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REPORT OF THE SECURITY COUNCIL SPECIAL MISSION ESTABLISHED UNDER RESOLUTION 326 (1973)

Addendum

ANNEXES

73-04502

Annex I

REPORT OF THE TEAM OF UNITED NATIONS EXPERTS TO THE SECURITY COUNCIL SPECIAL MISSION ESTABLISHED UNDER RESOLUTION 326 (1973)

Introduction

1. By resolution 327 (1973) the Security Council decided to entrust the Special Mission, consisting of four members of the Security Council, referred to in paragraph 9 of resolution 326 (1973), assisted by a team of six United Nations experts, to assess the needs of Zambia, in maintaining alternative systems of road, rail, air and sea communications for the normal flow of traffic.

2. Mr. Robert Gardiner, the Executive Secretary of the Economic Commission for Africa, following consultations with the President of the Republic of Zambia and the Security Council's Special Mission, gave over-all guidance and direction to the United Nations experts.

3. The resident representatives of the United Nations Development Programme in each of the countries visited - Mr. A. C. Gilpin in Zambia, Mr. Peter Lowes in Malawi, Mr. L. Mattsson in the United Republic of Tanzania and Miss Suzanne Drouilh, Deputy Resident Representative in Kenya - not only gave every assistance to the team but made arrangements by which all the experts from the United Nations and the specialized agencies serving in their respective countries were made available to consult with the team.

4. The team visited Zambia, and various members also visited Malawi, Tanzania and Kenya. The team leader had discussions with the President of the Republic of Zambia and a number of his ministers and officials. In addition, he attended briefings of the Security Council Special Mission in London and held technical discussions with Mr. Arnold Smith, Commonwealth Secretary-General, and with officials of the Commonwealth Secretariat.

5. The team held numerous meetings with officials of the Government of the Republic of Zambia in order to determine the "normal flow of traffic" and to discuss what was needed to maintain it. Following this, the team made its assessment of the capacity of alternative routes to carry this traffic and what was needed to allow them to do so.

A. Description of the situation

The normal flow of traffic

6. It was not an easy task to arrive at an estimate of the normal flow of traffic, as Zambia has been faced during the past decade with a succession of special situations. In 1963, the Federation of Rhodesia and Nyasaland was dissolved, and the after effects of the dissolution were still being felt when, on 11 November 1965, Southern Rhodesia illegally declared itself independent. The economy of Zambia

suffered significant disruption from this action, and from the attempts to divert trade in accordance with sanctions applied against the illegal régime. Succeeding years saw wide fluctuations in the price of copper, the major export, and a sustained drought which required heavy imports of maize, the staple food. In 1970, a disaster occurred at Mufulira Mine, causing the loss of many lives and a reduction of copper production. The rehabilitation of Mufulira had not been completed when the illegal régime in Southern Rhodesia closed the border to Zambian traffic on 9 January 1973. Throughout the period since 1963 the Government of Zambia had been following a policy of import substitution; and after 1965, a policy of finding alternative sources for goods previously imported from Southern Rhodesia. All these factors affected the flow of traffic, its size and its composition, and made it difficult to use a statistical definition of normal flow. Under the circumstances, the team met with officials of the Government of Zambia, to arrive at an agreed definition.

7. After much discussion of alternatives, it was agreed that an acceptable definition of "normal flow of traffic" would be: "The amounts of imports and exports which would allow the citizens of Zambia to maintain their normal standard of living and allow the economy to develop in a normal fashion, i.e., as if the special situation had not arisen".

8. It was agreed that the estimated imports for 1972, adjusted for any significant abnormal movements, would appear to correspond broadly with the normal flow of imports in the immediate future. Excluding pipeline traffic this gives total imports of about 1,430 million tons "normally" carried as follows:

via Southern route	900,000 tons
via Zaire	200,000 tons
via Tanzania	300,000 tons
via Malawi	20,000 tons
Air and other	10,000 tons
Total	1,430,000 tons
Monthly	119,000 tons (say 120,000)

The tonnage of imports could be expected to grow by about 5 per cent per year with the normal growth of the economy, but this should be absorbed by increasing operating efficiency of the transportation systems.

9. Appendix I gives the actual tonnages from 1969-1971, and estimates for 1972. It will be seen that the normal traffic flow as estimated above is broadly in line with the level in earlier years, and is close to the estimated tonnage in 1972. It was agreed that the 1972 figures included abnormal maize movements which were not expected to occur in 1973 or 1974.

10. It was necessary to look at exports in a slightly different way. The major "normal" exports, in tonnage and value, are copper, lead and zinc. Over the years development programmes have been worked out and set in train by the copper mining companies which indicate that under normal circumstances, the exports of copper would have grown from 700,000 tons (actual) in 1972 (the low figure reflects the Mufulira disaster) to 870,000 tons in 1975. Lead and zinc exports would continue at about 85,000 tons annually over the same period. The "normal" export flow therefore would appear to be as follows:

	Copper	Lead and zinc	Total
1972 (Actual)	700,000	85,000	785,000
1973 ...	735,000	85,000	820,000
1974 ...	810,000	85,000	895,000
1975 ...	870,000	85,000	955,000

11. It is thus clear that the major problem will be to carry the imports into Zambia, as not only will the export tonnage be substantially lower, but the bulk/weight ratio also favours exports. In other words, "alternative systems of road, rail, air and sea communications" to carry the normal flow of imports will have the capacity to carry all the normal exports.

12. An attempt was also made to establish the period of time over which the need to carry the normal traffic on alternative routes will persist. The two major developments in transportation routes available to Zambia which will come to fruition shortly are the completion of the rail link with Dar es Salaam (the TAZARA), and the completion of the Cubal variant on the Benguela railway to Lobito. While it is impossible to give a single day on which such major projects will become fully operational, it appears that the former will not be available for about three years (say the end of 1975) and the latter for about 16 months (say mid-1974). Therefore, the alternative systems will have to operate for about three years, with the likelihood that the situation will be eased slightly by mid-1974.

13. In summary, then the traffic to be carried would come to 120,000 tons monthly of imports. Alternative systems to carry this tonnage of imports will allow the exports to be carried with no difficulty.

Alternative routes

14. The major routes onto which the Southern traffic will need to be diverted are as follows:

(a) Through Zaire by rail

(b) Through Malawi by road (connecting to rail)

(c) Through Tanzania by road

15. Appendix II gives a detailed description of each of the ports involved, and appendix III deals with each of these routes. In summary the team estimates that it will be possible to carry some 23,000 tons per month of imports into Zambia through Zaire (corresponding to 38,000 tons per month of exports). Through Malawi, the team estimates that it will be possible to carry 17,000 tons monthly. Some 65,000 tons can be carried through Tanzania. This gives a total of 105,000 tons per month, leaving a shortfall of 15,000 tons per month to be made up by other means.

16. In addition to the 15,000 tons per month to be made up by other means, the team believes it will take some months to build up to the tonnages set out in paragraph 18 above. In addition to trucks, port handling equipment, road improvements, storage sheds and maintenance depots, substantial improvements in cargo handling will be necessary, documentation will have to be speeded up, changes in managerial practices will have to be introduced at all stages and there will be

a substantial lengthening of the supply pipeline. In the short run - say the next three to four months - an airlift would be necessary if normal tonnages were to be carried. Even though Zambia might be able to "tighten belts" and so reduce the necessary imports to an amount significantly below the normal flow, it will be necessary to utilize air freight to ensure that critically needed supplies are available, that port congestion is eliminated, and so forth.

17. Given a little time, the 15,000 tons per month shortfall might be handled in a number of ways. It might be possible to increase the traffic through Malawi - perhaps by another 5,000 to 10,000 tons per month. The balance - some 5,000 to 10,000 tons per month - could be brought in by one or more of the following:

(a) Increased operating efficiency at Dar es Salaam

(b) Arrangements to obtain additional tonnage through Mombasa

(c) Airlift from ports with adequate airports (other than Dar es Salaam)

(d) Use of Matadi and the "Voie Nationale".

The short term

18. The estimates given above are to a large extent theoretical. They are based on total tonnages on a monthly basis. They would seem to apply in about six months when arrangements have been made to divert the various types of cargo to the various ports and modes of transport best able to handle them. In the meantime, there are a number of essential considerations. These relate to (a) imports aboard ships diverted to Lobito, Beira, Dar es Salaam and Mombasa; (b) the pipeline of orders already placed; (c) the lengthening of the pipeline as a result of using new sources of supply and new routes; (d) the inward movement of the trucks and other supplies necessary to establish the new routes.

19. It is already clear that stocks of some materials and supplies in Zambia are inadequate to bridge the gap until new shipments are brought in by any of the above routes. Meat products, certain spares and supplies for the mines and for Zambia railways, medical supplies, yarns for the blanket factory, for example, are already in short supply. The Government of Zambia has initiated a major study of stocks on hand and when this study is completed, it will be possible to estimate immediate shortages having regard to the goods presently on board ships. These shortages will then have to be dealt with, either by special arrangements at ports or by utilizing air carriers as appropriate. Some air cargo will be utilized to clear ports, some will need to be used to bring imports from places of origin to meet critical shortages in Zambia. Rebuilding stocks will add to the "normal" tonnages given in paragraph 11 above.

Needs of Zambia to maintain the normal flow

20. The mission has made estimates of what will be necessary to handle 105,000 tons per month. These can be no more than an indication of actual needs, as specifications are unknown in some cases. The precise nature of any assistance will need to be discussed by the Governments and agencies concerned.

21. The Government of Zambia provided the team with the following assessment of their immediate needs:

Item	Cost
300 heavy vehicles with trailers	K 8,100,000
Additions to workshops and installations for trucking fleet	2,000,000
Manpower requirements	1,000,000
Mobilization costs (including equipment hire)	1,000,000
Communications improvements	100,000
Spare parts at K 200,000 per month for six months	1,200,000
Total	K 13,400,000[1/]

1/ All costs in the report are given in kwacha; the approximate rate of exchange is K 0.62 = $1 (US).

22. In the longer term, i.e., to maintain the normal flow of traffic, the Government of Zambia's preliminary assessment of needs was as follows (including the immediate needs in paragraph 21 above):

Item	Cost
1,200 heavy vehicles (various)	K 27,000,000
Drivers	4,800,000
Other manpower costs	2,300,000
Housing for additional manpower	1,484,000
Training costs	1,000,000
Workshop installations - Dar es Salaam route	2,000,000
- Malawi route	500,000
- Other	1,900,000
Storage facilities	1,428,000
Handling equipment	626,020
Zambia railways - 200 wagons	3,000,000
- 4 locomotives	1,100,000
Total	K 47,134,020
Add storage and handling facilities for wheat and vegetable oils	2,350,000
Total	K 49,484,020

23. In addition, the Government of Zambia estimated that the additional costs of handling the normal traffic based on a preliminary study of selected commodities would be between K 31.9 million and K 35.9 million.

24. The Government of Zambia also indicated needs for further improvement in the telecommunication system, totalling about K 1.7 million (at 1971 prices). No attempt was made to calculate the additional costs of air freight to maintain the normal flow of traffic.

25. In summary, the Government of Zambia's early assessment of the costs of maintaining the normal flow of traffic by alternative routes was as follows (excluding use of air freight):

(a) Additional equipment, manpower and other facilities: K 49.5 million;

(b) Additional costs of handling normal traffic: from K 31.9 million to K 35.9 million;

(c) Additional communications equipment: K 1.7 million.

The estimated total costs would therefore be between K 83.1 million and K 87.1 million.

B. Assessment by the team

26. After examining the various alternative roads the team believes that the traffic should, as far as possible, be carried via rail through Lobito, via road only through Dar es Salaam and Mombasa, and via road through Malawi. The possibility of using East African Railways from Mombasa or Dar es Salaam to Mikumi and then by road, or using rail to Kigoma then by lake to Mpulungu and then by road, should not be considered as primary routes, but should be kept as reserve methods of clearing the ports of Mombasa and Dar es Salaam. In the event that the congestion becomes critical the possibility of using the TAZARA for inward movement of goods and then trans-shipping to road was also examined but is not recommended. This would add to costs and to transit time and delay completion of the railroad. In any event at this time there is a serious shortage of rolling stock to carry this inward cargo on the TAZARA.

Via Rail through Zaire to Lobito

27. This is an all-rail route which can carry up to 38,000 tons monthly of exports and 23,000 tons monthly of imports. Because it is an established all-rail route, it should be used as far as possible for bulk commodities, and for heavy items not suitable for trans-shipment and road haulage. As the total tonnage of bulk commodities and heavy items will far exceed the inward capacity, great care must be taken to determine which imports should come through Lobito.

28. In order to carry the tonnage inward and outward, two things are necessary. First, there must be some additional equipment and supplies provided for Zambia railways; second, negotiations must be carried out to get agreement that Benguela railways will carry the kinds of tonnage offered and that appropriate facilities are available at the port. The team, in assessing the needs to allow this route to be utilized to capacity, finds that Zambia railways requires 300 general cargo wagons, 65 refrigerator cars, 4 additional locomotives and some K 1 million of spare parts (these are so urgently required that some should be airlifted to Zambia even at substantial extra cost). In addition to the foregoing, up to 12 diesel electric shunting locomotives (750 to 1,000 H.P.) are urgently needed if the railway is to continue to operate efficiently.

29. In summary, the team estimates the following needs to make full use of the capacity on the Lobito route. It should be stated that many of these items will be useful well beyond the period of diverted traffic.

Item	Cost
300 general cargo wagons	K 4,500,000
65 reefers	1,600,000
4 locomotives	1,100,000
12 diesel shunting	1,080,000
spares	1,000,000
Total costs of additional equipment	K 9,280,000

Via Road to Malawi, then by rail to Nacala and Beira

30. To carry 17,000 tons monthly on this route, the team estimates the following needs for Malawi Railways. Most of these items will be useful long after the present needs have been met.

Item	Cost
80 wagons	K 960,000
70 tarpaulins	5,600
2 shunting locomotives	180,000
4 fork-lift trucks	32,000
3 mobile cranes	75,000
Subtotal	K 1,252,600
Additional road maintenance costs	60,000
Total costs (excluding trucks)	K 1,312,600

31. Trucks needed for the Malawi route would appear to be about 450, of which about 50 could be provided locally. This leaves some 400 trucks to be provided at a cost of K 9,000,000. In addition new workshop facilities and installations to handle the trucking to Malawi are needed at Balaka and Salima, totalling K 500,000. Additional storage will be necessary at Balaka (K 10,000) and Salima (K 18,000). Some 16 fork-lift trucks (K 144,480) and 8 cranes (K 272,000) will be needed for the trucking operations. These items total K 9,044,480.

32. In summary, the following is needed to carry some 17,000 tons of imports and 7,000 tons of exports via Malawi:

Item	Cost
Equipment and rolling stock	K 1,252,600
Additional road maintenance	60,000
Additional trucks	9,000,000
Workshop facility	500,000
Storage	28,000
Fork-lift trucks	144,480
Cranes	272,000
Total (Malawi route)	K 11,257,080

The Route through Tanzania

33. The major route to be used for both imports and exports is the all-road route from Zambia to Dar es Salaam and Mombasa. Other modes of transport will provide important reserve facilities if congestion at the harbours seems too great. The vastly expanded road traffic to these ports will necessitate improved facilities and management at the ports, excellent arrangements to clear cargo from the ports, maintenance facilities for the trucking fleet at various places along the routes, increased storage capacities, a major increase in the trucking fleet and the

personnel to handle the larger fleet, improvements in the communications system and a new management structure to handle imports and exports.

34. Improved facilities at the ports will be provided by a $26 million harbour improvement programme being undertaken with the assistance of the Government of Canada and by a similar sized major construction programme being financed by the International Bank for Reconstruction and Development. These programmes are to be expedited as much as possible although it is unlikely that the latter can be speeded up. The Canadian programme will finance the construction of additional lighterage (to be built if possible in East Africa) and provide fork-lift trucks and mobile cranes. The original four-year programme to provide 98 diesel tow tractors (38 x 8T and 60 x 20T) and 440 flat-bed trailers is to be speeded up as much as possible. This assistance will do much to increase the ability of the ports in East Africa to handle the Zambian traffic.

35. Also needed is the new entrance road behind Berth 6 at Dar es Salaam Harbour, and the early completion of the Gerazani road. An emergency bridge, perhaps a Bailey bridge, just north of Tanga on the Mombasa road would permit the use of the shorter road for traffic to and from Mombasa. No estimate of this cost is available, but K 100,000 should cover the costs.

36. In order to clear goods from the ports, it will be necessary to have marshalling grounds outside the port area (Kenya National Transport Company (KENATCO) has such a yard at Mombasa, and there is a transit store at Ubungo at Dar es Salaam). Additional yards and storage space will be needed at Dar es Salaam, however, and a fleet of vehicles available to carry cargo from the port. It is not possible to estimate the extent to which the tractors and trailers to be provided to the port authority (see paragraph 35 above) will be used for this purpose. The team believes provision needs to be made for additional tractors and trailers to be stationed at Dar es Salaam. Some 50 tractors and 125 trailers, subject to the final disposition of equipment by the port authority and the availability of other equipment in the area of the dock, would appear to be necessary. The costs of these will approximate K 2,125,000.

37. The road connexion between Dar es Salaam and Zambia appears to be able to handle the expected traffic provided adequate maintenance is carried out and weight restrictions are rigidly enforced. The Great North road within Tanzania has been completed except for 121 miles between Dar es Salaam and Morogoro, which are still under construction. The critical considerations in carrying the expected volume of traffic are adequate maintenance and a rigid enforcement of load limitations. It is impossible to overstress the importance of the latter, as any overloading might well lead to a breakdown of sections of the Great North road.

38. The actual allocation of traffic between Dar es Salaam and Mombasa should be kept flexible in practice. For the purpose of calculating the needs of Zambia, however, the following tonnages were used:

Monthly tonnages via Mombasa	Imports	22,000
	Exports	10,000
via Dar es Salaam	Imports	43,000
	Exports	20,000

Given the turnaround time which has featured the operations of Zambia Tanzania Road Services, adjusted for empty trips and downtime, the team estimates that 1,310 trucks (30 T) will be needed for the Dar es Salaam traffic and 760 trucks (30 T) will be needed for the Mombasa traffic. As some 820 trucks are now available or, we understand, on order, the addition to the trucking fleet to carry the traffic to Mombasa and Dar es Salaam will amount to about 1,250. These will cost approximately K 25 million. This number could be reduced if turnaround time could be improved.

39. The larger trucking fleet on the Dar es Salaam and Mombasa routes will necessitate additions to the existing workshop facilities. The Government of Zambia estimated the costs of these additions at K 2 million. The team discussed this estimate with the authorities in Zambia, including officials of Zambia Tanzania Road Services, and agrees that this estimate is reasonable.

40. Increased storage capacity will be needed either at Dar es Salaam or Mombasa for vegetable oils and inedible oils. These will cost some K 157,000.

41. In summary, the use of the routes through Tanzania will necessitate the following. Many of these items will be useful after the extraordinary situation is ended.

Item	Cost
Bailey bridge and approaches	K 100,000
Additional tractors and trailers at Dar es Salaam	2,125,000
Additional trucks	25,000,000
Maintenance facility	2,000,000
Increased storage capacity	157,000
Total	K 29,382,000

42. The above total does not include many other costs in Zambia, including the costs of necessary personnel, or the costs of any telecommunication equipment needed in Tanzania or Kenya.

Other costs

43. New workshops and facilities in Zambia needed to cater for the haulage through Malawi have been estimated to cost K 1.9 million.

44. Additional storage sheds in Lusaka will cost about K 900,000 and at Ndola and Kitwe additional storage will cost about K 500,000.

45. Inside Zambia, additional fork-lift trucks will be required at an approximate cost of K 70,000 and cranes will be needed costing some K 135,000.

46. Special problems will emerge in handling wheat and vegetable oils. For vegetable oils some 30 special road tankers will be required costing some K 1.2 million and storage tanks will be necessary costing some K 215,000. Grain silos will be needed costing some K 2.25 million.

47. In order to handle the traffic through Dar es Salaam and Mombasa, the telecommunications system must be radically improved. Zambia has two major projects in hand to improve external communications - an earth station and a microwave link to the Tanzanian border - but both will require at least two years to complete after commencement. The emergency needs are better served by high frequency radio links. The equipment required (see appendix IV) will cost about K 1.1 million, installation costs will add about K 600,000 to the cost. This cost - K 1.7 million - does not include any equipment needed in neighbouring countries.

48. A major additional cost will be to provide the manpower needed to operate the larger truck fleet. The experience of Zambia Tanzania Road Services has been that it takes from two to six months to train a driver depending upon his background, and about six months to train a semi-skilled mechanic. Developing a skilled mechanic takes about a year. The total manpower needs for a fleet of 500 trucks is about 2,500 men - of these about 1,425 are loaders, swampers, etc., about 450 semi-skilled mechanics and fitters, about 100 skilled mechanics and fitters, about 450 drivers and about 75 engineers and administrative staff.

49. The team believes that the trucking fleet should be operated in units of about 700 vehicles each. This would offer the advantage of allowing several sources of equipment supply without prejudice to a high degree of standardization, and would make the control and supply of spare parts (always a critical question) easier to handle. Financial problems might also be eased, a certain degree of competition would be introduced and flexibility in operating procedures could be established (for example, leasing, subcontracting, etc.).

50. As some 2,000 additional trucks will be needed to handle the traffic, the approximate additional manpower requirements will be as follows:

Item	No.	Cost
Drivers	1,800	K 4,000,000
Loaders, etc.	3,800	3,800,000
Semi-skilled mechanics	1,200)	
Skilled mechanics	270)	4,500,000
Engineers and administrators	200)	
Total:	7,270	K 12,300,000

51. In Zambia it appears that housing units for skilled and semi-skilled staff will cost approximately K 2,000 per unit, for senior staff approximately K 15,000 per unit. If housing needs to be provided as part of the terms of service, housing costs for the additional manpower will be about K 5,940,000. It should be noted that such a construction programme might well add to import requirements. On the other hand these buildings will be useful long after the extraordinary situation facing Zambia has passed.

52. In summary, these other costs are as follows:

Item	Cost
Workshop facilities	K 1,900,000
Storage facilities	1,400,000
Fork-lift trucks and cranes	205,000
Special tankers and storage for oils	1,415,000
Silos for grain	2,250,000
Manpower costs	12,300,000
Communications equipment	1,700,000
Housing for extra manpower	5,940,000
Total	K 27,110,000

53. The needs to maintain traffic at estimated capacity of overland routes may be summarized as follows:

Item	Cost
To utilize Zaire route to capacity	K 9,280,000
To utilize Malawi route to capacity	11,257,000
To utilize Tanzania route to capacity	29,382,000
Other costs	27,110,000
Total	K 77,029,000
(say)	K 77,000,000

It should, however, be noted that much of the equipment and facilities included in this total would have been necessary in the normal course of development of Zambia, Tanzania and Malawi. To some extent the urgent needs reflect merely an earlier phasing of later developmental needs. This is true for most of the railway rolling stock, the housing needs, the storage facilities and the handling equipment. Even some of the trucks, tractors and trailers would have been needed in the years to come.

Air freight to carry the shortfall until land route capacities are built up

54. The best estimate the team could make of the costs of facilities, equipment and manpower required to use the alternative land routes at their capacity is given in paragraph 53 above. There is however a shortfall of some 15,000 tons per month of imports after utilizing the estimated capacity of each of these routes. If this additional tonnage is brought in by air freight (using nearest suitable ports with available capacity), the cost is likely to be in excess of K 250 per ton - or an added bill of nearly K 4,000,000 monthly.

Additional costs caused by rerouting

55. Even if all the above facilities and equipment were provided, there would still be significant additional costs for carriage by the alternative routes. The team cannot improve significantly on the estimates of the costs provided by the Government of Zambia (see paragraph 23 above) - i.e., between K 30 million and K 35 million.

C. General observations

56. The capacity figures of the various routes given in paragraph 15 above are estimates of what can be done if the needs set out in paragraph 53 above are met and given sufficient time, say four to six months, to get each of the routes operating effectively. If an immediate start is made, and specific attention is paid to improving the efficiency of operations, the needs might be reduced. But even if a concerted effort is made, the team believes that it will take many months and a great deal of effort and technical assistance to achieve "normal" monthly flows. Over the next six months, the tempo of activity in Zambia is bound to slow down; strict import and foreign exchange control will be necessary and government programmes will need to be rescheduled and modified.

57. The normal operations of government under such abnormal conditions will strain the administrative capacity of the public services, and necessitate senior officials devoting all of their time to the normal running of government. The added responsibilities involved in rerouting the traffic and in utilizing all alternate routes effectively will need to be met by special means and by technical assistance of various kinds.

58. It is very difficult under present conditions to make an accurate forecast of the points of entry into Zambia of the future imports during the period preceding the completion of the rail link with Tanzania. Any theoretical exercise tending to assign a specific tonnage to a specific route is certain to need major readjustments to fit the actual circumstances which will develop during this period. The variations in transport demand will be due to the pattern of Zambian requirements, variations of transport demand in neighbouring countries and unforeseen international circumstances.

59. A substantial amount of flexibility will need to be maintained in all areas of transportation, including ocean shipping, choice of receiving harbours, road or rail transportation, etc. In view of the urgency of the situation it is impossible to organize quickly and from scratch an efficient new organization to manage such a huge and complex problem. The team believes it would be preferable to rely on a single firm or consortium to deal with the management, handling, transporting and expediting of traffic moving into and out of Zambia. The terms of reference for such an organization should be carefully specified by the Government in authorizing its activities. All intergovernmental relations and negotiations should, of course, continue to be the responsibility of the Government of Zambia.

60. The reasons for suggesting the use of a single firm or consortium are the following:

(a) The necessity of making the best use of transport or storage capacity available to Zambia in both the public and private sectors;

(b) The necessity of world-wide contacts in shipping circles, and ability to establish offices, correspondents or liaison offices not only in Zambia and in the neighbouring countries, but also in any country trading with Zambia;

(c) The need to avoid congestion and expedite trans-shipment of goods to co-ordinate arrival of cargoes, to make optimum use of the land transportation available at any one time, and to take into account stocks and storage facilities;

(d) The necessity of centralizing and expediting custom formalities and other documentation.

61. The above organization should be concerned only with the national management of transporting goods to or from Zambia and should have nothing to do with the operation of the truck fleet and other transport systems. It should be the only authorized agency dealing with transportation companies, importers and government services. As far as the truck fleet is concerned, it seems clear that a number of operating units will be required. However, it would be dangerous to specify in detail the exact composition of the fleet and the exact assignment of units to any particular route. A wide margin should be left to the trucking operators to utilize their equipment with optimum efficiency. On the basis of the team's assessment, it appears that about 3,000 trucks and trailers will be in use, but this number may vary not only as demand fluctuates but also with the efficiency of management and the possible utilization of new routes (e.g. East Africa Railways, which could reduce the road requirements).

62. At the present stage it is not possible to foresee all the financial and economic consequences which will result from these new transport arrangements. There may be a need to subsidize certain commodities carried on certain routes, but the choice of routes should be made with full knowledge and in relation to the real costs, including overheads and amortization. Only in this way can it be hoped to avoid a permanent distortion of the use of established and future modes of transport, whether in Zambia or in neighbouring countries.

63. In addition to the management group referred to in paragraphs 58-62 above, there will be a need for additional specialized assistance. The Commonwealth Fund for Technical Co-operation has now provided a general transport co-ordination adviser and an expert on air-freight logistics. These experts will be in a position to work out over the next two to three weeks specific technical assistance needs. It should be emphasized, however, that while there would be a role for advisers, most of the requirements will be for operational and executive personnel.

64. The team understands that should it prove necessary to reduce the level of activity in Zambia - e.g., if imports should fall significantly below the normal level - the Government of Zambia has decided to give highest priority to basic necessities and the imports necessary for the copper mines and the agricultural programme. In view of this, the Government, in co-operation with the mining industry and the private sector, will need to give immediate attention not only to the necessary tonnages but also to the allocation of these tonnages, by commodity, to match the established priorities.

65. The team, however, wishes to stress that unless the above-noted needs are met, the economy of Zambia will suffer significantly. Already copper production is likely to slip below its planned figure for 1973, because delivery of necessary machinery and equipment is being delayed. Further slippage is almost certain, with serious effects on the balance of payments of Zambia, and on government revenue.

66. The annual balance of payments will be affected in a number of ways. If copper production slips below planned figures, exports will fall significantly. While rerouting traffic will reduce payments to Rhodesian Railways by some K 28,000,000 to K 30,000,000 2/ (a foreign exchange saving for Zambia), the

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2/ Of course the total loss to the Southern Rhodesian economy will be much greater.

corresponding payments across the exchanges for movements through Zaire, Malawi and Tanzania would be more than double this figure for traffic equal to what the team estimates to be the capacity of these routes. If air freight is used to bring in additional imports to maintain "normal" levels, the deficit on trade account would approximate K 115,000,000. Even payments for services will be affected by the need to increase the use of expatriate manpower to meet the emergency. Thus the total deficit on goods and services may be about K 120,000,000 for "normal" traffic, or K 80,000,000 to K 90,000,000 with limited use of air freight and the use of overland routes at the capacity estimated by the team. As the deficit on transfers is relatively fixed for the next few years at around K 75,000,000 annually, the total balance of payments deficit would seem to be about K 195,000,000 for the "normal" flow of traffic or K 155,000,000 to K 165,000,000 for traffic at the level of the estimated capacity of the land routes with limited use of air freight.

67. Recent improvements in copper prices may go some way to offset this large deficit, and may even offset part of the effects of a reduction in copper production. However, the recent upsurge in prices may reflect the markets assessment of the impact of diverting traffic in Zambia, and it would be dangerous to plan on the basis of significantly higher copper prices unless copper production is seriously affected.

68. The possibility of copper production being seriously affected should not be underestimated. Estimates of transport requirements for imports have been based in general on total tonnage estimates furnished by the Government broken down only into broad categories. Certain of the bulk commodity import requirements present special problems in handling and transiting. In the past such commodities have been carried from origin (if in southern Africa) or from the port of entry (if from outside Africa) to destination by rail. Under the changed circumstances only one direct rail link is available (via Lobito). As already noted, the total amount of cargo to be handled through Lobito is restricted by inland transport arrangements and the amount of bulk cargo limited by commercial considerations of the Benguela railway.

69. Particular attention must therefore be given to the routing of bulk commodities and to the provisions for handling them, especially at ports of entry other than Lobito. The principal commodities in this category identified by the team include:

Item	Estimated annual tonnage required
Coke	80,000
Sulphur	40,000
Timber	35,000
Sugar	15,000
Fertilizer	112,000
Wheat	95,000
Steel	120,000
	497,000 metric tons

70. In addition to the above items, such priority cargo as heavy machinery, refractory material, carbon black and vegetable oil must be considered. Total tonnages in these categories are at least twice the import capacity of the inland route from Lobito, and the problems raised of handling and hauling over the alternate truck routes will be considerable. As most of the bulk items are either essential to the mining industry, or basic food requirements, or needed for the agriculture programme, the problem cannot be ignored.

71. The Government of Zambia will find it extremely difficult to finance the deficit estimated above. Certainly Zambian foreign exchange reserves are not adequate to absorb these costs and the Government's budgetary position is already in deficit. Broadly speaking, in a country such as Zambia, the public deficit reflects the balance of payments deficit. The budget statement for 1973, which makes no allowances for the emergency situation caused by the border closure, estimated a very large deficit. But more than that, the team notes that significant revenue items (from mineral taxation, corporation taxes and import duties on luxuries and semi-luxuries) may well be reduced as a result of the programme to reroute traffic from Rhodesian Railways. These reductions in revenue may be particularly large if traffic falls below "normal" levels. These considerations emphasize the importance of Zambia receiving early and adequate assistance if the normal development of the economy is to continue.

72. As it will take some time to build up to the capacities of the various routes, and to provide all the facilities, equipment and manpower needed, the team has attempted to form an opinion of what should be provided at once, or as quickly as possible. In our view, the most urgent items are:

(a) The organization of the import/export management unit (paras. 58-62);

(b) Provision of telecommunications equipment (para. 47);

(c) Expediting the supply of equipment for Dar es Salaam port (para. 34);

(d) Spare parts, and at least part of the rolling stock for Zambian railways (para. 28);

(e) About 500 trucks (para. 38);

(f) Facilities and equipment for vegetable oils and inedibles (para. 46);

(g) Tractors and trailers to clear cargo from Dar es Salaam port (para. 36);

(h) A freight marshalling yard near Dar es Salaam port (para. 36);

(i) Training arrangements for maintaining and operating all elements of the supply system (para. 48);

(j) Arrangements to assist the Government of Zambia to meet the short-term financial strain and foreign exchange costs of the next three to six months (para. 55).

Appendix I

IMPORT AND EXPORT STATISTICS OF ZAMBIA

Table I

THE SHARE OF INDIVIDUAL ROUTES IN ZAMBIA'S EXTERNAL TRADE[1/]

(Per cent of total)

	1969		1970		1971		1972 (1st half)		1972 estimate[2/]	
	EXP	IMP	EXP	IMP	EXP	IMP	EXP	IMP	EXP	IMP
Through TANZANIA border	28.1	11.4	29.9	12.3	27.7	14.4	28.0	16.0	28.0	15.3
Through RHODESIA border	56.5	64.0	46.9	64.0	48.8	51.1	53.1	45.0	53.1	47.6[3/]
Through MALAWI border	0.9	2.7	0.7	0.9	1.1	1.4	0.5	1.2	0.5	1.1
Through ZAIRE border	14.2	5.8	22.1	5.8	22.1	13.1	18.4	10.3	18.4	9.8
Through PIPELINE	-	15.5	-	16.8	-	19.7	-	27.0	-	25.8
OTHER	0.3	0.6	0.4	0.2	0.3	0.3	-	0.5	-	0.4
GRAND TOTAL	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

1/ Source: For 1969 and 1970 Zambia's CSO - Annual Statement of External Trade - 1970.
For 1971 and the first half of 1972 Zambia's CSO - Method of Transport Analysis.

2/ Assumed that the volume of imports in the second half was the same as in the first half of 1972.

3/ Based on the data provided by Zambia Railways for the rail transport.

Table II

ZAMBIA'S IMPORT ROUTES[1/]

(In metric tons)

	1969	1970	1971	1972 (1st half)	1972 estimate[2/]
Through TANZANIA border	240,973	248,212	294,910	152,440	304,880
Through RHODESIA border	1,359,181	1,293,204	1,048,066	427,461	946,922[3/]
Through MALAWI border	56,166	18,385	29,121	11,164	22,328
Through ZAIRE border	121,546	117,654	268,929	98,050	196,100
Through PIPELINE	328,554	340,348	403,230	256,939	513,878
OTHER	12,970	3,833	6,593	4,416	8,832
GRAND TOTAL[4/]	2,119,390	2,021,636	2,050,849	950,470	1,992,940

1/ Source: For 1969 and 1970 Zambia's CSO - Annual Statement of External Trade - 1970.
For 1971 and the first half of 1972 Zambia's CSO - Method of Transport Analysis.

2/ Assumed that the volume of import in the second half was same as in the first half of 1972.

3/ Based on the data provided by Zambia Railways for the rail transport.

4/ Of which maize =

1969	1970	1971	1972	(1st half)
71,100	31,100	261,700	66,200	(in tons)

Table III

ZAMBIA'S EXPORT ROUTES

(In metric tons)[1/]

	1969	1970	1971	1972 (1st half)	1972 estimate[2/]
Through TANZANIA border	243,694	253,420	221,410	112,708	225,416
Through RHODESIA border	489,725	398,515	390,010	214,359	428,718
Through MALAWI border	7,793	5,749	8,879	2,396	4,792
Through ZAIRE border	123,419	187,291	176,256	74,272	148,544
OTHER	3,182	3,630	2,160	5	10
GRAND TOTAL	867,813	848,605	798,715	403,740	807,480

1/ Source: For 1969 and 1970 Zambia's CSO - Annual Statement of External Trade - 1970.
For 1971 and the first half of 1972 Zambia's CSO - Method of Transport Analysis.

2/ Assumed that the volume of exports in the second half was the same as in the first half of 1972.

Table IV

METHOD OF TRANSPORT OF ZAMBIA'S IMPORTS[1/]

(In thousands of metric tons)

	1969	% of total	1970	% of total	1971	% of total	1972 (1st half)	% of total	1972 estimate[2/]	% of total
By RAIL - total	1,377	65.0	1,341	66.3	1,100	53.6	415.9	43.8	923.8	46.3
of which through RHODESIA	1,255	59.3	1,221	60.5	831	40.5	318.0	33.5	728.0[3/]	36.6
By ROAD - total	401	18.9	338	16.8	543	26.5	273.6	28.8	547.2	27.5
of which through RHODESIA	103	4.8	71	3.5	217	10.6	109.5	11.5	219.0	11.0
By PIPELINE	328	15.5	341	16.8	403	19.7	256.9	27.1	514.0	25.9
OTHERS	13	0.6	2	0.1	4	0.2	4.0	0.3	8.0	0.3
GRAND TOTAL	2,119	100.0	2,022	100.0	2,050	100.0	950.4	100.0	1,993.0	100.0

1/ Source: Data for 1969 and 1970 are based on Zambia's CSO - Annual Statement of External Trade - 1970. Data for the first half of 1972 are based on Zambia's CSO - Method of Transport Analysis.

2/ Assumed that the volume of imports in the second half was the same as in the first half of 1972.

3/ Based on the data provided by Zambia Railways for the rail transport.

Table V

METHOD OF TRANSPORT OF ZAMBIA'S EXPORTS[1/]

(In thousands of metric tons)

	1969	% of total	1970	% of total	1971	% of total	1972 (1st half)	% of total	1972 estimate[2/]	% of total
By RAIL - total	611.8	70.5	582.9	68.6	535.0	67.6	288.0	71.3	576.0	71.3
of which through RHODESIA	488.4	56.3	395.4	46.5	386.0	48.8	214.0	53.0	428.0	53.0
By ROAD - total	254.8	29.4	265.7	31.4	256.4	32.4	115.7	28.7	231.4	28.7
of which through RHODESIA	1.6	0.2	3.2	0.4			0.1	...	0.2	...
OTHER	1.2	0.1	...	...	...	...	...	...	...	...
GRAND TOTAL	867.8	100.0	848.6	100.0	791.4	100.0	403.7	100.0	807.4	100.0

1/ Source: Data for 1969 and 1970 are based on Zambia's CSO - Annual Statement of External Trade - 1970. Data for the first half of 1972 are based on Zambia's CSO - Method of Transport Analysis.

2/ Assumed that the volume of exports in the second half was the same as in the first half of 1972.

Table VI

ZAMBIA'S EXTERNAL TRADE VOLUME[1/]

(In metric tons)

	1969	1970	1971	1972 (1st half)	1972 estimate[2/]
Imports	2,119,390	2,021,636	2,050,849	950,470	1,992,940[3/]
Exports	867,813	848,605	798,715	403,740	807,480
Balance	1,251,577	1,173,031	1,252,134	546,730	1,185,460

IMPORTS - WITHOUT PETROLEUM PRODUCTS
TRANSPORTED THROUGH THE PIPELINE

	1969	1970	1971	1972 (1st half)	1972 estimate[2/]
Imports	1,790,836	1,681,288	1,647,619	693,531	1,479,062
Exports	867,813	848,605	798,715	403,740	807,480
Balance	923,023	832,683	848,904	289,791	671,582

1/ Source: For 1969 and 1970 Zambia's CSO - Annual Statement of External Trade - 1970.
For 1971 and the first half of 1972 Zambia's CSO - Method of Transport Analysis.

2/ Assumed that the volume of import in the second half was the same as in the first half of 1972.

3/ Based on the data provided by Zambia Railways for the rail transport.

Table VII

THE SHARE OF SELECTED HARBOURS IN ZAMBIA'S EXTERNAL TRADE[1/]

(In thousands of metric tons)

	EXPORT		IMPORT	
	1970	1972 (1st half)	1970	1972 (1st half)
LOBITO	73.3	143.4	92.3	109.4
BEIRA	154.5	231.2	116.6	708.8
LOURENCO MARQUES	34.4	121.5	28.5	26.6
DAR ES SALAAM	112.5	252.5	181.4	299.8
OTHER	-	2.9	3.1	8.4
TOTAL	374.7	751.5	421.9	1,153.0

1/ Source: For 1970 Zambia's CSO - Annual Statement of External Trade - 1970.
For the first half of 1972 Zambia's CSO - Method of Transport Analysis.

Table VIII

ZAMBIA'S IMPORT COMPOSITION
TRANSITING RHODESIA
IN 1970 1/

In thousands of kwacha
(f.o.b.)

	BY RAIL	BY ROAD	TOTAL
Food	17,596	1,961	19,557
Beverages and tobacco	82	72	154
Crude materials	3,108	215	3,323
Mineral fuels	4,077	147	4,224
Oils and fats	3,108	2	3,110
Chemicals	12,717	2,408	15,125
Manufactures classified by materials	17,986	8,547	26,533
Machinery and transport equipment	31,202	36,095	67,297
Miscellaneous manufactured articles	1,309	943	2,252
Miscellaneous transactions	10	49	59
TOTAL	91,195	50,439	141,634

1/ Source: Zambia's CSO Annual Statement of External Trade - 1970.

Appendix II

CAPACITY OF VARIOUS PORTS TO CARRY REALLOCATED TRAFFIC FROM ZAMBIA

The allocation of traffic between the various ports given in the following table has been examined on the basis of visits to the ports of Dar es Salaam, Tanga and Mombasa to assess the problems. The assumed quantities are given in tons per month:

Ports	Import	Export	Total
Lobito	35,000	30,000	65,000
Beira	5,000	-	5,000
Nacala	12,000	7,000	19,000
Mtwara	-	-	-
Dar es Salaam	43,000	20,000	63,000
Tanga	-	-	-
Mombasa	22,000	10,000	32,000
	117,000	67,000	184,000

Although it is not proposed to divert any Zambian traffic through Mtwara and Tanga, both these ports have been considered because they may be of importance. In the case of Mtwara it might perhaps be possible to use this port for an airlift. In the case of Tanga, the Tanzanian Government has proposed the diversion of Tanzanian traffic from Dar es Salaam to free capacity for Zambian traffic. Each port is now considered in the sequence referred to in the above table.

A. LOBITO

No direct approach has been made by the team to port authorities in Lobito to obtain information. The proposed diversion of traffic involves an increase of the order of two to three times the traffic previously handled for Zambia. It is understood that this amount of traffic is small compared with the total through-put of the port, and there would seem to be no reason to doubt the ability of the port to handle it. These are capacity restraints on the railways, and this is discussed separately in arriving at the probable export/import capacity of the Lobito route (estimated at 23,000 tons of imports and 35,000 tons of exports).

B. BEIRA

In 1970, this port handled a total of 231,200 tons of Zambian exports and 708,800 tons of imports. It is now proposed to move through Beira only the traffic that can be handled by road and rail through Malawi.

Although no visit has been made to the port, there can be no doubt that the traffic will be within the capacity of the port. However, if it is intended to continue to handle vegetable oil through the port, the change in method of transport will create problems of storage, loading and movement of this commodity.

C. NAKALA

Information available indicates that there will probably by now be four deep-water berths operating in the port. Traffic approaching 2 million tons is indicated, but much of this is probably oil or other cargoes, so the general cargo capacity cannot be deduced. It is known that further expansion up to a total of 10 berths has been planned, and there may well be one further berth completed during this year and two next year. The exact timing of completion of these berths and provision of equipment for them has not been confirmed. However, it seems unlikely that the proposed traffic will be too much for the port to handle. It seems likely that the amount of traffic that can be allocated to this route will be limited primarily by the road and rail connexions through Malawi.

D. MTWARA

The port of Mtwara has two excellent deep-water berths (or berths for three smaller ships), with ample back-up space and storage. The East Africa Harbours Corporation (EAHC) assesses the capacity of the port at 320,000 tons per year and does not expect the normal Tanzanian traffic to amount to more than 150,000 tons during the next year. This port could therefore handle additional traffic if required. However, there is no rail connexion, and the road connexions are extremely poor. The port can therefore only be expected to contribute to the movement of Zambian traffic if an airlift is operated from Mtwara to Zambia. Because of the small number of berths it may be advisable to consider the peak capacity as less than 320,000 tons per year as ship delays would be high if the port works to a high berth occupancy. A figure of 250,000 tons per year or slightly more, however, is a safe assumption.

E. DAR ES SALAAM

As a result of discussions between the Government of Tanzania and the Government of Zambia, the Government of Tanzania has issued instruction that imports for Tanzania should, in future, be routed through Tanga, so that the maximum possible capacity can be made available for handling Zambian traffic.

The EAHC has some reservations about the feasibility of diverting a large proportion of the Tanzanian traffic, both because of the difficulties of rerouting parts of the cargo of ships which carry cargo for both countries and because of the limitations of Tanga.

The port authorities now feel that they would be able to handle the proposed Zambian traffic without diversion to Tanga. Their estimate of the likely traffic in the next year on this assumption is given in the following table.

EAHC estimate of possible traffic through Dar es Salaam 1973 - tons

Route	Import	Export	Total
Zambia	515,000	240,000	755,000
Zaire) Rwanda) . . . . . Burundi)	70,000	130,000	200,000
Tazara Railway construction	130,000	-	130,000
Tanzania	550,000	350,000	900,000
	1,265,000	720,000	1,985,000

(The above figures relate to general cargo and do not include the petroleum products landed at the oil berth or crude oil at the single point mooring.)

EAHC considers that a total traffic of 2,000,000 tons per year can be handled through the port without diversion to Tanga, provided that clearance from the port area is carried out quickly in order to avoid a build-up in the port, which is now extremely short of storage space because of the works that are being carried out.

The relevant facilities in the port consist of a lighter wharf, which is due to be modernized during the next two years, and eight deep-water berths.

Four of the deep-water berths have been in operation for some years. Berth 1 has a separate transit shed, and one large combined shed is available for Berths 2, 3 and 4.

Berths 5, 6, 7 and 8 have recently been constructed. Transit sheds at Berths 5 and 6 are now under construction and probably will be completed by July 1973. The single large transit shed proposed for Berths 7 and 8 may be available by September or October of this year, but the back-of-port areas will not become available for about a year. All four of these berths will therefore be operating under considerable difficulties during the coming year, with very inadequate storage space.

Despite the above difficulties, these berths have been handling quite large quantities of cargo during recent months. Total through-put i.e., exports and imports together, at each of the eight berths have been calculated for the latter part of 1972 and are given in the table below.

GENERAL CARGO HANDLED OVER DEEP-WATER BERTHS AT DAR ES SALAAM

1972 - last quarter

(tons)

	October	November	December
Berth 1	16,400	16,100	17,300
2	14,000	19,200	11,000
3	10,600	11,600	12,800
4	6,700	8,600	3,200
5	9,800	8,200	11,700
6	9,900	11,300	10,900
7	6,800	16,200	12,000
8	12,400	9,700	13,000
TOTAL	86,600	100,900	91,900

Combined total 280,000 tons in three months, equivalent to 1.1 million tons per year of EAHC estimated maximum capacity of 1.4 to 1.5 million tons per year.

It will be seen that the cargo handled over Berths 7 and 8 has been of the same order as that handled at Berths 1, 2 and 3. This has been achieved by using these berths primarily for such cargoes as the construction materials for the Tazara and arranging direct loading on to road vehicles for immediate removal from the port. This has reduced as far as possible the amount of traffic that has to be carried along the narrow aprons to the main transit shed at Berths 2, 3 and 4. Use of Berths 5, 6, 7 and 8 for this type of traffic, including Zambian traffic, which can be removed directly to the transit store at Ubungo, will be essential if the maximum use is to be made of this part of the port. It will also be essential that sufficient road vehicles should be made available immediately they are required for removal from the transit sheds at Berth 1 and Berths 2, 3 and 4 of any Zambian cargoes that have to be stored in the docks.

Since the exact time of arrival of ships carrying Zambian cargoes and the time required for documentation cannot be foreseen, quick removal can only be guaranteed if a reservoir of vehicles ready for loading is kept available close to Dar es Salaam.

EAHC has indicated that it anticipates handling a total of 2 million tons per year on the basis of approximately 500,000 to 600,000 tons per year by lighters and from 1.5 to 1.4 million tons per year on the eight deep-water berths. This requires handling of an average of about 180,000 tons per year on each of the eight deep-water berths. This is not unreasonable compared with the cargo handled during 1970, when only three deep-water berths were operational. These, together with the lighter wharf, handled 1,265,000 tons. If the same through-put can be achieved on those three berths, it will only be necessary for the other five berths

to handle about 150,000 tons each during the next year. This should be feasible, but berth occupancies are likely to continue to be very high, and there will be appreciable delays to ships waiting for berths. Delays in 1970 averaged 1.5 days per ship. As already mentioned, the shortage of storage space makes it essential that vehicles should be available for rapid clearance from the docks and from Ubungo and also that delays due to documentation should be kept to a minimum. It is on this basis considered reasonable to expect the port to handle up to 20,000 tons of exports and 43,000 tons of imports for Zambia each month, with little or no diversion of Tanzanian cargoes to Tanga. However, it seems likely that the required improvement in availability of vehicles can only be achieved if some centralized control of the movement of traffic for Zambia is established to keep track of the cargo as it approaches the port, is discharged, moved through the port and carried up to Zambia.

As already mentioned, there is considerable traffic congestion in the port area, so that it is important that some steps should be taken to improve the situation. Two points mentioned by EAHC are important.

The first is that it is constructing a new entrance road behind Berth 6. Once this is built, the main dock entrance behind Berth 4 can be used for out-going traffic only, and this should improve the flow of traffic, particularly in the critical area at the back of the transit shed at Berth 4. The construction of this new access road is behind programme, and EAHC is having difficulty with the contractor (the Tanzanian Government-owned company Mecco). It may be that some intervention by the Tanzanian Government would be necessary to produce a quick solution to this problem.

The second point mentioned by EAHC is that road movement could be improved by completion of the partly constructed Gerazani road. Because this road is not completed, quite a lot of traffic enters the docks by the gate behind the lighter wharf and travels through the most congested part of the docks and out by the main entrance to save taking a detour through the town. No exact statistics are available for the amount of traffic that is misusing the dock area in this way, but it is probably substantial.

Another way in which the flow of traffic out of the main dock entrance could be improved would be to streamline the arrangements for checking out-going vehicles. There are two check points where checks are made separately by the customs authorities and by the police. If arrangements could be made for the two checks to be carried out jointly, the flow of traffic could be improved and the development of queues of lorries at the first check point (which is close to an important junction behind Berth 4) could be eliminated.

The UNDP port study for the port of Dar es Salaam has only just started, and the study will take 12 months. One problem that will form an important point of that study is an analysis of the movement of traffic in the existing docks. In addition to studying minor improvements like those mentioned above, it is intended to make a detailed study of the whole question of railway operation in the port. The present port is laid out as a railway port, and a considerable number of railway wagons are in the port at any given time. Railway tracks are provided on the apron of each of the deep-water berths. This has necessitated the adoption of a somewhat unsatisfactory layout for some of the transit sheds, making movement of vehicles difficult. For the new Berths 6, 7 and 8, which are now being completed, and for Berths 9, 10 and 11, which are about to be started, the

adoption of a railway-oriented layout is being continued, with the added complication that both the East African Railways and the Tazara Railway, which have different gauges, are to be accommodated in the same area. A detailed study is to be made of the effectiveness of the port operations. The risk of prejudging the results of that study should be mentioned. EAHC indicated that it expects that the entire export traffic from Tanzania would be brought to the berths by road and that no more than 20 per cent of the Tanzanian imports would leave the docks directly by rail. In addition, most of the traffic for Zaire, Rwanda and Burundi normally moves from the docks by rail (generally from Berth 1). On this basis, it would appear that the amount of space occupied by the railways in the docks is not justified and that the congestion of the port could probably be considerably eased by stopping rail movements inside the docks altogether or very largely. This part of the port study was not due to begin until about May of this year, and it may be difficult to bring it forward; the possibility, however, is being considered by the consultants, Bertlin and Partners.

EAHC indicated that a considerable amount of additional equipment was needed for the port. Under a Canadian loan, some $26 million of port equipment is due to be provided over the next four years. In addition to this, discussions have been going on between the Canadian and the Tanzanian Government for an additional $6-8 million of equipment, which may be provided quickly. The position regarding this equipment and the expediting of some of the equipment under the main loan is now under urgent examination by the Canadian authorities. One of the most urgent requirements is the provision of extra lighters. Their construction in East Africa is being studied.

A number of road improvements are being carried out in Tanzania under United States aid. Some 20 miles of the road between Dar es Salaam and Morogoro is likely to be completed very shortly. The remaining 112 miles is scheduled for completion in October 1974, but it may be possible to bring this forward by about six months. The most important road from the point of view of clearance of the port is a new route to join the port to the main road near Ubungo. The design studies for this section of road have not yet started but should start soon. They would probably take about 12 months because of the difficult river crossing and crossings over the East African and Tazara Railways. It seems unlikely that the construction will be completed in much less than three years.

F. TANGA

The present through-put of the port of Tanga is about 240,000 tons per year, and much of this is sisal export, which is declining. EAHC estimates that the through-put can be increased by about 10,000 tons per month with the present equipment by working additional shifts. Any further increase will depend upon the provision of extra lighters and other equipment, which they do not think could be made available in less than six months.

One ship carrying 10,000 tons of cement has been diverted from Dar es Salaam to Tanga, and discharge commenced last week. The port manager was very doubtful whether East African Railways would be able to match the maximum rate of discharge of about 1,000 tons per day that he thought could be achieved. He thought that 500 tons per day might be the limit of the railway capacity.

In view of this and the very limited storage available in the port, it is considered doubtful whether diversion of more than about 10,000 tons per month can be envisaged, for at least six months.

Mention has been made of the fertilizer jetty at Tanga. This has been described as a multipurpose jetty, and it has been suggested that some diverted general cargo could be handled over the jetty. The layout of the jetty is very awkward, and vehicle movements are extremely restricted, so that even the movement of fertilizer raw materials, for which the jetty was designed, is very slow and difficult. There is also no storage space nearer than the lighter wharves. It is therefore not considered practical to handle diverted cargo at this jetty.

G. MOMBASA

The port of Mombasa has 13 deep-water berths and a lighter wharf capable of handling the equivalent of one additional deep-water berth. Two more berths are under construction and expected to be in operation late in 1974.

The normal traffic of the port for 1973 is expected to be about 2.4 million tons. The diversion of 22,000 tons of Zambian imports and 10,000 tons of exports monthly will bring the annual total to about 2.8 million tons.

Presently, the port operates two shifts on all the berths, and a third shift is operated on a selective basis on about one third of the berths to clear ships that are just finishing or just beginning discharge and to work on individual hatches that are out of phase.

If a third shift is worked on all the berths, no problem is envisaged in handling 2.8 million tons, provided that this is cleared reasonably quickly.

The port appears much more satisfactorily laid out than that of Dar es Salaam. It is primarily a railway port, and some 60 per cent of imports move by rail direct from the docks. Some additional traffic also goes by road to warehouses for loading onto rail.

The port has already established a copper yard capable of handling 10,000 tons per month of exports, and a further site is available which could handle double this quantity after it has been resurfaced, fenced and lit. This work would take about three months.

Conditions in the port are much more satisfactory than at Dar es Salaam, and it is not considered that the handling of 2.8 million tons per year would present any difficulty. If any further quantity of traffic has to be added to Mombasa or Dar es Salaam, we would strongly recommend that the extra traffic should be routed through Mombasa rather than Dar es Salaam.

The required equipment is being provided under the Canadian programme, and, if the supply can be accelerated, the increased capacity should be possible quite soon.

Mombasa is the only port in East Africa with any facilities for handling bulk vegetable oils. The question of diverting Zambian traffic through this installation was raised. The entire 4,000-ton storage capacity is leased to UNILEVER. It is understood that the Government of Kenya has contacted UNILEVER about the possibility of subletting some of the tank capacity to Zambia. There is also a plan for expanding the capacity by two 500-ton tanks.

UNILEVER has also been considering the installation of vegetable oil tanks in Dar es Salaam, and meetings are being held on the subject at the moment. The question is related to the provision of molasses tanks for exports.

In considering movement of vegetable oil by road, the problem of temperature is important. Even in Mombasa, the oil is heated to 105°F. to make it pumpable. Heating at the discharge point in Zambia would also be necessary, and there is normally a restriction on raising the temperature by more than 3°F. in 24 hours. This could make road movement difficult. Petroleum tanks are not suitable, because the baffles in the petroleum tankers make it very hard to get vegetable oil out of the tanks and to clean them. By comparison, the most optimistic timing for the provision of facilities for vegetable oils in Dar es Salaam is about 12 months.

H. CONCLUSION

The conclusion from this brief study of port capacity is that the ports of Lobito, Beira and Nacala appear unlikely to present any serious problems in relation to the allocation of cargo now envisaged, although other restraints may be critical.

The port of Mombasa can also undoubtedly be expected to handle Zambian traffic of the order of 10,000 tons per month export and 22,000 tons per month import. It is necessary, however, to ensure that imports are cleared from the port efficiently.

The port of Dar es Salaam is more of a problem. For many years it has been handling more cargo per berth than Mombasa, and it has been suffering somewhat greater delays to ships. New berths needed to break out of this situation have not yet been completed, and half of the eight deep-water berths now available have no back-of-port space or transit sheds, so that cargo has to be moved directly from the quay. EAHC has been surprisingly efficient in arranging this.

EAHC is satisfied that it can handle about 2 million tons per year of total general cargo, with a similar degree of congestion and delays as was experienced in 1970. This assumption is based on handling between 500,000 to 600,000 tons by lighterage (this has been achieved previously) and the balance on the eight deep-water berths.

From the EAHC estimates of the traffic through the port in 1973, this should allow Zambian cargo to be handled at the rate of about 3/4 million tons a year without any diversion of traffic from Dar es Salaam to Tanga.

The EAHC estimate of capacity could not be confirmed on a short visit, because the data on port operations was not available in sufficient detail. This sort of information will be collected during the next 12 months during the UNDP port

study, which unfortunately has only just started. On the information made available during the visit, it does appear that a total through-put approaching 2 million tons per year should be feasible, with extremely good arrangements for clearance of cargo on the port. It would also be advisable to direct to Dar es Salaam a high proportion of bulk or heavy commodities, which can be cleared direct from the quay apron at Berths 5, 6, 7 and 8.

To ease the flow of traffic in the docks, the new entrance gate behind Berth 6 should be opened as soon as possible and the arrangements for checking outgoing vehicles should be streamlined. The new Gerazani road should also be opened as soon as possible, because the delay in completing this road is causing an unnecessary large amount of traffic to use the port area as a short cut.

It is also recommended that consideration should be given to reducing the amount of rail traffic in the port and making some of the areas now occupied by rail trucks available for open storage and vehicle movement.

It is not considered likely that the port of Tanga can handle more than about 10,000 tons per month of Tanzanian traffic diverted from Dar es Salaam until a substantial number of additional lighters and more equipment have been made available. This would take six months or longer.

If about 10,000 tons of traffic per month can be diverted to Tanga, and the Dar es Salaam traffic is thereby reduced to less than 1.9 million tons per year, the delays and congestion in the port should be appreciably reduced.

Until more equipment can be made available at Tanga and more sheds and back-of-port space made available in Dar es Salaam, it is not considered advisable to route more than 3/4 million tons of Zambian cargo through Dar es Salaam. Some additional traffic, however, might be routed through Mombasa.

In addition to the total Zambian traffic of about 400,000 tons per year which EAHC has said that it can handle easily at Mombasa, it might be possible to handle a further 200,000 tons, provided that extremely good arrangements are made for clearance from the port.

Appendix III

ALTERNATE ROUTES

I. ROUTE THROUGH ZAIRE

A. Zambia-Lobito Route

The Zambia-Lobito railway line offers the most advantageous alternative route for Zambian export-import traffic. While substantially longer than other alternatives, it avoids both trans-shipment of goods and road transport entirely.

From an operating standpoint, the route may be divided into four sections:

1. Zambian railways (Diesel traction): Zambia to Sakania
2. KDL (Zaire) (Diesel traction): Sakania to Lubumbashi
3. KDL (Zaire) (Electric traction): Lubumbashi to Dilolo
4. CFB (Angola) (Wood-fired steam locomotives): Dilolo to Lobito.

The present capacity of the route (controlled in fact by the capacity of the CFB) is about 2,000,000 tons per year of export traffic. In comparison, expected traffic is as follows:

Angola, internal traffic	...	1,000,000 T/year
Zaire, export traffic	...	600,000 T/year
Zambia, export traffic (expected 1973 level)	...	456,000 T/year
Total	...	2,056,000 T/year

For all practical purposes, the line is operating at full capacity.

The major bottle-neck hampering increased line capacity is the escarpment, near Lobito, where steep grades and bad alignment seriously hamper operations: only a few cars at a time can be moved in the west-east direction over this section. Although the CFB has 10 recently acquired Diesels on line, the Zambian share of the traffic will remain restricted to 1,000 cars per month for the next 15 months or so.

A major line relocation is under construction to ease operating conditions on the escarpment. This work is not scheduled for completion until April 1974, and the increased capacity is not immediately available.

Due to the volume/weight ratio of metal exports and general cargo or bulk imports, the critical problem faced by the railways is the transport of imported goods. Line capacity in the west-east direction is therefore the limiting factor. This maximum capacity of the Lobito-Zambia connexion has been established at 23,000 tons per month of imports (corresponding to 38,000 tons per month of metal exports) or 1,000 railway cars per month.

One other substantial (and still unresolved) difficulty is the proportion of bulk and general cargo that will be accepted by CFB. The Lobito route is capable of handling bulk cargo (coke, sulphur, wheat etc.) more efficiently than other available routes. The tendency of the mining companies is therefore to route the major part of their bulk requirements through Lobito. However, (a) CFB is unlikely to accept too great a proportion of bulk traffic on its lines, as such traffic is not profitable, and (b) the bulk requirements of Zambia far exceed the railway capacity. Thus some compromise must be worked out with CFB, and the remaining bulk and general cargo rerouted to other ports.

B. Voie Nationale (Zaire)

The Voie Nationale in Zaire (Lubumbashi, Ilebo (Port Francqui), Kinshasa, Matadi) seems to have some capacity which could be made available to Zambia. This capacity, which the team could not investigate, is worth exploring. However, the route has serious disadvantages: two trans-shipments (rail-to-river at Ilebo, and river-to-rail at Kinshasa); relatively high costs in comparison with Lobito or other routes; slowness due to river transport and to organizational difficulties of the Zaire railways; and finally, chronic congestion of Matadi harbour. There also appears to be a power shortage on the KDL electrified lines.

Nevertheless, a study should be carried out so that any capacity existing on the Zaire route could be utilized for general cargo in order to relieve the strain on road transport and the congestion in eastern African harbours. In this connexion, the possibility of some of the Zaire traffic presently using the Lobito route being diverted to the Voie Nationale should be explored, as there is a major project to improve the Voie Nationale being undertaken by IBRD and UNDP.

C. Zambian Railways

The network has its difficulties, after years of indifferent management and insufficient maintenance. The present management is fortunately competent, dedicated and vigorous but is facing a difficult task of rehabilitation and re-organization. The main difficulties seem to stem from delayed rolling stock and track maintenance and lack of sufficient skilled labour. Track renewal cannot be implemented at this time owing to lack of capital resources; in any event the effects of track modernization would have no immediate impact on the present situation. The team therefore concentrated its attention on rolling stock.

1. Railway cars

A comparison has been made of the rolling stock situation before and after the closing of the border with Rhodesia:

	1972	1973	
Zambia Railways, all-purpose cars	1,200	1,200	
Pooled cars (Rhodesia, South Africa): general cars	4,241	3,200	
Reefer cars	72	8	(on lease)
Tank cars	42	81	
Explosives cars	55	26	(4 on lease)
	5,610	4,515	

2. Present traffic: car needs

1. The railway provides important internal transport services, such as coal to the smelters, metals and concentrates within the copper belt, cereals etc. Domestic traffic now amounts to 5,000,000 tons per year, which leads to the following car requirement calculations:

5,000,000 T/year, or 420,000 T/month

$\frac{420,000}{30}$ = 14,000 T/day

At 30 T/car estimated loading:

$\frac{14,000}{30}$ = 460 cars

460 cars x 8 days turnaround = 3,680 cars (see note below)

2. Some provision must be made for distribution by railway of goods arriving in Zambia by the various truck routes. This is estimated at 20,000 tons per month. On the basis of an 8-day turnaround time and a 24-ton load per car, additional needs are . . . . . 220 cars

3. Finally, the railway must provide for the Lobito route an additional. . . . . 1,000 cars

It would then appear the Zambian railways, in order to continue operations, would need about 300 general cargo cars and 65 reefer cars.

The reefer cars are badly needed, since the main source of supply is the south, and the main consumption areas in the copper belt. As far as the explosives

cars are concerned, a number of them were destroyed in an explosion two years ago. While it is expected the insurance claim will cover the damages, the case is in litigation, with no settlement in sight. In the meantime, it is believed Zambia will become self-sufficient in explosives in the very near future. The 22 explosives cars remaining in the network should be ample to insure transport of blasting accessories.

Note:

It is estimated that from 10 to 15 per cent of the car fleet is down for repairs or maintenance at any given time. Thus a similar percentage should be added to the total of 3,680 cars needed to meet traffic demand. It is felt, however, that the following factors need to be considered:

(a) Railway operations (except for the Lobito run) are now restricted to domestic traffic and therefore under the jurisdiction of Zambian Railways. Improved operations and remedial measures now in train should reduce turnaround time.

(b) Railway equipment has a long economic life, and the incidence of the Tazara railway (scheduled for commissioning in about three years) on rolling stock requirements is not known. Caution should therefore be exercised, in order to avoid unnecessary capital investment which might be more usefully employed somewhere else.

(c) A limited number of cars now in use for specific purposes will become available to general traffic. For instance, 22 of the tank cars will be assigned to haulage of Bunker-C oil from the refinery to the mine, thus releasing upwards of 60 coal cars for other uses.

It would seem reasonable to expect that the diversion of over 700,000 tons per year to the road sector would result in an excess of rolling stock. However, the following considerations apply:

(a) The 1,000 cars assigned to the Lobito route will experience a turnaround time, which is roughly double (30 versus 15 days) that prior to closure of the border.

(b) The cars inherited by Zambia from the former pooled equipment have a 5-year delayed maintenance liability. Thirty to 40 per cent of the equipment is more than 30 years old and should be retired. Continued use results only in loss of efficiency, added burden on the maintenance and repair shops and added operational costs.

3. Freight locomotives

Zambia railways operates 42 Diesel electric (G.E. 2,000 HP) locomotives - 22 units are 1967 models, and the balance are new (1970).

The 22 older units are some two years overdue for their first major overhaul. This lack of maintenance is beginning to have serious operational consequences, and the network currently experiences three to four line breakdowns per day. This,

of course, aggravates the situation for those locomotives remaining on line. Yet the demand is such that the locomotives cannot be spared:

Due to insufficient skilled labour in the shops, a major overhaul currently takes six months.

While the railway readily admits concentration of labour and of training could more than halve this delay, there are not enough spare parts to undertake a major overhaul programme. The railway has had difficulty obtaining the necessary import and foreign exchange licences and financing their needs, and the spares backlog now amounts to over K 1,000,000.

It would then appear that four additional locomotives are urgently needed, as well as all the spares on order. In fact, a substantial percentage of the first priority spares on order will require airlifting, if a gradual breakdown of the system is to be avoided within the coming 12 months or so.

Note:

In addition to its own internal traffic, Zambia Railways also furnishes hauling service (locomotives only) for some 300,000 tons per year of coke and general cargo traffic from Rhodesia to Zaire with some return cargo that is likely to continue for the near future.

4. Shunting locomotives

While this is a problem not previously mentioned, there is an urgent need for shunting locomotives. The railway owns 18 Henshell 750 HP, Diesel-hydraulic shunters, nine of which are currently out of service. Hydraulic traction is totally unsuitable to railway operations, and some old steam locomotives have been taken out of moth-balls for shunting operations. However, there are no parts for these, and some permanent solution must be found within the next few months. The mission estimates that 12 Diesel electric shunters (750 to 1,000 HP) are needed immediately. The Henshells now out of service should be decommissioned and cannibalized for spare parts in order to keep the remaining units in service for the next two or three years, and the remaining units retired as they break down and the slim supply of parts becomes exhausted.

II. ROUTE THROUGH MALAWI

A. Highways

1. In Zambia (from Lusaka to Chipata and Mchinji at the Malawi border - 396 miles)

The Great East Road is a Class 1 B highway, built since 1967, which is now a completely asphalted, two-laned carriageway, 22 feet wide. There is no problem of capacity, daily traffic of about 205 ADT, of which 55 per cent are trucks. Bridges have been reconstructed to the British standard 153 H A loading. The Luangwa bridge, which is a 1,000 feet steel girder-bridge (2 lanes), has been constructed for normal traffic: heavy equipment and exceptional convoys require capacity verification in accordance with exact specifications and load distribution.

2. In Malawi

From border to the railway there are two possible routes:

(a) Mchinji to Lilongwe and Salima (137 miles)

(b) Mchinji to Lilongwe and Balaka (219 miles)

Mchinji-Lilongwe. This section (71 miles) is a gravel road. The last 8 miles from the airport turn-off to the new capital site are asphalted.

The existing alignment has 4 to 5 per cent gradients, and the present traffic averages 75 vehicles a day (22 trucks) between the border and Namitate; 150 vehicles a day (20 trucks) between Namitate and the Lilongwe airport turn-off, and 300 ADT after that point.

This section is properly maintained and can be considered an all-weather road. A new alignment and other improvements are being considered, and a feasibility study is being made by British consultants under a UNDP project. The United States Agency for International Development (USAID) contemplates financing this section, if the feasibility survey shows that it is justified. One of the variants under consideration follows a totally new alignment, saving some distance and avoiding the present short stretch which crosses Zambian territory. The consultant is to deliver the feasibility report in April. It is assumed that construction would require about two years after a decision is made to proceed with the road.

Lilongwe-Salima (66 miles). The road has a 12-foot wide single lane with bituminous surface treatment, with wide shoulders to allow vehicles to pass. Although it is a light treatment, the surface is not in a too bad condition, except certain passages which are badly pot-holed. Maintenance of this section raises the problem of keeping the shoulders graded evenly with the surfaced strip - the normal problem on single-lane pavements when traffic exceeds the design capacity.

Lilongwe-Balaka (148 miles). The road has been recently reconstructed as an asphalted 22-foot wide, two-lane Class 1 road. The road is in very good condition and can support heavy traffic, if axles are normally loaded: the surface consists of a 3/4-inch layer of asphaltic concrete, which would be badly damaged by overloads.

B. Railways

The Malawi Railways give a connexion to the two Mozambique harbours of Beira and Nacala. The rail mileage between the Malawi border and Beira is 206, and from the border to Nacala 384 miles. The Beira line and the Nacala line intersect at Nkaya. From Nkaya the line extends to Balaka (11 miles north) and to Salima (108 miles north). Rail mileages from Salima are 496 miles to Beira and 554 miles to Nacala. The section between Balaka and Salima (97 miles) is in very poor condition, and both speed and axle loads (which cannot exceed 11 tons) are severely restricted. Distance from Balaka to Beira port is 399 miles, and to Nacala 457 miles. On the Beira line the escarpment gradients are about 2.5 per cent.

1. Capacity of railway

The present capacity of the various sections of the line according to the present condition of the track and motive power availability is shown in the table at the end of this section.

The total present daily capacity one way to or from Salima is limited to 1,000 tons by the Nkaya-Balaka section, a monthly capacity of 30,000 tons.

The railway will receive in May, from Canadian aid, four new diesel locomotives (leaving New York early in March). This will increase the capacity of sections 2, 3 and 5 to the following number of trains each way:

Section 2 = 2 double-headed and 4 single-headed

Section 3 = 4 trains

Section 5 = 7 trains

giving the following gross and net tonnage capacity per day each way:

Section 2 = 3,600 gross (1,200 net)

Section 3 = 3,000 gross (800 net)

Section 5 = 5,250 gross (1,400 net)

The limiting factor to or from Balaka and Salima will still remain the Nkaya-Balaka section, with 1,400 tons daily or 42,000 tons per month.

The 1972 statistics for tonnage received at Salima and Balaka (see table for 11 months of 1972 at the end of this section) show the peak month to be September,

with around 18,000 tons. This leaves 24,000 tons capacity for Zambian import traffic, provided the railways have the corresponding wagon capacity available.

2. Wagon capacity

The capacity of the Malawi Railway's rolling stock at the end of 1971 is reported as 20,218 tons, the breakdown being as follows:

Covered wagons	327 with	11,833 T capacity
High-sided wagons	56 with	2,184 T capacity
Low-sided wagons	138 with	5,411 T capacity
Pallet wagons (for tea)	20 with	800 T capacity
Total	541 with	20,218 T capacity
		(average 37.37 T/per wagon)

In addition, in 1971 the balance between foreign wagons working in Malawi and Malawi wagons working outside gave an average extra capacity of 8,355 tons (224 wagons), or a total capacity in Malawi of 28,573 tons.

The assumed internal traffic of around 480,000 tons a year or 40,000 tons a month, requires approximately 400 wagons. 1/ This leaves 141 Malawi Railway wagons for the import/export traffic.

To these wagons one must add the wagons of the other railway networks (Mozambique, Southern Rhodesia, South Africa), whose number can fluctuate. The authorities of Malawi have indicated that they could cope with an extra traffic of 17,000 tons imports in transit to Zambia for a short period of time but would require additional new wagons if this level of traffic has to be maintained for a longer period. From the information provided in Blantyre, it is understood that 17,000 tons would necessitate the procurement of at least 80 new wagons. Should Mozambique railways be unable to provide for the traffic, Malawi railways would need an additional 125 wagons.

C. Storage, marshalling and trans-shipment facilities in Balaka and Salima

(a) Salima offers very good facilities for trans-shipment. Manpower is available, and the sheds are easily accessible by rail and road. Eight trucks can be simultaneously loaded from the sheds.

1/ On the basis of 100 tons per wagon per month.

The present equipment includes:

3 fork-lifts (2 x 6,000 lbs. + 1 x 5,000 lbs.)

1 mobile crane (5 tons)

1 gantry 10 tons (hand-operated)

(b) Balaka, on the contrary, offers limited facilities, except for the Zambian plot with a 9,600 sq. feet modern shed. The railway sheds are old, and access for trucks is bad, but it appears possible to extend the present facilities and to create new shed capacities (on the Zambian plot the shed area could be doubled).

At present the equipment includes:

2 fork-lifts (6,000 lbs.)

1 mobile crane (5 tons)

1 gantry 10 tons (manually operated)

Manpower is also readily available in Balaka.

It appears that the storage and trans-shipment capacity in Salima can easily cope with a traffic of 7,000 tons a month and can probably be doubled without great investment. In Balaka there is undoubtedly at present limited possiblities, but the volume handled can certainly be greatly increased in a short period of time.

Malawi Railways has no plan for extending the Balaka facilities but indicates the necessity of 2 shunting locomotives for the marshalling in Balaka and Salima plus 4 fork-lifts and 3 (8-tons) mobile cranes.

D. Mozambique railways

The team made no detailed assessment of the capacity of the railways in Mozambique. Malawi authorities have assumed that these railways could easily increase their traffic to cope with new Zambian demands. During 1972, CFM suffered from a lack of motive power, as some were blown up in the Tete area. It has been stated 2/ that they have now recovered their motive power by buying new locomotives and transferring some units from other railway lines.

The rolling stock available will be affected by the capacity freed by suppression of traffic to Zambia through Rhodesia.

2/ Source: Nacala Port Traffic Advisory Committee, Blantyre, 30 January 1973.

E. Beira and Nacala harbours

1. Beira

Beira is the traditional port for rail entry into Malawi as it was for the Rhodesian route to Zambia. It is not necessary to go into any description of Beira facilities, as they are well known, but the following should be noted:

(a) During the past year (1972), Beira has suffered congestion with freight destined for Zambia, Southern Rhodesia, Cabora Bassa and Malawi. The FRELIMO activities on the Tete routes to Cabora Bassa are causing difficulties.

(b) Beira was one of the most frequently used harbours for Zambian traffic. Therefore, capacity exists for Zambia in Beira, and shipping agents are well aware of the conditions for handling traffic in Beira.

(c) Lead, zinc, and copper being bottom cargoes could be more easily loaded in Beira, as this port is served by the South East Conference for ships going to or coming from Europe.

2. Nacala

The Bay of Nacala offers exceptional conditions for a port: there is a vast sheet of water sheltered from wind and currents, with good natural depth, so that any ship may enter (the channel is 60 metres deep and 900 metres wide). There is practically no limit to the possibilities of harbour works and extensions. The port at present comprises:

2 quayside berths with a depth of 10.00 metres (312 metres long)

1 quayside berth with a depth of 7.5 metres (111 metres long).

The berths can accommodate 2 ocean-going vessels and one coaster simultaneously.

At present, 613 metres of new quays are under construction (408 metres with 15 metres depth and 205 metres with 7.5 metres). Contractors are expected to complete the first 100 metres by June/July 1973, thus giving accommodation of one more ocean-going vessel.

Nacala offers good handling facilities:

Lighters:

6 lighters of 100 tons each

3 lighters of 120 tons each

1 x 400 tons landing craft, self-propelled.

Railway sheds:

4 sheds of 3,000 square metres each

1 shed of 2,400 square metres

Electric cranes:

10 x 5 tons

1 x 10 tons

1 x 20 tons

(A further 20 electric cranes have been ordered)

1 floating crane 25 T capacity

Mobile cranes (2 to 7 tons)

Fork-lift (2 x 4 tons)

Shunting and power tractors

Nacala port performances[3/]

(a) Ship arrivals	Coasters	Ocean-going	Total
November 1972	15	23	38
December 1972	9	16	25

(b) Port tonnages	Total	Malawi imports	Malawi exports	Total Malawi traffic
November 1972	50,991	4,052	3,100	7,152
December 1972	82,868	4,214	18,203	22,417

(c) Annual tonnage: 1971 ... 655,819 tons

1972 ... 718,309 tons

(d) Delays to ships (December 1972)

Nil	19 ships
1 - 2 days. . . .	3 ships
2 - 3 days. . . .	2 ships
5 - 6 days. . . .	1 ship

3/ Source: Nacala Port Traffic Advisory Committee, Blantyre, 30 January 1973.

Current disadvantages of Nacala

Nacala is the last port for the European Eastern Africa Conference. Ship arrivals in Nacala are often delayed due to delays in other ports. Recent instances of ships arriving up to 16 days late have been mentioned, and it is still difficult to induce ships to go to Nacala.

Advantages of Nacala

The main advantage of shipping through Nacala is that the railway line and port facilities are not congested and that goods arrive in Malawi within one week of discharge. Reported delays were caused by the poor turnaround or railway wagons over CFM during 1972 and in early January this year, but the situation is reported to be back to normal. The problems, as in Beira, had arisen from lack of sufficient motive power, but now that two diesel locomotives have been loaned to CFM this situation may have been remedied. It is also stated that CFM expects to be fully dieselized by the end of 1973, which should significantly improve the motive power position.

Capacity offered to Zambian traffic

Nacala harbour does seem to offer good possibilities for Zambian traffic; indeed an increase of imports could be an inducement for ships to frequent the port. However, if copper exports to Europe are contemplated, it will be necessary to discuss with the Conference possible new schedules for ships with some vessels calling first at Nacala.

F. Over-all capacity of the Malawi route

The Malawi Government has offered a capacity of 17,000 tons for imports to Zambia, of which 12,000 tons would be imported through Nacala and 5,000 tons through Beira. Transit would be 7,000 tons through Salima and 10,000 tons through Balaka.

The monthly exports over the Malawi route would be 7,000 tons through Balaka (lead and zinc) to Beira.

In addition, the Malawi route will be used during the next eight months to import some 56,000 tons of fertilizer (i.e., 7,000 tons a month) coming from South Africa as a special arrangement. This tonnage does not raise problems of wagons capacity, as the wagons are being provided by South African railways. This traffic would be transited through Balaka giving a return freight for the trucks bringing the zinc and lead exports.

The above tonnages are not unreasonable, provided that:

(a) Truck capacity is available;

(b) Trans-shipment conditions in Balaka are improved;

(c) Wagons are made available for Malawi railways;

(d) The maintenance budgets for the Salima-Lilongwe and for the Lilongwe-Zambia border sections of the roads are increased;

(e) Trucks to and from Zambia respect the existing limitations of axle loads in Malawi.

The Malawi Government has estimated the investments corresponding to points (b) and (c) at K 1,252,600, broken down as follows:

80 wagons	K 12,000 each	960,000
70 tarpaulins	80 each	5,600
2 shunting locos	90,000 each	180,000
4 (6,000 lbs) fork-lift trucks	8,000 each	32,000
3 (8-ton) mobile cranes	25,000 each	75,000
	TOTAL	K 1,252,600

For extra road maintenance costs the road department has made an estimate for the Lilongwe-Zambia border section amounting to K 30,000. No estimate has been made for the Salima-Lilongwe section.

The road division estimates for extra road maintenance costs (made on the basis of the cost of regravelling) have been checked by using curves relating annual maintenance costs per mile to average daily traffic used by the British consultant presently studying the feasibility of improving the Lilongwe-Mchinji road. The order of magnitude is correct, and we think that K 40,000 a year would be adequate for this section, but we have no estimate of the problems raised by the Lilongwe-Salima section. A first approximation would be about K 20,000 a year.

Trucking capacity between Malawi and Zambia

On the Malawi side, it is currently proposed that the tonnage be divided, 50 per cent for big companies and 50 per cent for small ones. The latter do not provide the guarantees needed to cope with international traffic. For example, loaded trucks have been delayed because the transporters had omitted to secure passports for the drivers to cross the border. The role of small truckers has to be examined, otherwise a bottle-neck could come from deficiencies in the trucking capacity of Malawi transporters.

G. Rates through the Malawi route

It has not been possible to calculate the exact cost of the transport from Lusaka to the seaports through the Malawi route. Highway costs can be calculated on the basis of six ngwe per ton per mile, but it will certainly depend on the exact composition of traffic, which is not known at the present moment. Railway rates have to be negotiated with Malawi and Mozambique.

The Malawi Government wishes to increase the export tonnages in order to improve the return load factor and is anxious to export some copper in addition to lead and zinc. However, there are problems in using Nacala for copper that would likely be exported through Beira. This may not be consistent with any

limitations on tonnage to and from Beira, to keep open capacity for Blantyre and Limbe traffic. Thus it is not clear that an export copper quota through Malawi would be a satisfactory arrangement.

The Government of Malawi obviously favours the use of Salima 4/ for two reasons:

(a) Justifying the rehabilitation of the Balaka-Salima railway track presently being undertaken with Malawi Railway funds;

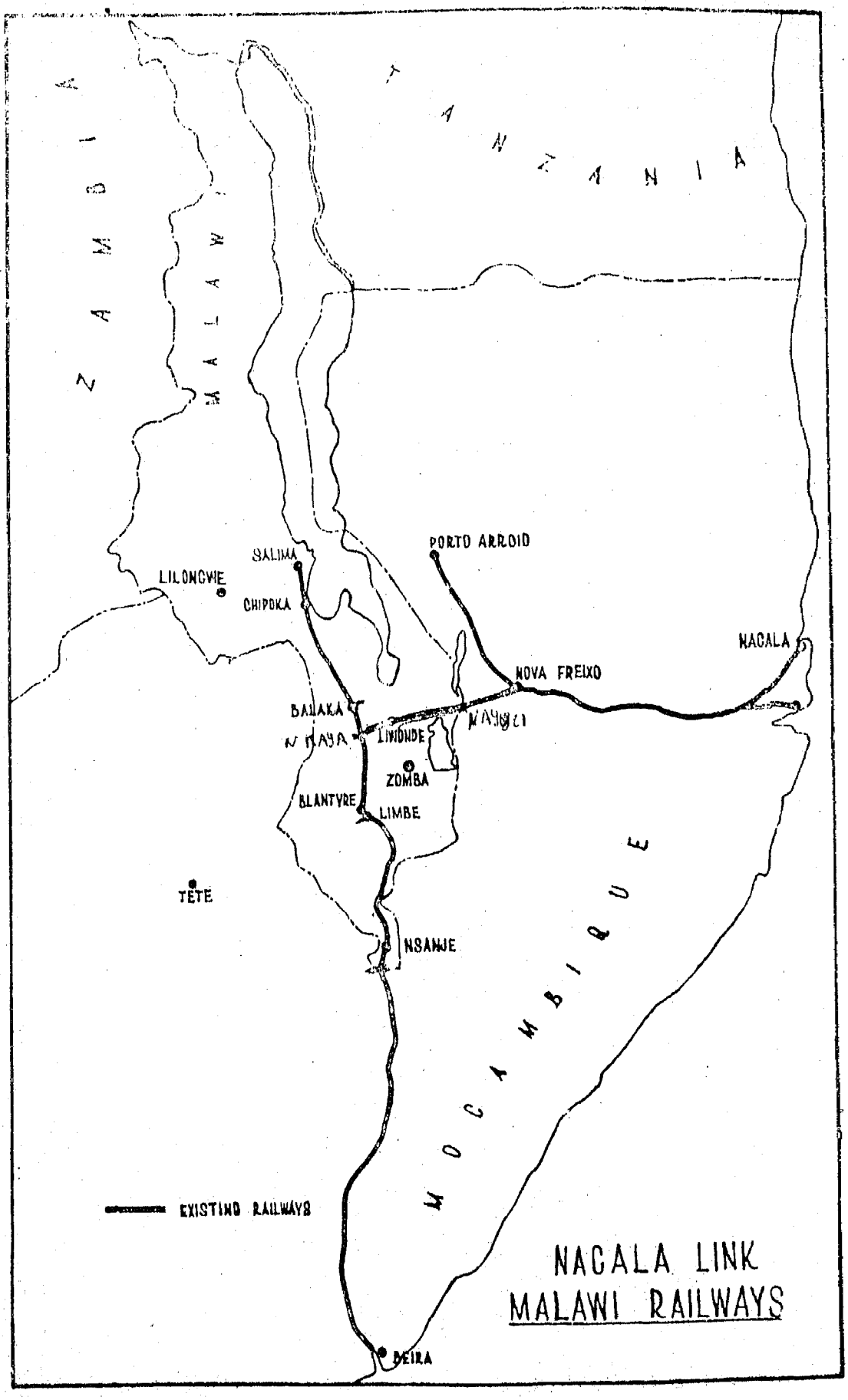
(b) Existence of good storage facilities in Salima and the poor condition of the railway sheds and trans-shipment facilities in Balaka.

The use of Balaka instead of Salima would save rail wagon capacity, and, as the highway section between Salima and Lilongwe is in poor condition, it is strongly recommended that consideration be given to the improvement of Balaka station.

Extension of Malawi route capacity beyond 17,000 tons import

The bottle-neck is the railway track capacity and rolling stock. It does not seem reasonable to consider the extension in the immediate exercise.

4/ In an exercise for offering a possible capacity for 27,000 or 37,000 tons import to Zambia, the increase of traffic has been assumed to go mainly to Salima.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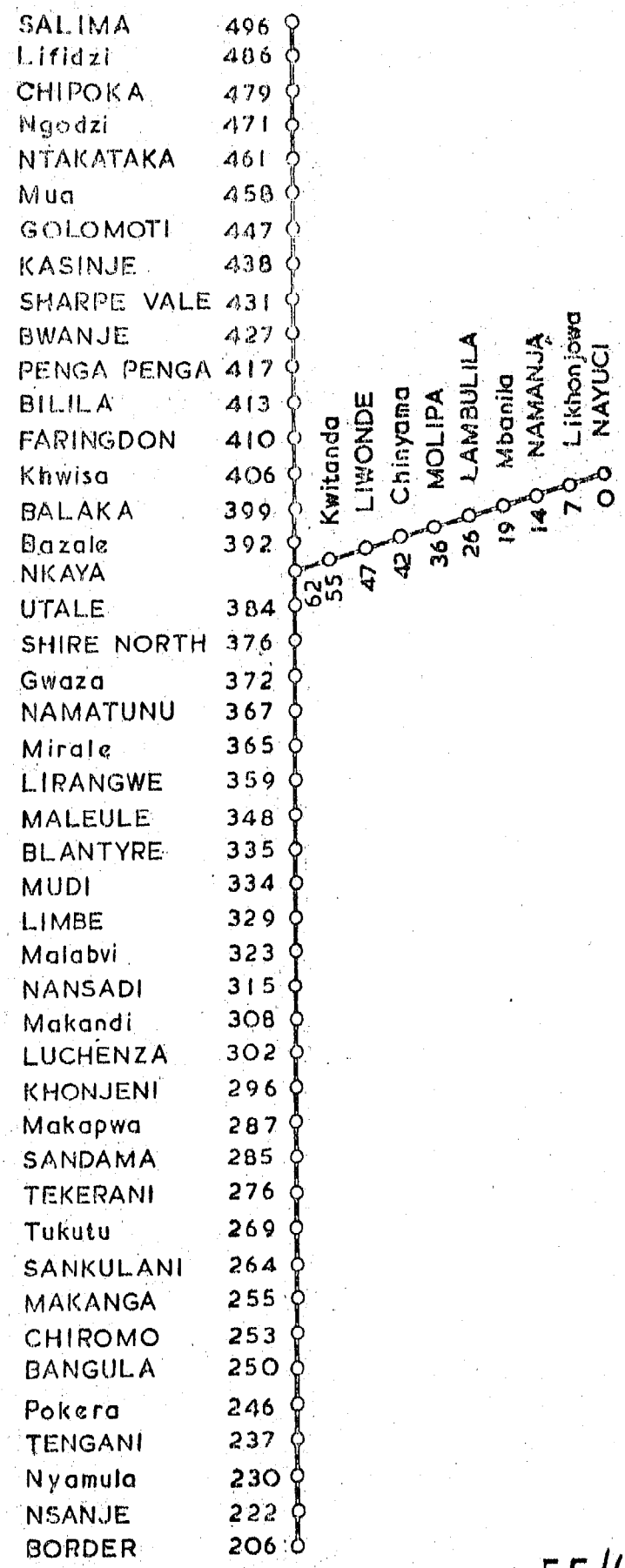
TANZANIA
SALIMA
LILONGWE
CHIPOKA
PORTO AMROID
NACALA
NOVA FREIXO
BALAKA
LIWONDE
ZOMBA
BLANTYRE
LIMBE
TETE
NSANJE
MOCAMBIQUE
BEIRA
EXISTING RAILWAYS
NACALA LINK
MALAWI RAILWAYS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Lifidzi 486
CHIPOKA 479
Ngodzi 471
NTAKATAKA 461
Mua 458
GOLOMOTI 447
KASINJE 438
SHARPE VALE 431
BWANJE 427
PENGA PENGA 417
BILILA 413
FARINGDON 410
Khwisa 406
BALAKA 399
Bazale 392
NKAYA
UTALE 384
SHIRE NORTH 376
Gwaza 372
NAMATUNU 367
Mirale 365
LIRANGWE 359
MALEULE 348
BLANTYRE 335
MUDI 334
LIMBE 329
Malabvi 323
NANSADI 315
Makandi 308
LUCHENZA 302
KHONJENI 296
Makapwa 287
SANDAMA 285
TEKERANI 276
Tukutu 269
SANKULANI 264
MAKANGA 255
CHIROMO 253
BANGULA 250
Pokera 246
TENGANI 237
Nyamula 230
NSANJE 222
BORDER 206
62
55
Kwitanda
47
LIWONDE
42
Chinyama
36
MOLIPA
26
LAMBULILA
19
Mbanila
14
NAMANJA
7
Likhonjowa
0
NAYUCI

55/63-A

CAPACITY OF MALAWI RAILWAYS

	Section	Practical line capacity trains per day each way [1]	Movement capacity (in trains per day each way with present locomotive fleet)	Gross train load per section in short tons	Gross tonnage per day	Net tonnage per day (short tons) [2]
(1)	Border SANKHULANI	11	4	1,100	4,400	1,500
(2)	SANKHULANI LIMBE	6	6	450	2,700	900
(3)	LIMBE NKAYA	9	3	750	2,250	600
(4)	NAYUCI NKAYA	12	2	1,200	2,400	800
(5)	NKAYA BALAKA	10	5	750	3,750	1,000
(6)	BALAKA SALIMA	6	5	375 single diesel hydraulic	1,875	650

Source: Malawi Railways, February 1973.

1/ Considered as 60 per cent of theoretical section capacity according to length, crossings and gradients.

2/ Assuming present pattern of commodities transported, giving same loading factor, for wagons.

TONNAGES FORWARDED AND RECEIVED

1972 (Total)	Salima		Balaka	
	Forwarded from	Received at	Forwarded from	Received at
January	1,044	7,515	1,432	4,631
February	1,252	7,286	1,637	1,730
March	783	8,434	2,354	2,097
April	1,244	6,804	5,812	1,732
May	1,864	6,042	2,628	1,516
June	4,066	6,887	2,678	3,556
July	6,805	7,787	5,241	3,003
August	5,889	13,025	8,367	3,865
September	9,300	11,334	13,809	6,499
October	4,599	11,442	8,985	4,297
November	8,148	9,226	10,175	4,413
TOTAL (Malawi and Zambia combined)	44,994[1/]	95,782[2/]	63,118[3/]	37,339

Source: Malawi Railways, February 1973.

1/ From which 3,414 tons from Zambia.

2/ From which 2,449 tons to Zambia.

3/ No traffic from or to Zambia.

III. ROUTE THROUGH TANZANIA

The route through Tanzania runs from Lusaka to Dar es Salaam and Mombasa along the Great North Road. The Tan-Zam Highway, with the exception of the section in Tanzania between Morogoro and Dar es Salaam (about 121 miles), still under construction, is a two-lane engineered asphalt surface highway as far as Dar es Salaam. The road to Mombasa leaves the Tan-Zam Highway at Chilenze and runs northward to Moshi. The shorter route, via Tanga to the Kenya/Tanzania border is not usable owing to a bridge construction project. As a result trucking must follow the route through Moshi and then eastward to Voi in Kenya and thence to Mombasa along the main Nairobi/Mombasa highway. The route now used from the Tan-Zam Highway to Mombasa is in good condition, and the alternate, shorter route would be serviceable if the bridge construction could be expedited. The Kenya authorities have suggested the possibility of installing a temporary Bailey bridge to open the route, and the team suggests that this approach is worthy of consideration.

Maintenance of the route within Zambia is generally adequate and the increase in number of vehicles is not likely to overstress the road as long as adequate control of axle loadings is exercised. On the Tanzanian side there is at present little or no maintenance activity on the Tan-Zam Highway or on the route to Moshi. The increased traffic will cause distress, unless the loads are within the highway design limits and unless adequate measures for routine maintenance are established immediately by the Tanzanian Government.

Traffic will be restricted on the Morogoro/Dar es Salaam stretch during the remainder of the construction time and additional maintenance effort (and costs) will undoubtedly result from any increase in traffic. This stretch will also cause delay in truck passage to avoid undue interference with the construction work.

In Kenya, the maintenance effort is generally adequate and, except for the foregoing stricture on axle loading, there should be little undue stress on the road.

Appendix II on port capacities discusses the problem of port access. The need to remove cargo quickly from the port areas has been discussed, and the need for relief roads from the ports and the establishment of adequate off-port assembly areas defined.

Trucking requirements for the route through Tanzania (and for the Malawi route described elsewhere) are based on the following team estimate of port tonnage allocations:

Port	Imports		Exports		Total	
	Annual	Monthly	Annual	Monthly	Annual	Monthly
Lobito[1/]	276,000	23,000	420,000	35,000	696,000	58,000
Beira/Nacala[2/]	204,000	17,000	84,000	7,000	288,000	24,000
Mombasa[3/]	264,000	22,000	120,000	10,000	384,000	32,000
Dar es Salaam[4/]	516,000	43,000	240,000	20,000	756,000	63,000
Total:	1,260,000		864,000		2,124,000	

1/ Exports through Lobito are restricted by the rail capacity of the CFB. An allotment of 1,000 cars per month is made and loadings are restricted inward by gradients of the line.

2/ Beira/Nacala traffic is restricted by the capacity of the two rail lines to Malawi.

3/ The Government of Kenya has indicated that at the present time Kenya requirements will allow imports and exports of 22,000 tons per month in and out.

4/ The Government of Tanzania has offered to make the total theoretical capacity of Dar es Salaam available for Zambian imports by diverting Tanzanian cargo to Tanga. The team believes that problems of inland routing from Tanga, as well as practical constraints on achieving the theoretical capacity at Dar es Salaam, will not allow the full utilization of rated capacity. However, the mission does believe that Dar es Salaam can, with adjustments, handle both the Tanzanian and Zambian requirements (see appendix II on port capacity).

A. Truck requirement calculations

The following calculations of truck requirements are based on current operating statistics and target forecasts of the Zambia Tanzania Road Services (ZTRS) for the Zambia/Dar es Salaam run.

Days	Offload copper	Service Dar	Load gen. cargo	Offload gen. cargo	Service Kitwe	Load copper	Road time return	Total
Current	2.0	2.0	3.0	3.0	2.0	2.0	9.0	23.0
Target	1.0	1.5	3.0	3.0	1.5	1.0	8.0	19.0

Trucking time to Mombasa is estimated by ZTRS at two days over Dar es Salaam time and to Malawi at two days less than Dar es Salaam. Twenty-five per cent of the fleet is estimated to be out of service at any one time for servicing, maintenance and repairs. Allowable loads are 30 metric tons per unit for exports (copper) and 20 tons per unit for imports.

B. Number of trucks required

1. Dar es Salaam

Monthly tonnages — Import 43,000
Export 20,000

Export unit loads 20,000 ÷ 30 = 667 loads

Return haul 667 x 20 = 13,340 metric tons

To cover by empty eastward run

43,000 - 13,340 = 29,660 ÷ 20 = 1,483 loads

Excluding service time, copper loads require 16 days per return trip, or 1.88 return trip per month.

667 ÷ 1.88 = 355 trucks

Other loads require 14.0 days per return trip or 2.14 return trip per month.

1,483 ÷ 2.14 =	693 trucks
Subtotal =	1,048 trucks
+ 25 per cent for downtime	262
	1,310 trucks

2. Mombasa

Monthly tonnages — Import 22,000
Export 10,000

Export unit loads 10,000 ÷ 30 = 334 loads

Return haul 334 x 20 = 6,680 metric tons

To cover by empty eastward run

22,000 - 6,680 = 15,320 ÷ 20 = 766 loads

Excluding service time copper loads require 18 days per return trip or 1.67 return trips per month.

334 ÷ 1.67 = 200 trucks

Other loads require 16 days per return trip or 1.88 trips per month.

766 ÷ 1.88 =	408 trucks
Subtotal =	608 trucks
+ 25 per cent for downtime	152
	760 trucks

3. Malawi

Monthly tonnages — Import 17,000; Export 7,000

Export unit loads 7,000 ÷ 30 = 234 loads

Return haul 234 x 20 = 4,680 metric tons

To cover by empty eastward run

17,000 - 4,680 = 12,320 ÷ 20 = 616 loads

Excluding service time, lead and zinc loads require 14 days per return trip or 2.15 return trips per month.

234 ÷ 2.15 = 109 trucks

Other loads require 12 days per return trip or 2.5 return trips per month.

616 ÷ 2.5 =	247 trucks
Subtotal =	356 trucks
+ 25 per cent for downtime	89 trucks
	445 trucks

4. Summary:

Dar es Salaam	1,310 trucks
Mombasa	760 trucks
Malawi	445 trucks
	2,515 trucks

Appendix IV

NEEDS IN THE FIELD OF EXTERNAL TELECOMMUNICATIONS

A. SITUATION

Until recently Zambia's external telecommunications have comprised:

ZAMBIA/UNITED KINGDOM	4 telephone channels 10 telex channels	Via HF radio
ZAMBIA/EAST AFRICA	4 telephone channels 4 telex channels	Via HF radio
ZAMBIA/MALAWI	3 telephone channels 2 telex channels	Via open-wire landline (carrier)
ZAMBIA/SALISBURY	92 telephone channels 16 telex channels	Via open-wire landline (carrier)
ZAMBIA/SOUTH AFRICA	Telephone channels routed via Salisbury	

Zambia has two major projects in hand for the improvement of external telecommunications, namely, the construction of an earth station, for which a contract is about to be signed, and the construction of a microwave link from Lusaka to the Tanzanian border and thence to Dar es Salaam. Both of these projects are medium-term and will require some two years from commencement. They will, therefore, do nothing to relieve the immediate situation.

B. IMMEDIATE REQUIREMENT

The present requirement in support of the rerouting of Zambia's main trade and supply routes northwards is the establishment of telecommunications to the alternative ports of entry and the reinforcement of telecommunications to the north generally. This is a short-term need to cover the situation over the next two years. Consequently, speed of procurement and installation is of the essence. It appears that HF radio links would be best for this purpose. The links needed are:

ZAMBIA/TANZANIA (Dar es Salaam) . .	8 HF ISB radio telephone channels (6 telex)	(2 HF terminals)
ZAMBIA/LOBITO BAY	2 HF ISB radio telephone channels (1 telex)	(1 HF terminal)
ZAMBIA/GABORONE	4 HF ISB radio telephone channels (1 telex)	(1 HF terminal)

ZAMBIA/EAST AFRICA	Increased existing radio telephone channels from 4 to 8 and 4 additional telex channels (2 HF terminals)
ZAMBIA/MALAWI	Increased existing radio telephone channels from 3 to 24 by means of increased provision of multiplex equipment
ZAMBIA/BEIRA	2 HF ISB radio telephone channels + 1 telex (1 HF terminal)
ZAMBIA/ZAIRE	Provide 100 km microwave link to connect with the Zairian system

C. IMPLEMENTATION

Implementation will require the following:

(a) Agreement with the other administrations will be necessary in order to implement the above links.

(b) It will be necessary to secure the supply of equipment not only for Zambia but most probably for some of the other administrations in order to speed up provision of the necessary circuits.

(c) In the case of the HF radio telephone links, the equipment, which should be supplied by air freight, should comprise for each terminal and each relation, one 7 1/2 Kw transmitter with four ISB drives, antennae and towers, Lincomplex equipment, ARQ equipment, auxiliaries for termination of the channels, telegraph channeling and telex equipment. Further details of equipment can only be supplied on the basis of an on-the-spot survey. Information provided to the team suggested the need for equipment similar to or compatible with the following:

(a) Marconi H11303, 7.5 Kw TX with drive unit plus feeder;

(b) Marconi H5512, RTT terminal plus Lincomplex;

(c) Marconi H1103, filter for TVI;

(d) Log periodic aerials;

(f) RACAL LA 1005 RTT terminal;

(g) ARQ terminal including six AB diplexers, subdividers and VFT rackside;

(d) With regard to installation, the suppliers should supply installation teams to carry out the work on a turnkey basis.

D. COST

A very preliminary estimate of the cost of the above proposals is given below. This figure should be treated with considerable reserve, being based in 1971 quotations.

Equipment

(a)	HF radio terminals		
	7 terminals at, say, K 150,000 per terminal		1,050,000
(b)	Additional multiplex equipment for Lusaka/Blantyre to replace existing 3-channel equipment 48 channel ends at K 400 per channel end		19,200
			1,069,200
(c)	Microwave link Zambia/Zaire		
	2 receivers + 2 repeaters, say	K	400,000

Installation

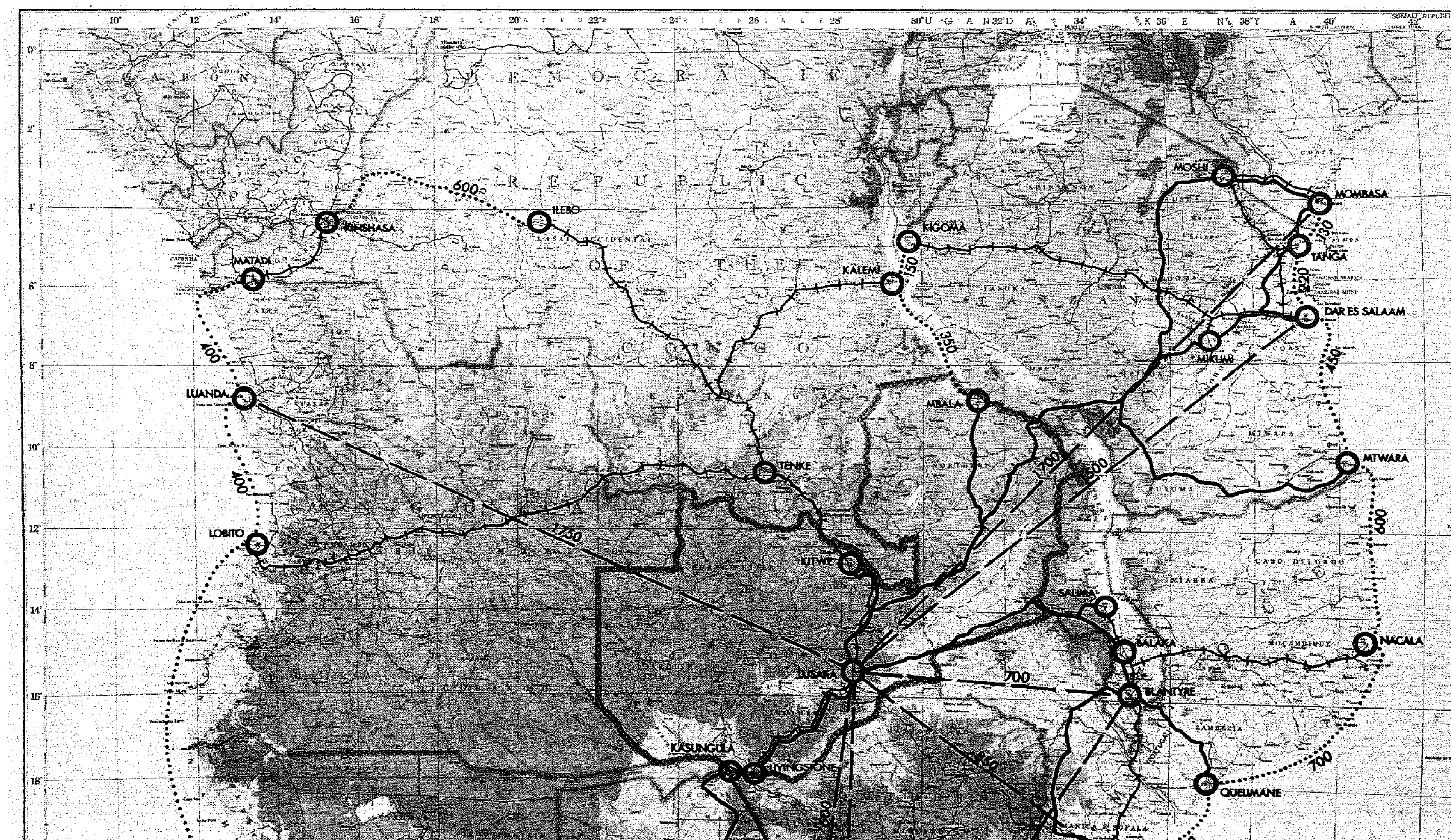
(a)	18 man-months at K 2,000 per month	K	160,000
(b)	Fares	K	20,000
(c)	Travelling and subsistence	K	50,000
(d)	Local transport	K	40,000
		K	1,739,200

It must be emphasized that the foregoing measures would only be considered to meet a desperate need for the immediate future and that the success of the enterprise depends entirely on the rapid procurement and installation of equipment. The medium-term measures for providing permanent telecommunications mentioned earlier should, in any case, proceed.

These needs do not include any equipment for mobile communications between operating bases and trucking units for the supply management group and the trucking agencies. Depending on the method of traffic control adopted, there may well be need for additional radio telephone equipment.

Annex II

MAP OF ALTERNATIVE TRANSPORT ROUTES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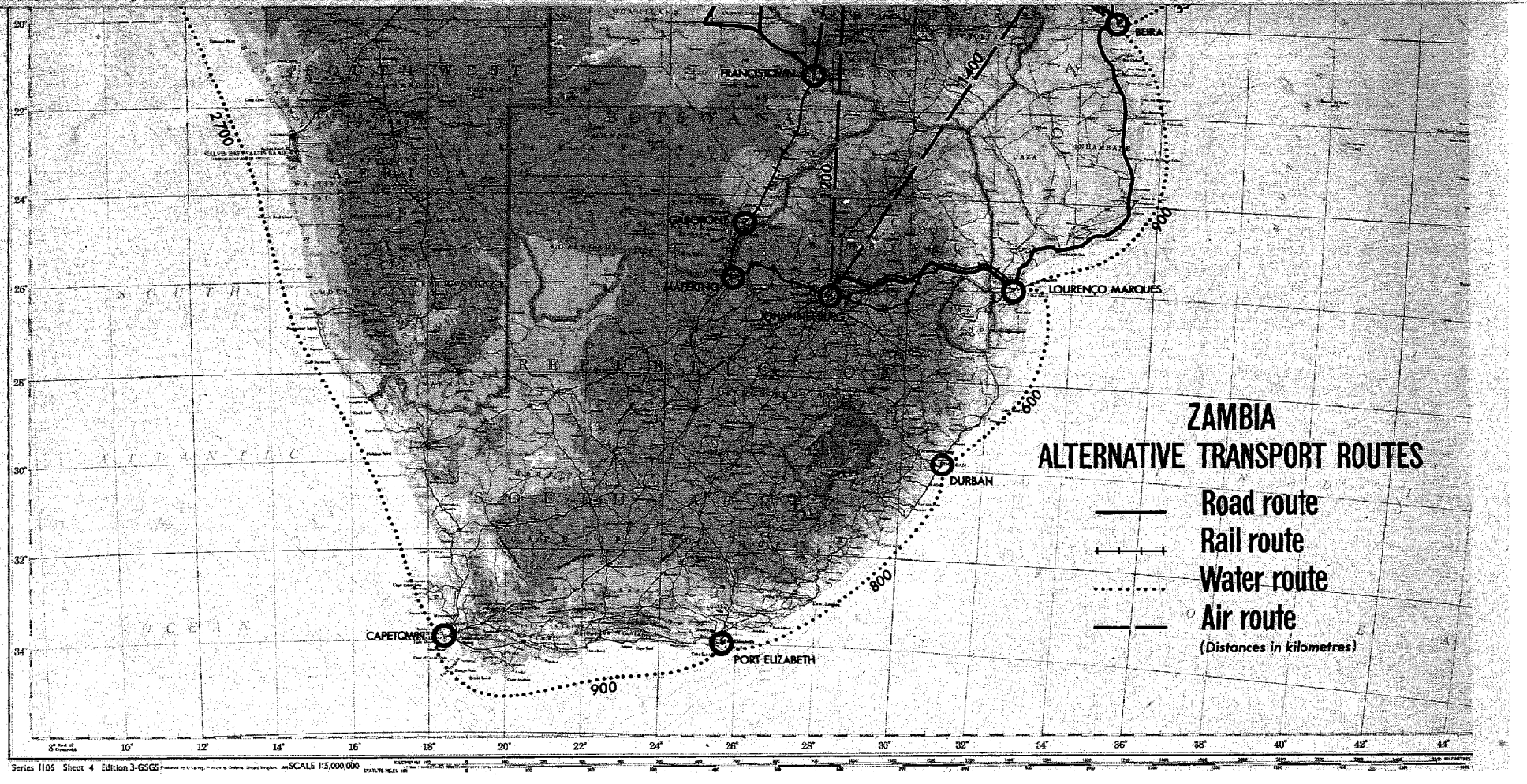
ZAMBIA
ALTERNATIVE TRANSPORT ROUTES
Road route
Rail route
Water route
Air route
(Distances in kilometres)
BEIRA
FRANCISTOWN
GABORONE
MAFEKING
LOURENÇO MARQUES
DURBAN
CAPETOWN
PORT ELIZABETH
2700
1400
200
900
600
800
900
BOTSWANA
SOUTH AFRICA
ATLANTIC OCEAN
INDIAN OCEAN
Series 1105 Sheet 4 Edition 3-GSGS
SCALE 1:5,000,000