP)	38	19	15	72
5. 1990-Projected shortfall (surplus)	(8)	5	(1)	(5)
6. Projected serviceable locos (1991)	42	22	15	79
7. 1991 Projected shortfall (surplus)	(12)	2	(1)	(11)

TANZANIA RAILWAYS CORPORATION
WAGON REQUIREMENTS

COMMODITY	Annual Tonnage (000 T)	Adsjusted Annual Rate (Peaked Tonnage)	Peaked Rate (Tonnes/day)	Loadability Per Wagon	Wagons Per Day	Type Of Wagon
Coffee	157	209	573	35	16.4	covered
Cotton	85	113	310	18	17.2	covered
Maize	29	29	63	35	1.8	covered
Tobacco	11	22	60	12	5.0	covered
Fertilizer	60	75	205	35	5.9	50% covered;50%
Phosphate	25	25	68	35	1.9	special phoshat
Cement	90	90	247	35	4.7	open
General Transit	45	45	123	35	3.5	50% covered; 50
Petroleum Products	160	160	438	30	14.6	Tank
Other type	450	450	1233	35	35.2	50% covered; 50
TOTAL	1222	1328	3621		117.9(=118)	

Summary of Required Daily Loading

Covered wagsons:	70
Open Wagons	27
Phosphate Wagons	1.9
Tank Wagons	14.6
Livestock	4.6
TOTAL	118

ANNEX 7

TANZANIA RAILWAYS CORPORATION
REQUIREMENTS OF PASSENGER COACHES

Type of Train	Section	Train Load No. of Coaches	Frequency	No. of Rakes Req. Required	No. of Coaches Required
Passenger	DSM-KGM	8	Daily	4	32
Passenger	DSM-MZA	6	Daily	4	24
Passenger	TBR-KGM	4	Daily	2	8
Mixed	TBR-MPN	6	3/week	1	6
Mixed	KID-MOR	3	2/week	1	3
Passenger	DSM-TAN/MOS	10	6/week	2	20
Mixed	MOS-ARS	3	3/week	1	3

TOTAL	96
Contingencies @ 10%	10
Maintenance @ 15%	16
Spares	
GRAND TOTAL	122

CHAPTER FOUR

TANZANIA/ZAMBIA - RAILWAY AUTHORITY

I. BACKGROUND

4.01 The Tanzania/Zambia Railway Authority (TAZARA) was initially conceived in the early 1960s. Construction of the 1860 kilometer long 1067mm (3ft, 6in) gauge, single track system was commenced in 1970, and commercial traffic was started in 1976. The track is laid on a ruling gradient of 2.0% between Mlimba and Chozi (501 km to 1043km-542km). The ruling gradient over the rest of the railway is 1.0%. The system capacity was designed at 2.5 million tons per year. The highest traffic carried so far has been 1.273 million tons in 1977/78, and the lowest was 0.752 million tons in 1980/81. The performance during the last three years has been as follows:

1984/85 - 1.041 million tons (74.5%-exports/imports)
1985/86 - 0.925 " " (67.3%-" ")
1986/87 - 1.163 " " (75.2%-" ")

TAZARA's forecasts of freight traffic are 1.571 million tons by 1990/91 and 1.823 million tons by 1994/95. A break up of the freight traffic and forecast are given at Annex I.

4.02 The primary constraint inhibiting increased traffic is locomotive availability. In 1976, when TAZARA commenced operations, it had a fleet of 85 mainline 2000hp diesel-hydraulic locomotives (class DFH2) and 17 shunting 1000 hp diesel-hydraulic locomotives (class DFH1), all of Chinese make. Twelve more DFH2 locos were added in 1979. Owing to a rapid fall in the availability of DFH2 locomotives due to design and manufacturing deficiencies, TAZARA embanked on a program of re-powering these locos with German-made MTU engines of equivalent horse-power. In addition, 14 diesel electric (DE class) locomotives of 3200 hp (Krupp/GE) were purchased in 1983/84. Taking into account the locomotives scrapped and repowered so far, the current holding and availability of mainline locomotives stands as follows:

Class of Locos	No. In fleet	% Availability
DF H2	40	37.5%
DFH2 (MTU powered)	26	65.7%
DE	14	58.9%
TOTAL	80	50.4%

II. TEN YEAR DEVELOPMENT PLAN

4.03 Taking into account the locomotive constraint, as well as other constraints and weakness noticed in the system, TAZARA embarked on a Ten Year Development Plan (TYDP) in 1984, and has been mobilizing donor support for 23 projects included in the TYDP. Many of these projects have been included in the SATCC project portfolio. The estimated cost of the 23

components, updated in February 1987 for a TAZARA Donors's Conference was US$227 million, including a local expenditure component of the equivalent of US$31.1 million. The situation as it then existed (February 1987) is tabulated at Annex II. Firm sources had been found for US$92.0 million worth of projects, and items for US$68.4 million were under negotiation. The most important and urgent component, namely locomotives, had not been covered at this stage. Since the last conference, there has been further progress in finding donor sources, and the bulk of the commitments needed have been met with vide Annex III. The TYDP is in the process being reviewed and updated in preparation for the TAZARA Donors' Conference scheduled for February 1988, soon after the SATCC meet in Arusha. In this process, the traffic forecasts will also be updated, taking into account the extra traffic from Malawi expected at Mbeya with the provision of expanded intermodal facilities at that station.

III. CAPACITY CONSTRAINTS

A. Locomotives

4.04 As indicated earlier, the most serious capacity constraint currently is locomotive availability.

4.05 Main Line Locomotives: For the purposes of these capacity estimates, a locomotive unit (LU) has been taken to be the equivalent of a DFH2 locomotive, hauling 900 tons gross over 1% gradients. For the 2% graded section, either two DFH2 (= 2 LUs) or one DE locomotive are used. The same equation holds good for passenger services also. Of the available locomotive hours, 25% were allowed for shed turn-round and of the remaining "operational" locomotive hours, 10% were allowed for terminal detentions. Thus, the ratio of (train engine hours)/(available engine hours) works out to be 0.75 x 0.9 = 0.675.

4.06 Passenger Trains: The average major inter-depot running times are as follows:

Dar es Salaam - Mlimba	-	10.75 hours
Mlimba - Mbeya	-	11.50 hours
Mbeya - Mpika	-	14.00 hours
Mpika - New Kapiri Mposhi	-	8.50 hours

DE locomotives or 2 x DFH2 locomotives are used between Mlimba-Mbeya-Mpika. Thus, the train locomotive hours per train, in terms of L.U. hours would be 10.75 + 2 (11.5 + 14.0) + 8.50 = 70.25. The available L.U. hours needed corresponding to this would be 70.25/0.675 = 104. With the three time-tabled pairs of trains per week, the available L.U. hours needed would be (6 x 104)/(7 x 24) = 3.7 or 4 locos. In actual practice, 2 DE locos and 2 DFH2 locos would be required to meet the link requirements.

4.07 Freight trains: The average inter-depot running times are as follows:

Dar es Salaam-Mlimba	-	14.50 hours
Mlimba-Mbeya	-	14.50 hours
Mbeya-Mpika	-	21.00 hours
Mpika-New Kapiri-Mposhi	-	12.50 hours

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The train locomotive hours per train, in terms of L.U. hours would be 14.50 + 2(14.50+21.00)+12.50 = 98. Converting this figure to "available" L.U. hours, the result is 98/0.675 = 145. Thus, the number of "available" LUs needed per train would be 145/24 or 6.

4.08 The number of available locomotives on the system currently is 8 DE, 15 DFH2 and 17 DFH2(MTU). Of these, 2 DE and 2 DFH2 locomotives are needed for passenger services, leaving 6 DE and 30 DFH2/DFH2(MTU) locomotives for freight services (= 42 LUs).

4.09 The number of trains possible daily, therefore, works out to 42/6 = 7. The set throughput per train is 497 tons, based on a gross trailing load of 900 tons, a minimum pay load/gross load ratio of 65%, and a load factor of 85%. The annual tonnage capacity, therefore, works out to be 365 x 497 x 7 = 1.27 million tons. As against this, TAZARA has achieved a figure of 1.163 million tons in 1986.

4.10 TAZARA is considering a feasibility study to work out the techno-economic implications of alternatives like re-powering more DFH2 locos with MTV engines, and replacement of some older hydraulic transmissions to meet the anticipated traffic after 1991. The arrival of the 17 US locomotives (8 in July 1989, and 9 in May 1991), as well as the receipt of spare parts for rehabilitation of the Krupp/GE locomotives in September-December 1988 leading to their re-commissioning by August 1989 would be the additions to locomotive power capacity during the period 1989-1991. The aid agreement signed in October 1987 with China for the equivalent of US$7.0 million for various spare parts and technical assistance would help in keeping the existing fleet going, in the interim.

B. Shunting Locomotives

4.11 Out of the 13 DFH1 locomotives in the fleet, 9 are available for service, on an average. The requirements of shunting locomotives has been assessed at 10 and the spare parts supply expected from China would assist in maintaining and improving the position.

C. Wagons

4.12 The current status of the wagon fleet is detailed in Annex IV. Currently, in interchange with the Zambia Railway Load (ZRL), TAZARA has an average debit balance of 350 wagons (750 ZRL wagons on TAZARA and 400 TAZARA wagons on ZRL). The overall wagon turn-around time was reported to be 38 days of which 13 days are on the TAZARA portion, and 25 days, on the ZRL portion. There is a commitment from Sweden for the provision of 350 open high-sided wagons and 25 tank wagons. For further increases in traffic anticipated, there is considerable scope for improving wagon turn-around and operating efficiency on both systems and at the inter-face between them, as well as at the interfaces between (a) the mining companies and ZRL; and (b) TAZARA and Dar es Salaam port. A joint operational study, if conducted on these systems and interfaces, would bring in very profitable results. There is the immediate need to run more block trains, point-to-point, to reduce wagon detentions.

D. Signalling and Telecommunications

4.13 The systems are functioning reasonably well, and based on the intersectional running times and tokenless block-working systems, there will be no need to introduce any upgrading, till the traffic level goes above 2.0 million tons of freight, and TAZARA has proposed detailed studies into the various aspects in 1990.

E. Track

4.14 The TAZARA alignment crosses difficult terrain for a considerable part of its length, with deep cuttings, high bridges, tunnels and viaducts with ruling gradients of 2% between Mlimba and Chozi and 1% elsewhere and curvatures upto 200 meters radius between Mlimba and Chozi and 300 meters elsewhere. The heavy track with 45kg/m rails is well laid on monoblock pre-stressed concrete sleepers with a density of 1520/km and with a 25 cm cushion of ballast practically all along the length. The major problem experienced with the track has been occurrence of landslides in 1979 between Mlimba (501 km) and Kiyowela (600 km). Track is not expected to be a capacity constraint in the near future, with TAZARA having taken measures to attend to the various weaknesses:

(i) Landslides: Project CE2 of the TYDP provides for a feasibility study, to be followed by necessary rectificatory work.

(ii) Ballast Replenishment: Project CE1 funded by Sweden and EEC addresses itself to the rehabilitation of the quarries and quarry equipment.

(iii) Track tamping and maintenance: The type of heavy track with concrete sleepers needs mechanized track maintenance, and project CE3 addresses itself to these aspects. There is, however, a financing gap for one more tamping machine, a track recording car, and service vans. TAZARA is also reviewing its requirement of track maintenance trolleys under project ME3.

(iv) Rail-welding: The rail ends have started showing beginnings of battering effects and it would have been prudent to have continuously welded rails right at the time of construction. However, the problem is now being addressed under project CE4 and a study is being made to determine the method of welding best suited to conditions on TAZARA - electric welding of rails in depots, electric welding at site, or alumino-thermic welding at site. A suitable donor source will have to be found for the actual work, as soon as the study is completed, and more accurate estimates of costs are available. The tentative cost has been estimated at US$16.4 million of which US$6.7 million is in foreign exchange.

(v) Rail-burns repairs: On the severely graded sections of TAZARA, there are many spots where excessive wheel slip has led to wheel-burn damage to rails. Project CE5 funded by Sweden and Switzerland takes care of TAZARA's present needs in this respect. It has been noticed that there is a lot of leakage of oil, particularly from DFH2 locos on the rails and this could be a contributory cause for wheel-slip. Preventive action, including provision of adequate wheel-slip protection devices on new locomotives, training of operating staff, proper maintenance of sanding gear on locos, and minimizing of oil leakages will be necessary.

F. Passenger Coaches:

4.15 Out of the initial stock of 100 coaches, 98 are now in the fleet, of which approximately 70% are available for service. The present time-tabled level of train services - two through services per week each way between Dar es Salaam and New Kapiri Mposhi and two regional services each way per week on each of the regions (Tanzania and Zambia), would need 4 rakes of 12 coaches each, making up a bare requirement of 48 coaches. Coach availability is not currently a limiting constraint on passenger traffic.

IV. General

4.16 The current review of the TYDP being undertaken by TAZARA's consultant is of great importance, particularly with respect to TAZARA's medium and long term needs of rolling stock, based on updated traffic forecasts.

4.17 There is need to systematize donor aid flows so that normal maintenance expenditure devolves as a charge to TAZARA. The USAID funded Technical Assistance for costing and tariffs would take into account the need for adequate cost recovery provisions in the system. TAZARA's accounting system, including its fixed asset accounting, has already been the subject of extensive recent studies.

4.18 Some of the stations on the TAZARA system which are not linked to the national electric grids have been provided with diesel generator sets, which will require replacement in the near future. TAZARA is assessing their requirements, prior to approaching donors for assistance.

4.19 It was reported that the Subsidiary Agreement had been signed between Malawi Railways and TAZARA, whereby the former would hire TAZARA wagons for its ordinary traffic, and provide its own tank wagons for petroleum products. This extra traffic is anticipated to be generated at Mbeya when the inter-modal facilities are expanded there.

4.20 There appears to be scope for introduction of freight forwarder systems, linking the trucking industry on the feeder roads touching TAZARA stations, particularly on the Tanzania region.

TAZARA GOODS TRAFFIC FORECAST (000 tonnes)

FY		1983/84	1984/85	1989/90	1994/95
EXPORTS, Total		431	435	535	541
(i)	Zambian Exports; Total	418	425	510	516
	Thereof				
	copper	353	360	460	460
	other minerals	41	40	34	34
	other goods	24	25	16	22
(ii)	Zairean Exports; Total	2	5	15	15
(iii)	Malawian Exports; Total	11	5	10	10
IMPORTS, Total		293	320	346	423
(iv)	Zambian Imports; Total	293	314	321	398
	Thereof				
	fertilizers	121	70	80	85
	wheat	25	70	109	146
	containerized	29	30	63	82
	other goods	118	144	69	85
(v)	Zairean Imports; Total		1	5	5
(vi)	Malawian Imports; Total		5	20	20
LOCAL,	Total	249	337	690	859
(vii)	Zambian Local; Total	58	65	114	150
(viii)	Tanzanian Local; Total	191	272	576	709
	Thereof				
	cement	6	25	15	55
	grains	21	44	77	91
	sugar	37	38	53	65
	molasses	15	25	30	37
	timber	7	17	20	25
	paper		12	52	52
	fertilizers	37	25	91	114
	POL	2		34	40
	coal			100	100
	other goods	66	86*	104	130
GRAND TOTAL		973	1092	1571	1823

* *Includes POL*

The total traffic carried in FY 1983/84 corresponded to a production of about 1.5 billion tonne-km, of which 11% was local traffic. The forecast implies that production is expected to increase to about 1.6 billion tonne-km during the ongoing FY, to 2.1 billion tonne-km in FY 1989/90 and to about 2.3 billion tonne-km in 1994/95. The local share of the total production will increase to 22% by the end of the decade and to 24% in 1984/85.

COST ESTIMATE AND FINANCING OF TAZARA TEN YEAR DEVELOPMENT PLAN - Status Feb. 1987

PROJECT NO.	PROJECT TITLE	TYDP ORIGINAL TOTAL M USD	PRESENT ESTIMATED COST M USD TOTAL	FOREIGN	LOCAL	FUNDING SECURED, & SOURCE ORIGIN. CURRENCY M UNITS			M USD	FUNDING UNDER NEGOTIATION M USD	FINANCING GAP M USD
PCU	Project Coordinating Unit	-	2.0	2.0	-	13.0	SEK	NORDIC	2.0		
CE:1	Rehabilitation of Quarries,	3.2	17.3	16.8	0.5	85.0 3.5	SEK ECU	SWEDEN EEC TAZARA	13.0 3.9 0.5		
CE:2	Permanent Fortification of Landslides	12.0	45.0	40.0	5.0			TAZARA	5.0	40.0 (ADB)	
CE:3	Mechanized Track Maintenance	14.9	15.1	14.7	0.4	3.6 3.4 50.0	ECU SF SCH	EEC SWITZERLAND AUSTRIA TAZARA	3.9 2.2 3.9 0.4		4.7
CE:4	Rail Welding	16.4	16.4	6.7	9.7			TAZARA	9.7		6.7
CE:5	Rail Burn Repairs	0.5	6.7	6.2	0.5	25.0 3.4	SEK SF	SWEDEN SWITZERLAND TAZARA	4.0 2.2 0.5		
CE:6	Terminal Facilities at New Kapiri Mposhi	[illegible]	0.3	-	0.3			TAZARA	0.3		
CE:7	Railway Link TAZARA-Mpulungu Port, Zambia	-	0.4	0.4	-					0.4 (ADB)	
ST:1	Solar Power Panels	0.6	3.2	2.3	0.9			DENMARK TAZARA	0.9 0.5		1.5
ST:2	Back-up of Radio Link	0.3	0.5	0.5				DENMARK	0.5		
ST:3	Teleprinters	0.1	0.1	0.1				DENMARK	0.1		
ST:4	Feasibility Study of future Telecommunications System	0.2	0.2	0.2							0.2
ST:5	Automatic Train Stops	4.5	4.5	3.5	1.0			TAZARA	1.0		3.5
ST:6	Track Circuiting	1.6	1.6	1.1	0.5			TAZARA	0.5		1.1
ME:1	Locomotives	24.0	46.0	45.3	0.7			TAZARA	0.7		45.3
ME:2	Goods Wagons	25.0	48.3	38.0	10.3	-		SWEDEN TAZARA	10.0 10.3	28.0 (SWEDEN)	
ME:3	Trolleys and Trailers	1.6	1.6	1.6							1.6
ME:4	Handling Equipment for Goods Depots	0.8	2.0	2.0				FINLAND	2.0		
ME:5	Rescue Crane and Ferrailing Equipment, Accident Prevention	1.6	6.8	6.6	0.2	25.5	FM	FINLAND TAZARA	6.6 0.2	-	
ME:6	Wheel Lathes	1.9	3.0	3.0		2.7	ECU	EEC	3.0		
ME:7	Mechanical Equipment for workshops	1.0	2.0	2.0		1.4	ECU	EEC	1.5		0.5
GM:1	Technical Assistance to the Head Office	2.7	2.7	2.2	0.5			TAZARA	0.5		2.2
GM:2	Manpower Development Plan & Training Facilities	1.3	1.3	0.7	0.6	14.0	NKR	NORWAY	2.0	-	-
	Grand Total	114.9	227.0	195.9	31.1				92.0		67.2

~~*According to information given by KfW at the Conference~~

TAZARA - TEN YEAR DEVELOPMENT PLAN

STATUS (OCTOBER 1987) C EMS NOT FULLY OR FIRMLY COMMITTED IN FEBRUARY 1987

PROJECT NO.	TITLE	ESTIMATED COST (M USD) TOTAL	FOREIGN	LOCAL	STATUS
CE2	Permanent Rectification of Landslides (73Km from km506 to Km579)	45.0	40.0	5.0	The feasibility study is being funded by Australia. The work itself is to be carried out with AfDB assistance
CE3	Mechanized Track Maintenance	15.1	14.7	0.4	The financing gap currently includes costs of one tamping machine (in addition to two already pledged for by Austria) one track recording car, and service vans for trak materials and equipment, and is estimated at US$1.7 million.
CE4	Rail welding	16.4	6.7	9.7	A techno-economic study to decide on the type of welding to be carried out is to be commenced very shortly with Austrian assistance. Based on results of this study, a suitable donor source will have to be found.
CE7	Link to Mpulungu Port, Zambia (Study)	0.4	0.4	-	The Terms of Reference have been agreed upon by Zambia and the AfDB and the feasibility study for the 160km long line linking TAZARA to Mpulungu on Lake Tanganyika will be organized by the Zambian government.
ST1	Solar Power Panels	3.2	2.3	0.9	Funds have been secured for replacing batteries used for block-instruments. A techno-economic justification was being worked out for solar power panels to light up signals, in the background of logistics problems in the use of kerosene lamps for semaphore signals.
ST4	Feasibility Study for Future Telecommunication Systems	0.2	0.2	-	This study has been deferred to 1990, to match need for upgarding communications and control systems thereafter to match anticipated traffic levels. The study will also cover automatic train stops, track circuiting and line radio.
ME1	Locomotives	46.0	45.3	0.7	17 diesel electric locos of 3200 hp aree included in the US$46 m US AID assistance agreement signed on 30 Sept. 1987. This covers in addition to the locomotives, spare parts for rehabilitating 2 Krupp/GE locos, workshop equipment needed for

					diesel-electrics, and technical assistance for locomotive maintenance and operations management, costing and tariffs, wagon control, transport economics and market analysis and staff development.
ME2	Wagons	28.0	28.0	-	Sweden is providing 350 high=sided open wagons and 25 tank wagons. The rolling stock requirement is being reviewed by TAZARA's TYDP consultants, in preparation for the SATCC and Donors' Conference in February 1988.
ME3	Trolley & Trailers	1.6	1.6	-	12 special trolleys for rail-burn repairs, and 14 working gang trolleys are covered under Swiss assistance under Project CE3. The requirement of trolleys will be updated and reviewed in November 1987 by TAZARA's TYDP consultant.
ME7	Mechanical Equipment	2.0	2.0	-	The gap here was estimated at US$ 0.5 m. TAZARA is currently re-assessing its requirements, taking into account balances available under projects CE1, CE2 and ME6. The main requirments are spares from China.
GM1	Technical Assistance for Head Office	2.7	2.2	0.5	Much of the content of the project has been covered under Project No. ME-1. However, important components left over are: (i) Work Study and Job evaluation for which Terms of Reference have been drawn up with the help of the CFTC; (ii) General Operations Management; (iii) Management Information Systems.

POSITION OF TZR WAGONS AS ON 6/5/1987

TYPE OF WAGON	ORDINARY WAGON					SPECIAL WAGON												
						TANK WAGON												
	COVERED WAGON	DROP SIDE WAGON	HIGH SIDE WAGON	FLAT WAGON	SUB-TOTAL	FUEL	COOKING OIL	WATER	ACID	SUB-TOTAL	LIVESTOCK WAGON	REFRIGERATOR CAR	BALLAST WAGON	WELL WAGON	CABOOSE	BRAKE VAN	SUB-TOTAL	GRAND TOTAL
	C	DSO	HSO	F		FT	COT	WT	AT		LS	R	B	WW	CB	BV		
No. at hand in 1976	523	735	399	161	1818	80	32	14		126	30	21	69	2	11	83	342	2160
No. scrapped off	60	35	35	4	134	15				15	2		2			9	28	162
Accident wagons awaiting Appreisal	42	32	73	12	159	5				5	1		1			12	19	178
Wagons waiting/under repair in/at wkp/distr/ and stations	51	92	41	25	209	18				18	8	4	15		6	9	60	269
Wagons in operation	370	576	250	120	1316	42	32	14		88	9	7	51	2	5	53	235	1551

- WKP - Workshop
- DISTR - District

ANNEX IV

CHAPTER FIVE

THE PORTS SECTOR

5.01 This paper establishes an optimum handling capacity for the port of Dar es Salaam for dry cargo and suggests a broad plan of action which will enable Tanzania Harbours Authority to achieve that potential. It also discusses the role of Tanga and the course of action required to enable Tanga to fulfill that role.

I. PORT OF DAR ES SALAAM

5.02 The capacity at Dar es Salaam for dry cargo is determined on the basis of two major streams of traffic, viz containerized and break general cargo. Bulk cargo also passes through the port but as the handling is not fully mechanized, for purpose of this paper, bulk cargo is treated as if it is general cargo. As the volume of bulk cargo relative to total dry cargo handled is not significant (estimated at 10%) lumping it with general cargo for purpose of estimating berth capacity will not have an unreasonable impact. The port in 1986 handled 1.7 million tons of dry cargo of which .5 million tons were containerised.

5.03 By mid 1989 when the reconstruction of berths 9-11 (quay length of approximately 550 m) are completed (see Annex I for financing plan), THA will effectively have two container berths and eight general cargo berths. Two quay side cranes are to be installed at the container berths providing THA with the capability of working gearless vessels at the berth. Assuming that one berth will be used for gearless container vessels, the other can be used for self-sustaining container vessels of the type that presently call at Dar es Salaam. Self sustaining vessels have the capacity to work an average of 12 teus per crane hour; a quay crane which is purpose built to handle containers will have an average crane cycle time of at least 20 teus per hour. Assuming that the port works 20 hours effectively a day, and on a berth occupancy of 50% the berth with two quay cranes will leave an optimum berth throughput of 146,000 teus per annum and the berth which accommodates self-sustaining vessels will have an optimum berth throughput of 87,000 teus per annum. The optimum handling capacity of berths 9, 10 and 11 for containerised cargo is therefore estimated at 233,600 teus per annum, or approximately 2.8 million tons on the basis that the average load per teu is 12 tons. It is likely, however, that traffic across the berths is imbalanced, i.e. exports will not evenly match imports. For purpose of computing the capacity of the berths, therefore, it will be prudent to assume that 15% of container moves will be of empty containers. Conservatively the capacity of the berths for containerised cargo will be 2.4 million tons. Considering that the volume of containerised cargo handled in 1986 was 0.5 million tons the capacity to handle containers after the completion of the Container Terminal in mid 1988 is large.

5.04 For the 8 conventional cargo berths, assuming that each vessel alongside works an average of 3 gangs and output per gang hour is 10 tons, the optimum handling capacity, on a berth occupancy of 75% and a 20 hour effective working day is 1.3 million tons. The optimum handling capacity of the port (containerised and conventional break bulk) is 3.7 million tons.

5.05 The handling capacity can be extended in the short run beyond the optimum by accepting a higher berth occupancy. In the case of Dar es Salaam, a berth occupancy rate of 60% for the container berths and 90% for the conventional berths may be acceptable. On these occupancy rates, the potential capacity of the container berths is 2.8 million tons and of the conventional berths 1.6 million tons. The potential of 1.6 million tons on 8 berths (200,000 tons per berth) is not unrealistic considering that in Assab whose cargo mix is similar to Assab, seven general cargo berths currently handle approximately 1.5 million tons of cargo a year.

5.06 It is evident that the throughput of the port will be enhanced by the handling of containers. The strategy of Tanzania/THA/landlocked countries must be to promote containerization. This strategy can be implemented by:

(a) the levy of port changes that favor containerised cargo;

(b) the adoption of a system/procedures for the clearance of cargo that minimizes the stay of containers in the port;

(c) the provision of adequate trucks and rolling stock to haul containers to and out of the port;

(d) the implementation of rail tariffs and trucking charges that take cognizance that empty containers have to be back hauled (because of the imbalance of trade) at attractive rates (what the traffic will bear);

(e) the provision of inland terminal facilities and equipment to handle containers; and

(f) the use of a through bill of lading to cover the contract of affreightment for shipments originating at and destined for inland cities.

5.07 Equipment for the operation of the container terminal, in addition to the two quay cranes, consist of:

(a) one rail mounted quay crane;
(b) five rubber-tired quay cranes;
(c) three large forklift trucks;
(d) thirty small forklift trucks;
(e) forty-four tractors and seventy-seven trailers.

The equipment is sufficient but it is essential that it is adequately maintained so that sufficient equipment is operational to support the crane cycle time in the discharging/loading of containers. The downtime of equipment should be targeted not to exceed 15%. Technical assistance would be necessary to achieve and maintain an acceptable level of maintenance..

5.08 Technical assistance and training in the maintenance of new equipment purchased for container and grain handling are being financed by various donors. The Bank is also financing a technical assistance and component in the project. Resources for technical assistance and training

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in equipment maintenance (and usage) appears adequate but THA has to decide on the specific requirements that are to be met by the Bank and by the various donors.

5.09 Workshop facilities for general cargo equipment maintenance, however, appear not to have been sufficiently met under the present project. THA has plans for the improvement of its maintenance capability by:

(a)	construction of satellite workshops	US$700,000
(b)	equipment for satellite workshops	500,000
(c)	additional equipment for central workshop	200,000
(d)	technical assistance to satellite workshop	530,000
(e)	technical assistance to central workshop	405,000
		2,335,000

5.10 The proposed investments to improve the maintenance capability of THA for general cargo handling equipment merit consideration. THA has the following fleet of equipment for the transfer of general cargo.[1] The Bank is financing the rehabilitation of equipment and no further purchases should be considered until the rehabilitation program is completed and the situation re-assessed.

	No.	In Use
(a) forklift trucks	297	89
(b) heavy lift truck	1	-
(c) top lift truck	5	3
(d) trailers	29	24
(e) tractors	41	26

5.11 Operationally, the strategy to be adopted would be to move containerised cargo of landlocked countries in whole containers between the port and final destinations with a minimum stay in port. Movements of containers, ideally, would be by rail. Provided that sufficient rolling stock is available import containers can be dispatched out of the port expeditiously (say within 3 days). Export containers may have to be marshalled in the port to await shipment for a slightly longer period (say 7 days). Major freight centers in landlocked countries (e.g. Zambia) should have container freight station facilities with suitable cargo handling equipment for the distribution and consolidation of LCL (less than container load) cargo. LCL cargo for Dar es Salaam (and Tanzania) would be handled at Ubungo which is being developed under the present Bank financed project.

1/Source: THA and SIDA : Port of Dar es Salaam. The rehabilitation of berths 1-8, Draft Final Report, June, 1985.

5.12 With regard to break bulk conventional cargo, the strategy would be to decentralize warehousing, the port being used only as a transit point in the transportation of goods. Storage capacity at Dar es Salaam for berths 1-8 consists of 80,140m^2 covered storage and 29,600 m^2 open storage. Transit storage, by its very nature, requires more floor space per unit of cargo stored than longer term warehousing. To facilitate operations, it is assumed that a ton of cargo requires 3m^2. On this basis, the covered storage capacity for berths 1-8 is 26,713 tons and for open storage 9,867 tons. It is estimated that about 40% of the dry cargo requires open storage. On an optimum handling capacity of 1-3 million tons, the volume of cargo requiring open storage is 520,000 tons or an average of 1,425 tons a day; the volume of cargo requiring covered storage at 60% of 1.3 million tons would be 780,000 tons or an average of 2,137 tons a day. Given these average daily throughputs, Dar es Salaam has a capacity to hold covered storage cargo for 12 days and open storage cargo for not more than 7 days.

5.13 The decentralization of warehousing away from the port can take the form of the development of national cargo centers outside the port similar to what has been proposed for Malawi. Landlocked countries should be encouraged to develop cargo centers for their national cargo to avoid congesting the port.

5.14 The optimum handling capacity of 1.3 million tons for berths 1-8 is arrived on the assumption that all the berths are fully operational without interference from construction work. This scenario is not likely to materialize until the paving of berth 1-8, financed by SIDA ($18.9 million including $2.1 million for copper handling requirements), is completed. The effect of construction work on the capacity of berths 1-8 will have no significance if the volume of cargo passing through these berths is less than 1.3 million tons. However, if the volume of cargo passing through these berths approximates the optimum handling capacity of the berths, any diminution in the capacity will have to be replaced. This can take the form of the development of the rehabilitation of the lighterage wharf.

5.15 The rehabilitation of the lighterage wharf was justified on the ground that the loss of capacity of the port during the reconstruction of berths 9, 10 and 11 would have to be replaced. This presupposed that the rehabilitation of the lighter wharf would be completed before the reconstruction of the three berths commenced. However, the rehabilitation has been so excessively delayed that the justification for its investment is no longer valid. It should only be proceeded if the capacity of berths 1-8 will be affected so significantly by the paving work that they will not be able to handle the volume of cargo that is projected to pass through these berths.

II. PORT OF TANGA

5.16 Tanga has a significant role in the maritime trade of Tanzania (and of her landlocked neighbors) because of her position at the northern end of Tanzania. It is positioned to serve a hinterland distinct from Dar es Salaam's. The port, however, is disadvantaged in that there are no facilities for vessels to berth alongside, all cargo being worked into

lighters. Currently, the port's lighterage facilities are also in poor condition and require repairs/rehabilitation. Despite the poor condition of its facilities, the port handled 236,000 tons in 1986. At its peak in 1978, Tanga handled 403,000 tons. No recent forecast of traffic has been made of Tanga and in the absence of such a forecast, it is not possible to determine the nature and the scope of development. It is, however, prudent to rehabilitate existing facilities to prevent further deterioration and to restore the port's capacity to approximately 500,000 tons. THA has estimated that urgent repairs to the lighter wharf and fertilizer jetty would amount to US$ 2.1 million and improvements to the port area another US$6.0 million. No detailed feasibility or engineering has been made. It is recommended that funds be made available (US$ 2.1 million) for the urgent repairs while at the same time, a proper feasibility study estimated to cost $300,000 be made to consider the long term development of Tanga. A proper study is necessary in view of the changing technology in cargo handling brought about by containerization. Of the 236,000 tons of cargo handled in 1986, 80,712 tons were containerised cargo, approximately 34% of total cargo handled. In keeping with the trend in shipping, containerization is expected to increase in Tanga and in the longer term consideration should be given to the provision of facilities for the handling of containers.

Project Components and Financing Arrangements

Project Component	Financed by	Amount (US$M)
Kurasini Oil Jetty	(a) THA	1.53
	(b) NORAD	1.65
Pipeline Diversion	(a) THA	.12
	(b) IDA	.12
Lighter Wharf Rehab.	(a) THA	3.59
	(b) IDA	.18
Container Terminal and Ubungo Depot	(a) THA	18.71
	(b) IDA	19.12
Grain Facility	(a) THA	4.65
	(b) Netherlands	10.29
Equipment	(a) THA	1.00
	(b) IDA	2.47
	(c) DANIDA	7.88
	(d) FINNIDA	6.82
	(e) Italy	3.82
Technical Assistance	(a) THA	.35
	(b) NORAD	.71
	(c) IDA	1.47
Program Coordination	(a) THA	.18
	(b) ODA	.35
Training	(a) THA	.29
	(b) IDA	.24
	(c) NORAD	.47
Training Equipment	(a) THA	.18
	(b) IDA	.47
Consultant Services	(a) THA	.82
	(b) IDA	2.94

CHAPTER SIX

CIVIL AVIATION

I. BACKGROUND

6.01 Tanzania has a network of 28 aerodromes served by commercial scheduled and charter services in addition to numerous airstrips. Two airports--Dar es Salaam and Kilimanjaro--cater to international traffic. The Directorate of Civil Aviation (DCA), established under the Civil Aviation Act of 1977, has responsibility for air traffic control, airworthiness certification, the management of aerodromes, conditions of operation of aircraft within the country and negotiation of international air traffic rights. The Department of Construction and Maintenance of the Ministry of Communications and Works (of which the DCA is also a department) has responsibility for construction and periodic maintenance of civil structures in aerodromes, while the Electrical and Mechanical Division of MCW has responsibility for mechanical and electrical installations at aerodromes. Domestic scheduled air transport services are provided exclusively by Air Tanzania Corporation (ATC). Charter services are provided by a number of small operators and ATC while regional and international air services are provided by ATC and about eight other airlines.

6.02 Activity at Tanzanian airports over the recent past is summarized in the table below:

	1980	1981	1982	1983	1984	1985	1986
Aircraft Movements:							
International Airports	25200	20465	21315	21794	24870	22279	25095
Domestic Airports	41652	40215	44124	33560	41024	43600	33221
Total	66852	60680	65439	55354	65894	65879	58316
	1980	1981	1982	1983	1984	1985	1986
Freight Handled (tons):							
International Airports	4,995	5,296	5,441	5,689	6,595	9,805	16,816
Domestic Airports	1,126	951	1,134	1,316	2,471	2,941	3,438
Total	6,121	6,248	6,575	7,005	9,066	12,746	20,254
Passengers Handled ('000)							
International Airports	648	637	681	645	767	716	814
Domestic Airports	469	416	483	404	500	422	484
Total	1,117	1,053	1,164	1,049	1,267	1,138	1,298

6.03 The table indicates significant growth in air freight traffic at an average rate of about 22% p.a. for both international and domestic airports. Growth in passenger traffic has been small with an overall rate of 2.5% p.a. with passengers handled at purely domestic airports static while international airports saw an average 3.2% p.a. growth. A detailed classification of traffic (e.g. passenger traffic by international, regional and domestic and freight traffic by regional/international inbound and outbound) is not

available. However, assuming that virtually all domestic airport traffic originates from or is destined to Dar es Salaam, the following tentative observations can be made:

(i) international freight traffic remained broadly static until 1984 but increased sharply in 1985 (about 66% growth on 1984) and in 1986 (about 95%); this probably reflected an increase in high-value imports as the own-funds import rules were relaxed;

(ii) domestic air freight traffic has grown relatively evenly during the period probably in reflection of expanded route coverage by the ATC and the increasing importance of timely delivery for some high value goods as other transport mode capacity are constrained;

(iii) international and regional passenger traffic has expanded at an annual average rate of about 11% p.a. which probably reflects the expansion in the number of international and regional airlines serving Tanzania and that of ATC's regional routes.

The total number of aircraft landings and take offs (movements) has been broadly stagnant over the period 1980-1986. However, the number of passengers per movement both in the international and domestic airports has increased significantly (average of 4% and 5% p.a. respectively in the domestic and international airports, indicating increased use of bigger planes.

6.04 Although air transport activity is small in the context of total transport activity in Tanzania, it is nonetheless of key importance to the economy:

(i) it is an important element in the promotion of the development of commercial and administrative centers outside of Dar es Salaam;

(ii) it is the main means of transport for international business and social travel;

(iii) it is crucial to the development of Tanzania's latent tourism potential and for that of certain types of potential non-traditional exports;

(iv) in all its facets, it involves significant capital resources and is foreign exchange intensive in both capital and operating requirements; as a consequence investments in the sub-sector can have serious resource allocation implications for the transport sector and the economy.

II. DIRECTORATE OF CIVIL AVIATION (DCA)

A. DCA: Institutional Arrangements

6.05 Central to the effective and efficient management of civil aviation is the institutional framework governing the discharge of the DCA's prescribed role. The current fragmentation of responsibilities between

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operations and equipment management on the one hand and civil works and mechanical and electrical maintenance on the other inhibits the proper planning of investments and the monitoring of the efficiency of use of total fixed assets in aerodromes. Symptomatic of the problems of diffused responsibilities is the lack of knowledge of DCA as to the plans for runway maintenance at airports and the progress and cost of rehabilitation of a major domestic airport and the compilation of its investment plans for airport equipment without any knowledge or interest in the civil works components of such investments.

6.06 The problems of lack of coordination in investment planning are exacerbated by lack of an appropriate accounting framework. The DCA is not a self-accounting unit. The DCA has responsibility for collection of landing parking and navigational fees, rental payments and other charges. These revenues which are accounted for by it revert to the Treasury. Recurrent expenditures of the DCA for which provisions are made in MCW's budget are accounted for by it. The gaps in the system are basically:

(i) accounting is on a cash, not accruals basis;

(ii) periodic civil works maintenance expenditures are omitted in DCA's accounts as they fall within the budgeted responsibilities of the Department of Construction and Maintenance of MCW;

(iii) the value of assets is not accounted for.

As a result there is no clear basis for a policy of cost recovery. Correspondingly, there is no clear basis on which estimates of the cost effectiveness of investments (other than those related to safety) can be made. Although the user charges at airports appear reasonable by international standards, their adequacy given domestic conditions and international competitive conditions (in the case of international airports) cannot be determined.

B. DCA: Investment Program

6.07 The major elements of the DCA investment program consist of (i) the rehabilitation of Kilimanjaro International Airport (US$25 million); (ii) the rehabilitation of the major domestic airports (US$5 million); (iii) the establishment of a regional flight calibration unit at Dar es Salaam. The airports' rehabilitation projects may be warranted on technical grounds since they are essentially to upgrade facilities beyond or approaching the end of their useful lives. Nonetheless even here, there may be benefits in reviewing their content to determine the availability of more cost-effective technical options. More serious however, is the fact that the planned investment program is driven mainly by (or justified solely in the context of) technical considerations. The economic justification for investments is not considered, nor does there appear to be any explicit consideration of the implications of investments for other transport sub-sectors. Similarly, the implication of the investments for the level and structure of user charge is not a consideration.

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C. DCA: Summary

6.08 From the foregoing, the management of the country's airport facilities would benefit significantly from reorganization of the institutional arrangements governing DCA. In particular, there would appear to be considerable merit in making DCA more fully self-accounting and preferably to account for its activities on commercial lines. This is one relatively simple step that can be taken to start the process of ensuring that assets under its operational control are effectively utilized or do not constitute a drain from the resources available to the transport sector.

III. AIR TANZANIA CORPORATION

6.09 ATC was incorporated and commenced operations in 1977 following the demise of the East African Airways Corporation. Similarly to the other Tanzania transport parastatals that are the successors to entities formerly operated under East African Community ownership, ATC started operations with minimal managerial and operational systems infrastructure--most of which were centralized outside Tanzania and manned by non-Tanzanians.

6.10 Since its inception, ATC's aircraft fleet has grown from four aircraft (3 Fokker Friendships--2 owned by it--1 Boeing 737) to a fully owned fleet of eight aircraft (3 Fokker Friendships, 2 Boeing 737s and 3 Twin Otter DC6s) acquired between 1977 and 1979. ATC route structure has expanded considerably. A proxy for this expansion is the growth of available seat kilometers from 83 million in its first year of operation to about 350 million in 1983. Against this background of growth in service provision, ATC has managed to achieve a significant localization of key professional staff.

A. ATC: Recent Operational Performance

6.11 ATC's recent operational performance is summarized in the table below:

ATC: Recent Operating Performance

	1983	1984	1985	1986
Passengers ('000)	403	501	456	456
Revenue Passenger-km (millions)	226	265	274	248
Revenue Ton-km (millions)	23	28	29	25
Available Seat-km ('000)	353	360	381	332
Budgeted Seat-km ('000)	385	376	438	415
Passenger Load Factor (%)	64.1	73.7	72.0	74.8
Weight Load Factor (%)	54.8	62.0	63.3	63.0
Aircraft Average Daily Utilization (Block Hours)				
Boeing 737	6.62	N/A	N/A	6.37
F27	4.89	N/A	N/A	7.49
DHC	5.18	N/A	N/A	5.92

Source: ATC various budgets, ATC, Mission estimates

6.12 Scheduled service provision has fluctuated between 1983 and 1986, reflecting ATC's adjustments of routes for commercial reasons but partly because of expected service interruptions due mainly to renovations on domestic aerodromes. Actual production declined progressively from 96% of planned production in 1984 to 80% in 1986. This performance has been due largely to technical problems affecting the planned utilization of aircraft. However, actual utilization has been on an upward trend and is generally satisfactory: Utilization of the Fokker Friendship fleet in 1986 at about 2,750 hours was very good given its domestic service base. However, this has been due largely to external donor support. The utilization of the Boeing fleet was not entirely satisfactory given its use in regional and high traffic density domestic routes, while that of the DHCs was reasonable. The achieved passenger load factors have increased substantially over the period, reflecting primarily a large increase in domestic load factors. Passenger load factors in the domestic services increased from around 72% in 1983 to 82% in 1986. Such an occupancy level implies a considerable number of turnaways and a large degree of unsatisfied demand. In turn, this level of unsatisfied demand is attributable mainly to (a) the poor alternative modal choice of travel for time-sensitive travellers to and from Dar es Salaam and the other major administrative and commercial centers; (b) the restrictions on ATC's utilization--partly due to restrictions on the use of some aerodromes and ATC's limited capacity.

6.13 An analysis of ATC's productivity in 1986 showed the following:

ATC: Productivity Measures (1986)

No. of Employees	Revenues per Employee (TSh'000)	Operating Expenses Per Employee (TSh'000)	Labor as % of Operating Expenses (%)	Operating Expenses per ATK (TSh)	ASK per Employee ('000)	RTK per Employee ('000)	ATK per Employee ('000)
1,401	614	763	15.3	26.5	237	18.1	28.7

ATC labor costs as a proportion of total expenses are by international standards very low. This is notwithstanding the fact that its operating expenses per employee are very low even by regional standards, implying a very high labor complement for its operations, but very low unit labor costs. However, the benefits of low labor unit costs are eroded by very poor productivity figures exemplified by the large number of employees relative to its route structure and fleet payload (i.e. low ASKs and ATKs per employee). The high ratio of employees to capacity reflects (a) the fact that ATC is a very small airline (fleet size) with relatively short routes as a result of its major orientation to the domestic market; (b) over-manning largely due to an extravagant support structure relative to its size. Given the structure of its fleet and current load factors, ATC can only improve its productivity by a combination of the following actions:

(i) rationalization of its support system;

(ii) greater reliability and increased frequency of flights in the domestic system; and

(iii) expansion of the regional route network.

6.14 In respect of rationalization of its support system, it is difficult to determine in a quick study the portion of ATC's support system and its related costs that are unavoidable for its operation. Nonetheless, it appears that there is scope for rationalization in commercial areas where there is a substantial network of non-contributing sales stations and possibly in some areas of activity at headquarters. In respect of the greater utilization of the fleet, the constraints assuming acceptable route profitability, are the adequacy of domestic aerodromes for extended operations and the ability of ATC's maintenance system to sustain a higher degree of aircraft availability. This latter factor which appears to be the binding constraint on effective capacity depends critically on the adequacy of its maintenance management system and its access to foreign exchange to finance both the cost of major aircraft checks not undertaken in its own facilities and spare parts for routine and major maintenance undertaken domestically. ATC has had to periodically defer major overseas checks on its boeing fleet. For its Fokker Friendship fleet ATC has been a major beneficiary of Dutch assistance (both personnel and spare parts support) and this has been reflected in the increase in utilization of this aircraft type over the last four years. For its small planes it has had to rely on its foreign exchange resources. Since Dutch support is being phased out, ATC will have to rely increasingly on the level of its cash generation and Government policy on its priority of claim to foreign exchange to sustain its domestic service level. The scope for expansion of the regional route network needs closer all-round study, particularly with respect to route profitability.

B. ATC: Financial Performance

6.15 ATC's recent financial performance is summarized in the table below:

ATC: Recent Financial Performance[a]/
(TSh millions)

	1983	1984	1985	1986
Operating Revenue	450	588	765	863
Operating Cash Flow	97	107	106	(172)
Interest Charges	(43)	(53)	(61)	(267)
Net Income	12	(23)	(7)	(512)
Financing				
Net Debt and Grants	21	80	15	372
Trade Financing[b]/	(15)	(9)	7	217
Internal Financing	(1)	(11)	(15)	(15)
Total Financing[c]/	5	60	7	574
Operating Cash Flow Margin (%)	22	18	14	(20)
Debt/Capital Employed (%)	45	44	33	115
Return on Capital Employed (%)[d]/	12	10	8	NM

Source: ATC, Mission estimates

a/ The figures are derived from unaudited statements--ATC's only audited statements were those for 1983 which were heavily qualified.
b/ Creditors less debtors
c/ By definition this represents the total cash shortfall financed by outsiders.
d/ Based on capital employed at beginning of year; capital employed is historic as partially adjusted by deferred foreign exchange losses.

6.16 ATC's financial performance since its inception has been poor. Between 1977 and 1982 cumulative operating cash outflow amounted to TSh176 million. Operating viability in each year of this sub-period was supported by Government grants and equity infusions. ATC's financial performance improved in 1983 although operating margins have since been squeezed as tariff increases have failed to keep pace with fuel, maintenance and support cost increases. In 1986, with substantial devaluation of the Tanzanian shilling, ATC's overall financial position deteriorated significantly with substantial cash outflow in operations and a massive increase in its debt costs. Overall, ATC accumulated net losses of TSh891 million between 1977 and 1986 and had an aggregate cash outflow from operations (including net accumulation of maintenance supplies) of TSh65 million. Against this cash leakage from operations, ATC incurred interest charges on its debt of a total amount of TSh550 million. In effect, in its decade of existence, ATC has not been able to earn or sustain a return on its total capital adequate to ensure its operating viability in the long run.

6.17 ATC's poor financial performance has to be viewed against the background of:

(i) its large exposure to the domestic market to which it devotes about 60% of its capacity;

(ii) its fleet mix and route structure, and the constraints on its aircraft utilization relative to its overhead cost structure (para. 10).

An analysis of a sample of ATC's routes based on September 1987 fares and fuel costs and estimates of maintenance and crew costs indicates the following seat load factors by aircraft type for ATC to cover the short-run variable costs of operation:[1]

1/ Short-run operating costs comprise of: fuel, flight crew costs, landing and air navigation charges and aircraft maintenance charges (for which our estimate includes burden costs which could not be adequately segregated).

Short-Run Route Profitability Analysis

Aircraft	Route	Breakeven Seat Load Factor
B737	Dar-Mwanza	42%
	Dar-Kilimanjaro	45%
	Dar-Zanzibar	61%
	Dar-Kilimanjaro-Nairobi	38%
	Dubai-Dar (via Djibouti/Zanzibar)	23%
Fokker F27	Dar-Tabora	56%
	Dar-Zanzibar	95%
	Dar-Tanga	67%
	Dar-Kigoma (via Dodoma)	67%
DHC6	Dar-Mafia Island	108%

6.18 This analysis of ATC's route profitability suggests that the domestic service to the secondary centers served by ATC's small DHCs are uneconomic--the existing fare levels do not even cover or just cover the short-run variable costs of operation. These routes accounted for about 4% of ATC's total ASKs in 1986 with passenger load factors averaging about 70%. The routes served by the Fokker F27s--other than to Zanzibar--contribute reasonably. However, taking account of the annual equivalent cost of replacement craft, these routes are economic but not profitable enough, even with passenger load factors of about 88% (in 1986), to recover the aircrafts capital costs and make a contribution to system support costs.[2] The B737 fleet routes contribution margins are substantial. Given current capital costs of similar craft, passenger load factors and utilization, these margins are enough to allow a full recovery of capital costs and a substantial contribution to system costs.

6.19 The following conclusions can be drawn from this analysis:

(i) provision of service by ATC to small regional centers that cannot be served by larger planes because of the state of the aerodromes or density of traffic is uneconomic. Fares to these centers need substantial upward revision.

(ii) provision of service to the centers served by the Fokker F27s appears economic taking account of the current replacement cost of this aircraft type and its already high degree of utilization (see footnote 2). Nonetheless, some upward revision of fares may be warranted to allow a margin of

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2/ For the Fokker F27, an approximate measure of capital costs are the annual equivalent cost of the PV at 12% of replacement by an equivalent craft in 1997 and every 20 years thereafter--this is approximately US$0.43 million p.a.; taking the Dar-Tanga fare and distances as a benchmark for calculations, an 87% load factor generates a contribution of US$0.5 million assuming utilization of the aircraft at current levels. This result is indicative since the fare structure is not strictly linearly related to stage lengths and aircraft operating hours.

contribution to the unavoidable fixed costs of the airline's operations. In the context of the overall emphasis of full cost recovery under efficient operating conditions in the transport sector as a whole, lack of such a revision will be inequitable to other classes of travellers.

(iii) provision of service by the B737 fleet is profitable. The only issue is the extent to which the capacity and capacity utilization can be raised by expansion of route frequencies and network and more aggressive and effective marketing.

(iv) notwithstanding improvements in the overall level and structure of fares, ATC's overhead and operations support costs may still constitute a problem for its overall financial performance; these costs amounted to an estimated 54% of total cash operating costs in 1986 (or about TSh530 million). The extent to which these costs can be reduced needs close assessment. However, in the final analysis, ATC may be handicapped by an ambitious domestic route structure, the maintenance of which requires substantial fixed costs i.e. there may be an inherent cost penalty to an extensive route structure given the size of the domestic market.

6.20 One adverse consequence of the poor financial performance of ATC and its inability to obtain foreign exchange is the deferral of major checks on aircraft and of training for its staff particularly that of operational staff. Deferrals of such expenditures are not reflected in its accounts (although provision can and should be made for deferred aircraft checks) but will seriously affect its future operational capability.

6.21 Underlying ATC's poor financial performance is a weak accounting and financial management system. ATC's revenue accounting system is weak and the critically important inter-line accounting is currently about 9 months in arrears heavily affecting ATC's cash flow (in foreign currency) by deferring its recovery of services provided on other airlines coupon stock. This undermines the real profitability of the regional services provided by the B737 fleet. In the domestic and regional market this weakness has meant lack of timeliness in matching own-coupon stock sold and thus timely recognition of sales, deferral of collections from agents and generally weak cash controls. These issues have apparently been at the heart of the lack of auditable accounts for ATC since its inception.

C. Investment Program

6.22 ATC's capital investment budget for 1987 is relatively modest at TSh111 million and consists mainly of replacement investments. Given the airline's precarious financial position, a substantial proportion of this budget can probably not be financed. Further, a significant part of this budget relates to assets to support ATC's administrative structure. The priority of these investments is questionable in the context of the need to reduce these costs.

6.23 ATC's fleet of aircraft is not due for replacement in the medium term given its age and the fact that there is little competitive pressure to engage in technology-driven attempts at reducing operating costs.

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6.24 The one major planned capital investment is the acquisition of a new aircraft to enable ATC to enter the international market. The estimated cost of the type of aircraft proposed by ATC is US$80 million. On a full pay-out lease over 12 years the annual equivalent cost (lease charges) at 10% per annum is about US$11.6 million per annum or ___% of the annual investment budget of the transport sector. The investment is premised on ATC being able to:

(i) capture about 46% of the international air traffic to Tanzania and sustain a passenger load factor of greater than 71%;

(ii) utilize the aircraft on average for 8.4 operating hours per day:

(iii) sustain a yield per revenue passenger kilometer of greater than USc7.6.

6.25 The viability of the expansion proposal depends crucially on these assumptions. The assumptions as to load factor (ATC's market share) appear highly questionable in the absence of any explicit coercion of Tanzanian passengers to use the service and action to curtail existing foreign airlines' traffic rights to Tanzania. Any decline on this assumed load factor (which will also have adverse implications for sustainable yields per revenue passenger-km), will jeopardize the project's viability. Further, given its history of aircraft availability, it is unlikely that the assumed level of utilization can be sustained. Again, this depends to some extent on its generation of and access to foreign exchange which in turn depends on the attainment of the traffic forecasts.

6.26 The implied assumptions in ATC's feasibility study for this venture are mainly that its existing revenue accounting, reservations and marketing systems can support this market. This is a heroic assumption given the poor performance of the existing systems. The alternative course is for ATC to establish a separate support structure or contract out support services. The cost of such a course of action which is not explicitly considered in ATC's public project justification documents could easily wipe out the net contribution to ATC's overall fixed costs assumed in its projection. Further, it undermines the implicit objective of the expansion which is to spread existing support costs over a greater traffic base. Finally, the savings in foreign exchange costs are totally linked to the ability of ATC to manage this project within the structure of its existing support and managerial systems and the traffic forecasts. As such, they will not materialize on more realistic (less optimistic) assumptions.

6.27 In summary, ATC's capital expenditure program should continue to be modest over the next five years in recognition of its priorities for ensuring its financial viability. The major entry into the intercontinental market planned should be subjected to more realistic appraisal and sensitivity tests. In the final analysis, this proposed expansion represents the establishment of a completely new venture and should be viewed as such with full consideration of all the attendant risks. For the time being, it may serve the efficiency of use of managerial resources and scarce investment resources if managerial attention is focussed on rationalizing the existing activities.

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D. ATC: Summary of Issues

6.28 (i) Rationalization of ATC's overhead and support cost structure is imperative to improve its productivity.

(ii) Significant fare increases are required in the domestic market to ensure full cost recovery in the provision of service by ATC's smaller aircraft and a flexible mechanism to enable fare adjustments should be instituted.

(iii) The sole provision of scheduled air transport services in the domestic market by ATC is not observably sufficient to meet demand and open entry by resident companies subject to the normal DCA safety regulatory functions may ease the situation and provide, given its likely fixed cost structure, efficiency-inducing competition for ATC.

(iv) Capital investments by ATC should stay relatively modest over the medium term and managerial and investment resources should not be dissipated by large expansion ventures without thorough study of the risks involved.

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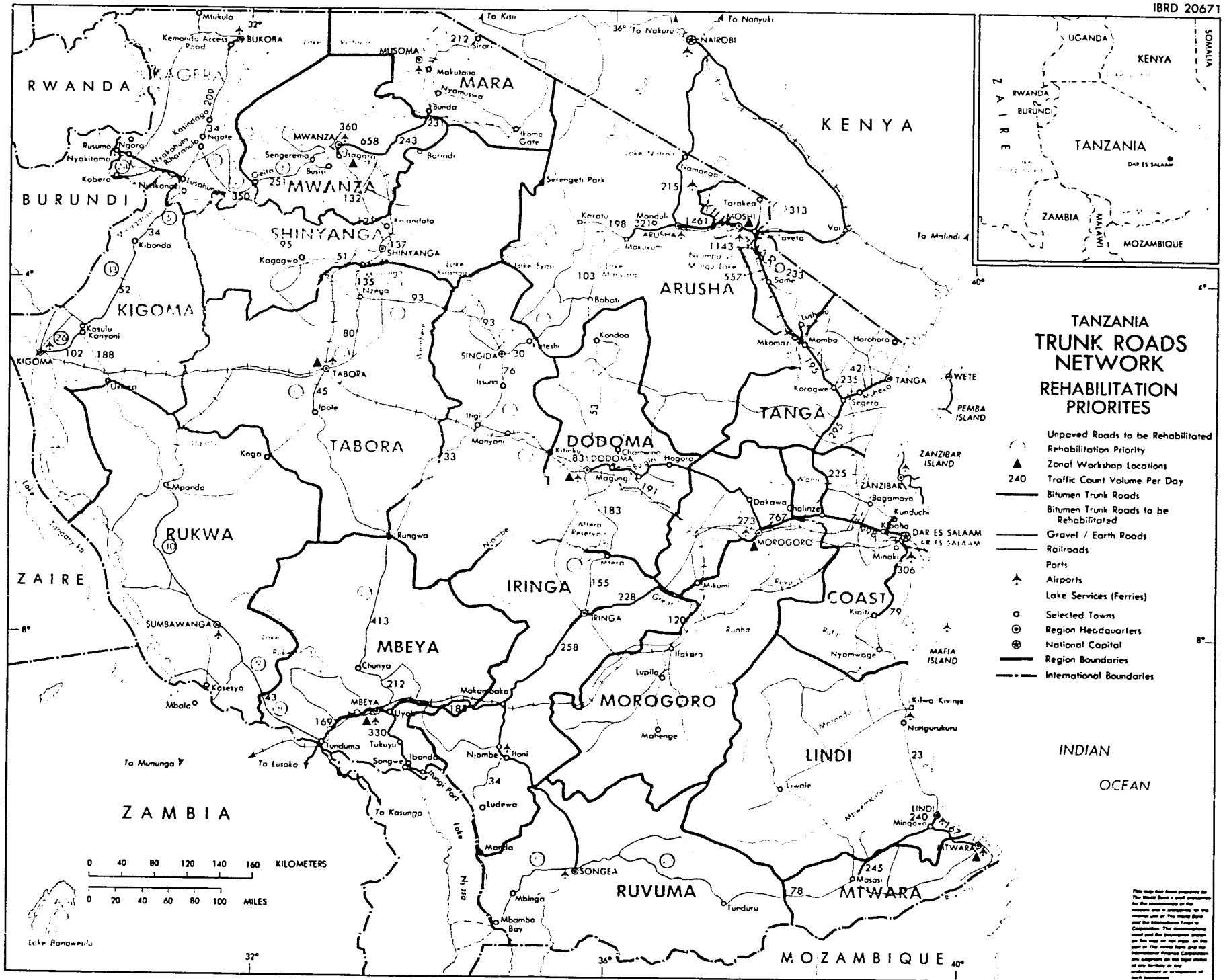

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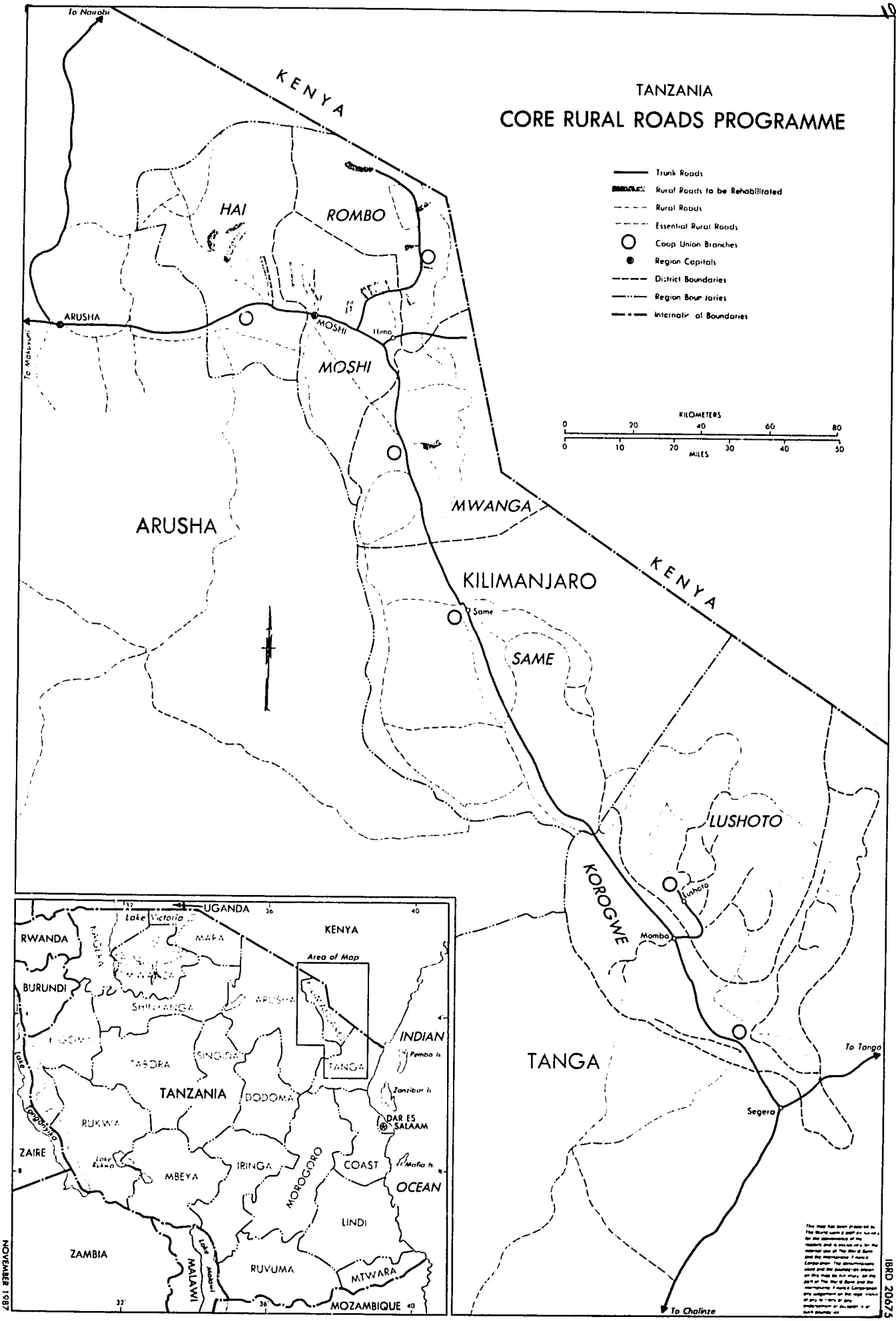
TANZANIA
CORE RURAL ROADS PROGRAMME
Trunk Roads
Rural Roads to be Rehabilitated
Rural Roads
Essential Rural Roads
Coop Union Branches
Region Capitals
District Boundaries
Region Boundaries
International Boundaries
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RWANDA
BURUNDI
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Zanzibar Is.
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Mafia Is.
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Lake Rukwa
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IRINGA
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Lake Malawi
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MTWARA
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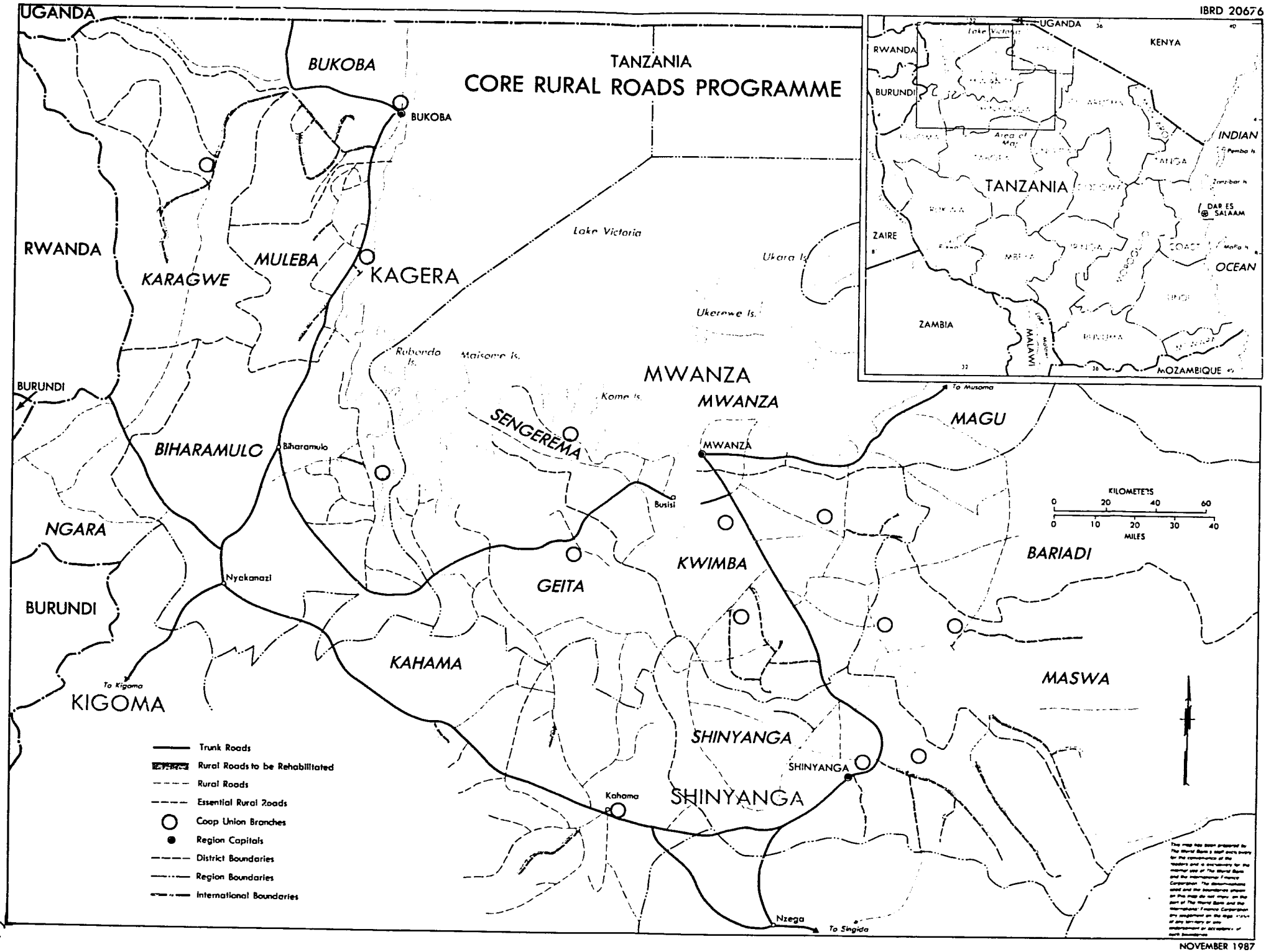

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Lake Rukwa
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UGANDA
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Area of Map
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