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ETHIOPIA

TRANSPORT CORRIDOR ANALYSIS

Operational Improvements
and
Investment Options

Volume I

Main Report

June 12, 1987

CURRENCY EQUIVALENT[1]

Currency Unit = Ethiopian Birr (Br)
US $ 1.00 = Birr 2.07
Birr 1.00 = US $0.48

FISCAL YEAR (FY)

July 8 - July 7

WEIGHTS AND MEASURES

Metric System

1 meter (m)	=	3.28 feet (ft)
1 kilometer (km)	=	0.62 mile (mi)
1 kilogram (kg)	=	2.20 pounds (lb)
1 metric ton (m. ton)	=	2,205 pounds (lb)

LIST OF ABBREVIATIONS AND ACRONYMS USED

ASC	:	Audit Services Corporation
CDE	:	Ethio-Djibouti Railway
CIDA	:	Canadian International Development Agency
EEC	:	European Economic Community
ETCA	:	Ethiopian Transport Construction Authority
ESLC	:	Ethiopian Shipping Lines Corporation
FTC	:	Freight Transport Corporation
FTO	:	Freight Transport Organization
FTSC	:	Freight Transport Service Coordination
LBI	:	Louis Berger International
MOC	:	Ministry of Construction
MTA	:	Marine Transport Authority
MTSC	:	Maritime and Transit Services Corporation
MOTAC	:	Ministry of Transport and Communications
NATRACOR	:	National Road Transport Corporation
NCCP	:	National Committee for Central Planning
PTC	:	Public Transport Corporation
PTSC	:	Public Transport Service Corporation
RITES	:	Rail India Technical and Economic Services
RRC	:	Relief Rehabilitation Commission
RTA	:	Road Transport Authority
SPID	:	Spare Parts Import and Distribution
SSC	:	Service Stations Coordination
TSS	:	Transport Sector Study

1/The currency equivalent between the US dollar and the Ethiopian Birr has been constant from 1973 to the date of this report.

ETHIOPIA
TRANSPORT CORRIDOR ANALYSIS
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Volume I
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This report, written mainly by D. Jovanovic and J. Holt, is based on the findings of a mission which visited Ethiopia and Djibouti in March 1986. The mission consisted of D. Jovanovic (Senior Economist - Mission Leader), J. Holt (Financial Analyst), K. Chung (Port Operations Specialist), E. Irgens (Highway Engineer), and M. Bery (Railway Consultant). Following Government comments received in May 1987, the Report has undergone some amendments and updating.

ETHIOPIA

TRANSPORT CORRIDOR ANALYSIS
Operational Improvements and Investment Options

EXECUTIVE SUMMARY

BACKGROUND

i. Ethiopia's poor transportation infrastructure has hampered economic development to date and remains an obstacle to an integrated economy, the growth of agriculture, the enhancement of export sales, the putting of imports to productive use quickly and the realization of greater economic potential in general. Never was this inadequacy clearer than during the recent drought. The large increase in food imports put an enormous strain on the country's infrastructure, particularly its transportation capabilities. Ships lay at anchor for days waiting to get into the port and even when they were unloaded much of the food relief lay for weeks, some spoiling for lack of covered storage space, because of cumbersome customs and freight forwarding procedures and poor utilization of vehicles moving the grain inland.

ii. Indeed, the drought brought world-wide attention to many of Ethiopia's transport weaknesses: (1) congested ports due to limited berthing and storage capacity, old and inadequate cargo handling equipment, excessive customs requirements and paperwork delays; (2) poor utilization and long turnaround times of vehicles used to get goods moved inland from the Port of Assab due to an old and limited trucking fleet, unduly long loading and unloading time, shortage of trained drivers, unavailability of tires and spare parts, inefficiencies within the Government-run road transport agency and inadequate incentives for private sector truckers; (3) insufficient rail carrying capacity to move goods inland from the Port of Djibouti due to an old, deteriorated and inefficiently run railway; (4) limited resources for new vehicles, spare parts, costly petroleum imports and/or railroad rehabilitation; (5) diversion of existing transport facilities to meet short-term priorities; and (6) a striking lack of roads throughout the country (road density per capita and per km2 is virtually the lowest in Africa).

iii. Some of these problems were addressed as part of food relief efforts, some have been and are still in the process of being tackled under the ongoing Second Road Sector Project (Cr 1404-ET); some are about to be dealt with in the recently approved Port Engineering and Construction Project (Cr 1676-ET); and others remain under study or have yet to be addressed.

iv. Aside from a need to construct rural roads, much of Ethiopia's existing primary road network needs rehabilitation or upgrading. The main road, 889 km long, connecting Addis Ababa, the capital, with the Port of

Assab on the Red Sea, particularly needs upgrading and strengthening on one 366 km section at the Assab end. Moreover, since about 80% of Ethiopia's total exports and imports and over 40% of all road transport freight in the entire country moves over this road, Government is anxious to anticipate any potential capacity limitations over the long term and overcome them via expansion or via construction of alternative routes, if necessary. About 6-7 percent of external trade now moves on an alternate route, between the Port of Djibouti in the neighboring country of the same name and Addis Ababa, but it moves over an old and inefficiently run railway whose capacity without rehabilitation is now limited to about 350,000 tons p.a. Freight movement in the Corridor is discussed in para. 2.04. Figure I depicts these two routes and summarizes recent freight volumes moving over them.

v. Government attention is now focussed on this multi-modal corridor between Addis Ababa and the Red Sea, the transport backbone of the country. Here Government intends to improve infrastructure, remove bottlenecks and improve the efficiency of freight movement by transport entities operating in the corridor. Government is also interested in providing an optimal intermodal mix in the corridor and is, thus, considering the construction of a new railway and/or pipeline as well as upgrading and expanding, if necessary, the existing road and railway. Ways to improve road transport operations and to better organize and manage government entities charged with overseeing operations and investment in the entire transport sector are also being studied. These and other issues have been the subject of reports undertaken recently by various consultants at Government request (para. 1.19). The analyses and conclusions are currently being reviewed and finalized with a view toward: (a) implementing actions designed to improve transport operations in the corridor, and (b) determining investment priorities within the context of economic rate of return calculations, available resources, and the country's long term development needs.

vi. A major purpose of this Transport Corridor Analysis (TCA), therefore, is to provide guidance in both areas. Accordingly this report:

- updates statistical information for the transport sector;
- summarizes and evaluates operations in the corridor;
- suggests measures to improve them;
- analyzes alternative capital investment plans considered by Government;
- makes recommendations regarding investment priorities in the transport sector.

In doing so, the TCA is intended to lay a foundation for future Bank Group lending as well as to help Government evaluate its options. Transport is a service sector whose justification comes from providing appropriate and often critical services to other sectors of the economy. With limited resources and virtually every segment of the economy in need of capital, it is essential that maximum utilization of the existing transport infrastructure be achieved before additional investments are made. Administrative reform is often a low cost means of reducing costs, so this TCA is as concerned with identifying actions to improve transport operations and utilization of existing facilities as it is with assessing potential investments in the corridor.

Moreover, since investments in the corridor could be at the expense of other investments, such as rural road construction or projects in directly productive sectors, it is imperative that every corridor investment be scrutinized carefully to ensure that its return is well justified compared to other investment possibilities. IDA's investment recommendations reflect these considerations.

MAIN CONCLUSIONS WITH RESPECT TO TRANSPORT OPERATIONS

vii. The report addresses the principal operational, financial, organizational and policy problems which have been identified during the 1986 review of the corridor by the World Bank, by consultants, and by the Government. An outline of the main conclusions is provided below. A more detailed and systematic summary, by transport entity, is provided in matrix form at the end of Chapter III, pages 50-53.

viii. Problems. The entities engaged in transport operations within the corridor experience a number of common problems such as: shortage of foreign exchange; lack of spare parts; insufficient funds for replacement of vehicles, rehabilitation or improvement projects; shortage of qualified and experienced staff; shortcomings in management and inadequate coordination of activities among the various transport entities. Specific issues related to each transport mode are summarized below:

(a) Port of Assab: inadequate infrastructure to cope with growing traffic; a shortage of cargo handling equipment; an inadequate accounting system (not cost based); low storage rates and insufficient storage area given the current level of port clearance (paras. 3.03, 3.06, 3.09, 3.11).

(b) Freight forwarding interface: a freight forwarding parastatal which needs improvement and does not properly coordinate operations with shippers, the port and road transport; its coordinating efforts are handicapped by a Governmental system that involves too much paperwork, employs cumbersome and time consuming customs procedures and requires full advance payment of duties, transport and freight forwarding charges by importers and exporters; as a consequence of these interrelated difficulties, goods spend an average of about 55 days in the port of Assab awaiting shipment inland (paras. 3.17, 3.18, 3.20, 3.21).

(c) Road transport: low vehicle utilization due to an aging fleet, lack of spare parts, long loading and unloading times, too few qualified drivers, and inefficiencies stemming from institutionalized freight allocation services; a deteriorating competitive position for private truckers; insufficient and poorly equipped garages and workshops; poor security that could be improved with around-the-clock patrol service on the Addis Ababa-Assab road; a need to adjust tariffs to commercial levels so they cover costs of operating on different road conditions as well as the long term costs of staying in business (paras. 3.37, 3.38, 3.39, 3.41, 3.43, 3.45).

(d) Railway: an outdated infrastructure that has almost no ballast and is in poor shape; inadequate management, lack of marketing orientation, shortages of engines and rolling stock, coordination and managerial difficulties due to joint ownership by two countries, uncertainties as to the future use of the Port of Djibouti, general labor inefficiency; and unduly long turn-around time (about 12-20 days) between Addis and Djibouti (paras. 3.85, 3.96, 3.97).

(e) Bus Passenger Transport: a need for new buses to replace the large percentage of non-operational buses (estimated to be between 25%-35%) of an already inadequate fleet and to meet increasing demand for reliable transport; a continuous supply of spare parts and tires is also of high priority (para. 3.57).

ix. Managerial and Organizational Matters. With regard to the institutional framework, every entity involved in transport would benefit from reorganization to eliminate duplicative or conflicting responsibilities, reduce unneeded managerial layers, improve communication, make freight and passenger transport more cost-based and efficient. Specifically:

(a) Road Transport Authority (RTA) needs to expand its planning and analytical branch for continuous review of road transport costs, development of transport demand countrywide and for monitoring (and enforcing) road transport regulations (para. 3.73);

(b) A single highway authority (based on ETCA's organization) should be given responsibility to enforce axle load legislation (para. 3.73);

(c) The Marine Transit Services Corporation (MTSC) needs additional managerial strengthening and overhaul of its functions to become a true freight forwarding agency, to improve its liaison time with Customs, clients and Marine Transport Authority (MTA), and to continue efforts with Customs and MTA to reduce the amount of documentation required for imports and exports (para. 3.18);

(d) The National Road Transport Corporation (NATRACOR)'s recent de facto separation into freight and passenger transport (FTC and PTC) is a positive development and is to be officially endorsed by the Government in the near future; it should eliminate possible cross-subsidization between the two, give each greater flexibility to develop according to need and remove unnecessary layers of management. FTC's relay system on the Addis-Assab road needs improvement in logistics, organization and management to be fully operational and successful (para. 3.46);

(e) Ethio-Djibouti Railway (CDE) needs to operate under a treaty more conducive to efficient railway operations, to reorganize its structure to conform more to a unified Addis Ababa located headquarters, to enhance its financial autonomy and to reduce the number of members on its Board of Directors (para. 3.97).

x. Policy Issues. Some of the operational problems being experienced by entities operating in the transport sector stem from macroeconomic issues or broad-based Government policies. Shortage of foreign exchange is one such issue that particularly hurts the import dependent transport sector. Unavailability of foreign exchange manifests itself in a lack of funds for spare parts, replacement vehicles, rehabilitation or improvement projects, but is basically related to larger issues. These include: (a) overvaluation of the currency; (b) lack of cost-based tariffs; (c) failure to grant revenue earning entities financial autonomy or to permit these entities to set rates or retain earnings sufficient to cover long term costs and fund capital expenditures; (d) Government's need to control access to, and timing of, the use of foreign exchange due to its overall scarcity in the country. Currency valuation and reform of foreign exchange allocations are beyond the scope of this TCA. To the extent that shortage of foreign exchange stems from inadequate tariffs and from insufficient financial autonomy, however, Government is urged to review these policies from this point of view.

xi. Absence of Accounting Data or Systems to Establish Cost-Based Rates is another issue that calls for an urgent review of present accounting practices and the introduction of cost-based accounting systems wherever relevant. Better accounting systems will permit the charging of cost-based tariffs which will not only make more realistic the internal finances of transport operating entities; it will also bring about more rational traffic allocation (cost based) on Ethiopia's transport infrastructure.

xii. Lengthy administrative procedures and cumbersome documentation required by the freight forwarding agency, customs, the ports and other transporting entities require urgent and coordinated action on the part of the Government to enable more efficient transport of cargo and to shorten unduly long port delays and turnaround time for wagons and trucks in the corridor. In recognition of this need for reform, the Government recently formed an interministerial committee to streamline procedures and eliminate unnecessary documentation.

xiii. Another policy matter which warrants further investigation and analysis is that the present system of public transport does not allow for competition, because of NATRACOR's (FTC) tight control of dispatching and freight allocation. This fact, together with an outdated tariff system (unchanged since 1981), is gradually undermining the private segment of the industry.

xiv. Truck owner/operators in the private sector are known as "Associates" because they operate in association with the Government run road transport agency. Commercial road transport by Associates and by the Government owned trucking company is tightly controlled by NATRACOR (FTC). Each load carried by an Associate has been assigned to it by NATRACOR (FTC). Currently the rates are insufficient to enable Associates to renew their fleet. Also Associates do not have the same access to spare parts, tires and garage facilities as does the Government operated company. Trucking by the private sector is thus gradually being undermined. This trend is serious as the bulk of road transport is carried by 5,800 or so vehicles owned by the private sector. NATRACOR (FTC), by contrast, owns 1,100 trucks. Specific suggestions for improving the position of the private sector are listed below:

(a) provide longer term loans from lending institutions with appropriate borrowing terms;

(b) ensure that private spare parts dealers have access to sufficient foreign exchange to meet the demand of private truckers, or undertake systematic stocking of spare parts by Spare Parts Imports and Distribution (SPID), subsidiary of NATRACOR (FTC), to include those required by private owners (to accommodate needs of their makes of vehicle) as well;

(c) encourage replacement of old, inefficient heavy trucks with a combination of tractor-trailers;

(d) revise tariffs to encourage acquisition of larger vehicles, to cover operating and capital costs and to better reflect differences in road conditions;

(e) finance or otherwise facilitate the expansion of private workshops country-wide to provide maintenance of vehicles owned by Associates, and

(f) establish terminal to terminal service and "trailer pools" to improve service and to provide opportunities for private owners to participate more fully in transport operations on the main road in the corridor.

RECOMMENDATIONS REGARDING INVESTMENT PRIORITIES IN THE CORRIDOR

xv. The transport corridor investments being considered over a ten-year period and summarized below, are discussed in Chapter V of the report. Altogether, their economic cost is estimated to be Birr 3.9 billion (US$ 1.9 billion), far beyond levels spent in the past. Over the last 6 years, by comparison, only Birr 160 million (US$ 77 million) was spent on the corridor, excluding Djibouti port.

	Cost Estimates (net of taxes)		
	Km	Birr (million)	US$ (million)
Roads:			
- Addis/Mojo section	73	15	7
- Mojo/Awash section	150	30	14
- Awash/Mile section	300	60	29
- Mile/Assab section	366	92	45
		197	95
Port Extension		85	41
Rail Rehabilitation		268	130
New Railway Line	871	2,840	1,372
New Pipeline	860	460	222
TOTAL		3,850	1,860

xvi. Based on the analysis in Chapter V of the report, summary aspects of which are contained in Table V.4, the following investments are warranted:

Road. Strengthening/upgrading of sections of the Addis-Assab road as follows:

Mile-Assab section	1988-1991
Awash-Mile section	1990-1993
Mojo-Awash section	1995-1996
Addis-Mojo section	1998

Port. Constructing at Assab a multi-purpose berth (No. 13) during 1988/91 (US$ 41 million) and upgrading the berth to function as a container terminal in 1997.

The analysis shows that simultaneous construction of a second berth (no. 14) is economically inferior to staged construction and should be postponed for some time. Final judgment on further expansion/modernization of the port infrastructure should await the outcome of a more detailed economic and financial analysis which will be carried out under the ongoing port project (Cr. 1676-ET).

xvii. Based on the analysis in Chapter V (Table V.4), the following investments may be warranted:

Pipeline. Construction of a new pipeline between Addis and Assab (US$222 million) of 12 inches diameter (1989-1990), first with four pump stations and about 10 years later with two more stations, appears to be sufficiently viable to call for a feasibility study (actually about to start). The rationale for this investment, however, assumes the gradual phasing out of the existing railway. We estimate an Economic Rate of Return (ERR) of 17% for the pipeline.

Existing Railway. The rehabilitation/improvement of the existing railway (Addis Ababa-Djibouti) over the 1987-93 and 1994-99 periods, with US$ 129.5 million equivalent, is a project with a marginal economic justification. We estimate an ERR of about 10%, assuming no pipeline is built. Although economic viability is not clear-cut, the project should be carefully examined in view of Government's strategic interest in keeping an alternative route to the Red Sea open. If the Government opts to rehabilitate the railway, it should also ensure that CDE is reorganized and that management is strengthened, particularly in marketing, cost accounting and maintenance of locomotives. Since there is significant traffic overlap between the pipeline and the CDE, the economic analysis shows that there is no complementarity between building the pipeline and rehabilitating the CDE, leaving Government with the option of which investment to make.

xviii. Based on the analysis in Chapter V, the following investment is not warranted:

New Railway. Construction of the new railway line Addis Ababa-Assab over 1990-1996 period, with preliminary cost net of taxes of US$ 1,372 million, is not economically justified; detailed engineering, therefore, should be delayed. We estimate an ERR for the project of 8%. Even an ERR of 12-13% would still be insufficient, taking into account the size of investments and the risks associated with them (only preliminary cost estimates are available). The project is extremely costly; with limited resources the funds could be better used to fund higher priorities, such as rural road construction. To illustrate the tradeoffs, more than 30,000 km of rural roads could be constructed with an equivalent amount of funds. Currently there are an estimated 25,000 km of rural roads and tracks in the country; whether or not building 30,000 km in addition is justified, the comparison gives some order of magnitude of what Ethiopia would be giving up by tying up so many financial resources in a new railway.

xix. The Addis Ababa-Red Sea Corridor can be served by: (a) making operational improvements through maximizing the use of existing investments; and (b) making limited new investments in the Port of Assab and on the Addis-Assab road as well as in the road transport industry (particularly for private sector trucking) and perhaps in a petroleum pipeline. There is no complementarity between rehabilitating the CDE and building a petroleum pipeline nor will there be sufficient traffic to justify a new railway in view of the ample carrying capacity of the Addis-Assab road well into the next century. Resources saved from not doing uneconomic investments in the Corridor should be used in other areas of the transport sector, where justified, or reoriented to more directly productive sectors of the economy.

I. INTRODUCTION

1.01 Situated on the Red Sea in the horn of Africa, Ethiopia is the third largest (after Sudan and Zaire) and second most populous (after Nigeria) country in Africa. Ethiopia is also one of the poorest countries in the world with a GNP per capita of about $120 (1984). Governed as a virtual feudal monarchy for much of this century, economic and social development has come slowly to this country despite fertile highlands and abundant natural resources. A revolution in 1974 led to the nationalization of all lands and put into power a Marxist-oriented Government intent upon socializing all productive and commercial activities. Since the revolution the country has made considerable social progress but economic growth, although creditable given the turbulence caused by civil unrest, war and drought at various times since then, has not been sufficient to forestall a decline in per capita income. Agricultural production, which accounts for about 48% of the GNP, remains low and Ethiopia's considerable mineral potential largely untapped due to a combination of factors that include: severe droughts, soil erosion due to deforestation, social and political upheavals, inappropriate policies, want of resources and an insufficiently developed transportation network.

1.02 Government is in the process of resettling large numbers of families from northern to western provinces and promoting "villagization" with a view toward improving production and providing social and agricultural services more efficiently.[1] The country remains largely rural and still dependent upon small landholdings, however. Nearly 95 percent of the land now under cultivation is still operated by peasant farmers who have user rights averaging two hectares or less.

1.03 Major products include cereals, pulses, oil seeds and cakes, fruits, vegetables, sugar cane, molasses and coffee, which is Ethiopia's primary export, and major source of foreign exchange. Ethiopia also supports the largest animal population in Africa, exporting meat, skin and hides; livestock production has still a lot of room to develop further, however, as animal husbandry follows traditional and nomadic practices. Agricultural production overall is low and in normal years barely exceeds subsistence levels. During these last years of drought, output has been worse; food production declined by over 15% during fiscal year 1984/85.

1.04 Even without the drought, Ethiopia still must rely on imports to fuel development and sustain its rapidly growing population. Imports include fertilizers, petroleum, chemicals, manufactured goods, machinery, transport equipment and grains. Total imports in 1984/85 equalled US$ 1.3 billion or 24% of gross domestic expenditures. Exports were valued at about US$ 450 million, 9% of gross domestic expenditures. Imports substantially exceed exports: on a tonnage basis the margin was about 4:1 in 1984/85 with imports about 3.2 million tons and exports about 0.8

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1 About 500,000 persons were resettled between the Fall of 1984 and Spring of 1985. The large-scale movement of people placed heavy demands on the country's transportation system among other things, and was estimated to have consumed financial resources equivalent to about 26% of the 1984/85 Capital Budget.

million tons, although recent grain imports distort the picture somewhat. The ratio for 1983/84 was 3:1. Massive amounts of food aid donated in response to the drought crisis in the last several years increased the imports of grain and cereals from about 220,000 tons to more than one million tons in 1985. The large increase in food imports put enormous strain on the country's infrastructure particularly its transportation capabilities. Ships lay at anchor for days waiting to get into the port and even when they were unloaded much of the food relief lay for weeks, some spoiling for lack of covered storage space, because there were not enough vehicles to move the grain inland, or because of cumbersome customs and freight forwarding procedures. The backlog of cargo in Assab port remained high and in March 1987 it was about 160,000 tons.

1.05 Indeed, the drought brought world-wide attention to many of Ethiopia's transport weaknesses: (1) congested ports due to limited berthing and storage capacity, old and inadequate cargo handling equipment, excessive custom requirements and paperwork delays; (2) insufficient road carrying capacity to get goods moved inland from the Port of Assab due to an old and limited trucking fleet, too few trained drivers, unavailability of tires and spare parts, inefficiencies within the Government-run road transport agency and inadequate incentives for the private sector truckers; (3) insufficient rail carrying capacity to move goods inland from the Port of Djibouti due to an old, decrepit and inefficiently run railway; (4) limited resources for new vehicles, spare parts, costly petroleum imports or railroad rehabilitation; (5) diversion of existing transport facilities to meet short-term priorities; and (6) a striking lack of roads throughout the country.

1.06 Some of these problems were addressed as part of food relief efforts, some have been and are still in the process of being addressed under the ongoing Roads Sector Project (Cr 1404-ET of 1983); some are about to be dealt with in the recently approved Port Engineering and Construction Project (Cr 1676-ET of 1986); and others remain under study or have yet to be addressed. On the whole, however, it is clear that Ethiopia's poor transportation infrastructure has hampered economic development to date and remains an obstacle to an integrated economy, the growth of agriculture, the enhancement of export sales, the putting of imports to productive use quickly and the realization of greater economic potential in general.

1.07 In addition to lack of capital, transportation development has been seriously limited by wide topographical variations, an extremely rugged terrain, severe climatic conditions and a widely-dispersed population. Road is the dominant form of transportation but the country has only about 13,500 km of main roads (4,000 km paved) and about 25,000 km of rural roads and tracks. A country twice the size of France thus has a road density of only about 0.9 km per 1,000 people, virtually the lowest on the continent; by comparison the weighted mean of road density in all of Africa is 2.6 km per 1,000 persons. Density per 1,000 square km is only 31 km, also well below the continental mean of 58 km.

1.08 The primary road network consists largely of radial extensions from Addis Ababa. There are few interconnecting links between adjacent regions and large parts of Ethiopia remain isolated and dependent upon pack animals or human carriers for transport. Indeed, nearly three-quarters of

all farms are more than a half-day walk from an all-weather road. Road development has been especially deficient in the agriculturally rich west. Since about 89% of the total population is rural and 85% employed in agriculture, the lack of roads is a significant constraint for this important sector of the economy and for much of the population.

1.09 Aside from a need to construct rural feeder roads, much of Ethiopia's existing primary road network needs rehabilitation or upgrading. The main road, 889 km long, connects the capital of Addis Ababa with the Port of Assab on the Red Sea and is in particular need of improvement. Moreover, since about 80% of Ethiopia's total exports and imports and approximately 35% of all road transported freight in the entire country moves over this road, Government is anxious to ensure that any potential capacity limitations over the long term are anticipated early enough to overcome via expansion or via construction of alternative routes if necessary. Toward that end Government has recently retained consultants: (1) to ascertain the long term maintenance and upgrading needs of the road; (2) given the high cost of fuel, to examine alternatives for the provision of bulk transport, particularly the possibility and potential economic rate of return of establishing a pipeline and a new rail link between Assab and Addis Ababa.

1.10 Commercial road transport on the main corridor and throughout the country is closely regulated and controlled by Government. Tariffs are set and enforced by a Road Transport Authority (RTA) that also determines routes, licenses vehicles, promulgates safety and axle load standards and generally regulates road transport. Freight and passenger transport operations were conducted and controlled by the National Road Transport Corporation (NATRACOR). However, this organization has recently, but not yet officially, been divided into a separate freight entity (FTC) and a separate passenger entity (PTC). On the freight side, road transport services are controlled by NATRACOR (being renamed Freight Transport Corporation) using trucks privately owned and operated as well as those belonging to FTC. FTC has a fleet of about 1,100 trucks but about two-thirds of the freight traffic is carried by nearly 5,800 privately-owned trucks. Unfortunately the average age of commercial vehicles is increasing; for the fleet owned by the private sector it is over 11 years. FTC assigns traffic and issues travel permits to the private owner-operators on a load-by-load basis and receives 5% of their freight revenues for dispatching and revenue collecting services. Needs of the road transport sector include: expansion and modernization of the fleet; expansion of garage service and terminal facilities; more trained drivers; completion and expansion of a relay system designed to improve truck utilization; improvement in turnaround times; reduction of paperwork delay and tariff revision so that the full, long-term cost of truck operations, including truck replacement, is provided for. Spare parts and tires are scarce and over-priced and truck owners do not have access to enough foreign exchange to purchase them in a timely fashion. Also the process by which shippers arrange for freight transport is cumbersome and time-consuming and FTC's centrally-controlled dispatching of trucks does not necessarily lead to an efficient allocation of trucking resources throughout the country. Tariff flexibility and greater reliance upon truck competition would lead to greater efficiency.

1.11 Assab is the major source of traffic over this main road, handling about 80% of Ethiopia's external trade. The port was constructed in 1959 about 100 miles north of the Port of Djibouti for strategic and economic reasons. Entirely within Ethiopia, Assab was built so that Ethiopia would no longer have to rely upon a neighboring country and foreign government to serve as the country's primary gateway and provider of development needs. Consisting of two jetties with only six functional berths for ocean-going vessels, Assab proved a major bottleneck during the drought, as previously mentioned. Despite the recent addition of storage capacity and bagging facilities to ease handling of bulk grain imports, the port continues to operate at capacity and remains congested.

1.12 Imports that represent a considerable portion (24% in 1984/85) of Ethiopia's gross domestic expenditures sit idle in the Port awaiting paper processing or transport inland; currently it takes an average of about 55 days to move cargo from ship to final destination. Capital improvements can solve some of the physical causes of delay within the Port, by adding berths, equipment and storage capacity. Indeed provision has already been made in the newly approved Port Project (Cr 1676-ET) for the most pressing of these needs. Unfortunately the bottlenecks are caused by weaknesses associated with inefficient Government policies, with cumbersome and time consuming customs and documentation procedures, with lack of coordination among parastatals operating the Port and by lack of access to foreign exchange to maintain equipment. The Marine Transport Services Corporation, the only shipping and freight forwarding agency in the country, had been a particular source of delay; but recent changes in MTSC's management and in its tariff structure have reduced substantially MTSC's processing time (from 15 to 5 days according to a recent MTSC sampling). Customs clearance takes, on average, another 13 days. Delays by importers in submitting to MTSC documentation to process consume an additional 32-40 days, indicating the burden administrative and financial requirements can present. Altogether cargo spends an average of 55 days in the port before moving inland. Ways and means of attacking these institutional inefficiencies are intended to be a subject for the upcoming Transport Sector Project planned for FY 1989. Port productivity improvements achieved by improving management or reducing unnecessary paperwork would be an inexpensive means of reducing the cost of imports and the price of exports. Either development would be a substantial shot in the arm to Ethiopia's struggling economy. If the total number of days imports rest in the port could be reduced to, say, 15 days, substantial savings could be achieved: (1) by avoiding the carrying costs of financing unproductive assets; and (2) by realizing sooner the productive benefits of these assets. While difficult to quantify, approximately 30-40 million Birr in financing charges could have been saved in 1984/85, assuming a 12-20% rate of interest for short term credit; perhaps an additional 10-15 million Birr in lost productivity could have been saved, assuming an average annual return on assets of 10% could have been earned on one-half of the imports.

1.13 Ethiopia has a second port, Massawa, but it is substantially to the north and too far from Addis Ababa by road to be a realistic alternative to Assab. Massawa is an old port, and serves the northern part of the country and nearby inland city of Asmara. Due to lack of maintenance, dredging, and partial collapse of its quay wall, Massawa

accepts vessels at only two berths and essentially handles traffic from or destined to the Eritrean provinces (where hostilities are now most prevalent). Proposed improvements for the port been identified in Ethiopian Port Studies, Master Plan (1982) and are expected to be implemented by Government in the near future.

1.14 The Port of Assab was so congested as a result of having to handle large the quantities of donated grain during the recent food crisis that Government was forced to increase its use of the neighboring Port of Djibouti. Connected by rail, Djibouti is 781 km. from Addis Ababa. Currently only about 6-9% of the Djibouti Port's volume involves Ethiopian-related cargo but this level represents about 7% of Ethiopia's total external trade. The increased use of Djibouti, in turn put pressure on the old jointly-owned Ethio-Djibouti railway, the only practical means of moving bulk cargo between Djibouti and Addis Ababa.[2] Inefficiently run, the railway is in a deteriorated state and faces substantial investment needs for track and equipment. As a result, capacity is declining and tonnage carried is now about 300,000 annually. Financially, the railway operates at a substantial loss and managerially needs help to become more efficient. Lack of capacity on the railway has created a backlog of goods at Djibouti as well. For example, in March 1986, 70,000 tons of goods were in the Port awaiting transport inland and the average number of days goods stay in the port climbed from 60-90 days in 1983/84 to 90-180 days in 1984/85. In March 1987, however, the backlog of the Ethiopia-bound cargo was reduced to less than 30,000 tons. Although the railway is jointly-owned, most of it is inside Ethiopia and virtually all its traffic is Ethiopia-bound; realistically therefore, responsibility for any rehabilitation program lies with Ethiopia.

1.15 Institutional responsibilities for the transport sector are divided among a variety of Government entities, some of which appear to have overlapping responsibilities. The Ministry of Transport and Communications (MOTAC) is responsible for setting an overall policy and planning infrastructure. MOTAC oversees port operations which are run by the Marine Transport Authority (MTA), freight forwarding activities, run by the Marine Transport Services Corporation (MTSC), freight and passenger transport, which in turn is provided or directed by FTC and PTC under policies and a regulatory framework devised by RTA and, together with the Government of Djibouti, rail operations by CDE. MOTAC also oversees civil aviation, the regulatory side of which falls under the Civil Aviation Authority and the operations of which are handled by the Ethiopian Airlines. Highway construction and maintenance, however, is carried out by the Ethiopian Transport and Construction Authority, a parastatal that falls under the authority of the Ministry of Construction (MOC). The present situation lends itself to some confusion and conflict. For example, MOTAC, through RTA, is responsible for road signs, road marking, road safety, axle load standards, and overall network planning, yet MOC, through ETCA, is responsible for road design, construction and maintenance. Highway issues would be more effectively handled under one strong authority. Some

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2 A road exists but the Djibouti Government does not permit its use for transit cargo to Ethiopia. The road, although paved, was not built for heavy cargo in such volumes but, more importantly, traverses through areas considered unsafe.

redundancies and overlapping responsibilities are also observed between RTA, FTC and PTC. A number of organizational improvements and ways of improving the efficiency of these entities have, however, been identified and are expected to be implemented.

1.16 Government recognizes the inadequacy of the transportation infrastructure and has been giving this need high priority for some time. The total length of the road network has increased over two times in the last sixteen years and road investment and maintenance expenditures equal US$ 460 /km or 0.41% of GNP (1983 figures). Aside from road construction, about which there is little argument, Government attention is now focussed on the transport backbone of the country, the multi-modal corridor between Addis Ababa and Assab. Here Government hopes to improve infrastructure, remove bottlenecks and improve the efficiency of freight movement by transport entities operating in the corridor. Government is also interested in providing an optimal intermodal mix in the corridor and is, thus, considering the construction of a new railway and/or pipeline as well as upgrading and expanding, if necessary, the existing road and railway. Ways to improve road transport operations and to better organize and manage government entities charged with overseeing operations and investment in the entire transport sector are also being studied. These and other issues have been the subject of reports undertaken recently by various consultants at Government request. The analyses and conclusions are currently being reviewed and finalized with a view toward establishing investment tradeoffs within the context of rate of return calculations of available resources and of providing an integrated development program for the country's long term development needs. It should also be noted that the transport sector, MOTAC in particular, have been making tremendous efforts to support drought relief efforts and to improve transport sector management and modernize operations.

1.17 Whatever transportation investments are decided upon, they must compete with other demands. Virtually every segment of the economy is in need of physical capital yet availability of domestic resources for investment is constrained by Government's outlays on defense and backing of inappropriate incentives for production, as well as by a rapidly growing population, low levels of external aid, lack of savings, and an inefficient allocation of resources.

1.18 With limited resources, it is essential that maximization of the existing infrastructure be achieved before additional major investments are made. Moreover, since investments in the corridor will be at the expense of projects elsewhere in the country, such as rural road construction, every additional investment should be scrutinized carefully to ensure that its return is greater than that of other needed projects.

1.19 A major purpose of this Transport Corridor Analysis (TCA), therefore, is to provide guidance in this regard. Toward this end the report seeks to:

(i) evaluate present operations in the Addis-Assab Djibouti corridor with a particular view toward assessing overall effciency, asset utilization, degree of cost recovery via rates; measures to improve these operations are suggested;

(ii) study alternative capital investment plans considered by Government and consultants for the corridor to assess their potential impact on transport costs and benefits and implications for future investment requirements; the optimal investment plan for the corridor, taking into consideration macroeconomic issues at the country and sector level are provided.

The TCA is also intended to form the basis for determining future Bank Group assistance, as well as to help Government evaluate proposed investment options and policy changes relevant to the corridor.

1.19 In preparation of the TCA, a number of recently completed transport studies were reviewed, particularly as they apply to the multimodal transport corridor between the Red Sea coast and Addis Ababa. The studies include:

(1) A Transport Sector Study financed by the Bank under Cr.1404-ET was completed in draft final in January 1987 by Louis Berger (USA). The study is focused on: (a) development of a 20 year Transport Sector Investment as an input to the national development; (b) recommendation of policies for achieving effective coordination of the Transport Sector operations; (c) analysis and recommendation of a development strategy for the multimodal corridor between Addis Ababa and Assab/Djibouti; and (d) recommendation of Government organizational arrangements and management systems for improved sector and subsector planning.

(2) A Techno-economic Feasibility Study of a Transportation System on the Addis Ababa-Assab Corridor financed by Government and completed by Rail India Technical and Economic Services Ltd. (RITES) in 1986. The study addressed three alternative investment options in the corridor: (a) The building of a new railway system within Ethiopian territory; (b) Road only; (c) Pipeline with the Road.

(3) A study on the Financing Needs of the Djibouti-Ethiopian Railway funded by the ILO and completed by Vijay Raman, independent consultant, in 1985.

(4) A Road Transport Study financed by IDA and carried out by consultants Roy Jorgensen Associates and Hughes Economic Planning in 1984 to propose and help introduce improvements to the organization, operation and regulation of Road Transport.

(5) An organization and management study for the Maritime and Transit Services Corporation financed by MOTAC and carried out jointly by consultants Roy Jorgensen Associates, Inc., and Tippets-Abbett-McCarthy-Stratton in 1984.

(6) An Organization and Management Study for the Djibouti-Ethiopian Railway financed by the Railway and carried out by consultants Louis Berger Int. in 1984.

(7) **A Study on the Development and Implementation of a Road Monitoring and Evaluation System** funded by IDA and completed by consultants Delcanda (Canada) in 1984. The study focuses on development and maintenance of roads, including rural roads.

(8) **Ethiopian Ports Studies, Master Plan**, financed by Government and carried out by consultants Bertlin & Partners (UK) in 1982. The study served as the basis for the recently approved Port Engineering and Construction Project (Cr.1676-ET).

1.20 The TCA is organized in two Volumes. Volume I, Main Report, contains six Chapters; Volume II contains seven Annexes providing additional and more detailed information on specific subjects.

Chapter I of Volume I introduces the transport corridor, highlights its importance and summarizes its major problems within the context of Ethiopia's policies and economic condition.

Chapter II discusses the economic role of the corridor in more detail;

Chapter III describes the nature of the transport operations undertaken by Government agencies, transport parastatals and the private sector that are involved in the corridor; explains the operating difficulties, managerial issues and problems now being encountered by these entities; and summarizes proposals put forward to address these problems;

Chapter IV presents traffic forecasts and sets forth investment alternatives in the corridor that are to be considered;

Chapter V presents the economic analysis of these investmnet options;

Chapter VI contains conclusions and recommendations.

II. THE TRANSPORT CORRIDOR

A. DESCRIPTION OF THE CORRIDOR

2.01 The Transport Corridor actually consists of two routes: (1) an 889 km long bituminous paved road, located entirely within the Ethiopian territory, connecting the capital of Addis Ababa with the deep water Port of Assab on the Red Sea; and (2) a more southern rail route that is shorter (781 km) but traverses through the small country of Djibouti to the older Port of the same name south of Assab. These routes are indicated on Figure 1 and on the map at the end of Vol. I. There is also regular air transport of passengers and small cargo between Addis Ababa and Assab; since air transport has only limited importance in terms of traffic volume, it was not considered in the analysis.

2.02 Both rail and road routes link the economically more developed and populated central part of the country with the coast, extending east from the capital in parallel fashion for about 223 km. Thereafter, at Awash, the routes part. The road turns to the north through a sparsely populated area inhabited by nomads and dry arid land before reaching the Port of Assab. The railway continues east another 250 km through relatively populated areas until reaching Dire Dawa, a major market center in the region. From Dire Dawa the railway turns north, also passing through dry land populated with nomadic tribes, on to the Port of Djibouti.

2.03 In addition to the road route between Addis Ababa and Assab (AAA road), there are two other road routes to the Red Sea via Djibouti: one reaches the port there via Dire Dawa(850 km); another drops down from the AAA road after Mile at Dobi and goes on to Djibouti via Garabbarjis (957 km). One can also reach the port of Berbera in Somalia by road, from Dire Dawa via Hargeisa. None of these three routes is a realistic alternative to the two main routes that are subjects of this TCA, either because they are long, or have long unpaved sections or are built to low axle load standards. In the event the main routes are ever severed, the CDE shut down for rehabilitation, or the Port of Assab unable to cope with traffic loads (as during the latest drought), however, these alternative routes might prove useable for limited traffic volume and over the short term.

B. ECONOMIC ROLE OF THE CORRIDOR

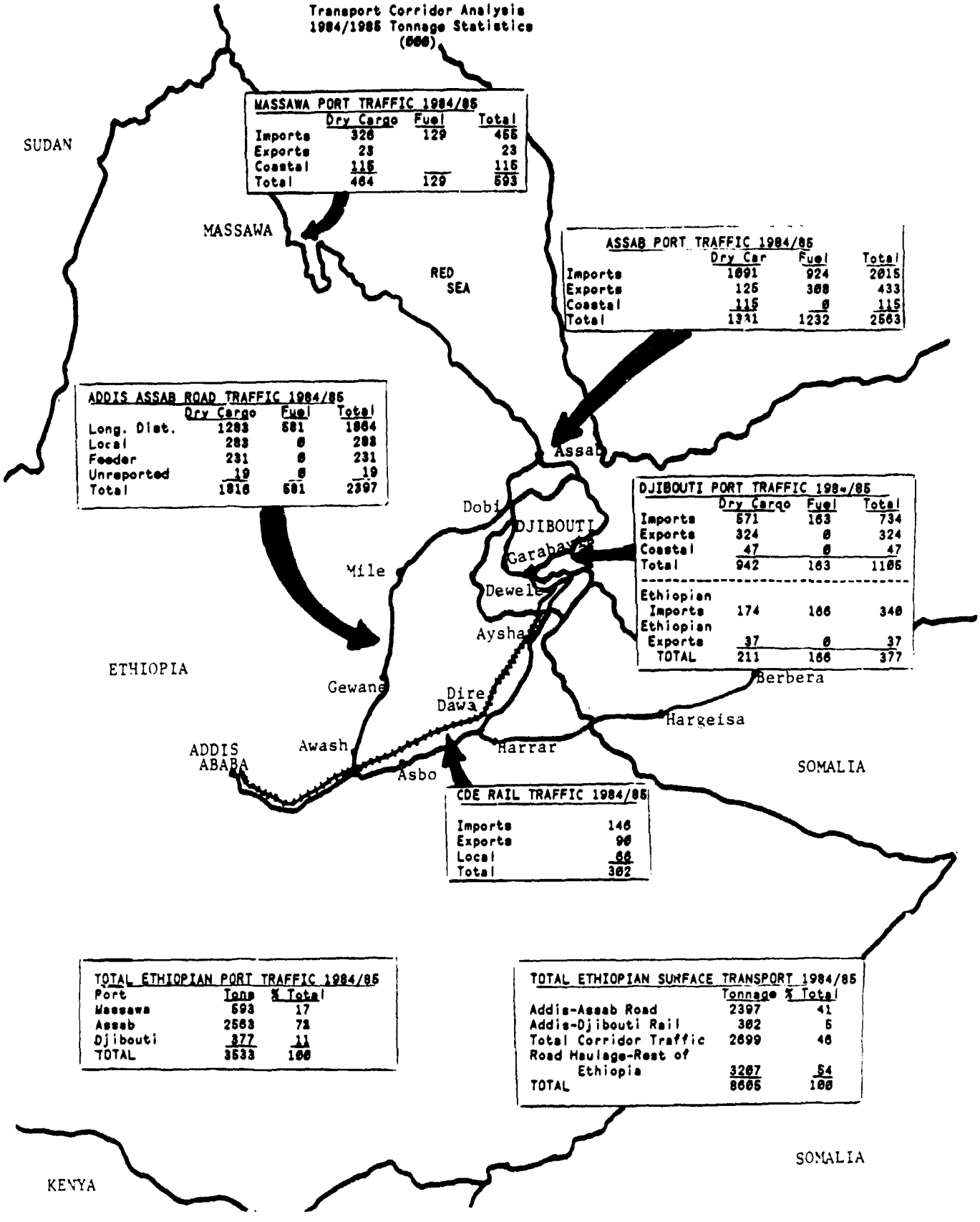
Freight Movement

2.04 The role played by the corridor is highlighted in Figure I. As shown therein, freight movement between the capital and Red Sea coast over the two routes in this main transport corridor is considerable and represents about 47% of total rail and road freight movements in the country. Total freight moved by both modes in the corridor itself was 2.7 million tons in 1984/85; in 1985/86 the total traffic volume was about 2.8 million tons. The Port of Assab is Ethiopia's primary link with the external world, handling 72% of the country's external trade for 1984/85. The road inland to Addis Ababa is the route over which most of this trade moves to and from Assab and is thus clearly the transport backbone of the country. About 1.8 million tons moved long distance by truck over the road; an amount equal to about 80% of Assab's total imports and exports. By contrast, only 357,000 tons of Ethiopian cargo, 11% of the total external

Figure 1

ETHIOPIA

Transport Corridor Analysis
1984/1985 Tonnage Statistics
(000)



MASSAWA PORT TRAFFIC 1984/85	Dry Cargo	Fuel	Total
Imports	326	129	455
Exports	23		23
Coastal	115		115
Total	464	129	593

ASSAB PORT TRAFFIC 1984/85	Dry Car	Fuel	Total
Imports	1091	924	2015
Exports	125	308	433
Coastal	115	0	115
Total	1331	1232	2563

ADDIS ASSAB ROAD TRAFFIC 1984/85	Dry Cargo	Fuel	Total
Long. Dist.	1283	581	1864
Local	283	0	283
Feeder	231	0	231
Unreported	19	0	19
Total	1816	581	2397

DJIBOUTI PORT TRAFFIC 1984/85	Dry Cargo	Fuel	Total
Imports	571	163	734
Exports	324	0	324
Coastal	47	0	47
Total	942	163	1105
Ethiopian Imports	174	166	340
Ethiopian Exports	37	0	37
TOTAL	211	166	377

CDE RAIL TRAFFIC 1984/85	
Imports	146
Exports	90
Local	66
Total	302

TOTAL ETHIOPIAN PORT TRAFFIC 1984/85	Tons	% Total
Massawa	593	17
Assab	2563	72
Djibouti	377	11
TOTAL	3533	100

TOTAL ETHIOPIAN SURFACE TRANSPORT 1984/85	Tonnage	% Total
Addis-Assab Road	2397	41
Addis-Djibouti Rail	302	5
Total Corridor Traffic	2699	46
Road Haulage-Rest of Ethiopia	3207	54
TOTAL	8605	100

Table II.1 ETHIOPIA

Transport Corridor Analysis

ETHIOPIAN PORTS DRY CARGO TRAFFIC STATISTICS 1973/74-1984/85 (000 tons)

	1973/74	1974/75	1975/76	1976/77	1977/78	1978/79	1979/80	1980/81	1981/82	1982/83	1983/84	1984/85	1985/86
1. Foreign Trade													
Imports													
Assab	170.1	132.6	181.7	263.8	411.9	671.5	726.1	540.8	528.3	630.5	599.3	1090.7	1,231.8
Massawa	120.8	97.3	54.9	58.8	19.7	8.1	36.6	54.6	112.1	146.6	174.2	325.7	309.5
Djibouti								55.8	54.2	57.5	32.3	83.3	N.A.
Total	290.9	229.9	236.6	322.6	431.6	679.6	762.7	651.2	640.4	834.6	805.8	1499.7	1,541.3
Exports	162.4	123.2	203.0	210.5	154.0	186.7	158.0	199.2	190.4	196.2	231.4	124.9	128.5
Assab	301.0	196.0	92.0	73.5	22.2	11.4	19.5	38.4	33.0	25.2	22.6	22.7	36.1
Massawa								38.8	24.7	25.3	25.0	41.5	N.A.
Djibouti													
Total	463.4	319.2	295.0	284.0	176.2	198.1	177.5	276.4	223.4	247.2	279.0	189.1	164.6
Total Imports & Exports	332.5	255.8	384.7	474.3	565.9	858.2	884.1	740.0	718.7	826.6	830.7	1215.6	1,360.3
Assab	421.8	293.3	146.9	132.3	41.9	19.5	56.1	93.0	145.1	171.8	196.8	348.4	345.6
Massawa								94.6	78.9	83.3	57.3	124.8	N.A.
Djibouti													
Total	754.3	549.1	531.6	606.6	607.8	877.7	940.2	927.6	942.7	1081.7	1084.8	1689.2	1,705.9
2. Coastal Trade													
Unloaded													
Assab	4.8	1.3	2.7	15.6	7.3	5.9	13.4	47.5	44.0	19.8	27.0	21.0	11.7
Massawa	7.8	7.8	32.5	59.3	19.1	47.2	100.0	89.3	112.2	106.3	117.8	96.0	96.0
Total	12.6	9.1	35.2	74.9	26.4	53.1	113.4	136.8	156.2	126.1	144.8	117.0	107.7
Loaded													
Assab	5.2	7.7	33.7	62.4	20.1	37.1	95.3	88.8	112.9	105.1	117.8	94.4	94.4
Massawa	8.0	5.0	5.2	16.1	8.1	2.5	15.1	49.3	41.0	21.1	28.5	19.1	11.4
Total	13.2	12.7	38.9	78.5	28.2	39.6	110.4	138.1	153.9	126.2	146.3	113.5	105.8
Loaded & Unloaded													
Assab	10.0	9.0	36.4	78.0	27.4	43.0	108.7	136.3	156.9	124.9	144.9	115.4	106.1
Massawa	15.8	12.8	37.7	75.4	27.2	49.7	115.1	138.6	153.2	127.4	146.3	115.1	107.4
Total	25.8	21.8	74.1	153.4	54.6	92.7	223.8	274.9	310.3	252.3	311.2	230.5	213.5

Source: MTA, Addis Ababa, 1986

trade, came through the (Figure I) Port of Djibouti. Of the 377,000 tons, 81% moved over the rail line to and from Djibouti in 1984/85. However, if the local traffic on CDE is excluded, only 62% of export/import traffic from Djibouti was transported on the railway in 1984/85. The rail traffic represents only about 7% of Ethiopia's total freight transport market for 1984/85.

2.05 The difference in annual tonnage between traffic handled by the ports and traffic transported in and out of the ports via road or rail is partly due to local traffic but also to the fact that at both ports there is a lag between the amount of goods unloaded from ships and the amount moved inland from the ports. Both ports currently have a significant backlog of cargo sitting in storage areas awaiting transport inland. As of March 1987 the backlog in Assab was about 160,000 tons; the backlog of Ethiopian cargo in Djibouti was about 30,000 tons.

2.06 As mentioned earlier, Ethiopia has another deep water port at Massawa, but it is too far north to be a realistic alternative for handling traffic destined for the central highlands of the Addis Ababa area.

2.07 Table II.1 contains dry cargo statistics for all three ports. Two trends are evident: (i) the drop in the use of Massawa as use of Assab grew in turn, and (ii) the sudden resumption of the Port of Djibouti in 1980/81. Prior to this period, the Ogaden war and border fights with Somalia disrupted the railway and halted use of the Port. Ethiopia's dry cargo imports have significantly increased from 291,000 tons in 1974/75 to about 1,800,000 tons in 1985/86; the increase is partly attributable to drought relief cargo. Meanwhile, exports have declined from 463,000 tons to 195,000 tons respectively. Ethiopia's long term economic recovery is dependent upon reversing the large imbalance between imports and exports. The cost and reliability of transport will be critical to this effort.

2.08 Freight Traffic on the Road Route. Freight transported over the road route represents about 41% of all tonnage transported by roads throughout the country. The long distance traffic on the main Addis Assab road represents about 80% of the total. Transport of fuel, in turn, represents about 30% of all the long distance cargo being hauled over this one road. Local traffic, including traffic originating or terminating in neighboring areas but travelling over the main road, amounted to 21% of the total. Recent tonnage figures are shown in Table II.2 below:

Table II.2 - ETHIOPIA - VOLUME OF FREIGHT TRANSPORTED ON ADDIS-AWASH-MILE-ASSAB ROAD
(000 tons)

	LONG DISTANCE TRAFFIC			LOCAL TRAFFIC			GRAND
Fiscal Year	General Cargo	Fuel	Total	General Cargo	Feeder a/ Traffic	Total	TOTAL
1982/83	1,029	476	1,505	251	N.A.	251	1,756
1983/84	1,165	524	1,689	322	N.A.	322	2,011
1984/85	1,283	581	1,864	283	231	514	2,378

a/ Feeder traffic is traffic that originates or terminates off the main road in neighboring geographic zones but travels on the road for portions of the trip.
Source: NATRACOR, Addis Ababa, 1986

2.09 Main commodities transported by road over the entire route include imported grain (50% of imports in 1984/85), fuel, and coffee destined for export (56% of exports in 1984/85). As the food crisis recedes, however, grain imports are expected to decline. Internal or local traffic on the Addis-Assab road is about 500,000 tons/year, and so called "unreported traffic" (charcoal, wood, beverage gain, etc.) is estimated at about 18,000-20,000 tons/year. Average growth of freight volumes on the Addis-Assab road in the last several years was 6-7% per year. With the exception of some export commodities (coffee, pulses, oil seeds) which approximate 100,000 tons/year, there are no significant seasonal variations in traffic on the road.

2.10 As the country's imports are significantly greater than exports, long distance road traffic is imbalanced. As a consequence, efficient transport operations are more difficult to achieve and the average load factor of trucks is low, about 60%.

2.11 Freight Traffic Handled by the Port of Assab. Assab handles 76% of Ethiopia's external trade. Dry cargo moving through the Port has grown steadily over the last five years, from 0.88 million tons in FY80/81 to 1.33 million tons in FY84/85 and 1.46 million in 1985/86. The total volume of cargo handled in FY84/85 (dry and liquid) was 2.56 million tons of which crude oil consisted of 0.72 million tons and refined oil 0.51 million tons. In FY85/86 total volume was 2.87 million tons, of which crude oil 0.73 and refined oil 58 million tons. The number of vessels calling annually at Assab in conjunction with this traffic also increased, from 479 in FY80/81 to 561 in FY84/85.

2.12 With imports comprising about 87% of total tonnage, port traffic is heavily unbalanced. Moreover, of the total 1.09 million tons general cargo imports in FY84/85, 0.54 million tons, or about 50%, were cereals associated with food relief, 0.49 million tons were general cargo, and 0.07 million tons were cement and fertilizers. The primary commodity exported was coffee (0.07 million tons). The commodity mix handled by Assab is shown in Table III.1. A large proportion of the traffic at Assab lends itself to containerization although the present share of containerized cargo is less than 2%.

2.13 Freight Traffic on the Rail Route. By contrast, total export/import freight transported on the Railway in 1984/85 amounted to 233,000 tons, only 9% of the total corridor freight volume. Traffic on the railroad has never come close to the volumes being carried over the road; rail traffic peaked in 1975/76 with 471,000 tons. Since then, in ton-km terms, the traffic has also been declining although a dramatic increase in 1984/85 was due to emergency food aid shipments being hauled the entire route. Actually, as shown in Table II.3, total rail volume has remained between 240,000-310,000 tons the last five years. About one third of the rail traffic is local; thus only about 150,000-230,000 tons is export/import bound and travels all the way to/from the port of Djibouti.

Table II.3 - ETHIOPIA - RAIL TRAFFIC

	Freight a/									
	Total		Import		Export		Local		Passenger b/	
	T	TK	T	TK	T	TK	T	TK	P	PK
1980-81	310	137	101	48	71	39	141	50	1,358	302
1981-82	238	108	74	38	66	36	98	34	1,164	308
1982-83	237	112	94	44	59	33	84	29	1,269	337
1983-84	240	116	93	-	78	-	68	-	1,114	267
1984-85	305	144	144	-	89	-	70	-	903	221

a/ T = tons (000); TK = ton kilometers (millions)
b/ P = number of passengers (000); PK = passenger kilometers (millions)
Source: Louis Berger International, Transport Sector Study, Draft Final Report, 1985

2.14 Due to limited capacity and operational shortcomings on the railway, relief aid from Djibouti to Ethiopia is moving at an average of 300-350 tons/day, a very slow pace. CDE currently operates 4 trains per day, each carrying 10-15 wagons of 25 ton capacity. The result is build-up of traffic destined for Ethiopia in the port of Djibouti. The backlog included 50,000 tons of foodstuffs and 20,000 tons of regular material as of March 1986. Overall, the average time Ethiopia bound cargo spends in Djibouti port warehouses has increased from 60-90 days (1983/84) to 90-180 days (1984/85).

2.15 Freight Traffic Handled by the Port of Djibouti. The port of Djibouti lies south of Assab in the neighboring country of Djibouti. At one point in time Djibouti was Ethiopia's main gateway to the western world but its use declined after Ethiopia built its own ports and virtually came to an end during the Ogaden war. One reason Ethiopia built its own ports was that Ethiopia had and has no guarantees on rates from the Djibouti Port and has had little success securing a long term agreement. Notwithstanding the uncertainties and the difficulties of the CDE, the drought forced Ethiopia to make greater use of the Port of Djibouti. Ethiopian imports handled at Djibouti increased substantially over the last four years and totalled 320,000 tons in 1985. Of this total, 46% was fuel. Ethiopian exports handled at Djibouti, on the other hand, are relatively modest and increased from 27,000 to 37,000 tons over the same period. Details are shown in Table II.4.

Passenger Movement

2.16 Much of the country's bus service, in passengers and passenger kilometers, takes place on the Addis-Assab road although the majority consists of passengers moving short distances. A 98 km section between Addis and Nazret has the highest number of passengers. Passengers travelling on the road totalled 5.2 million in 1983/84 and 4.6 million in 1984/85. Most of the traffic is carried out by privately owned buses (Table II.4). By comparison, 903,000 passengers travelled on the railway in 1984/85 (more about passenger transport is in Volume II, Annex I).

Table II.4 PASSENGER TRAFFIC ON ADDIS ABABA-ASSAB ROAD
(Passengers served by private buses, in '000)

	1982/83	1983/84	1984/85
Addis-Nazret	1,020.04	1,159.5	1,017.0
Nazret-Awash	53.5	61.0	54.2
Awash-Mile	0.9	0.9	1.0
Mile-Assab	2.0	1.9	2.2
Addis-Assab	8.7	8.4	9.4
Addis-Assab*	3,494.5	3,969.0	3,530.0

* Passengers boarded at various points between Addis and Assab.

Source: NATRACOR, Addis Ababa, 1986

Table II.4 - PORT OF DJIBOUTI
TONNAGE HANDLED
(in metric tons)

A. IMPORTS
(000)

	1982		1983		1984		1985	
	Tons	%	Tons	%	Tons	%	Tons	%
Fuel Oils	468.6	58.3	647.1	67.1	455.8	52.5	163.3	20.9
Djibouti Imports	195.7	26.4	196.2	20.4	219.9	28.82	35.7	30.1
Ethiopian Imports	73.3	9.1	87.6	9.0	97.0	11.3	320.5	41.2
Somalia Imports	28.5	3.5	11.6	1.2	22.9	2.6	14.4	1.8
Transshipments	37.6	4.7	22.2	2.3	41.9	4.8	46.7	6.0
	803.8	100.0	964.7	100.0	837.5	100.0	780.6	100.0
Ethiopian Traffic								
Fuel	38.6		31.9		30.4		146.3	
General	34.7		55.7		66.6		174.2	a/
	73.3		87.6		97.0		320.5	

a/ Of this total, food aid represented 145,000 tons or 83% of general merchandise.

B. EXPORTS
(000)

	1982		1983		1984		1985	
	Tons	%	Tons	%	Tons	%	Tons	%
Fuel Oils	61.8	11.5	325.7	46.9	221.8	38.0	39.31	12.0
Soutage	284.0	53.1	143.5	20.7	108.7	18.6	101.0	31.0
Water	131.9	24.6	110.0	15.8	105.3	18.0	84.1	26.0
Djibouti Exports	10.0	1.9	12.3	1.8	10.6	2.0	12.1	4.0
Ethiopian Exports	26.8	5.0	30.0	4.3	43.1	7.4	37.3	11.5
Transshipments	20.7	3.5	72.6	10.5	92.5	16.0	50.1	15.5
TOTAL	535.2	100.0	694.1	100.0	582.0	100.0	323.9	100.0

C. CONTAINER TRAFFIC (in tons)

1981	1982	1983	1984	1985
16,689	12,091	14,185	14,709	17,800

Source: Port of Djibouti, 1986

III. INFRASTRUCTURE AND TRANSPORT ENTITIES ON THE CORRIDOR

A. THE PORT OF ASSAB TO ADDIS ABABA ROAD ROUTE

Marine Transport Authority

3.01 Marine Transport Authority - Port management and operations. The Port of Assab is managed by the Marine Transport Authority (MTA). MTA has a legal personality, operates with administrative autonomy and reports to the Ministry of Transport and Communications (MOTAC). MTA is well managed; staff are generally competent and should have no difficulty in managing future investments in the port efficiently. In Assab, MTA has a permanent staff of 1,200, 1,600 dockers and 2,500 daily construction workers. The port of Assab operates around the clock.

3.02 Financial Performance of MTA. MTA's financial performance is good, as described in more detail in Annex III. MTA earned a substantial profit in each of the last six years and maintained an operating ratio of about 65%. On a consolidated basis, MTA's revenues have increased from Birr 50 million in FY81 to approximately Birr 131 million in FY86. All of the revenue growth is due to volume rather than price increases since tariffs were not increased during this period. Tariffs have been changed recently so results in FY87 may be significantly different (para. 3.03). Overall, MTA's return on fixed assets was 32% in FY85, a figure that is somewhat distorted as assets have not been revalued to reflect inflationary cost increases over time. Accounts receivable are within an acceptable range, representing two months of total revenues while accounts payable were 13% of total operating expenses.

3.03 Assab's FY85 revenues come primarily from cargo handling charges (45%) and storage (29%), followed by charges for equipment rentals (17%). Revenues for FY86 are similarly derived with cargo handling charges (47%), storage (22%) equipment rentals (20%). A breakdown of the subcategories of Assab's FY85 revenues (Annex III) shows that cargo handling charges are split among stevedoring (37%), shore-handling (48%) and loading and unloading (13%). Stevedoring charges reflect labor costs of on-board workers and are to be paid by the ship owner in foreign currency. In FY85 the port thus earned 14.8 million Birr (US$7.2 million equivalent) in foreign exchange, roughly 17% of total revenue. Storage earnings come primarily from open areas (86%) for an average of Birr 202/m^3 (US$97/$m^3$). MTA's tariffs have not been assessed to determine if they are cost based because its accounting system is inadequate. A tariff study and asset valuation have been included in the recent Port project. Meanwhile, however, significant tariff changes were introduced in December 1986. The main feature of the revision was the incorporation of all charges for landing, handling on quay, transport, storage and loading of cargo upon delivery into a flat rate. The flat rate vastly simplifies bill preparation (reduced from 15 to 3 days) and enables importers and shipowners to more easily estimate cargo handling charges. Experience with the new tariffs is not yet extensive enough to anticipate how MTA's overall revenue performance will be affected by the change.

3.04 Port Traffic. Total volume handled by all MTA's ports for the last five years was shown in Table II.1. Import and export volume in Assab for 1984/85 and 1985/86 is shown in Table III.1 by major commodity. As mentioned in para. 2.12, about 50% of imports, excluding fuel were cereals associated with food relief:

Table III.1 - ETHIOPIA: DRY CARGO HANDLED AT ASSAB
IMPORT & EXPORT BY MAJOR COMMODITY
(000'TONS)

1. Imports	1984/85	1985/86	2. Exports	1984/85	1985/86	3. Coastal Traffic 1984/85	1985/86
Wheat	531.6	604.3	Coffee	70.8	66.0	115.4	106.2
Fertilizer	34.5	22.3	Expeller	2.1			
Cement	32.6		Pulses	15.8	8.2		
		605.2					
Other Dry Cargo	492.0		Live Animals		5.6		
			Hides & Skins	9.9	11.9		
			Oil Seeds	16.4	9.9		
			Other Dry Cargo	9.9	27.0		
Total	1,090.7	1,231.8	Total	124.9	128.6		
Grand Total			1984/85	1985/86			
			1,331.0	1,466.6			

Source: MTA, Addis Ababa, 1986 and 1987.

3.05 Berth Facilities. Port facilities currently available in Assab were completed mostly in 1959 and consist of two jetties which extend south-south east from the shore forming a relatively sheltered basin 300 m wide. The jetties house seven berths with a total length of 1,020 m; depth alongside ranges from 5.8 m to 11 m. Six of these berths are currently used for commercial shipping, the seventh is now used to berth tugs and harbor craft.

3.06 Operational Productivity. During the fiscal year 1984/85, Assab handled 1.33 million tons of dry cargo across the six berths currently

available. This worked out to 189,185 tons per annum or 79% of the optimum handling capacity of each berth.[1] This average, however, masked the exceedingly high utilization of berths 1(95%) and 2(92%). High utilization of these three berths stems from the fact that berths 3 and 9 were essentially unavailable for many vessels calling at the port: berth 9 was occupied by barges most of the time due to its shallow draft while berth 3 was immobilized for maintenance purposes for one quarter of the year. The current throughput of the berths thus was achieved at the expense of a long waiting time for berth for some vessels. On the average, a vessel stayed 109 hours (4.5 days) at the anchorage against 140 hours (5.8 days) at berth. As a consequence the Port of Assab is currently operating at capacity and its berthing facilities need to be expanded. This need was recognized in the Port Engineering and Construction Credit (Cr. 1676 - ET) which became effective in November 1986 and which will fund construction of a new tug berth by 1988 so that Assab will have the use of 7 berths for commercial purposes. Further expansion is likely to be necessary given expected traffic growth; construction of additional berths is thus one of the investment options being considered in this TCA.

3.07 Vessel performance in the port has been improving and the volume of cargo handled per shift per hour has increased from an average of 21.8 tons in 1982/83 to 29.5 tons in 1984/85. Furthermore, average time alongside has been declining from 5 days (1982/83) to 4.7 days (1984/85). Labor productivity (shown in Annex III by major cargo classification) is comparable to other East African Ports but has remained constant the last few years indicating that further improvements will require structural changes in cargo handling.

3.08 Of the 398 dry cargo vessels calling at the port in FY84/85, a total of 269 vessels worked alongside the berths, loading and discharging 1.14 million tons of cargo. Total hours occupied by the vessels at berth were 38,781. The average tonnage handled per vessel was 4,220 tons and the average tonnage handled per vessel hour alongside berth was 29.4 tons. Given this throughput, the number of gangs working per vessel would have averaged three per ship.

3.09 Cargo Handling Equipment. The port is fairly well equipped with cargo-handling equipment although much of it is old. Most of the equipment is designed to handle break bulk general cargo. There are no container handling facilities at Assab. Annual average availability of the port equipment is declining and in 1984/85 fell to about 66%. The berths are

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1 Optimum Handling Capacity. With an availability of seven berths, berth occupancy should not exceed 75% if vessels calling at the port are not to be subjected to an unacceptable waiting time for berths. On the basis that the average effective working time of a berth in a 24 hour working day is 20 hours and on the current labor productivity rate of approximately 11 tons per gang hour, the optimum handling capacity at Assab (with seven berths) would be approximately 1.68 million tons per annum assuming that a vessel on the average works four gangs simultaneously while alongside the berth. Optimum berth throughput is therefore approximately 240,000 tons per berth per annum. On an average, 657 tons of cargo could be optimally handled across a berth a day; or using seven berths, Assab can optimally handle, on the average, 4,600 tons of cargo a day.

equipped with 18 modern quay cranes for the loading and unloading of cargo with capacities ranging from 6-20 tons. Other cargo handling equipment includes seven mobile cranes with lifting capacities of 3-150 tons, 65 fork lifts with lifting capacities of 3-25 tons and 65 tractors, 130 trailers and some equipment for bulk handling. In order to cope with the assistance received during drought relief efforts, the port has recently acquired bulk handling equipment for cereals. This includes mobile conveyor units, a bagging plant, front end loaders and trucks. MTA, however, still needs to replace some of its oldest cargo handling equipment, to obtain spare parts for others, to acquire additional equipment for handling containers and bulk cargo and to procure port workshop equipment to equip the newly constructed workshops. These needs, have been provided for in the Port Engineering and Construction Credit.

3.10 Cargo Storage Facilities. Cargo storage on the jetties is limited but many old buildings and sheds were demolished in the last few years to provide better access and open storage areas. Currently storage capacity consists of:

	Area (m^2)
4 Transit sheds/warehouses	39,419
3 Open Sheds	21,912
Open Storage Area	297,590
Total	358,921

3.11 Given the cargo mix that is being handled in Assab, it is estimated that a ton of cargo would require a floor area of 3 m^2 (including allowance for space for working and the maneuver of equipment). The total tonnage of cargo that can be stored at any one time in Assab is therefore about 120,000 tons. Assuming an optimum berth throughput for Assab of 675 tons per berth per day, the total average daily throughput would be approximately 4,600 tons (para. 3.6, footnote 2). Storage facilities in Assab, therefore, have the capacity to store 26 days of the daily throughput of the berths. Storage capacity of 26 days should be more than adequate: unfortunately, because of the sort of inordinate delays described below, it is not. The solution is not to create more storage, but to solve the root cause of the delay.

3.12 Clearing and Dispatching Operations from Storage Areas. Although loading and unloading of cargo from ship to shore is being handled fairly efficiently, the clearing and dispatching of import cargo from the port of Assab is not. According to consultants, the average time between discharge from the vessel and the clearing and dispatch of the import cargo from the port of Assab was about 55 days! As a result, there is an enormous backlog of cargo in the port, which, as of July 1985 was 135,800 tons. Storage capacity, given this time frame, is thus inadequate, a fact clearly reflected by the present congestion in the port's storage areas. Storage areas are so severely congested that a given ship's cargo is now scattered and stored wherever space is available. Proper segregation of cargo is thus difficult, as is assembling consignments for final delivery; both further delay moving cargo out of the port. Over time, congestion and delay become self-generating and the distinction between cause and effect

is lost. Unless the volume of cargo stored at the port is kept at less than 120,000 tons (i.e., the optimum storage capacity), cargo congestion at the port will arise and will subsequently have an adverse impact on the throughput at the berths.

3.13 In part, it could be argued that some of the congestion also stems from the fact that aid cargo is given free storage so that there is little incentive to move grain quickly. As of September 1986, 75% of the 216,000 tons at Assab belonged to relief organizations. However, storage rates are probably less to blame than poor management of trucking transport used to move grain and other cargo inland. As discussed in more detail in para 3.53, the relief organizations have brought used or new trucks to transport donated grain inland, but organizational, managerial and technical problems relating to inadequate vehicle mix severely hindered utilization to capacity of these vehicles. Vehicle utilization of NATRACOR (FTC) owned or controlled vehicles is also low, as described in more detail in para. 3.42. Even in the best of circumstances it has been estimated that it would take nine months to clear this congestion. Export storage areas are also subject to congestion because storage fees are low for exports -- free the first 30 days -- to encourage production, and the average time exports remain in storage prior to shipment is about 60 days.

3.14 More storage capacity would solve the port's immediate needs, but would not get to the root of the delays which, as illustrated by the following statistics, stem from inefficiencies built into the system:

(a) staggering paperwork delays (submission, clearance and forwarding of documents together with processing of port and freight forwarding charges takes an average of about 55 days) and poor vehicle scheduling;

(b) poor ship to shore communications (on average vessel documents are received seven days after ship arrival);

(c) low utilization of the country's trucking fleet which (using 1985 data) could only move 66,500 tons out of the port for a month while the average volume of dry and liquid cargo being imported via Assab was about 170,000 tons; in 1987 the issue was somewhat reduced since over 100,000 tons/month due to the relay system could be moved out of the port.

MTA can reduce port congestion by making cargo handling faster and more efficient, which should happen once its cargo equipment is enhanced, and by reducing the time it takes to get the Ocean-Bill-of-Lading (OBL) and the ship's manifest to its offices in Assab. Currently documents go first to Addis Ababa and are then channeled to Assab so that these documents are seldom available to MTA prior to vessel arrival. Communication between vessel and port must be improved.

3.15 The most serious causes of delay in the Port of Assab however, rest: (1) with other transport entities, namely the Maritime Transit Services Corporation, NATRACOR (FTC) and its private trucking Associates; (2) with the interface between and among these entities and MTA; (3) with lengthy and cumbersome customs procedures; and (4) with the effects upon all these entities of lack of foreign exchange and macroeconomic issues such as the overvaluation of Ethiopia's currency. Some of the underlying causes of the staggering paperwork delays and the inefficienies in the road transport system are discussed below.

Maritime and Transit Services Corporation

3.16 The Maritime and Transit Services Corporation (MTSC), a parastatal freight forwarder, is the sole shipping and transit agent in Ethiopia. As such MTSC serves all ships using the port for which it collects service charges in foreign exchange; handles imports and exports, which means that it arranges terminal service and subsequent transportation inland of imports, and, on the export side, arranges for goods to be stored and subsequently loaded by MTA onto ships for export; furthermore, it deals with all related intermodal movement documentation, which means MTSC acts for the client (importer or exporter) in its dealings with port authorities (MTA), customs and commercial freight transporters (FTC or CDE).

3.17 Prior to its establishment as a government corporation in 1979, more than 44 private and government entities were involved in providing shipping and transit services in Ethiopia. The initial effort of coordinating the transition from a competitive to a monopolistic environment proved to be a formidable task which, it would appear, MTSC has never quite mastered. The total average time that cargo spends in Assab, from vessel discharge until dispatch, is about 55 days. MTSC's processing of documents submitted by the importer, its handling of the receipt of advance payment and its preparation of customs clearance once consumed an average of 15 days, but has been reduced to a reported 5-days according to a recent MTSC sampling. In addition, the average cargo spends 32-40 days in port waiting for importers to submit documents to MTSC before MTSC even starts processing. With MTSC functioning as the sole freight forwarder in Ethiopia, there is no rush to complete the documentation process and clear the port. MTSC and the importer himself are thus responsible for sizeable share of the total time imports remain in the port of Assab and the clearance process is the primary bottleneck in the transport chain from port to destination.

3.18 MTSC's pivotal role in transport has not gone unnoticed by Government which financed an organization and management study of MTSC that was completed in 1984. Some of the recommendations in that study have already been implemented and MTSC's current processing time in fact represents a dramatic improvement from the recent past. In 1981, according to samples taken in the Roy Jorgensen/TAMS study, MTSC took 65 days to process import documents and 149 days to process export documents. In spite of recently implemented (December 1986) tariff simplification and other minor improvements, MTSC's operations are not yet satisfactory and warrant further attention. The most relevant inefficiencies include:

(a) in general, MTSC does not accomplish its part of shipping agent functions, obliging MTA to discharge such responsibilities without compensation;

(b) the present time, about 45 days, taken to obtain and process transit documents remains far in excess of industry averages (most ports issue bills of lading in one day) and can only have a negative affect on Ethiopia's export/import trade;

(c) MTSC's difficulties in coordinating with other port entities together with complex and costly procedures and low storage charges that discourage importers from submitting documents and even trying to collect their goods, creates congestion in the port and interferes with FTC's (NATRACOR's) dispatching and planning for vehicle requirements;

(d) on the export side, MTSC's lack of cargo consolidation results in substantial ship delays and additional expense.

3.19 These inefficiencies can be traced to five main causes: inadequate management; lack of motivation; cumbersome documentation; problems relating to the interface of other institutions (MTA, FTC, Customs); obstacles experienced by clients that affect MTSC, such as scarce foreign-currency; and difficulties in obtaining letters of credit; and a lack of proper facilities and equipment to do the job.

3.20 Management. Freight forwarding is a management and systems intensive activity but MTSC lacks managerial expertise and trained and capable staff to discharge this activity. General deficiencies include: no definite procedures for booking of import cargoes; no alternative procedures to cover shipping document delays; no defined lines of authority for loading or unloading cargoes through the system; no procedures for transfer of responsibilities from one organization to another; and a general lack of incentive and motivation. The MTSC Study discusses these and other problems and contains 58 pages of specific recommendations for improvement. These recommendations should be implemented as soon as possible, if necessary with assistance from consultants with experience in the field. In addition, training as recommended in the study should be funded.

3.21 Documentation and Interface with Other Institutions. The time required for paperwork to execute export/import transactions is excessive. The delay stems partly from MTSC's cumbersome documentation requirements but also from complicated administrative procedures required in conjunction with customs, foreign-exchange currency and letters of credit regulations. The import of goods into Ethiopia required the completion of 142 forms, 295 documentary pages and 239 signatures covering importing, clearing through customs, insuring and transporting the goods into Ethiopia. The institutions involved and the number of forms (in brackets) are: Ethiopian Insurance Company (10); National Bank (22); Commercial Bank (27); Customs (2); FTC (NATRACOR) (11); Ethiopian Shipping Lines (6); MTSC (35); MTA (29). Other countries require far fewer documents to achieve similar aims and controls. Because of the myriad of documents and signatures required, importers take an average of 32-40 days to submit documents to MTSC while their cargo sits idle in the port. Efforts are now being taken to provide incentives to reduce the delays. In conjunction with a new flat rate tariff (3.25) importers now have only 5 days of free storage in the port unless they have submitted all their documents for processing cargo out of the port. If documents have been submitted within 5 days, storage continues to be free. Government is also making efforts to simplify documentation requirements and to keep open customs operations around the clock.

3.22 The following is recommended: (1) In addition to these efforts, closer coordination among the institutions listed above to facilitate domestic and international transit of freight; (2) continuance of the recently formed task force/coordinating committee to supervise and coordinate a study of specific actions that could be taken to streamline documentation and comply with international liability requirements applicable to "letter of credit" and "bill-of-lading" responsibilities yet to safeguard interests of Customs and Excise; (3) the provision of technical assistance by experts of FALPRO (Facilitation Program of UNCTAD) be provided to MTSC and to Customs and Excise jointly to help simplify the documentation and implement other related recommendations from the MTSC study; (4) one or two local seminars involving UNCTAD (TRAINMAR program), with participants from key international institutions in freight transport services, to be held to clarify for MTSC and other Government officials the operational, financial and technical measures that could facilitate international transit of freight in Ethiopia.

3.23 Motivation. One of the obvious reasons for MTSC's inefficieny is that it is now trying to accomplish a job once handled by 44 entities. The consolidation may not only have made the job too big, it also eliminated all competition. The steps being taken now and the technical assistance planned for the future should significantly improve MTSC's operations. Given its monopoly situation, however, in the long term, it is recommended that Government consider establishing gradually several competitive freight forwarders, privately owned or parastatals.

3.24 MTSC Facilities. MTSC has six branches, including the main ones in Djibouti, Assab and Massawa. Headquarters are in Addis, while offices are maintained in Assab, Massawa, Djibouti and at some airports. Staff numbered 1,150 as of March 1986. Facilities include 16 covered warehouses (five for coffee and eight for cereal) and 13 sheds in Assab as well as two at Djibouti, and four at Massawa. Altogether, they total 75,000 m^2 and offer 50,000 tons of total storage capacity. In addition, there is an open storage area of about 150,000 m^2. MTSC also owns six 4-ton forklifts, 32 tractors and 17 trucks in Assab but most unloading equipment for imports in Assab are rented from MTA. In Djibouti, MTSC has two forklifts and trucks/tractors. To the extent that these facilities are lacking (fork lifts, some tractor trailers and gravity conveyers are needed) IDA recommends that these be funded.

3.25 MTSC Tariffs. MTSC tariffs are issued by MOTAC; until December 1986, there had been no change since MTSC's charges are essentially bills for the reimbursement of funds paid to MTA or other service organizations employed in the transiting of cargos. In December 1986, MTA's tariffs were put on a flat rate/per tonnage basis and MTSC's charges changed accordingly. As a paper handler, MTSC charges to clear documents with customs and for reimbursing MTA for taking cargo to the warehouse. There is no possibility of paying a premium to obtain priority service.

3.26 MTSC requires clients to pay in advance for its services. This policy means that MTSC usually overcharges initially in order to cover contingencies and subsequently refunds money to the client. Unfortunately this system requires the user to obligate funds over an extended period of

time; since no interest is paid to the user in the meantime, many importers delay posting of funds until the last minute. The incentive to delay in turn extends cargo transit time at the port, adding to port congestion and increasing delivered cost through additional port storage charges. Moreover, all cargo must clear customs before being released from the port. (This adds further to delays since many of the customs related decisions take place in Addis rather than at the port).

3.27 Analysis of MTSC's financial statements (see Annex V for details) indicates that MTSC's charges for its services may be excessive. In FY86 MTSC's operating margin of pre-tax income as a percent of revenue was 38%, in FY86. Total revenues were 42.9 million Birr including cargo clearing at seaports, airports, post offices and the CDE railway. Yet, since MTSC is essentially a paper handler, its earnings do not really have to cover much debt or renewal of assets beyond its administrative buildings and warehouses. It is difficult to see any real justification for MTSC's high operating margins. On a tonnage basis, MTSC's port related cargo clearing charges averaged Birr 10.13 (US$=4.89) in FY85 and Birr 7.35 (US$=3.55) in FY86. MTSC also collected ship's fees totalling Birr 10.9 million and Birr 9.9 million in FY's 85 and 86 respectively. As these fees are paid in foreign exchange, MTSC earns about US$5.0 million equivalent annually. The extent to which charges are cost based is difficult to determine since expenses are not broken down by port or major activity.

3.28 Accounting Disputes. Disputes between MTA and MTSC often arise over charges. These disputes occur between the two agencies but also between shippers and MTSC. Indeed many of the shipping companies and conferences have questioned charges and refused to pay disputed items. Meanwhile MTSC must pay MTA promptly for all port charges that it intends to pass on to customers. MTSC therefore loses control of the disputed amount until resolution and restitution occur. These disputes have been substantially lessened with the new flat rate tariffs, introduced in December 1986, because activities are charged on a tonnage basis rather than on a labor and equipment usage basis.

3.29 Arrears in Storage Charges. MTSC offers free storage to exporters for the first 30 days. Yet often the value of the second month's storage fee exceeds the value of the goods being exported so exporters have little incentive to pay their bills. Many exporters, therefore, are in arrears with MTSC. The storage time is too long and according to MTSC is caused by exporters sending to many small shipments to the port; it would be better if exporters consolidate their shipments in order to reach the volume of export cargo necessary for processing it further to MTA and ships. This practice encourages the overcharging of other customers in order to compensate.

Road Transport Operators

3.30 Road transport for hire, including service provided by the private sector, had been organized, closely regulated and controlled by the National Transport Corporation (NATRACOR), a transport entity under the institutional responsibility of MOTAC. Recently, however, NATRACOR was split (para. 1.10) into FTC and PTC. In essence, main responsibilities of the two new entities remained unchanged; their respective organizational charts are presented in Volume II, Chart III. As the reorganization has

not yet been legally approved, the description that follows is based upon the previous organizational structure for which most of the data is available. Actually, basic freight operations remain the same: Government owns and operates a trucking parastatal and the same parastatal controls freight operations by private truck owners.

3.31 Freight Transport. Government operated road transport has been provided by the branch of NATRACOR known as the Freight Transport Organization (FTO) which has been generating 82% of NATRACOR's total freight-related revenues. FTO owns, maintains and operates about 1,100 trucks (25 tons-35 tons each) and has about 2,900 employees, of whom 1,100 are drivers. FTO financial results are discussed in detail in Annex I, but FTO has recorded a net loss in each of the last three years. The loss is substantial but should be adjusted to reflect the fact that it includes an annual charge of Birr 2.9 million for the use of "capital" contributed by the Ethiopian Government. In this respect this charge is similar to paying a dividend to equity holders. Readjusting the statements to treat the charge as a post-income transaction shows that FTO improved from a negative Birr 5 million in 1982/83 to a positive Birr 1.7 million in 1984/85. FTO's operating ratio has improved from 95.8% in 1982/83 to 89.2% in 1984/85. FTO's cash flow is sufficient to pay its debts but the operation is not necessarily self-sufficient.

3.32 Whether the enterprise can survive over the long term depends upon whether the business is generating enough cash to continue replacing assets as needed and whether the structure of the basic operations is sound enough to be expanded if demand warrants. These last questions are related to the competitiveness of FTO's tariffs and the degree to which the tariffs permit full recovery of the costs incurred doing business. An economic analysis carried out by consultants (Roy Jorgensen 1985) of the adequacy of these fares concluded that the tariffs were insufficient to cover FTO's costs except under the most favorable road conditions; moreover, the tariff did not permit enough capital recovery. Further refinements are also necessary to ensure that fares were better related to the variations in vehicle operating costs due to road conditions. The entire problem of tariff adequacy should be addressed within the context of a more macro-economic consideration: the overvaluation of Ethiopia's currency.

3.33 Freight Transport Service Coordination (FTSC). The Freight Transport Service Coordination has been the subsidiary of NATRACOR that serves as an umbrella organization over trucking operations conducted by private truck owners in Ethiopia. As described earlier, NATRACOR has been controlling the loads carried and routes used by these private truckers and collects a fee of 5% of revenues for its services. The earnings and expenses of FTSC are discussed in Annex I. FTSC is in good shape except for the fact that accounts receivable have risen fairly dramatically over the past three years and now make up 57% of all assets (up from 30%). Since FTSC has no pressing debts nor capital expenditure program, it can afford to let accounts receivable build up. Yet the building up of receivables is serious since it probably indicates an increasing inability of the private truckers to pay FTSC's service charge. Since the private trucking fleet is far larger than the one operated by NATRACOR'S own FTO, FTSC's rising accounts receivable may be an indication that much of Ethiopia's trucking business is in financial difficulty. Assuming that

private industry pays 5% of all revenues to FTSC, private trucking revenues in 1984/85 could be estimated at 274 million Birr, more than three times the level earned by FTO. Yet tariffs are not high enough to enable the private truckers to fund adequate maintenance nor to replace old vehicles when necessary. The lack of income is exacerbated by government policies that limit access to foreign exchange.

3.34 Private Sector - Associates. The private carriers are called "Associates" of NATRACOR (FTC). In commercial freight transport of Ethiopia in 1984/85 the total fleet owned by the private sector (there are about 4,500 owners) amounted to about 5,790 trucks of various sizes as compared to NATRACOR's own fleet of 1,100 large tractor-trailers. In terms of capacity the trucking fleet of the associates was about 63,000 tons while that of NATRACOR (FTC), was about 30,000 tons; consequently, the private sector had about 68% of total commercial fleet capacity. For services rendered by NATRACOR, Associates pay 5% of their contract price. The contract is actually between the shipper and the private carrier who gets 50% downpayment while the balance is paid (normally after delays) when the cargo is transported to its destination point.

3.35 For dispatching purposes, the country is divided into six freight zones, or Ketanas. The Addis Ababa-Assab road, the main transport corridor, has been designated as Zone 5. Allocation of trucks is according to zones and within those zones, routes to be followed during transport of each load are also specified. The system works as follows: when truckers register with NATRACOR (FTC) they are assigned to one of six zones into which the country has been divided, depending on: the demand and supply in each zone; the capacity, type and age of the truck; and the place of origin or area of preference of the trucker. Once the trucker has been assigned to a zone, he is assigned specific freight consignments and routes within the zone on a first come, first served basis. The procedure for obtaining such consignments is based on standard request forms filled in by any individual or company (state-owned or private) wishing to ship any cargo within the zone. The requests are received by the local NATRACOR (FTC) office which then assigns a trucker from its lists. The selected trucker fills out another form which allows him to carry out the transport service, to pass the check-points along the travel route and to collect his fees from the shipper. For allocating loads, NATRACOR (FTC) charges private carriers a fee. This close regulation and control of trucking services are in line with the Government's development philosophy and with its perceived internal/security needs.

3.36 In spite of its complexity, the Ketana system seems to work smoothly. Information received from private owners revealed the following positive aspects: (a) freight allocations by the local Ketana is practiced fairly; (b) the distribution pattern, a model of ingenuity, is counterbalanced by the continuous control of the receivers of allocations through an arithmetical system; and (c) a claim system for unfair practices operates effectively through the local Ketana and the Chamber of Commerce.

3.37 The average age of vehicles in the privately-owned fleet is over 11 years while that of the publicly-owned vehicles is about five years. The age disparity has arisen because Associates have not been able to earn enough to import replacement, while NATRACOR (FTC) has been able to obtain financing or obtain tractor-trailers with government backed equipment financing. In addition to the problem of the age of the equipment, the Associates are confronted with breakdowns, lack of spare parts, and inadequate maintenance facilities. Also, standardization is a problem: the fleet of the Associates is composed of about 20 different makes, while that of NATRACOR (FTC) of only four. This puts a particular strain on the private sector when coping with shortages of spare parts and tires.

3.38 Spare Parts Imports and Distribution (SPID), a subsidiary of NATRACOR (FTC) that sells and distributes spare parts and tires, sold the private sector only 5-7% of its total volume in the last three years (Volume II, Annex I, Table 14). This caused the associates to turn to private dealers who charge substantially higher prices. At the same time, the pace of fleet renewal is lagging as far as the private sector is concerned, thus creating problems not only for individual carriers trying to stay in business, but also leading to a gradual curtailment of the supply of the industry with serious consequences for the whole economy. Associates will invest in new trucks only if they can be sure of achieving sufficient utilization of vehicles at adequate rates to cover the capital investment. Therefore, efficiency of operation and adequacy of tariffs are crucial to encouraging the Associates. Also critical to timely replacement of vehicles is access to foreign exchange and the availability of credit to Associates.

3.39 The Road Transport Study (1984) identified a number of difficulties standing in the way of associates wishing to replace their trucks. They can be summarized as follows:

(i) the Associate must pay at least 70% cash for the vehicle; no more than 30% of the purchase price, subject to the posting of collateral, may be borrowed;

(ii) the Associate may not import vehicles but could buy locally assembled (IVECO or Fiat) trucks of only 7-10 ton capacity;

(iii) the local purchase is sold at a price 50% higher than if the truck could have been purchased abroad and imported tax-free;

(iv) because the vehicles are old they need spare parts, but these are often unavailable and the operators must improvise, paying dearly; and

(v) vehicle repair facilities are in short supply generally throughout the country.

3.40 Suggested Improvements. It is imperative, therefore, to secure a more rational rate structure so as to motivate associates to invest in larger vehicles (9-12 ton or tractor-trailers) and to put into place a

financial program of support that includes: (a) longer term loans from lending institutions and better terms when borrowing; (b) ensuring that private spare parts dealers have access to foreign exchange to provide necessary parts to the privately owned industry or that stocking of spare parts by SPID to include those required by private owners is ensured; (c) encouragement of associate owners to replace straight trucks by combinations units and/or to participate in trailer pools (para 3.47); (d) encouragement of vehicle rehabilitation at all levels; and (e) financing of workshop expansion to provide maintenance facilities needed by Associates. With respect to (a), IDA recommends that direct lending to operators be initiated via a local commercial bank which would act as an on-lender for donor funds. With respect to (b), disbursements from a line of credit in foreign currency at an Ethiopian bank could be made to Associates to help FTC, Associates and private garages stock spare parts. Ethiopia's commercial banks have undertaken similar programs in other sectors and are capable of administering such a program. Another suggestion for augmenting the fleets of Associates is to auction off donor-owned vehicles once the drought emergency is over (para. 3.53). The large mix of vehicle type and the varied age of these vehicles makes this solution at best a partial one.

Freight Transport Effectiveness on The Corridor

3.41 Freight transport on the corridor is now very inefficient: according to July 1985 data, trucks moved only about 66,000 tons out of the port in one month yet there are approximately 1,000 Government owned trucks operating between Assab and Addis Ababa and over 2,000 trucks owned by the private sector and relief organizations. The rate at which goods are transported is far lower than the rate at which goods are being imported--about 170,000 tons/month. The difference produces congestion and is one of the primary reasons that the Port of Assab is currently such a bottleneck in the transport system. At present Assab receives about 70% of the transport capacity it needs to clear the port area (175 trucks in average per day vs. a need for about 250). The "missing 30%" could be supplied: (a) by lowering vehicle turnaround time and otherwise improving the use of the present fleet; (b) by increasing truck capacity by adding more vehicles to the fleet or by replacing smaller vehicles with larger ones; (c) by improving port operations and reducing loading and unloading times; (d) by improving management of freight allocation and dispatching services; and (e) by reducing paperwork and improving the interface between NATRACOR, MTSC and MTA.

3.42 Truck Utilization. Truck utilization has been poor in Ethiopia for a number of reasons. According to the Road Transport Study (1984) Government tractor-trailers averaged 23 days for the round trip from Addis Ababa-Assab in 1983. Driving time occupied only 41 hours and loading/unloading 40 hours, while lost utilization was found to be 52 percent of total round trip time. The lost time does not include office processing, check point monitoring, meals and rest time, and the out-of-

service factor. Privately-owned commercial vehicles ran at about the same average.[2]

3.43 Causes of low utilization include:

(i) Low Vehicle Capacity. According to a vehicle inventory carried out in 1984/85, 47% of the commercial vehicles in the country have a capacity of less than 10 tons, and 20% of the total commercial fleet run on gasoline. Use of these small petrol powered trucks is uneconomical for long haulage operation. NATRACOR is trying to ensure that such vehicles are replaced with high capacity and diesel powered trucks.

(ii) Lack of Preventive Maintenance; too few and inadequately equipped garages. NATRACOR's (FTC) existing workshops are poorly equipped and preventive maintenance is not carried out. It is becoming more difficult to fund the required level of service. This problem is more acute outside Addis Ababa where there are no Government garages and the existing small workshops do not have the capacity and capability to undertake maintenance. The problem also prevails for private truckers who rely upon private garages for maintenance. In order to ameliorate this problem, NATRACOR (FTC) has already started the construction of regional garages, which would give maintenance service to private trucks as well. These garages are to be located in Nazret, Dire Dawa, Shashemene, Kombolcha, Asmara, Jimma and Mekele. NATRACOR (FTC), however, lacks foreign exchange to supply necessary equipment and tools.

(iii) Lack of foreign exchange for spare parts. Though NATRACOR (FTC) has made considerable effort to make spare parts available to Associates as well as NATRACOR, delays in acquiring foreign exchange permits, has to a large extent, mitigated the effort. Moreover, a wide spectrum of different makes and models, as well as the age of the vehicles in the country, has further aggravated the problem, making it harder to allocate the scarce foreign exchange, and tying up more capital. Actual funds spent on procurement of spare parts and tires for both NATRACOR (FTC) and the private sector is presented in Annex I.

(iv) Too much paper work. The flow of cargo on the road is also impeded due to unnecessary complex procedures and paper work in the port and in Addis Ababa as described earlier. A simplification of the procedures is now being considered by authorities. Also, since March 1986, MTSC offices in Addis Ababa and Assab communicate via telex to speed up handling of cargo.

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2 Tanker operations (designated Zone 6), are less complex, and thus show better utilization. Tankers are dispatched from Assab and from depots; all tankers are loaded out and return empty, with only two hours required for loading and unloading, while paperwork is limited with only eight forms in use. With an average 12 days for NATRACOR and 10 days for Associates, performance is better than for dry cargo transport although improvement could be achieved by concentrating articulated units and implementing management improvements similar to efforts made in Zone 5 in the transport of general cargo.

3.44 Anxious to improve this record, Government included a Road Transport Study in the ongoing Second Road Sector Project and has now begun to implement its recommendations. In the course of 1984 and 1985, due to coordinated efforts made by NATRACOR, associates, RTA and MTSC, the turn-around time was reduced from about 20 days to about 10-12 days.

3.45 Relay System. Government also invested about Birr 5.0 million to build dormitory and garage facilities along the road Addis-Assab to start a driver relay system whereby drivers are relieved after a day's drive and changed so that the truck can continue and vehicle utilization can be improved. Initiated in late 1985, the relay system applies only to Government owned vehicles and full operation is not expected to be achieved until late 1987. Thus far turnaround time of the vehicles participating (about 340 power units as of March 1987) has been reduced to as low as four days. The system is still burdened with difficulties, including a shortage of qualified mechanics, lack of spare parts and inadequate management of vehicle maintenance.

3.46 Although introduction of the relay system should improve utilization of the Government-operated fleet, it does nothing to improve utilization of the private sector trucks which make up most of the fleet in Ethiopia. Indeed, one could argue that the relay system could undercut the ability of the private sector to serve the corridor over the long term. This latter possibility is exacerbated by the fact that the current structure gives little incentive for Associates to invest in the larger vehicles necessary to compete for corridor business. Government's reasons for not extending the relay system to the private sector include:

(i) the existing relay facilities on the Addis-Assab road cannot accommodate Associates' vehicles, since NATRACOR's (FTC) organization and facilities are at an early stage; furthermore, these facilities do not even provide service for Government commercial vehicles that are not in the relay system.

(ii) the relay system assumes a strong maintenance back-up, i.e., preventive maintenance, inbound and outbound inspection, etc.; given the facility problem that NATRACOR (FTC) is facing for its own vehicles, it would be difficult to extend such a type of service to Associates.

(iii) as per the recommendation of RTS, there must be long haulage drivers and local drivers for each truck to meet standard driving hours; as Associates are not in a position to employ more than one driver per truck, it would be difficult for them to enter relay operations.

(iv) as most of the Associates' vehicles are of the standard truck or semi-trailer type, it would not be possible to carry out smooth operations under the relay system with a more suitable tractor-trailer combination being used by NATRACOR (FTC) vehicles.

3.47 Suggestions For Improvements. The current relay system should be carefully monitored in light of the following potential alternatives: (a) a two driver system which could be used to increase driver incentive, improve accountability, and decrease operating costs (although implementation would require more drivers and an intensive and long educational program for those involved) and would thus be most applicable to the private sector; (b) a terminal to terminal system (station to station), which could be used with either the relay or two driver system, and which would broaden service to include loading and unloading at origin and destination points. The terminal to terminal system would thus involve more door-to-door truck use and might thereby increase the percentage of Associate vehicles working in the corridor. To complement both types of operations, the availability of trailers to FTO and Associates should be increased. Trailers would then be organized in pools at relay and/or terminal points and would be leased per day, trip or alternative units of time for a fee. The RTS estimates trailer needs at 1.5 per unit of traction although allowing for breakdowns, trailer positioning and maintenance, this estimate may be on the low side.

3.48 Fleet Capacity. Ethiopia's road transport carrying capacity could also be enhanced by purchasing more trucks. Indeed shortage of trucks was considered one of the primary reasons grain imports, sent to relieve the famine, began to pile up in the port. Recognizing the need, a number of relief agencies brought hundreds of trucks into Ethiopia. As a result, the number of trucks in Ethiopia has increased tremendously.

3.49 There are about 20 different bilateral and multilateral agencies involved in road transport on a temporary basis for the transport of food aid; as of March 1986 their total fleet was 395 tractor-trailers and semi-trailers and 163 medium trucks with total fleet capacity of about 10,000 tons (Table III.2).

3.50 In addition to these relief trucks, the country has: (a) NATRACOR' (FTC's) fleet of about 1,100 tractor-trailers and semi-trailers (about 4.5 years old on average) of 33,000 tons capacity in total; (b) 1,450 tractor-trailers and semi-trailers (average age 10 years) owned by the private sector with total capacity of 35,000 tons; and (c) RRC with 330 large trucks and 700 smaller and medium trucks with a total capacity of about 11,500 tons.

3.51 Shortage of vehicles, therefore, is no longer seen to be the immediate problem it once was. Rather, as many relief agencies will attest, there are major shortcomings in organizing and managing the transport of the relief cargo which should be solved first. Ethiopia has too few resources to risk investing in assets that will not be well utilized.

3.52 Government has been trying to help improve and coordinate management of the sector. Food aid organizations and other external aid organizations have also been working to better coordinate the movement of relief cargo, among them NATRACOR, UN Office for Emergency Operations in Ethiopia, RRC (Relief Rehabilitation Commission) through its transportation branch and the World Food Program. Unfortunately, during the worst of the drought there was no clear leadership and with so many agencies involved, the speed with which the cargo was cleared, even with the new trucks, did not meet expectations.

3.53 Even as late as September 1986, 75% of the 216,000 tons at Assab belonged to relief organizations, some using the port as cheap storage. It has been estimated that under the best scenario it would take the relief organizations up to nine months to clear the congestion. Normally dispatching of relief organization vehicles has been handled by NATRACOR (FTC) but orders for moving freight from the ports are dependent upon the relief organization management of the fleet capacity. Technical problems of excessive vehicle mix (multiple makes and models) severely hinder such management. Better planning and management of donor vehicle requirements would certainly alleviate current port congestion. Policies related to RRC and other relief organizations should be reappraised in light of the vehicle management issue. As food imports decline, the magnitude of the problems will be reduced.

3.54 Once the emergency is over, a number of donors have indicated that these vehicles will be left in the country. Government has not yet decided how to distribute the trucks. The percentage sold to the Associates will be an indication of Government's commitment to allowing the private sector to begin replacing its aged trucking fleet.

Table III.2: ETHIOPIA - TRUCK FLEET FOR EMERGENCY OPERATION
(as of March 1986)

Organization	Trucks Long-haul	Short-haul	Capacity-mt	Remarks
ADRA	2	5	74	
CARE	38	-	836	
CRS	12	12	336	+55 Kenyan trucks
CRDA	31	21	808	
CONCERN	6	5	162	
ECS	38	4	860	
Food for Hungry	-	4	24	
German AGRO Act.	3	-	66	
ICRC	50	28	1,268	
LRCS/ERCS	16	7	394	
LWF	10	17	322	
Norwegian Church	5	6	146	
Philad. Church	2	3	62	
OXFAM/SCF (U.K.)	15	6	366	
Redd Barna (Norway)	18	7	438	
SCF (U.S.A.)	20	20	560	
24 Hour TV	-	2	12	
WUSC (Denmark)	21	9	516	
World Vision Int.	108	6	2,412	
Subtotal	395	163	9,662	
NATRACOR Gov. 1/	1,100	-	33,000	
Private Sector 1/	1,450	-	35,000	
RRC (Gov.)	329	703	11,456	Expected 100
WTOE	116	-	2,552	Expected 134 veh.
Subtotal GOV/WTOE	2,995	703	82,008	
TOTAL (all)	3,390	866	91,670	
TOTAL (in country)		4,256		

1/ Total tractor-trailer fleet available in principle.

NOTES: - NATRACOR/Ketana vehicles are for all transport requirements in Ethiopia and not exclusively for the emergency operation.
- 30 trailers recently supplied by the U.K. to RRC will transform a corresponding number of short haul into long haul units.

Source: UN, Office for Emergency Operations in Ethiopia, Addis Ababa, 1986.

3.55 Public Transport Corporation. The bus is by far the most common mode of passenger transport in Ethiopia. Otherwise, in urban areas, travel is by foot, taxi or car; in rural areas, where roads are few, short trips are made by foot or donkey. Rail and air passenger travel is minimal compared to the number of passenger trips made by bus. Commercial bus transport is available to the general population on both public and privately-owned buses but all such services were controlled by the Public Transport Service Corporation (PTSC). Recently, however, PTSC was de facto transformed into Public Transport Corporation (PTC) as an independent entity under MOTAC; that still needs Government formal approval. Most bus service, however, is provided by private operators; long distance transport is handled almost entirely by them and on the Addis Ababa-Assab road their share is over 95%.

3.56 PTC emerged from NATRACOR which was responsible for overseeing public bus transportation in Ethiopia. PTC establishes bus routes and schedules and dispatches buses owned and operated by independent bus owners (usually referred to as Affiliates) and by the Government. Commercial bus transport in the private sector consists of about 160 owners with approximately 2,700 buses of various sizes; about 300 maxibuses are for long distance routes, while the rest are used in intraregional transport. PTC owns 286 buses (1986) of various sizes and provides city transportation in Addis Ababa, Jimma and Asmara as well as about 25-30% of all long distance intercity transportation. It should be noted, however, that about 25-35% of the fleet is always out of service. Affiliates supplement city transportation with smaller buses but primarily are responsible for providing intraregional bus service. Ethiopia is divided into seven regions for that purpose. Allocation by PTC of the privately-owned buses is done in sequence over good and bad routes so that each carrier has a chance to get profitable routes as well.

3.57 Although some private operators have bought buses in the last few years, they fall short of the number needed even to maintain existing services. The problems faced by private bus operators in financing renewal of their vehicles and in getting them repaired are in many ways similar to those of the private freight operators. The problems are exacerbated by the age of the private buses, which is in many cases even greater than that of the private trucks, and the unavailability of facilities for repairs in the regions.

3.58 Corridor Passenger Traffic. Much of the country's bus service, in passengers and in passenger kilometers, falls within the Addis-Assab corridor. Indeed, passengers on the Addis-Assab road totalled 4.6 million in 1984/85 and 3.8 million in 1985/86. By comparison, the railway carried 771,000 passengers in 1984/85. The vast majority of this transport was handled by privately-owned buses; less than 5% of these passengers were carried by government-owned buses. There are, however, major fluctuations of passenger volumes on different sections of the road; Addis-Nazret (98 km) is the most trafficked one. Moreover, most of the passenger transport on the Addis-Assab road is carried for shorter distances.

3.59 Since the PTC is a newly created entity with limited data on its performance, the presentation below will mostly refer to the PTSC from which PTC derived. PTSC's revenues consist of commissions on bus service

provided both by Affiliates and Government owned buses. All intercity routes are designated by PTSC which also prepares monthly schedules. PTSC operational staff, basically the conductors, actually ride the buses, collect passenger fares and issue tickets. For these services, PTSC collects a commission from PTC and private operators equal to 12% of revenue from the maxibus operations. For midibuses the operator pays a commission to PTSC equal to 8% of revenue but the owners collect their own fares.

3.60 The tariff was last revised in 1981. Within Addis Ababa there is a standard flat fare of 15 cents, which has been the case for about 20 years. Recently, private Affiliate buses operating in peak periods as supplements to the PTC city buses have been charging a flat fare of 25 cents. On long distance routes, the tariff per passenger/km is 3.385-5.00 cents for midi and mini buses and 3.155 cents for maxibuses. Consultants have recently carried out an analysis (1985) of the existing tariffs that concludes that both passenger and freight transport rates do not fully cover costs. RTA is now preparing proposal for tariff revision.

3.61 PTSC's financial results are discussed in more detail in Annex I. To summarize, however, PTSC's income before taxes has dropped from 2.8 million Birr in 1982/83 to 2.3 million Birr in 1984/85, an 18% decline. In part the decline is due to a drop in revenues but in 1984/85, wages and depreciation were somewhat higher than the previous year. PTSC's working ratio is 75% and its operating ratio a respectable 91-92%. It should not be assumed from these figures, however, that bus service in Ethiopia is profitable. PTSC has managed to tap enough revenues from the bus service to cover expenses, and pay some taxes to the Government, but whether the tariffs it charges are sufficient to cover bus service provided by private operators cannot be assessed from PTSC's financial results.

3.62 Problems pertinent to passenger transport could be summarized as follows: (a) insufficient fleet; (b) old age of the fleet; (c) little preventive maintenance and a sizeable part of the bus fleet is out of service at any one time (particularly Government-owned); (d) inability to determine whether the private bus owners are making any profit; to date there has been arbitrary profit-taking or transfer of income between the two, and it is impossible to determine if the value of services being offered to the private sector really is worth the 8% commission that PTSC takes;
(e) strictly-controlled market by PTSC without allowance for competition; and (f) shortage of foreign exchange for bus fleet renewal and purchase of spare parts and tires.

The Addis Ababa-Assab Road

3.63 There are two principal road routes connecting Assab and Addis Ababa. One of them passes through Awash and Nazret and the other passes through Kombolcha and Debre Sina. These two routes join near Mile; the section from Mile to Assab is common to both routes. The route via Kombolcha is shorter by about 20 km but passes through tortuous mountain terrain and is thus characterized by curves, tunnels and several drainage structures that make driving difficult. By contrast, the road via Awash passes through comparatively easy terrain for most of its length. Once the

section between Mile and Awash was constructed (1969 - 73) traffic shifted to the longer route via Awash due to savings in journey time and operating costs. For this reason and because the Kombolcha-Mile section has not been properly maintained (it was constructed from 1935 - 40 to a bitumen standard but 25% of the road has reverted to a gravel standard), little traffic is now using the road. For purposes of TCA, therefore, references to the road route in the corridor refer only to the route via Awash.

3.64 Road Condition. The 889 km road between Addis Ababa and Assab traverses terrain that varies considerably: about 70% of the length is relatively flat, 24% rolling and the balance, hilly to mountainous. The road took more than 40 years to complete; thus, design speed, cross-section, pavement design, and vertical and horizontal alignment vary considerably. Safety features also vary; there are many sections, especially through the mountainous areas, where there are no guardrails or other protective devices. Additional retaining walls are needed in many places to take care of unstable side slopes and falling rocks. The drainage structures along the road are generally in a reasonable condition; however, the length of some of the culverts is only about 8 m. in some locations. This results in reduced side clearances at culvert headwalls, which in turn, causes safety hazards.

3.65 Responsibility for highway construction and maintenance lies with the Ethiopian Transport Construction Authority (ETCA) under the Ministry of Construction. The sections from Addis Ababa to Awash and from Mile to Assab were completed about 1940, whereas the section from Awash to Mile was completed in 1974. Given these different ages, the road sections naturally have been resurfaced at various stages: Addis Ababa to Awash as late as in 1984/85; and Awash-Mile in 1980. The Mile-Assab section is now due for more extensive rehabilitation.

3.66 The bearing capacity of the road is generally high but certain sections show signs of distress. This is particularly noticeable between Awash and Mile where total pavement thickness is only 250 mm compared to from 320 mm to 550 mm prevalent in other sections. To make an accurate estimate of the residual life of the road, a comprehensive deflection survey should be carried out. Bridges and box culverts on the Mile-Assab section also should be tested for load carrying capacity.

3.67 Portions of the road passing through towns and villages show signs of congestion, a situation that will increase in severity as the traffic volume increases. When necessary, construction of bypasses will alleviate the problem. Moreover, the present road lacks adequate arrangements for parking of vehicles, both at terminal points and along the route. The pavement width varies from 6 m on the mountainous section between Mile and Assab to 7.5 m (generally) on the section between Addis Ababa and Mile. The width of the shoulders varies as well from as little as 0.2 m to 2.5 m.

3.68 Traffic Volume and Composition. The average daily traffic (ADT in 1985) varied between 1,470 vehicles per day near Addis Ababa and 400 between Mile and Assab. The traffic is characterized by an exceptionally high proportion of heavy vehicles, on the order of 90% between Awash and Assab (666 km), down to 60% between Nazret and Addis Ababa (97 km). This pattern verifies that long distance traffic dominates over most of the road. The annual traffic growth on the road has been between 4 - 6%.

3.69 At current levels, the number of vehicles using the road is not creating any capacity problems except for occasional congestion in villages and townships. The composition of traffic, however, especially the number of trucks with high axle loads, gives cause for concern. A review of the records at the weighbridge near Awash shows that 64% of all rear axles weigh more than 10 tons. Government officials recognize the consequences of permitting overloaded vehicles to use the road, but no action is taken to fine or stop the operators of these overloaded vehicles. In part, inaction stems from the fact that new legislation that would permit axle loads up to 12 tons is pending, making it difficult to enforce the old standard. [3] In part, however, the problem of controlling axles is related to the division of responsibility between the Ministry of Transport and the Ministry of Construction. Unlike other countries, control over axle loads in Ethiopia is not given to the authority also responsible for maintenance. Instead it is given to MOTAC, the same Ministry that is responsible for operating a large proportion of the heavy vehicles that contravene the existing axle load standards. As the party most interested in maintaining the roads, perhaps ETCA should be put in charge (para. 3.73). Whoever is responsible, if overloading to the extent described above is permitted to continue, the design life of the road will be reached at a much earlier date than would otherwise be the case.[4]

3.70 Capacity. Capacity may be of some concern in the future as traffic growth may require expansion to four lanes. The theoretical capacity for a two-lane, two-way road is 2,000 passenger car units (PCU's) per hour, total. This capacity is only obtained under ideal conditions in terms of traffic flow, riding surface, lane width, side clearance, grades and sight distance, curvature, intersections and other, non-vehicular, traffic. The possible capacity, however, is the maximum traffic volume which a road can carry under prevailing road and traffic conditions. The conditions are usually not ideal and the possible capacity is calculated by reducing the theoretical capacity with factors that take into account actual road conditions including: gradients, sight distances and side clearance restrictions. Applying these factors to the theoretical capacity, and also allowing for an acceptable level of service, the practical capacity in PCU's per hour for each section has been determined. (Table III. 3) Assuming the practical capacity in PCU's per hour can be sustained over eight to ten hours pr. day, the practical capacity in terms PCU's per day has also been calculated. In turn, the PCU's have been

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3 Existing vehicle weight legislation limits the axle load to 8 tons. New legislation would increase the permissible load to 10 tons in most of the country and to 12 tons on the Addis-Assab road. The proposed legislation, prepared by RTA, is now pending before the Council of Ministers. Because of potential change of the standards and some confusion as to who is in charge of enforcing the law, virtually no effort is currently being made to limit axle loads although there are three vehicle weighing stations (at Mojo, Awash and Assab) on the main road.

4 The relationship between axle load and damaging effect on the road is not linear but exponential.

converted into vehicles per day, using the same equivalence factors for heavy vehicles which were used to determine the reduction factor for gradients. [5]
The calculations also assume that the present mix of traffic, will persist through the forecast period and that traffic will grow at an annual rate of 5%. These are, of course, broad assumptions and are subject to refinement as more data become available.

3.71 The results of this analysis, made to estimate the residual life of the present road in terms of capacity, are shown in Table III.3. As shown therein, the road has a practical capacity that varies between 2700 and 5750 vehicles per day. The year in which the practical capacity will be reached on each of the sections also has been calculated. Based on these calculataions and assuming that the CDE will continue to operate, the earliest date in which a serious capacity constraint will be experienced is the year 2013 on the section between Addis Ababa and Nazret. Without the CDE, capacity will be constrained only three years earlier, or in 2010. On the Mile-Assab section, capacity constraints will not be experienced until the year 2023 (year 2020 without the CDE). These calculations compare favorable with the Louis Berger study, whereas the RITES study indicates that capacity will be reached before the end of the century on the mountainous sections. The RITES study concludes that on the hilly to mountainous section between Mile and Assab, upgrading to four lanes will be required when the traffic reaches 1,100 vehicles per day. On other sections, four lanes are recommended when the traffic exceeds 9,000 passenger car units (PCU) per day. This means that in the hilly to mountainous sections, the consultant considers capacity to be reached when one vehicle on average passes any one point along the road at more than one minute intervals. This is obviously not realistic; the error that is made, in our opinion, is in the conversion from heavy trucks to passenger car units. The high value of trucks in terms of PCUs normally used in capacity calculations, is meant to take care of the interruption that heavy trucks necessarily make to the free flow of light vehicles. When there are 94% heavy trucks of more or less the same engine to load-carrying capacity ratio, this argument is of less importance, at least not to the extent used in the study.

3.72 The main conclusion with respect to capacity, therefore, is that the Addis Ababa - Assab road will not experience capacity constraints (apart from short sections near villages, etc.) during the next 20 or so years. Climbing lanes on the steep and long grades between Mile and Assab might be required at an earlier date, however, especially if the traffic composition should change in favor of light vehicles. Another major

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5 The reduction factor adjusts capacity for the fact that heavy trucks normally interfere with the flow of lighter vehicles --- especially on steep grades. The steeper and longer the grade, the higher the reduction factor. The reduction factor generally applied assumes relatively normal traffic composition (i.e. 30% heavy, 70% light vehicles). In the case of the mountainous sections between Mile and Assab, however, the composition is not normal; heavy vehicles account for 94% of the traffic and therefore, inconvenience to light vehicles on steep grades is of little significance. In calculating capacity for this TCA, therefore, adjustments to the reduction factors have been made where appropriate.

conclusion of the analysis is that the capacity of the Addis Ababa - Assab road could be significantly increased without any investment if the road could be kept open to use 24 hours per day. At present, due to security problmes, night traffic has been restricted. Even now, capacity can be extended by organizing convoys for night driving.

Suggested Improvements For Road Operations

3.73 There are a number of improvements that could be made to increase the operating efficency and thus the capacity of the road that can be made without large investments. Organizationally, it is recommended that Government review the present organizational structure of MOTAC and MOC with the aim of establishing a single highway authority (preferably based on the present ETCA organization) so that there would be no confusion or shirking of responsibility regarding road markings, axle load control and provision of general service to the public. ETCA is responsible for highway construction and maintenance and has therefore a vested interest in preventing premature deterioration of roads. As transport regulator, RTA needs to expand its planning and analytical branch to better monitor road transport costs and tariffs, traffic and transport demands, and to administer Government regulations regarding vehicle dimensions and technical specifications, vehicle inspection, as well as general transport regulations.

Table III.3- ETHIOPIA: ADDIS ABABA-ASSAB ROAD
ANALYSIS OF IMPROVEMENTS NEEDED

SECTION #			1	2	3	4	5	6
From			Addis	Mojo	Nazret	Awash	Mile	Dobi
To			Mojo	Nazret	Awash	Mile	Dobi	Assab
Constructed year			1940	1940	1940	1974	1940	1940
Technical Features								
Length (km)			73	25	125	300	204	162
Pavement Width		Present (m)	7.3	7.3	7.3	7.3	6.0	6.0
		Proposed (m)	7.3	7.3	7.3	7.3	6.0	6.0
Shoulder Width		Present (m)	2.5	2.5	2.5	2.5	0.2	0.2-2.0
		Proposed (m)	2.5	2.5	2.5	2.5	0.5	0.5-2.0
Surface type			A.C.	A.C.	A.C.	A.C.	D.S.T.	D.S.T.
Base course type			Crushed Stone	Crushed Stone	Crushed Stone	Crushed Stone	Telford	Telford
Cost Estimate								
(i) Routine maintenance		Birr/year/km	2000	2000	2000	2000	2000	2000
(ii) Periodic maintenance		Birr/year/km	4500	4500	4500	3500	4000	4000
(iii) Upgrading		Birr '000/km	200	200	200	200	250	250
Traffic								
(i) ADT 1986			1500	1445	695	470	433	433
(ii) % Heavy vehicles			60	61	82	89	94	94
(iii) Annual growth rate (average)			5	5	5	5	5	5
Capacity Reduction Factors								
F_h (side clearance)			0.95	0.95	0.95	0.95	0.75	0.75
F_s (sight distance)			0.98	0.98	0.97	0.99	0.90	0.90
F_e (gradients)			0.94	0.89	0.71	0.92	0.69	0.62
$F = F_h \times F_s \times F_e$			0.87	0.83	0.65	0.87	0.47	0.47
Theoretical Cap. 1/ PCU/hr			1700	1700	1700	1700	1650	1650
E 2/			2.6	2.7	3.8	2.6	3.0	3.0
Practical Cap.								
PCU/hr 3/			1470	1410	1110	1480	780	780
Peak hour factor 4/			13%	13%	12%	12%	10%	10%
PCUs			11300	10850	9300	11300	7800	7800
V.P.D.			5750	5500	3520	4650	2700	2700
Expected Life 5/								
(i) Strengthening/upgrading due			1998	1995/98	1995/98	1990/93	1988/91	1988/91
(ii) Capacity reached 6/		year =	2013	2013	2019	2032	2023	2023
(iii) Without CDE		year =	2010	2010	2016	2029	2020	2020

1/ Theoretical capacity depends on design speed and average traffic speed in the design peak hour (30th highest hour).
2/ Equivalent value for heavy vehicles. Depends on vertical alignment. For flat road E = 2.5
3/ Practical (or design) capacity in PCU's (passenger car units) = Theoretical capacity multiplied by the reduction factor F_h for lateral clearance, F_s for sight restrictions and F_e for gradients.
4/ Peak hour factor. An estimated volume of traffic as a % of the ADT. The peakhour is normally taken as the 30th highest hour in the year.
5/ Does not assume night driving
6/ Short sections will reach capacity earlier (junctions, villages, bridges, etc.), and may need improvement. The cost of such improvements are included in cost of periodic maintenance.

Source: World Bank Analysis based on data obtained from ETCA, Addis Ababa, 1988.

To improve safety, provide parking areas, and information regarding road facilities, it is recommended that the full three year program prepared by RTA and being partly financed by the Second Road Sector Project (Cr.1404-ET) be implemented. Properly paved parking areas with the necessary service facilities should be arranged away from the carriageway itself and at regular intervals along the road. Better infomation to the road user regarding traffic hazards, temporary congestion, services and rest areas would also be helpful. To enhance security, highway patrols are being created. The establishment of patrol vehicles, service stations, rescue squads and the like will improve security and eventually make night driving safe; that, in turn will greatly increase practical capacity of the road.

B. PORT OF DJIBOUTI TO ADDIS ABABA RAIL ROUTE

The Port of Djibouti

3.74 The Port of Djibouti is the gateway for Ethiopian traffic using the rail route in the corridor. South of Assab in the neighboring country of Djibouti, the port sits in an accessible and convenient location in the Gulf of Tadjourah that has made it an important transshipment port for Ethiopia and Somalia and, to a lesser extent, to other coutries that border the Red Sea. As described in para 2.15, Ethiopia's use of Djibouti virtually came to a halt during the Ogaden war but was revived as an alternative to congested Assab during the recent drought.

3.75 Since the Port is not in Ethiopian territory, Ethiopia is obviously not responsible for its operating practices or efficiencies. With respect to the TCA, however, the port of Djibouti has been examined to assess its capacity to handle future Ethiopian traffic that might flow over the rail route in the corridor assuming the railway was rehabilitated to handle the traffic and that the overall costs of using the rail and Djibouti port were cheaper than the Addis-Assab alternative road route. Currently the Government of Ethiopia limits the share of Ethiopian traffic that can go through Djibouti to 15%, although at present the actual share is only about 7%. The limit stems from a reluctance to put too much reliance on another country's facilities; furthermore, there is the risk that port charges might be raised to cover inefficient and costly port operations or raised somewhat capriciously for some other reason by the Government of Djibouti. The Government of Ethiopia has attempted to negotiate long term rates with Djibouti in conjunction with use of the port but has to date had little success.

3.76 According to our assessment, Djibouti has ample capacity (berths as well as storage) to handle an increase of traffic of more than 15%. No further investments in port facilities will be required in the future. However, the port is currently congested due to undue delays in getting Ethiopia's traffic out of the port. A more complete description of the Port, its operations and facilities is contained in Annex IV but the most salient information is summarized below.

3.77 The port of Djibouti has 13 berths with a total length of 2,642 m. Two of the berths -- with a total length of 400 m -- form the container terminal. Six are general cargo berths (one of which can also handle bulk

liquid); one berth is used for coastal shipping; and the rest (four berths) are used for bunkers and mineral oil in bulk. Details of the berths are shown in Volume II, Annex IV, Table 1. The berths are well-designed for their intended use. Each of the coastal and general cargo berths has a transit shed ranging from 1,080 m^2 to 4,900 m^2. The container terminal has covered storage of 11,720 m^2. Open storage areas available in the port total 120,000 m^2. [6] The port also has cold storage of 2,450 m^3 capacity and private warehouses totalling 12,000 m^2. In addition, just outside the port there is a Free Trade Zone of 14 hectares in which 6,000 m^2 of warehouses operated by the Chamber of Commerce are available.

3.78 All berths, transit sheds, warehouses and open storage areas are rail-served. Except for the container berths, Djibouti's berths are not equipped with shore cranes and cargo is loaded and discharged with a vessel's own gears. However, two mobile cranes of 15 ton and 20 ton capacities with boom lengths of 13 m and 18 m respectively, and a floating crane capable of lifting 70 tons, are available for the loading and unloading of cargo if required.

3.79 The sufficiency of cargo handling equipment is not an issue for the port since Djibouti is not constrained by lack of foreign exchange availability for the purchase of equipment or spares.

3.80 Djibouti's container terminal consists of two berths with a total length of 400 m and drafts of 9.5 m and 12 m respectively. A ro-ro ramp with a width of 18 m and a draft of 9 m is adjacent to one of the berths thus enabling the handling of ro-ro vessels at the terminal as well. The stacking area for containers totals four hectares.

3.81 The berths are equipped with two gantry cranes with a lifting capacity of 35 tons under the spreader and an outreach of 37 m. Transfer equipment at the container terminal consists of 6 tractors, 10 trailers, 4 heavy duty fork lift trucks (32 ton capacity) and 2 fork lift trucks of 12 ton capacity. The fork lift trucks are fitted with spreaders for the handling of containers.

3.82 Containerization has proceeded at a much faster pace in Djibouti than Assab. In view of (i) the container handling facilities already available in Djibouti, (ii) the suitability of containers for the inland haul of cargo, and (iii) the large percentage of cargo that is containerizable, it is conceivable that by 1994/95, provided the CDE has the facilities to move containers by rail between Djibouti and the hinterland of Ethiopia, all the cargo that can be will be containerized. Assuming rehabilitation of CDE (para. 5.51) and relevant forecast of dry cargo traffic via Djibouti (Annex IV, Table 3) Ethiopia's containerized traffic through Djibouti could reach about 150,000 tons, which would be equivalent to about 15,000 containers. Domestic Djibouti's containerized cargo is expected to reach 329,800 tons by 1994/95.

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6 Source: Louis Berger International: Transport Sector Study, Draft Final Report, Nov. 1985.

3.83 The port should be able to handle the increase with no problem. Storage should not be a problem assuming (i) 30% of the domestic containerized cargo has to be stuffed or unstuffed within the container terminal, (ii) cargo remains at the container freight stations not more than 14 days, and (iii) a ton of cargo requires $3m^2$ of floor area for storage and handling purposes, container freight stations totalling 11,384 m^2 are required to handle the traffic forecast for 1994. Currently covered storage capacity in the Container Terminal total 11,720 m^2. As for storage of containers, the container terminal has a storage area of about four hectares which is ample for the forecasted levels. Nor should capacity of the berths be a problem. The optimal handling capacity of each general cargo berth should approximate 240,000 tons per berth while the forecasted general cargo is estimated at 1.44 million tons per year, indicating a capacity utilization of only 18% by 1994. The container berths should have over 50% capacity for the forecast container traffic assuming: (i) berth occupancy rate of 30%; and (ii) handling capacity of each berth of 98,550 TEU's per annum. Further details are contained in Annex IV.

The Railway

3.84 The jointly-owned Chemin de Fer Djibouti-Ethiopie (CDE) was established by treaty in 1981, more than two years after the demission of the original Franco-Ethiopian Railway. The 781 km. single line meter-gauge railway follows a sinuous course from sea level at the Red Sea Port of Djibouti to the highlands of Addis Ababa. The route is distinguished by sharp curves (minimum radius 100 m), steep inclines (ruling grade 22%, otherwise generally 15 to 18%) and low embankments and cuttings. Bridging is relatively moderate as the alignment more or less rides the ridges of drainage lines; depressions and declivities of any consequence are absent, and there is only one tunnel. The system includes 35 stations with a border control station 107 km inland from Djibouti at Dewele. There are no branch lines but several industrial and service sidings exist. Apart from the sharp curves, operationally inhibiting factors, from a design point of view, are the crossing loop lengths and five long block sections. Only ten stations, unevenly distributed, have crossing loops of 400 m and over.

3.85 Infrastructure. The CDE is an old, deteriorated railway. The section between Djibouti and Dire Dawa was constructed in 1902, the remainder in 1917. Track and bridges are generally in serviceable condition, but ballast is scant and the formation top width deficient throughout the line. Considering the lack of track ballast, the railway has been able to operate because of the severe limitation of maximum speeds: 50 kph for loco-hauled passenger and freight trains and 65 kph for railcars. The incidence of serious accidents,[7] particularly derailments, has been astonishingly low, primarily because of the alertness of the permanent way staff in prompt imposition of highly restrictive temporary speed restrictions over very defective earth-supported track. Steel girder bridges, of which there are quite a number, have not been painted nor the bearings greased for many years. Masonry structures are reputedly in good

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7 One serious accident of a passenger train involving 450 casualties, occurred in 1984 owing to excessive speed; a second accident in 1985 was attributed to sabotage.

condition, except the two damaged in the Ogaden war and those needing waterproofing to prevent mortar deterioration. Naturaly, only a special study could assess the real state of the structures. Parts of the line are prone to flooding during heavy rains either due to inadequate height of culvert waterway openings or lack of rip-rap protection on the embankment flanks of major bridges.

3.86 Rolling Stock. Over 40% of the 630 wagon stock is more than 50 years old and another 20% is over 35 years old. Thirty five percent of the 29 main line locomotives and 50% of the 6 shunters are over 30 years old and both of relatively low horsepower for effective operations. Two of the six autorails are over 20 years old and 50% of the 38 passenger coaches are more than 45 years old. For want of spares. there is a disturbing build-up of arrears of motive power and rolling stock overhaul schedules.

3.87 All stock is equipped with vacuum brakes and center-buffer couplers. Wagon and coach availability is 82-85%, locomotive availability 50-55%; utilization of the 1,200 HP mainline locomotives averages 8,000 km monthly, with a min-max range of 4,600-12,500 km. The 1,850 HP cc have the lowest availability (33%) and utilization (3,000 km monthly, range 2,000-6,000 km). These three-axle monomotor version of Alsthoms, introduced in the 1960's, have not been a success and it is surprising that they are still maintained in service--at presumably very high cost. Shunting locomotive and railcar availability ranges between 45-50%.

3.88 Recurrent shortages of spares account for the low availability of stock. At least five locomotives of the 1,200 HP series are overdue for a general overhaul. The average downtime of locomotives is 167 days per year. A similar backlog is building up for wagons; if not overtaken in the near future, the overhaul demands will outstrip workshop capacities.

3.89 Workshops. Lifting gear is short in both the general engineering and wagon workshops and, barring a few items recently acquired, the machine tools are overaged. Wheel turning capacity is not adequate as there is only one new wheel lathe. Generally, the capacities of both workshops are sufficient for the present workloads. Some work reorganization and better production control and management can yield another 10-15% capacity. However, if overhaul arrears accumulate, the 20 wagons/month current capacity will not suffice.

3.90 The diesel workshop, though adequate in capacity for the present fleet, lacks two facilities--a proper bogie overhaul area and a repair/overhaul capability for heavy electrical gear (traction motors, generators). A bogie repair area can be provided in extension of the present stripping bays. Until recently the electrical gear was being sent to France for overhaul. EEC funds have now been secured and bids invited for installation of an overhaul shop, inclusive of site overhaul of about 65 traction motors, 17 main generators, 2 alternators and 45 auxiliaries. An expatriate advisor is attached to the workshop. Prima facie, work management, organization and execution appeared competent.

3.91 Signalling and Telecommunications. There is no signalling system, only fixed speed reduction warning boards to indicate station approaches. All turnouts are manually operated with provision for padlocking.

Telecommunications are open wire land lines. Recently an EEC funded 12-channel carrier system using a pair of overhead wires has been installed. Solar power is provided at stations without a main supply. To improve audibility crimping overhead wires has been started systematically from the Addis Ababa end. For the present this improvement is sufficient, but if a management reorganization is implemented, radio links would be necessary between major centers--Addis Ababa, Dire Dawa, Border station, and Djibouti. Line clear is by the paper order system and the central train control is located at Addis Ababa.

3.92 Traffic. As shown in Table III.4 tonnage has been declining an average of 4.5% per annum, since 1975/76. In part the decline in rail volume was due to the Ogaden war during which time railroad operations virtually ceased, but a more fundamental reason is that Government decided for strategic reasons to shift the focus of its commercial exchange with the outside world from Djibouti to its own port of Assab. The average length of haul on the railway is 509 km for imports, 548 for exports and 305 for domestic goods. Longest hauls, virtually the entire length of the railway, involve the import of fertilizer, iron and steel, and chemicals and the export of molasses and sugar. Given this pattern of traffic, it would seem appropriate for the CDE to run some unit trains or through trains for some of these bulk commodities; its pattern of operations, however, is to run trains between Djibouti and Dire Dawa and between Dire Dawa and Addis Ababa, generally stopping at every station along the way for clearance since CDE has no signalling system; at Dire Dawa locomotives are changed and the trains are reassembled. Long delays are also incurred by each train at the border.

Table III.4 - ETHIOPIA: REVENUE EARNING FREIGHT AND PASSENGER TRAFFIC ON THE CDE 1973/74 - 1984/85

	1973/74	1974/75	1975/76	1976/77	1977/78	1978/79	1979/80	1980/81	1981/82	1982/83	1983/84	1984/85
Freight												
Import (000 tons)	203.5	194.8	215.8	205.9	4.9	121.7	107.7	90.0	87.5	102.0	93.4	144.5
Import (tkm mill.)	123.6	114.8	130.3	129.0	2.5	71.9	61.1	41.8	43.6	56.2	48.1	77.5
Average lead (km)	607	589	604	627	510	591	567	464	498	551	515.0	509.8
Export (000 tons)	153.9	158.1	178.9	101.2	0.7	41.0	80.6	71.3	56.9	76.7	89.1	90.2
Export (tkm mill.)	90.8	97.5	107.0	59.3	0.2	23.8	45.1	40.1	31.9	42.4	50.1	49.5
Average lead (km)	590	616	598	586	307	580	560	562	560	553	563	548.8
Internal (000 tons)	87.2	100.4	74.0	71.3	112.1	158.3	127.9	139.1	92.5	68.2	58.0	70.1
Internal (tkm mill.)	29.2	31.4	22.8	202.0	27.8	52.2	41.8	49.4	31.9	23.2	18.2	21.5
Average lead (km)	333	313	308	283	248	329	327	355	345	340	314	306.0
Total (000 tons)	444.5	453.3	478.6	378.5	117.7	321.0	316.1	300.4	236.9	247.0	240.5	304.9
Total (tkm mill.)	243.6	243.7	260.1	200.5	30.5	147.8	148.0	131.3	107.5	121.8	116.5	144.6
Average lead (km)	548	538	553	551	259	461	468	437	453	493	484	474.0
Passenger												
International (000 pass.)								67.9	92.6	154.2	156.5	128.0
Intnl (pkm mill.)								19.3	25.6	33.7	33.8	34.1
Average lead (km)								284	276	216	216	216
Domestic (000 pass.)								1267.8	1111.3	1273.9	957.8	740.6
Domestic (pkm mill.)								291.1	281.1	326.2	234.2	186.1
Average lead (km)								230.0	253	256	245	251
Total (000 pass.)	502.9	613.4	171.0	940.2	503.3	1089.3	1348.8	1335.7	1203.9	1430.1	1113.8	903.4
Total (pkm mill.)	95.2	107.7	132.8	154.7	63.1	170.6	247.2	310.4	306.3	359.9	267.7	220.7
Average lead (km)	189	176	171	164	125	157	184	232	253	252	240	244

Source: CDE Addis Ababa, 1986

3.93 The present level of rail operations has been insufficient to move quickly the enormous quantities of grain being donated to Ethiopia to combat the effects of drought. Despite joint governmental efforts to reduce the backlog, as of March 1986 there were 70,000 tons of goods waiting to be transported from the port by rail. The recent purchase of new locomotives has helped raise locomotive availability to 60% and relieve the congestion, but inefficient operations, slow unloading of wagons and excessive delays for customs and border checks continue to hamper turnaround time and hurt wagon availability.

3.94 Five trains (3 passenger, 2 freight) currently run between Addis Ababa and Dire Dawa 17 times per week; three trains (1 passenger, 2 freight) run regularly between Dire Dawa and Djibouti. Additional freight trains are run at frequencies of two-three per week. Frontier formalities hold up passenger trains for three to four hours.[8]

3.95 Wagon turnaround data are not readily available; and user "impressions" put the figure as high as one month. However, rough calculations place the average turnaround between 12-20 days for different types of traffic.[9]

3.96 Difficulties of Joint-Ownership. Some of the treaty provisions, in acceding to considerations of sovereign reciprocity, are not exactly conducive to effective management. For instance, of the six departments, three--Transportation, Finance and Personnel--are located at the Addis Ababa Headquarters; two--Civil and Mechanical Engineering and Stores--at Dire Dawa (the midway point where the Central Workshops are); and one--the Commercial Department--at Djibouti. The Chief of the Technical Services, who has jurisdiction over the Dire Dawa group of departments, is located at Djibouti with a counterpart at Addis Ababa. The procurement division of the Stores Department is at Addis Ababa.

3.97 Consultants have recommended the following amendments to the Treaty to rationalize and strengthen the management structure of the bi-national enterprise:

(i) reduce the Board of Directors to eight, making it a smaller, more effective body.

(ii) reorganize management structure conforming to a unified Addis Ababa located headquarters comprised of a General Manager, Deputy General Manager, and seven heads of Departments - and three Regional Managers (Djibouti, Dire Dawa and Addis Ababa) with staff-line related departmental divisional managers. National parities would be maintained by sharing of posts of the Departmental heads and Regional Managers, with an Ethiopian GM and Djiboutian DGM as at present.

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8 Smuggling is considerable along the Djibouti-Ethiopian border. Freight stock detention is equivalent to a daily holding of 100-200 wagons at this point where train loads are dropped and locomotives changed.

9 Louis Berger's Transport Sector Study estimated this at an overall average of 14 days based on an average wagon load of 16.4 tons.

(iii) provisions which allow the expansion or contraction of facilities according to business requirements.

(iv) a specific provision to enhance the autonomy of enterprise. (The two nations are understood to have initiated discussions on this already).

3.98 In general, the above proposals are feasible. Proposal (ii) of having all heads of Department at Addis Ababa is the ideal but not the only solution. Relocation to Addis Ababa entails logistical problems of accommodation as well as reorganization of the management system at Dire Dawa - and supplementing of the improved land line carrier system by radio links - if the maintenance installation there is not to be shifted. A more effectively organized regionalized management system may then be the answer. Adequate provision exists in the proposed investment rehabilitation estimates for providing the radio links - by marginal adjustments between categories. The question needs further examination with CDE's top management.

3.99 Financial Performance. The CDE is not a financially strong corporation. The railway carries only about 300,000 tons of freight annually from which it must earn enough to maintain operations over 781 km of track. At present, revenues are insufficient to do so; as shown below working expenses have exceeded revenues in the last few years and net operating results have been negative in eight of the past 13 years. A more extensive financial analysis is contained in Volume II, Annex II.

	1981/82	1982/83	1983/84	1984/85	1985/86
Working Ratio	95.4%	92.2%	114.8%	101.2%	90.0%
Operating Ratio	101.5%	94.6%	117.2%	105.4%	94.0%

Fluctuation in the ratios relates almost entirely to a decline in passenger revenues. Expenses, on the other hand, have been held fairly steady, a remarkable achievement given inflation and the growth in freight volume in 1984/85. Indeed, applying the GDP deflator to both revenues and expenses for the above years hardly effects the working ratio. This means that CDE has in fact been "doing more with less." Efforts to hold down costs are beginning to show positive results: both the working ratio and the operating ratio dropped by more than 10 percentage points in FY85/86.

3.100 Unfortunately the belt-tightening has probably been accomplished by increasingly deferring maintenance of track and equipment. Actual cash losses have been minimized by annual gains resulting from shifts in foreign currency exchange rates but subsidies totalling Birr 14.9 million, more than one-half an average year's revenues, were required to keep the corporation solvent between 1983/84 and 1984/85. Additional support has been obtained in the form of short term bank debt and suppliers credit and less formally by letting accrued expenses and pensions payable to the Government increase over time. Working capital is consistently negative, CDE's current ratio is about 40% and short term bank debt alone

consistently exceeds the value of accounts receivable. Short of funds, the railway has deferred maintenance and capital investments to a point where operations have been judged unsafe by two separate groups of rail consultants.

3.101 Yet CDE's recent traffic and earnings record is not consistently downward. Efforts have been made to study, if not fully address, some of CDE's managerial and operating problems. Also, Government has obtained some badly needed locomotives (two in 1983 and seven in 1984/85) and telecommunications equipment with French Government and EEC assistance and is committed to improving the track so that it can continue to maintain a railway route to the coast. These measures, together with an increase in drought-related imports of donated grain, led to an increase in traffic levels and an improvement in carrying capacity in 1984/85. Expenses were also cut somewhat the same year so operating losses were less than in 1983/84. Results for FY1985/86 show further improvement, but, due to foreigh exchange losses, overall net income dropped to a negative Birr 4.9 million in 1985/86. More must and can be done, however, to reduce expenditures and improve operations. Whether the economic role of the railway justifies the cost of rehabilitating its infrastructure, however, is not quite clear (Chapter V).

C. SUMMARY OF PROPOSALS TO IMPROVE OPERATIONS

3.102 From the preceding discussion it is clear that Ethiopia's transport operations can be much improved. It is also clear that many of the problems stem from operational inefficiencies that could be improved with managerial changes and administrative reform. Moreover, the entities operating in the corridor are, for the most part, fairly well-established and should be capable of implementing changes to become more efficient. In some cases, particularly that of MTSC, management may need upgrading, reorganization and/or technical assistance to do so; in other cases Government involvement and support will be a critical input as improvement will require far greater coordination among the transport entities than has ever been the case. Nonetheless, analysis of Ethiopia's transport sector in general, and the Addis-Assab road route in particular, shows that much can be gained from better utilization of existing human and physical resources in conjunction with implementation of some low cost improvements and provision of equipment and spare parts.

3.103 On the other hand, there are a number of problems common to the transport entities operating in the corridor that cannot be solved with "self-help" measures because they stem from more macroeconomic issues or from broad-based Government policies that can only be addressed if Government is willing to commit itself to reform or change top level policies. The issue of shortage of foreign exchange and adequacy of tariffs fall into this category, for instance, since they relate to the overvaluation of Ethiopia's currency and as well as to Government's control of pricing and foreign exchange.

3.104 Given the number of entities, their interrelationships and the commonality of some of their problems, the purpose of the matrix below is to put in one place and to briefly summarize the various suggestions for reform, managerially, operationally and organizationally that were cited in this chapter.

IMPROVING PERFORMANCE OF TRANSPORT ENTITIES IN THE ADDIS ABABA-RED SEA CORRIDOR - SUMMARY OF PROPOSALS

Entity	Problems	Subset of Problems/Related Issues	Actions, Suggestions for Improvement	Implementor
MTA	Port is operating at capacity and there is a backlog of cargo.	Long waiting time for vessels at anchor and at berth. Valuable goods lying idle in port. Cargo handling equipment is old and inadequate. Workshop facilities for repair are inadequate. Foreign exchange for new equipment is lacking.	(1) Emergency Port Project for immediate needs: - Construct new tug berth so all 7 commercial berths can be used. - Supply cargo handling equipment - Supply workshop equipment (2) Plan further expansion - Undertake master planning. - Establish container handling facilities for future. (3) Include Port expansion in proposed Transport Project.	MOTAC, MTA, assistance Port Engineering & Construction Project (Cr.1676 - ET) | | \V/ MOTAC, MTA, proposed Transport Proj.
	Storage areas are congested	Cargo storage is inefficient. Cargo is scattered. Export cargo not consolidated prior to shipment. Cargo removal is inefficient.	Expand storage areas (underway) Review storage charges to determine whether they are an incentive to move cargo. Improve vehicle utilization by reducing turnaround & loading & unloading times (See NATRACOR); improve MTA/MTSC/ NATRACOR communications.	MOTAC, MTA MTA with consultants via Tariff Study under Port Eng. & Const. Proj. MTSC via proposed Transport Proj. NATRACOR, RTA, MOTAC, via RTS & prop. Trans. Proj. (See NATRACOR)
	Ship to shore communications are poor	MTA in Addis is point of central control and there is delay in conveying information to Assab.	Improve communications between Assab and MTA; permit telexing of data (just begun) and consider start of direct communications between ship and Assab.	MTA, MOTAC
	MTA documentation requirements need simplification	Adds to delay in port, increases storage charges of importers and contributes to congestion.	Improve interface with customs and MTSC to reduce time cargo is left in port due to cumbersome documentmentation and clarify responsibilities of each entity.	MOTAC, Customs, MTSC, National Bank, MTA, Ethiopian Shipping Lines General Insurance Co. Task Force, UNCTAD, Consultants as needed to implement suggestions in MTSC report ASAP and via proposed Transport Proj. | | \V/
	Poor MTA/MTSC interface & unclear designation of responsibilities.	MTA handles shipping agent duties that should be handled by MTSC with no compensation; accounting disputes; internat'l insurance practices need better compliance	Simplify Ocean Bill of Lading (OBL) Establish Task Force to streamline documentation with help from UNCTAD (FALPPRO) Review and Implement other suggestions per MTSC Organization & Management Report pertaining to MTA.	
	Tariffs are not cost based.	Tariffs have recently been simplified to flat tonnage basis but assets have not been revalued & cost based accounting system does not exist.	Review Tariffs, asset values & establish cost-based accounting system with help of experts, if necessary.	MTA, MOTAC, & experts via Port Eng. & Constr. Project
	Financial autonomy needs strengthening	- MTA cannot retain earnings sufficient to fund annual capital expenditures. - Lack of foreign exchange.	Credit Covenant in Port Project (Cr. 1676-ET) addresses this issue. Permit MTA to retain a percentage of its annual foreign exchange earnings.	GOE, MOTAC, IBRD GOE, MOTAC, MTA

IMPROVING PERFORMANCE OF TRANSPORT ENTITIES IN THE ADDIS ABABA-RED SEA CORRIDOR - SUMMARY OF PROPOSALS

Entity	Problems	Subset of Problems/Related Issues	Actions, Suggestions for Improvement	Implementor
MTSC	Cumbersome documentation and slow processing time.	Cargo stays in ports too long.	Task force to continue efforts to stream line documentation and comply with international liability requirements.	GOE, MOTAC, MTSC, customs National Bank, MTA, Ethiopian Shipping Lines General Insurance Co. Task Force, UNCTAD, Consultants as needed to implement suggestions in MTSC report ASAP and via proposed Transport Project.
	Inadequate planning and coordination with MTA, NATRACOR, CDE. for cargo removal from port.	Slows cargo removal; also some abandonment of cargo by clients who can't pay storage charges after long delays.	Bring in FALPRO (UNCTAD) and other TA to help. Reorganize MTSC per consultant report.	
	Lack of experienced freight forwarding mngt & shortage of trained staff	Inefficient operations; lack of focus, impetus for improvement.	Provide training to staff. Consider establishing competitive para-statal or otherwise provide perfor-	
	Poor MTA/MTSC interface & unclear designation of responsibilities.	MTA handles shipping agent duties that should be handled by MTSC with no compensation; accounting disputes; internat'l insurance practices need better compliance	mance incentives to MTSC staff. Establish MTSC/MTA responsibilities. Adapt documentation and insurance practices to internat'l standards.	
	Insufficient consolidation of exports prior to shipment.	Small shipments increase storage requirements, thus increasing port investment.	Consolidate exports prior to shipment and review storage charges in Port to assess whether they encourage use of port as cheap storage.	
	Tariffs not cost-based and may be excessive.	Imports may be costlier than necessary; encourages smuggling; Export charges for storage are low and stay in port too long.	Undertake tariff study.	GOE, MOTAC, MTSC via proposed Transport Projec. (exports as necessary)
NATRACOR (FTC, PTC)	Organization too layered; too complex.	Headquarters overhead redundant with overhead of subsidiaries; thus costs too high.	Make revenue earning entities more autonomous (no cross-subsidies; access to foreign exchange; let earnings for capital expenditures be retained; make tariffs more cost-based.	GOE, MOTAC, NATRACOR (FTC, PTC) and consultants via Second
		Possible cross-subsidization among freight-related subsidiaries	Split passenger from freight (underway). Reduce management layers. Implement suggestions of RTS study.	Road Sector Project
	Allocation of freight not based on shipper demand or on supply of trucks but on centralized dispatching on a sort of queing basis; demand information slowed by requirement for written request & centralization of orders.	Transport allocation not as efficient as market pricing would make it. Priority shipments not allowed. Timeliness of shipments affected by not letting competitive forces work.	Consider modifying centralized dispatching service; introduce door to door service (via trailer pools) and permitting Associates to service Zone 5 more freely; permit priority shipments and introduce other changes suggested in the RTS.	GOE, MOTAC, RTA, NATRACOR FTC, PTC, Associates IBRD, & exports via RTS (and measures done under Second Highway Sector Project) and via upcoming Transport Sector Project.
	Tariffs not cost-based	Does not yield enough return to fund timely replacement of vehicles or expansion of busines for FTC or Associates. Does not reflect cost of carrying freight over different road conditions.	Reassess tariff; make tariff setting mechanism more responsive to market. Ensure that tariff is cost-based and takes into account different road conditions as well as need to replace vehicles.	

IMPROVING PERFORMANCE OF TRANSPORT ENTITIES IN THE ADDIS ABABA-RED SEA CORRIDOR - SUMMARY OF PROPOSALS

Entity	Problems	Subset of Problems/Related Issues	Actions, Suggestions for Improvement	Implementor
FTC & Associate	Poor truck utilization	Too much lost time; excessive downtime of vehicles due to lack of spare parts; long unloading and loading times; not enough drivers; limited garage facilities; security limits potential for night driving; truck & trailer stay together; freight allocated by zones rather than origin/destination.	Implement suggestions in RTS; train mechanics; improve garage facilities & extend to private sector; improve access to foreign exchange; reduce paper work;expand fleet if necessary and replace older, smaller vehicles with larger ones as approprate; institute trailer pools, driver teams, improve port operations, reduce customs and related documentation; improve tariffs so as to reduce need to accept illegal loads; enforce axle limits; train more drivers; establish door to door service.	
FTC		paperwork excessive; Associates have no access to relay system; limited access to Zone 5.		
	Relay system limited	Relay system needs expansion, more organization; garages, terminal parking along route; more driver more mechanics.	Expand relay system per RTS suggestions and later extend to Associates.	
				\V/
Associates	Fleet old makes varied, low capacity	Breakdowns more frequent; vehicles too small on average; lack of spare parts (lack of foreign exchange); not enough retained earnings, access to credit, foreign exchange, or import market to replace vehicles with larger standardized makes;	In addition to above, improve credit terms and access to foreign exchange Open up Zone 5 via introduction of terminal to terminal service. Expand SPID to serve private sector. Auction relief vehicles to Associates. Raise tariffs to cover fully allocated costs.	
	Garage facilities lacking	Garage facilities of Natracor not available to Associates;lack of access to SPID; overall lack of preventive maintenance.	Improve garage facilities & expand to private sector. Other RTS suggestions.	\V/
	ROI's insufficient	Limited access to Zone 5 traffic; tariffs not cost-based. . All of the above problems are relate Credit to expand or replace vehicles limited.	Encourage Associates to have more say in FTC operations.	
			\V/	\V/
PTC	Too few buses Too old Too many breakdowns	Replacement difficult due to limited access to foreign exchange lack of spare parts increases breakdowns; fleet not sufficien to ensure service & regular preventive maintenance.	Improve tariff so returns are sufficient to fund replacement of fleet; permit private owners access to foreign exchange to replace vehicles, and to obtain spare parts to reduce breakdowns. Preventive maintenance should be emphasized.	MOTAC, PTSC, PTO, RTA consultants & other experts via RTS.
	Tariffs low, not cost-based. Single tariff; not revised in years.	Tariff unrelated to demand; peaking/off-peaking; tariffs not sufficient to fund fully allocated costs including replacement of vehicles.	Review tariffs vis a vis costs and vis a vis demand, peaking, off-peak periods, etc.; establish tariff mechanism more responsive to market mechanisms. Implement consultant suggestions. Buy more buses (recently done)	\V/

IMPROVING PERFORMANCE OF TRANSPORT ENTITIES IN THE ADDIS ABABA-RED SEA CORRIDOR - SUMMARY OF PROPOSALS

Entity	Problems	Subset of Problems/Related Issues	Actions, Suggestions for Improvement	Implementor
ETCA	Road deteriorating too fast.	Axle load legislation in limbo Axle load limits not enforced Maintainer of road needs greater role in guarding its use.	Pass legislation; enforce law. Permit ETCA to enforce law; alternative is to establish Highway Authority with resposibility for both maintenanc & axle load legislation (and road signs, safety etc.)	GOE, Council, MOTAC, RTA ETCA, NATRACOR, via covenant to Second Road Sector Project
	Road needs widening at some culverts; possible expansion in congested villages.	Delays vehicles, increases accidents, leads to poor utilization of trucks.	Include improvements in upgrading plans.	ETCA, NATRACOR, RTA via upcoming transport project.
	Organizational structure needs review	RTA/ETCA overlap.	Study and review per covenant in Second Road Sector Project	MOTAC, MOC, ETCA, RTA, via Second Road Sector Project.
RTA	Organization needs review	RTA/ETCA overlap	Study and review per covenant in Second Road Sector Project	MOTAC, MOC, ETCA, RTA, via Second Road Sector Project & proposed Transport Project
		Planning functions weak	Implement RTS suggestions.	
	AAA road lacks parking areas, rest stops, safety signs	Delays vehicles, increases accidents, lowers utilization of vehicles.	Improve via 3 year program already designed under Second Road Sector Project	
	Security needs improving	Night driving impossible; break downs not reported quickly; decreases utilization/safety of vehicles/cargo.	Establish patrol cars and all night patrols; consider implementing convoy generally improve safety via signs, better rest stop areas, etc.	
CDE	Old unsafe infrastructure with no ballast; unpainted bridges.	Inefficient operations; slow orders; line prone to flooding in places	Replace ballast; repair worst track; paint bridges and check for long term use provided RGI meets test.	GOE, MOTAC, CDE, Djibouti EEC, bilateral aid.
	Inefficient Operations	Trains stop at too many stations; custom delays excessive; trains broken at Dire Dawa when traffic suited to unit trains.	Revise operations. Consider sealed unit trains to run straight to Addis. Improve track so slow orders can be reduced.	
	No signalling, poor communications	Slows operations; inefficient	Improve radio communications. Run more trains that stop less.	
	Poor Locomotive Availability	Old locomotives; Alstoms don't work well; poor preventive maintenance; lack of spares; workshops short of equipment; wheel turning not adequate	Improve workshop equipment & TA for loco repairs & introduction of preventive maintenance.	
	Joint Ownership Creates Problems	Division of Responsibility disrupts normal rail operations	Establish stronger headquarters (place major departments in Addis with alternating Ethiopian/Djibouti chief/deputy Reduce Number of Board of Directors.	
	Tariffs not cost-based; CDE deficits mounting	Earnings insufficient to cover deficits or long term capital needs or repay debt.	Implement related suggestions of management study. Improve operations & revise tariff schedule so CDE's overall earnings will improve. Reduce passenger trains and run more unit trains.	

IV. TRAFFIC FORECAST AND CORRIDOR DEVELOPMENT

4.01 In 1984/85 the transport entities moved about 2.7 million tons between the Ethiopian capital and the Red Sea ports. It should be noted, however, that close to 900,000 tons of cargo was drought relief aid, i.e., not part of the regular traffic pattern. About 88% of the tonnage was moved by trucks along the 889 km bituminous paved road between Addis Ababa and Assab while about 12% went along the 781 km CDE railway; however, not all of it goes to the port of Djibouti due to local traffic on CDE. Moreover, tonnage moved on Addis-Assab road has represented about 40-42% of all tonnage transported on the roads in the country. Both routes of the corridor have a significant imbalance between exports and imports. In Assab, unloaded cargo is about 78% of all cargo handled by the port while in Djibouti 90% of the Ethiopian-related port traffic in 1984/85 were imports. The imbalance between outbound and inbound traffic has been creating major difficulties in transport operations of CDE, NATRACOR and associates and to certain extent to the ports as well. As a consequence, average load factor is low -- about 60%.

A. FORECAST OF TRANSPORT DEMAND

4.02 In assessing transport demand development in the corridor, which serves later as an important parameter in the economic analysis of investment options (Chapter V), the projection of the export/import traffic was made in a historical perspective, i.e. taking into account: (a) past traffic trends and its pattern, (b) current economic development in the country, and (c) recent World Bank macro-projections. In the last ten years (1974/75-1984/85) actual average annual growth of GDP in real terms in Ethiopia was only about 1.3%; if, however, drought year is excluded, in the period 1974/75 - 1983/84 the annual GDP growth was 2.2%. In the period 1980-1984, prior to the inflow of drought relief cargo, dry cargo traffic in the port of Assab grew at 4% per annum while in the port of Djibouti Ethiopian traffic was declining at about 16% p.a. Overall, the total traffic on both routes was growing at 2.5% p.a.

4.03 According to the World Bank projections,[1] GDP is projected to grow at 2.6% annually, between 1986/87-1991/92; a higher growth scenario in the same report projects GDP annual growth at 3.6% for the same period. The corresponding growth of export/import volumes are estimated between 2.8% - 4.5% per annum. Government ten-year Perspective Plan (1984/85-1993/94) and recent traffic projections made by consultants (para. 4.12) are more optimistic; they were also considered in projecting future transport demand.

4.04 Due to many uncertainties which exist in forecasting the traffic for the long-term period -- until year 2000, two scenarios i.e. base case and low growth scenarios are presented. As a base year, 1983/84 was taken rather than 1984/85 which due to massive drought relief inflow of cargo could not be considered as a "normal" year in traffic development and would

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1/ Ethiopia - Recent Economic Developments and Prospects for Recovery and Growth, World Bank, February 1987

Table IV.1

ETHIOPIA: FORECAST OF IMPORT AND EXPORT TRAFFIC VOLUMES OF ETHIOPIA

			Average Past 5 Years Tons (000)	1983/4[1] Base Year Tons (000)	Growth % p.a.	1989/90 Tons (000)	Growth % p.a.	1994/95 Tons (000)	Growth % p.a.	1999/2000 Tons (000)
A. EXPORTS										
	Dry Cargo	B	256.0	329		480		635		840
		L				340		415		490
	Petroleum[2] Prods.	B	184.3	243		260		360		440
		L				260		290		330
	TOTAL	B	440.3	572	4.3	740	6.1	995	5.2	1,280
		L			1.0	600	3.3	705	3.0	820
B. IMPORTS										
	Dry Cargo	B	671.9	853		1,195		1,520		1,910
		L				1.010		1,215		1,430
	Petrol.[3] Prods.	B	767.8	995		1,105		1,410		1,670
		L				1,070		1,180		1,240
	TOTAL	B	1,439.7	1,848	3.7	2,300	4.9	2,930	4.0	3,580
		L			2.4	2,080	2.7	2,395	2.1	2,670
	GRAND TOTAL[4]	B	1,880	2,420	3.9	3,040	5.3	3,925	4.4	4,860
		L	--	2,420	2.1	2,720	2.7	3,100	2.4	3,490

1/ Based on MTA data
2/ Not included in the corridor traffic projection
3/ For the traffic projection on the A-A road 70% of the total imports was included.
4/ It is assumed that the share of Massawa port will gradually decrease from 11% (1983/84) to 10% (1989/90) and to 8% (1994/95).

L - Low growth scenario
B - "Base case" scenario

give a distorted traffic development pattern. General projection of the Ethiopian export/import traffic until year 2000 with the breakdown of dry and liquid cargo is given in Table IV.1; it was based on the exports and imports of major commodities. The estimated corridor traffic derives from those projections. The estimated volume of export/import traffic and corresponding annual growth rates were calculated for the following periods of time: (i) 1983/84 - 1989/90, (ii) 1990/91 - 1994/95 and (iii) 1995/96 - 1999/2000 (Table IV.1)

4.05 Forecasts of Ethiopian imports and exports have recently (December 1985/May 1986) been carried out in the feasibility study of a new railway to Assab (RITES) and in the Transport Sector Study (L.B.I.) financed under the Second Road Sector project. We believe traffic forecasts in the RITES study (8.7% average annual growth 1983/84 - 1999/00) are overestimated, and would imply an annual growth in the GDP two to three times the rate estimated by the World Bank (para. 4.03). On the other hand, the growth pattern in LBI (medium scenario) forecasted for import/export flow is relatively close to the base forecast in this report (para. 4.12). For comparison, the corresponding estimates of traffic growth in the corridor are given in Table IV.4. The setbacks of the drought and falling agricultural output delayed faster growth and the whole development path of the economy is on a lower base than it could have been anticipated two years earlier when agricultural output reached a peak after 1974. Following the drought in 1984, high growth rates for the economy as a whole and consequently in the demand for transport do not appear realistic. Furthermore, the Government earlier commitment to a high growth-strategy and investment in new projects laid down in the ten-year plan was adjusted to certain extent under the three-year plan (1986/87-1988/89) to a more realistic pace of development. It is plausible, however, to expect that the country will in the years to come reach gradually a development momentum which might reduce the present vulnerability to climatic and environmental shocks and establish a more stable growth pattern for the economy. That assumption was taken into account when the transport demand projections were made.

4.06 The Ethiopian economy has been based on agriculture which accounts for about 48% of the GDP and about 90% of the country's exports. Agriculture is mainly concentrated in the central high lands and the main crops are cereals, pulses, coffee and oil seeds. The present structure of the economy is expected to change gradually and it would be realistic to assume that the present modest share of the industrial sector in GDP (15%) will gradually increase.

4.07 The overall projection of Ethiopian export/import traffic volumes are presented in Table IV.1. In the "base case" the overall export/import traffic demand will continue to rise and by 1994/95 it is expected to be 60% higher than in 1983/84. The exports are expected to continue to be based on agriculture and livestock. Coffee, the principal export commodity, is produced mainly in the southern and southwestern regions of the country. With some extension of the area under plantation and increase in yield per hectare, a modest increase in production could reach 135,000 tons by 1999/2000. Ethiopian coffee has accounted for less than 2% of world coffee trade and with expected gradual increase of world demand, the projected conservative increase in production and export should be

Table IV.2

FORECAST OF FUTURE ETHIOPIAN EXPORT/IMPORT TRAFFIC 1/

('000 tons)

Imports	1989/90	1994/95	1999/2000
Foodgrains	300	200	100
Fertilizers	200	390	495
Chemicals	120	150	180
Metal Products	140	180	240
Industrial Machinery	60	90	110
Transport Equipment	90	120	140
Others (textiles, paper, rubber, etc.)	285	390	645
	1,195	1,520	1,910
Petroleum/Mineral oil	1,105	1,410	1,670
Total Imports	2,300	2,930	3,580
Exports			
Coffee	95	115	135
Oil Seeds and Cakes	80	100	135
Pulses and Vegetables	70	95	130
Animals and Animal Products	35	50	70
Sugar	40	60	80
Salt	20	30	45
Minerals (soda ash, marble)	80	120	170
Others	60	65	80
	480	635	840
Petroleum Products 2/	260	360	440
Total Exports	740	995	1,280
GRAND TOTAL	3,040	3,925	4,860

1/ Base case
2/ Does not affect directly the traffic on the Road Addis-Assab

considered attainable. Other main agricultural exports -- oil seeds and cakes are expected to grow from 80,000 tons (1989) to 135,000 (2000) while sugar and sugar products are forecasted to increase from 40,000 tons (1989) to 80,000 tons (2000). Other important exports would be soda ash from Lake Shaba and marble from Wollega which could reach at least 170,000 tons by year 2000. The projection of exports and imports by main commodities is presented in Table IV.2.

4.08 The imports are expected to continue to surpass significantly the volume of exports -- by about a three to one margin and the growing needs of the Ethiopian economy will continue to cause the imbalance of inbound versus outbound traffic. Petroleum and its products are expected to be the major imported item increasing from 1.1 million tons (1989) to 1.67 million tons in year 2000. If the Government's 10-year Perspective Plan was fully implemented, it would lead to even higher level of petroleum imports. Due to priority in economic development assigned to agriculture and consequently efforts in mobilizing the necessary resources, consumption of fertilizers is expected to increase substantially reaching about 0.5 million tons by year 2000. Due to the expected increase in agricultural production imports of foodgrains are forecasted to decline to 300,000 in 1989 and further to 100,000 tons by year 2000. Assuming expected gradual structural changes of the economy and priority (after agriculture) given to industrialization and mining it is plausible to expect an increased share of imports of metal products, industrial machinery and transport equipment which could reach about 0.5 million tons in total by year 2000 (Table IV.2).

4.09 In the overall Ethiopian export/import traffic flow the corridor Assab/Djibouti has been increasing its share reaching 88% in 1983/84; the balance of 12% was routed through the port of Massawa. In view of the main targets set in the ten-year Perspective Plan and the Government's intention to expand further the port of Assab, it would be plausible to expect that the share of the corridor in the external traffic will continue to rise, while the share of Massawa port could fall to 10% or even less of the country's total export/import traffic flow.

Table IV.3 - ETHIOPIA: PROJECTED LONG DISTANCE TRAFFIC* IN THE CORRIDOR 1983/84 - 1999/2000 (in 000' tons)

a) Low Growth Case			b) Base Case		
Year	A.A. Growth Rate (%)	Total Corridor Traffic	Year	A.A. Growth Rate (%)	Total Corridor Traffic
1983/84	--	1,682	1983/84	--	1,682
1989/90	2.1	1,905	1989/90	3.9	2,116
1994/95	2.7	2,176	1994/95	5.3	2,739
1999/00	2.4	2,450	1999/00	4.4	3,397

*/ Both dry cargo and liquid bulk included; excludes petroleum exported from Assab refinery.

4.10 In the "base case" the traffic in the corridor Addis-Red Sea i.e. dry and liquid combined, is expected to grow at an average annual rate of 3.9% (1983/84-1989/90), 5.3% (1989/90-1994/95) and 4.4% (1995/96-1999/2000). By 1989/90 the total traffic on the corridor (with adjustments to petroleum traffic) is expected to reach 2,116,000 tons and by 1999/2000 about 3,397,000 tons (Table IV.3). These traffic projections do not include local traffic which was estimated at about 300-400,000 tons/year (in 1984/85) on the road and about 70,000 - 80,000 tons/year on the railway. In the economic analysis, beyond year 2000 an annual growth rate of 4.0-4.4% was applied.

4.11 Under less favorable economic conditions, in the low growth scenario estimated growth rates are: 2.1% (1983/84-1989/90), 2.7% (1989/90-1994/95) and 2.4% (1995/96-1999/2000). By 1999/2000 the total corridor traffic would be 2,450,000 tons, or about 28% less than in the "base case." In addition, as in the "base case," there will be local and "unreported" traffic which is also taken into account in the economic analysis. The split between the road, pipeline and railway traffic is reviewed in Chapter V.

4.12 The projected export/import traffic (base case) on the corridor is lower than the ones forecasted by consultants LBI and RITES. When compared with the consultants "medium" growth scenario by year 2000 the traffic projected in this report is 79% of LBI estimates and only 54% of RITES estimates. (Table IV.4). In particular, consultants RITES projection appears highly optimistic and difficult to substantiate; for example, for year 1994/95 their "medium" traffic projection on the corridor is estimated to be 266% higher than 10 years earlier.

Table IV.4 - ETHIOPIA: SUMMARY OF DIFFERENT FORECASTS OF EXPORT/IMPORT TRAFFIC IN THE CORRIDOR (IN 000' TONS)

	1989/90	1994/95	1999/2000
World Bank a/	2,116	2,739	3,397
LBI b/ c/	2,393	3,350	4,284
RITES b/ d/	3,126	4,422	6,335

a/ Base Case
b/ Medium growth scenario; both reports also have high and low scenarios
c/ Years are: 1988/89, 1993/94 and 1998/99
d/ Years are: 1990, 1995 and 2000

B. INVESTMENT OPTIONS

4.13 The significance of the corridor Addis Ababa-Red Sea, i.e. of the road and rail routes, for the economy is obvious; it handles over 85% of total export/import trade of Ethiopia and over 40% of all land transport in the country. As stated earlier in the report, in addition to operational inefficiencies stemming from human factors, shortage of foreign exchange

and other reasons, the present state of the transport infrastructure has become inadequate to accommodate growing traffic. It is therefore crucial that the corridor does not become a bottleneck to the economic growth, but to develop in an appropriate way to meet the increasing transport demand and needs of the economy in general.

4.14 This chapter evaluates five possible major investment options/scenarios which are selected for the economic evaluation:

(i) strengthening/upgrading of the existing road between Addis Ababa and Assab (no railway or pipeline investments);

(ii) construction of a new railway line Addis Ababa-Assab (no pipeline or major road investments);

(iii) rehabilitation of the existing railway (CDE) and strengthening/upgrading of the Addis Ababa-Assab Road (no pipeline);

(iv) construction of a petroleum pipeline from Assab to Addis Ababa; rehabilitation of CDE and strengthening/upgrading of Addis Ababa-Assab Road; and

(v) construction of a petroleum pipeline from Assab to Addis Ababa and strengthening/upgrading of the Addis Ababa-Assab Road (no railway investments).

Each of these investment packages is reviewed in a short to mid-term future time perspective taking into account present performance of transport entities on one hand and possible improvements in the infrastructure on the other which would not lead only to increased capacity but to improved transport efficiency in the corridor as well. The future traffic allocation by mode was carried out on the basis of transport costs per ton per route and mode. Since the port of Djibouti has excess capacity, no investments were considered for the port. The traffic split in the corridor was made in the first place between the existing bituminous paved road Addis-Assab and the railway Addis-Djibouti; in addition, scenarios with the possible pipeline (Assab-Addis) and new railway line (Addis-Assab) were also included in the analysis. Expansion of the port of Assab was considered separately. For the calculation of economic rates of return (ERR) "base case" traffic growth was used for the best estimate. As the inputs in the economic analysis were prepared with various degrees of uncertainty, in sensitivity analysis various parameters were tested including cost estimates, savings in transport costs, etc. The economic analysis was carried out in 1985 prices, the year of which most of the cost data was available. Since the share of foreign exchange in the capital costs and in the transport costs (savings) were found to be close and proportional, shadow pricing of foreign exchange in calculating the ERR would not make a marked difference.

4.15 Due to the shortage of reliable data (e.g., absence of detailed engineering for Assab port and the new railway and cost accounting systems) the calculated ERRs presented in Chapter V for Assab port and new railway should be considered only as an attempt to produce indicative ERRs which

would indicate whether a particular investment option is economically viable or not. This corridor analysis was not intended to produce a detailed presentation found in a feasibility study, but rather to answer whether a specific investments are economically sound to warrant funding of a full-fledged feasibility study.

V. ECONOMIC EVALUATION OF INVESTMENT OPTIONS

A. TRANSPORT COSTS AND PRICING (TARIFFS)

Introduction

5.01 The economic analysis of investment options in the corridor in the next several years and appropriate timing of possible projects depend mainly on: (i) the traffic forecast scenario for the Addis-Red Sea corridor, (ii) transport cost per ton/km on different transport modes and (iii) anticipated operational efficiency of each mode. None of these parameters should be taken in isolation when the final economic analysis is carried out on the basis of cost/benefit comparison. It should also be noted that in addition to the above stated economic criteria, there are other factors which influence investment decision such as national security, relationship with neighboring countries and their readiness to make mid or long-term arrangements, etc. The critical factor, however, in determining the future modal split i.e. Assab route vs. Djibouti route lies in determining the transport costs of each transport mode: road, railway, port of Assab, port of Djibouti and pipeline. Following the analysis of estimated transport cost per ton/km, a review of transport costs of major commodities on different routes -- "door to door" is presented.

a) Road Transport

5.02 Transport costs per ton/km on different modes are presented where possible on the basis of actual variable/operating costs and depreciation costs (net of taxes). However, for the CDE Railway and ports of Assab and Djibouti, there are no reliable data on actual transport costs per ton/km, since there is no cost accounting system in these transport entities. Consequently, in quantifying the costs best estimates were made taking into account the existing tariff system and annual financial reports of the entities where total revenues and expenditures were compared with the volume of traffic handled. On the other hand, transport costs on the new railway (Addis Ababa-Assab) and the pipeline were taken from recent consultants' (RITES and LBI) estimates and served as a basis for relevant economic analysis (paras. 5.44 and 5.58).

5.03 For estimating transport costs on the Addis-Assab road there is sufficient data to make reasonably accurate estimates. In 1984/85 three consulting firms prepared detailed analysis of vehicle operating costs for different type of vehicles in Ethiopia; one consultant also reviewed the present road tariff system and actual transport costs per ton/km for freight transport and its report was prepared at the end of 1985. All these reports were carried out under World Bank financed road transport projects. In addition, NATRACOR keeps data on operating costs of its trucks. For the purpose of the analysis, i.e. long distance traffic of export/import cargo, the following types of vehicles were considered -- for dry cargo truck-trailers (30-ton average capacity) and for liquid bulk tankers (30,000 liters capacity).

5.04 As part of its regulatory functions RTA makes recommendations to MOTAC on tariffs, and the present "normal" tariffs, which were revised in 1981, are as follows:

Dry Goods Vehicles

Truck = 20.49 cents/ton/km
Truck-trailer = 12.50 cents/ton/km

Bulk Tankers Gasoline

Tanker (30,000 L) = 12.64 cents/m3/km
Truck/Tank (15,000 L) = 27.10 cents/m3/km

In addition, for roads in poor condition there are "special tariffs" also determined by RTA; however, they are not relevant to this analysis.

5.05 NATRACOR's reported cost to transport a ton on the Addis-Assab road is currently as follows (without freight forwarding costs):

Dry cargo = 110.25 Birr
Fuel = 111.52 Birr

Assuming a route length of 889 km these figures are roughly equivalent to the standard of larger vehicles shown in para. 5.04 and per km they could be rounded to figures presented below:

Dry cargo = 12 cent/ton/km
Fuel cargo = 13 cent/ton/km

These costs are in line with FTO's total operating costs per ton/km of 0.123 Birr, but do not provide enough of a margin to cover the cost of capital (vehicle depreciation). Moreover, the rates are even less adequate for the private truckers who must pay 5% of their revenues to FTSC (under NATRACOR) for billing and dispatch services.

5.06 The relevant question is whether the rates cover the vehicle operating costs. The vehicle operating cost (in 1985 prices for a bituminous paved road of Addis Ababa-Assab standards as estimated by consultants (Volume II, Annex I, Table 15) are as follows:

On a flat primary road

Truck-trailer/Tanker 193.9 cents/km or 10.20 cents/ton/km

On a mountainous primary road

Truck-trailer/Tanker 272.1 cents/km or 14.32 cents/ton/km

In the case of the Addis-Assab road the mountainous road conditions should be applicable to a good part of the road length. On that basis, it could be concluded that the costs per ton/km would be about 13 cents on average and that the current rate is slightly below VOC for tractor-trailers and

tankers. Based on assumptions as to vehicle speed, load factor and life, the present tariff yields a small surplus for freight haulage to truck-trailers on flat roads only.

5.07 In summary, present tariffs are generally covering operating costs of major freight movements along the corridor, but overall the rates do not permit returns sufficient to allow for depreciation and replacement of vehicles. Rates should be more variable to cover different road conditions and capital recovery should be incorporated in the rate-setting methodology. RTA is now in the process of reviewing the rates following the consultants 1985 analysis.

b) Railway Transport Cost

5.08 Railway tariffs for different commodities are shown in Volume II, Annex II, Table 12; tariffs for goods travelling the entire railway route range widely making it difficult to assess actual cost per ton/km. Imported goods have higher rates, from 65.3 Birr per ton of fertilizer and 121.3 Birr per ton for dangerous chemicals to 206.9 Birr/ton for high valued commodities. Given a rail distance of 781 km between Djibouti and Addis Ababa these rates are equivalent to 0.08 Birr, 0.16 Birr, and 0.26 Birr/km respectively. Due to imbalanced traffic flow rates for exports are substantially lower. The tariff for maize is the lowest at 34.8 Birr per ton or 0.04 Birr per ton/km and grains accounted for nearly 20% of all freight carried on the railway. Other exports have rates between 45-64 Birr/ton. Fuel and lubricants have a relatively high yield with a tariff for diesel fuel at 0.16 Birr per ton/km; fuel products accounted for 11% of the traffic hauled.

5.09 At current traffic volumes these tariffs are insufficient to generate enough funds to cover CDE's operating costs. In 1983/84, the railway's revenue was only 0.84 Birr for every Birr of operating expenditure. Consequently, it could be assumed that actual transport costs are about 15-20% above the tariffs on CDE, or that average transport cost per ton/km is about Birr 0.14-0.16. Whether the existing freight tariff would be sufficient to cover the costs of moving freight by rail if operating costs were reduced and efficiency increased is another question. CDE's freight costs (terminal and movement) in 1983/84 were 12.2 million Birr, which equate to an average variable costs of 10.47 cents per ton/km. The average freight costs vary by type of cargo. Comparing these costs with CDE's tariffs one could conclude that CDE is carrying at least three major commodities below cost: grain, oil seed and cotton seed. There is, however, a limited cross-subsidization since CDE generates higher revenue for some other commodities (chemicals, fuel).

5.10 Since CDE has no cost accounting system which would serve as a basis for tariff review, it is difficult at present to determine the degree of adjustment needed in the rates for major commodities transported. Unit costs would be substantially increased if some necessary steps were taken, such as: an increase in maintenance expenditures (there is no ballast), reevaluation of assets, etc. As indicated in para. 5.09, it is estimated that at current traffic levels these costs combined would be about 14.0-16.0 cents per ton/km, a figure greater than average revenue yield per ton/km. Naturally, for the rehabilitated CDE and the new railway operating

costs would be substantially lower (paras. 5.47 and 5.53). To what extent the tariffs need to be adjusted depends upon the mix of variable and invariable costs, average length of haul and volume of traffic to be carried in the future.

5.11 The present CDE tariff system is based on eight commodity tariff classes, where each one has a number of different rates. The situation is further complicated by the existence of a number of exceptional rates for specific commodities or commodities when they are for certain origins or destinations (e.g., exports or imports). For each special rate there is also a minimum tonnage and a lower rate per ton for heavier consignments per wagon. However, there is no consistency about the minimum tonnage or about the steps for heavier loads. The result is a tariff of great complexity. Consequently, customers find it difficult to understand and as a result there are many disputes. The present situation calls for a tariff revision and simplification.

5.12 As mentioned earlier the tariffs are not cost-based. As a further illustration, a cost-based tariff would be one which related tariffs to wagons. The tariff would need to be varied to allow for the different movement costs of different wagons due to differing capacities and utilization.

5.13 If a cost based tariff is to be introduced, then it must include an adjustment factor to allow for the structure for operating costs -- divided into movement costs which are dependent on distance and terminal costs which are independent of distance. This would have the effect of discouraging short-distance traffic where rail is most expensive and encourage long haul traffic where rail shows the greatest cost advantage over road. In addition to a taper for distance the tariff should also include a discount for large consignments since costs per ton-km of operating large wagons are lower than for small wagons. Such a discount exists at present but it is not uniform. In determining such a discount it is important that it is related to the present wagon fleet capacities so that customers are encouraged to utilize the wagon fleet efficiently.

5.14 As an indicator of tariff adjustment needs, one could assume that under a traffic growth scenario of 4-5% annual increase and current level of CDE efficiency, freight tariffs would need to be increased generally by about 20 percent overall to meet fully distributed costs. For passenger services the increase would have to be as much as 35 percent. If tariffs were increased by these average levels the CDE would break even in 1993/94 at the modal split recommended by the Transport Sector Study (L.B.I.). This modal split is based on the economic costs of the alternatives and the need to preserve the CDE as a strategic alternative for Ethiopian export/import traffic. The comparison of costs between the two routes is presented on Table V.1.

c) Port Charges
Assab

5.15 Charges in the Port of Assab were set by MTA in 1979 and revised in December 1986. Since there is no cost accounting system (like in CDE) and systematic reevaluation of assets, the current tariffs are not cost-

based. In the absence of necessary data it is not possible to assess the real costs of the services in the port. To resolve that problem and make necessary adjustments, i.e. to bring port charges to the level to cover both operational and capital cost, recently the Bank approved Port Engineering and Construction Project included an appropriate cost accounting and tariff study and reevaluation of assets on regular basis. That is expected to be completed by the end of 1987.

5.16 Present charges in the port for imported goods are summarized in Volume II, Annex III, Table 8. The revised tariffs (1986) include all charges (stevedoring, handling on quay, transport in port handling/ unloading and MTSC charges). For bulk and dry cargo new charges per ton range between Birr 44.1-52.5. With regard to exports, there are no port dues. The rates are generally lower than for imports -- mostly between Birr 18.00 - 41.00/ton. For containerized cargo separate charges are not listed and charges for general cargo are being applied instead, thus discouraging more use of containers. Storage charges per ton/day of general cargo range from 15 cent (5-30 days) to 66 cents (per 60 days).

5.17 According to financial reports of MTA and the Port of Assab for 1983/84 and 1984/85 (Volume II, Annex III) average total revenue per ton in the port was about Birr 39-40. On the other hand, total expenditures (including depreciation) per ton was Birr 28-29, which led to significant profits. However, real average costs per ton should exceed Birr 30, had the port assets been revalued.

Djibouti

5.18 With some exceptions (for imports of petroleum, chemical products, exports of pulses, coffee, live animals) charges in the port of Djibouti are generally higher than in Assab. That also reflects a higher level of prices (including wages) in Djibouti than in Ethiopia. For an imported ton of general cargo the total charges are Birr 46.0 equivalent (at the official exchange rate). In the composition of the charges the largest items are stevedoring (Birr 17.6/ton) and shorehandling (Birr 14.6/ton). For petroleum the charges are Birr 31/barrel (42 gallons).

5.19 For exports the charges are substantially lower than those for imports. They range from about Birr 25.0 equivalent per ton for bagged cargo to about Birr 55.0 for containerized cargo. The charges in Djibouti port Ethiopia has to pay in hard currency, except its freight forwarding agency MTSC which handles about 80-90% of Ethiopian traffic in the port. Therefore, in a direct comparison total port charges in Birr equivalent would be actually even higher in Djibouti if a shadow exchange rate would be applied. It should also be noted, however, that foreign exchange costs incurred in Assab port (similar to the ones in Djibouti port) have to be borne by the Ethiopian economy as well.

5.20 As indicated earlier in the report the Ethiopian Government has been interested in negotiating special rates for its transit traffic through the Djibouti port. So far, no progress has been made (5.34). It is relevant to note that Ethiopian traffic in the port of Djibouti has only a small share of 6-9% of the total port traffic (excluding the drought year) and consequently is not of critical importance for the operations of

the Djibouti port; however, as the port has surplus capacity, Ethiopian traffic through the port could increase in principle provided that the CDE increased its capacity.

d) Freight Forwarding Charges

5.21 MTSC is the country's single shipping agency and freight forwarder. Following the consultant's study of 1984 and its recommendations a cost accounting system started to be installed in 1986. At present, however, there are no reliable data on MTSC's costs per ton of cargo handled. For its services MTSC charges Birr 10.70/ton in Port of Assab and Birr 13.85/ton in the Port of Djibouti. According to MTSC's past financial report (1984/85), total revenue per ton handled is about Birr 15.4 while the costs are about Birr 10.0/ton. The total revenues also include those from charging clients for MTSC storage services, so that the actual revenue for regular handling of a ton of cargo is not available. Furthermore, as with other transport entities, re-evaluation of its assets is not done on a regular basis, and there is no appropriate allowance for depreciation.

B. TRANSPORT COSTS ON DIFFERENT ROUTES

5.22 To establish "door-to-door" transport costs for Addis-Assab and Addis-Djibouti routes in order to create the appropriate rail/road split of the traffic forecasted on the corridor is a rather complex task. Determining the transport costs on competing routes requires data on both operating and capital costs for all the entities (transporters, shippers, etc.) involved in the transport cycle. However, as indicated earlier in the report, there is no cost accounting system in the transport entities engaged in the corridor. With exception of the road transport, where an analysis of transport costs and a tariff review were recently carried out by consultants, there are no reliable data on actual transport costs or projected ones/assuming certain traffic level. The subject was only lightly addressed by consultants in the draft TSS financed under the Second Road Sector Project.

5.23 To establish an impartial analysis of transport costs per ton of cargo on different routes, it was essential to avoid adding up tariffs for various modes and services which may not be cost related (most likely they are not) and ultimately lead to distorted results. Therefore, an attempt was made where possible to adjust the rates to reflect the actual costs -- both variable/operating and depreciation of available assets. The transport costs per ton on two competing routes were reviewed for major dry cargo goods and liquid bulk cargo; also, the costs of inbound (imports) and outbound (exports) traffic were treated separately due to different port charges.

Table V.1

Comparison of Transport Costs[a]/ on the Corridor for Dry and Liquid Cargo

(per ton in Birr)

(in 1985 prices)

	A. EXPORTS						B. IMPORTS			
	Coffee		Cereals & Pulses		Other Exports		Bulk Cargo	Petroleum	General Cargo	
Road	Container	Bagged	Container	Other	Container	Other	Bagged	Barrel	Container	Other
Assab Port[1]/	30	45	30	38	30	28	42	37	30	41
Container Pack/ Unpack.	17	--	17	--	17	--	--	--	17	--
Transfer to Truck[2]/	--	--	--	--	--	--	--	--	--	--
Truck Tran. to Addis[3]/	124	124	124	124	124	124	124	129[6]/	124	124
TOTAL COSTS	171	169	171	162	171	152	166	166	171	165
Rail										
Djibouti Port[4]/	67	28	57	3.	55	39	47	31	75	48
Transfer to CDE	14	14	14	14	14	14	14	8	14	14
Rail to Addis[5]/	88	88	88	88	88	88	88	91[6]/	88	88
Transfer to Truck	6	6	6	6	6	6	6	6	6	6
Addis delivery	10	10	10	10	10	10	10	10	10	10
TOTAL COSTS	185	146	175	150	173	157	165	146	193	166

a/ Data for actual transport costs per ton were not available for all multi-modal operations compared; certain data was based on actual tariffs and financial reports of transport entities concerned;

1/ Estimated cost of handling one container includes also MTSC costs.

2/ Shipper's charges included in port charges; port import charges also include port's due of Birr 6/ton;

3/ Truck-trailer vehicle with average load of 19 tons; transport cost per ton also includes estimated road investment depreciation of Birr 4/ton;

4/ Current rates converted into Birr; cost of container pack/unpacking is also included in port costs since CDE can take only smaller size containers;

5/ CDE adjusted transport costs assuming 800-900,000 tons/year; with current traffic and operations the average cost of transport is about Birr 105-112/ton. It is assumed that the operating costs with the rehabilitation package would decrease by about 30%, the estimated cost per ton also includes depreciation of the anticipated investments of about Birr 11/ton. In absence of reliable data on cost per ton/km estimates from para. 5.09 were used.

6/ Per cubic meter of fuel; for fuel transport it is assumed that the load factor is 50%.

Source: MTA, NATRACOR, TSS (L.B.I.) 1986 and World Bank estimates

Assab Route

5.24 Since the traffic flow is uneven, the load factor for trucks was assumed to be about 60%, i.e. 19 tons on average for a tractor-trailer. The costs of transporting a ton of cargo includes: cost of road transport (including depreciation of vehicles), depreciation costs of estimated road investments (Birr 4.0/ton), and allowance for road maintenance. The "door-to-door" costs also include the cost of Port of Assab services as well as of MTSC. As one vehicle is to handle the freight from the port to final destination in Addis no trans-shipment costs were considered. Also, no storage charges were applied since the analysis assumes certain level of efficiency and that extra delays in shipping the cargo (after normal gratis period for storage) come only in extraordinary situations. The cost of exporting a ton of cargo amounts from Birr 152 (general exports) to Birr 171 (for containerized merchandise which include costs of containers packing and/or unpacking). The cost of transport of imported goods (ton) is somewhat higher due to higher port costs and charges and range between Birr 165 for general cargo and Birr 177 for containerized cargo (Table V.1).

Djibouti Route

5.25 The transport costs on this route should be looked at from two approaches: (i) assuming that a proposed CDE rehabilitation program will materialize (para. 5.51) and (ii) CDE will continue to operate at present level of capacity and efficiency which will after a period of gradual decline lead to its closure (para. 5.36). In the first case, it is assumed that the capacity of CDE will increase to about 900,000 tons of cargo/year and that the CDE efficiency would be accordingly improved, leading to about 30% reduction of transport costs, from present average of Birr 110.0 per ton on 781 km. Without the rehabilitated program, it is plausible to assume that the transport costs per ton on CDE will continue to rise and the traffic continue to decline. The rehabilitated railway with anticipated increased traffic would have a reduced transport cost per ton of Birr 88.0 which (Table V.1) also includes a depreciation allowance (Birr 11.0/ton) for anticipated capital investments of US $129.5 million under the CDE rehabilitation package.

5.26 Other transport costs on "Djibouti" route include Port of Djibouti costs/charges, freight forwarders' charges, cost of transfer from truck to rail and from rail to the port and cost of road transport delivery in Addis Ababa. For imported Ethiopian goods the "door-to-door" cost per ton varies between Birr 146 (petroleum) and Birr 193 (containerized general cargo). For exported cargo the total cost per ton is expected to range between Birr 146 (coffee in bags) and Birr 185 (containerized cargo). The port costs in Djibouti are generally higher than in Assab, but overall costs on non-containerized cargo are relatively close due to higher transport costs on the road than on the (rehabilitated) CDE.

5.27 The Table V.1 indicates that the Djibouti route would have a cost advantage in export of bagged cargo (coffee, cereals, pulses) and imports of petroleum; part of bagged bulk cargo may also go via Djibouti, although the route cost advantage is marginal. For other commodities the advantages

lie to a larger or lesser degree with the Assab route. On that basis and taking also into account total estimated traffic for the corridor a split of the future traffic was made for the investment option that both the road to Assab and CDE will remain.

Table V.2 - ESTIMATED ROAD/RAIL TRAFFIC SPLIT
(in 000' tons)

	Assab Route/Road[1]/		Djibouti Route/CDE[1]/	
	Base	Low	Base	Low
1983/84 (actual)	1,515	1,515	167	167
1989/90	1,735	1,625	360	280
1994/95	2,134	1,726	580	450
1999/00	2,550	1,810	820	640

1/ Local traffic on the road and CDE is not included.

It should also be noted that the projected long distance traffic on CDE (820,000 tons in year 2000) was made not only on the assumption that the railway will increase accordingly its present capacity through a rehabilitation program, but that its transport costs will go down with larger traffic volumes and improved efficiency in operations. Notably, these things are interrelated. In addition to the export/import traffic projected above, the road carries about 300,000 of local and 20-25,000 tons of unreported traffic; CDE local traffic is estimated at 80,000 ton/year. This split assumes no pipeline construction. In the scenario with the pipeline the split of traffic due to reassignment of petroleum would undergo certain changes (paras. 5.59-5.60).

5.28 In determining the modal split between different routes, other factors are also relevant -- speed and overall reliability of a transport service. Namely, clients tend to forgo cheaper transport arrangements for their cargo in order to choose one which is faster and more reliable. That practice should not be considered unusual in countries where there is a substantial difference in quality of transport services. On the corridor the quality of service given by both road and rail has been poor so far; however, certain recent improvements in road transport along the corridor are now being made under the relay system which has lead to a significant reduction of the turn-around time.

C. ECONOMIC EVALUATION OF DIFFERENT OPTIONS

5.29 As stated in para 4.14 there are five possible options/scenarios which warrant analysis on how the transport infrastructure of the corridor Addis-Ababa-Red Sea could be improved/developed. Since substantial capital investments are to be considered in the mid-term future, prudent evaluation of possible projects is therefore needed. The Government, being aware of the generally underdeveloped transport infrastructure to support economic development of the country, has planned sizeable investment in the infrastructure (para. 5.30)

Government Investment Program for the Sector

5.30 The Government's priorities in the sector are laid by the National Committee for Central Planning (NCCP) in the ten-year Perspective Plan (1984/85-1993/94). Investments for the sector total about Birr 4.8 billion (US $2.32 billion) or about 18 percent of total investments envisaged for the economy. The share is in line with experience in other countries of the region, but it may well be difficult for the Government to mobilize the planned resources (Table V.3). The largest share within the transport sector is envisaged for road construction/rehabilitation $657 million (29 percent), road transport development $ 642 million (28 percent), ports and marine transport and air transport over 15 percent ($363 million) and the remainder $ 283 million (12 percent) for the railway.

5.31 The investment program for the sector could be, however, considered as an indicative one, subject to revisions in the course of its implementation (para. 4.05) and once the Transport Sector Study is finalized. The Government priority in the sector is the development of the Addis-Assab corridor with limited reliance on the port of Djibouti -- up to about 15 percent of total export/import traffic. With regard to investments relevant to the corridor, the main ones are earmarked for extension and modernization of Assab port, replacement of aging freight and passenger vehicles for public road transport and for the beginning of construction of a new railway line Addis-Assab. Smaller allocations are envisaged for further strengthening/improvement of certain sections of Addis Ababa - Assab Road and for repair/rehabilitation of the aging CDE railway. Certain allocations in maritime transport (ESLC) and in civil aviation (construction of new Assab airport) would also fall in this group, but it is not reviewed in this report. The economic analysis presented below addresses the Government priorities set in the ten-year plan, by comparing different investment options.

Background to Investment Options

5.32 Before the economic evaluation of different options is presented, it is necessary to indicate some salient facts which have been influencing traffic and operations in the corridor. With regard to the constraints of CDE to handle more traffic (its annual capacity is estimated now at about 350,000 tons), MOTAC, being in charge of the transport coordination on the corridor between road and rail transport, has not much leverage over CDE at present. The railway is jointly owned and managed with Djibouti and the technical and commercial departments are stationed in Djibouti.

Table V.3

GOVERNMENT PERSPECTIVE TEN-YEAR PLAN

PLANNED INVESTMENT IN THE TRANSPORT SECTOR 1984/85-1993/94

	1984/5-1985/6		1986/7-1988/9		1989/90-1993/4		1984/5-1993/4	
	Birr mn	%	Birr mn	%	Birr mn	%	Birr mn	%
Road Construction	137.0	16.4	421.0	23.3	802.3	38.0	1,360.3	28.6
Road Transport								
Public	143.2	17.2	119.7	6.6	302.0	14.4	564.9	11.9
Freight	194.3	23.3	266.4	14.7	304.5	14.4	765.2	16.1
Railway	76.7	9.2	169.3	8.8	339.7	16.1	585.7	12.2
Air Transport								
Civil Aviation	33.0	4.0	100.1	5.5	150.9	7.2	284.0	6.0
Ethiopian Airlines	70.1	8.4	369.5	20.4	22.5	1.1	462.2	9.7
Adnas Air Services	1.2	0.1	1.8	0.1	3.6	0.2	6.6	0.1
Subtotal	104.3	12.5	471.4	26.1	177.0	8.4	752.7	15.8
Marine Transport								
Athority	53.8	6.5	216.1	12.0	154.7	7.3	424.6	8.9
Shipping Lines	104.3	12.5	131.1	7.3	--	--	235.4	5.0
MTSC	20.3	2.4	22.2	1.2	29.0	1.4	71.5	1.5
Subtotal	178.4	21.4	369.4	20.5	183.7	8.7	731.5	15.4
TOTAL	933.9	100.0	1,817.2	100.0	2,109.2	100.0	4,766.3	100.0

Source: NCCP, Addis Ababa 1985

Furthermore, the current bilateral treaty is binding the two countries up to the next century and eventual organizational changes of the CDE railway would involve necessary bilateral legal arrangements as well. This report, however, was not envisaged to go into these matters.

5.33 The coordination between the road to Assab and railway to Djibouti has therefore significant limitations at present. However, if the railway will undergo a comprehensive rehabilitation program (para. 5.51) and its capacity as a consequence substantially increased, the coordination between the two modes will become more meaningful. For the time being, however, the coordination is basically limited to type of cargo more suitable for rail transport (e.g. transport of fuel, livestock, construction material) goes to CDE. With regard to drought relief cargo MOTAC and CDE had only a limited role in directing cargo to specific ports; aid agencies and shippers were the ones who in many instances decided on the port for unloading the aid cargo.

5.34 It should also be noted that in coordinating road/rail modal split there are problems linked with the port of Djibouti. Namely, there have been difficulties in securing agreement with the Government of Djibouti on fixed/special rates for Ethiopian cargo on annual basis. Furthermore, the management of the Assab port has been trying, unsuccessfully so far, to discuss with the Djibouti port, matters of mutual interest and to compare rates/costs. As a result, Ethiopia has no guarantees on rates for the Djibouti port, which has kept its options to increase rates at will. For example, recently the rate per livestock unit exported from Ethiopia increased without prior notice from Birr 7 to Birr 15. Notwithstanding difficulties with the Ethio-Djibouti Railway, Ethiopia is also faced with uncertainty at Djibouti. That, in turn, has strengthened the Government strategy to expand and modernize its own ports, particularly Assab.

Economic Evaluation of Different Scenarios

5.35 The analysis presented below is based on economic criteria and actual data as available at present. Other factors, including political, strategic and other criteria were not considered. For example, the Ethiopian Government position to use the Djibouti route only up to 15% of its total external traffic, possibility that Ethiopian transit cargo in Djibouti may get preferential rates in the future, etc. were not taken into account in calculating economic rates of return (ERR); however, possibility of limiting the Ethiopian external traffic via Djibouti up to 15% was treated in a sensitivity analysis. Excerpts from cost/benefit analysis are presented in Volume II, Annex VII.

i) Strengthening/Upgrading of Addis-Assab Road

5.36 This scenario assumes that the CDE railway will continue with the traffic decline and that the railway will gradually phase out in a few years if no major rehabilitation program is materialized. Also, in this scenario it was assumed that there will be no pipeline construction. That in turn assumes that all corridor traffic (Table IV.3) will use the bituminous road Addis Ababa-Assab.

5.37 Under the ongoing Second Road Sector Project (Cr. 1404-ET) and previous Bank Group financed road projects the major part of the 889 km road was resurfaced between Addis and Mile (523 km). Resurfacing and strengthening of the remaining part Mile-Assab (366 km) was already identified by the Government and the Bank to be of high priority and consequently included in the road program being carried out under the Second Road Sector Project. Notwithstanding the road's generally recognized importance, the timing and type of road strengthening/upgrading was reviewed anew in the changed context, i.e. with adjusted traffic forecast, taking into account the anticipated role of the road.

5.38 The current status of the road, actual traffic and scope of works required were reviewed in Chapter III. Due to different road characteristics and traffic, for the purpose of economic analysis four sections were identified:

a) Addis Ababa-Mojo (73 km); strengthening/upgrading due in 1998;

b) Mojo-Awash (150 km); strengthening/upgrading due in 1995/96;

c) Awash-Mile (300 km); strengthening/upgrading due in the period 1990-1993; and

d) Mile-Assab (366 km); strengthening/upgrading due to start in 1988 and to take three years.

Assuming closure of CDE and that the civil works will be carried out on the proposed schedule, the road capacity will not be reached before the year 2010 for the most trafficked section Addis-Mojo; for other sections it would come much later (2016-2029). Therefore, it could be concluded that there would be no need for the road widening to four lanes in the next twenty years.

5.39 In the absence of complete detailed engineering and road maintenance records appropriate estimates were made (Table III.3). In quantifying the benefits of the anticipated civil works, two scenarios were assumed: (i) "without the proposed road works" (para. 5.38)[11] case would lead to road deterioration and to increase of vehicle operating costs (VOC) and ultimately to the need of a full road reconstruction; and (ii) assuming that the proposed works will be carried out in the timing laid out as stated in para. 5.38. On technical grounds, based on present road condition, the priority in the strengthening/upgrading is to be given to the works on the section of Mile-Assab which is estimated to be due by 1988.

5.40 The calculation of ERR was based on a 15-year economic life, and depending on the section, economic costs of the road strengthening/ upgrading were estimated at about US $ 100,000 - 125,000/km; appropriate costs of periodic and routine maintenance were also included in the analysis. The benefits were calculated from the difference in VOC between

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11/ Described by section in more detail in Volume II, Annex I, paras. 1.10-1.12.

the two scenarios; Table 15, in Annex I (Volume II) served as a basis; if the savings from deferred road reconstruction costs were included, the ERRs could have been even higher. It should also be noted that there were no negative benefits from shifting the traffic from CDE to the road, since transport costs on the Djibouti route without CDE rehabilitation would be about Birr 168/ton or higher than on the Assab route. The future traffic on the road was determined by the present traffic (para. 3.68) taking into account growth rates and freight transport forecast presented in Table IV.3. The proposed road works are economically justified and yield the following ERRs: Addis-Mojo section 44%, Mojo-Awash 39%, Awash-Mile 26% and Mile-Assab 21% (Table V.4).

5.41 The section which comes first in the time prospective for the strengthening/upgrading has, however, the lowest ERR. That could be explained for the following reasons: (a) Mile-Assab section has by far the lowest traffic volume on the whole road (in 1985 only 27% of the traffic of the Addis-Mojo section); (b) the cost of the civil works and maintenance per km on that section were estimated to be the highest on the road (Table III.3); (c) the physical condition of the road section is in worse shape calling also on technical grounds for earlier attention than on the other section, and (d) by delaying civil works on more trafficked sections due to their condition to several years later the difference in traffic relevant to ERR calculation becomes even more pronounced.

5.42 In the sensitivity analysis, assuming low traffic growth rates (2.1%, 2.7% and 2.4%) which would reduce the overall benefits by about 25%, the ERR will be in the range of about 17-34%. If the estimated costs of civil works are increased by 20%, the ERR will drop to 18-35% depending on the section.

(ii) Construction of New Addis Ababa-Assab Railway

5.43 This scenario assumes that all export/import traffic (long distance traffic) will go to the new railway (Table IV.3). Only some limited passenger and local freight traffic would remain on the road which would call for some periodic investments on the road to keep it open for the limited (local) traffic. CDE railway would be phased out. The 871 km Assab-Addis Ababa projected link was conceived to have all the attributes of a long-haul, highly productive, low-cost mass transportation system. Basically, nearly 80% of the traffic is expected to be between the two end terminals of the line, and there are no intermediate yards and only a few stations to serve en route.

5.44 The engineering part of the feasibility study, completed by consultants RITES (India), appears to be generally well-prepared. The technical aspects of constructing a new 871 km railway line of 1,067 mm gauge between Addis Ababa and Assab are summarized in Volume II, Annex II, Table 4. Total cost without contingencies would be about US$ 1.372 million equivalent (including infrastructure, rolling stock and other expenditures) over 1990-1996 period; the line could be open for traffic in 1997. Another US$ 565 million equivalent in capital investment was also envisaged in the period of about 25 years thereafter.

5.45 The Government attaches, however, particular importance to this project. It is included in the ten-year plan (Table V.3). The feasibility study was financed by Ethiopia and the Government is now considering whether to commission the detailed engineering. The feasibility study comes up with ERRs of 24.5%, or 23.0% if shadow pricing is applied. The actual EER would be, however, substantially lower if certain parameters are adjusted as explained below.

5.46 The main benefits of the project are to come from the anticipated difference between Addis-Assab rail and road transport costs and total investment requirements over 30 years on both modes. The deficiencies of the consultant's economic evaluation are summarized as follows: (a) no allocation for physical contingencies could be found in the cost estimates; (b) after 30 years substantial residual value was included in the calculation of ERR (as project benefits) of US $753 million equivalent to the permanent way and US $212 million equivalent to locomotives and rolling stock; (c) estimated average operating cost on the new railway (871 km) are quite low, declining from Birr 12.8/ton (1995) to about Birr 7.5/ton (2015) i.e. 10-16 times less than on the road; (d) estimated vehicle operating costs (VOC) on the road (benefits to the project) are over 50% higher than calculated in detail by other consultants in a road transport costs analysis; and (e) road vehicle replacement costs (benefits to the project) are estimated at a very high level, from about US $45 million/year to about US $ 195 million/year in relation to traffic increase. In addition, the feasibility study assigned huge benefits to the new railway by increasing substantially the Addis-Assab road upgrading costs -- calling for road widening to four lanes; however, World Bank estimates (Table III.3) do not envisage any need for major new construction/widening of the road, since the capacity will not be reached before year 2016 (with exception of the first 98 km from Addis).[12]

5.47 In assessing the economic viability of the new railway line, this analysis used RITES estimates for railway construction costs; physical contingencies of 10% were also added. The extremely low operating cost on the new railway (less than Birr 0.02/ton/km) were increased. The consultant's assumption that the new railway will be operating at a maximum efficiency from the very first year is difficult to accept. In the cost stream, costs of the road rehabilitation and road transport costs of remaining road traffic were also included (as RITES did) in the calculation of ERR. The estimated project benefits coming from savings in road construction and road transport costs (para. 5.46) were adjusted to more realistic ones. The future traffic (base case) on the corridor was based on figures presented in Table IV.3. Assuming the 7-year construction period (1990-1996) and 30-year economic life period as RITES consultants, the ERR in our analysis is only 8.3%. In a sensitivity analysis, the ERR will increase to 12.9% only if the benefits will be increased by 50% and

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12/RITES study concludes that about 50 km of Mile-Assab Road (366 km) would need to be upgraded to four lanes when the traffic reaches 1,100 vpd; this would mean that vehicles would be passing at intervals of over a minute.

the preliminary cost estimates remains the same; if the costs are increased by 30% (which is plausible) the ERR will go down to 9.7% not enough to justify such a huge project.[13] With the pipeline scenario the ERR will be even lower. If, however, the medium traffic forecast (unrealistic) prepared by consultants RITES is applied the ERR will be increased to 13.0%. In a sensitivity analysis (benefits reduced by 20%, cost increased 10%) ERR would be 10.5%. Overall, that is insufficient to justify the huge investments. Finally, it should be noted that a proper financial analysis (including projected income statements, cash flow, balance sheets) of the new railway is still lacking.

5.48 Construction of a branch line (from CDE) to Assab would not have any advantage over the new railway line. The rationale is presented below:

a) The RITES feasibility study demonstrates that no advantage could be gained by using a portion of the existing CDE line for the new Assab route. Rather, the costs of a new and independent alignment for the Assab-Addis Ababa railway work out to be marginally lower (Birr 2,480 million versus Birr 2,496 million). Topographically the most suitable break off point for the Assab line is 236 km from Addis Ababa near the existing Awash station, where the CDE line crosses the major river of the same name. In the climb of 1,422 m to Addis Ababa (elevation 2,348 m), this section has a high proportion of sharp curves and steep gradients, the easing of which to the technical standards of the new line (minimum radius 600 m, maximum grade 1.67%) will entail an almost complete realignment. Besides most of the bridges are understrength for 20-ton axle loads. Adoption of CDE standard for the Assab line would restrict its operating characteristics, chosen to exploit the horsepower and payload economics of modern railway stock. In short, the 236 km of the CDE would have to be rebuilt completely, without any benefit to the rest of the line of interchange of Assab railway locomotives and wagons.

b) Choice of 1,067 mm as against the 1,000 mm gauge of the CDE is on the basis that 75% of railway track in Africa is to the former gauge, which is also the norm recommended by the Organization of African Railways for future construction. This choice can be upheld on other grounds too, namely:

- as a branch off the CDE has no particular cost-saving advantage, the Assab connection can be constructed to any appropriate economically justifiable gauge; moreover, junctioning of the two lines will raise issues of bi-national functioning according to the 50-year treaty governing the management of the CDE; and

- the wider gauge commands a larger market for spare parts manufacturers and suppliers of rolling stock and locomotive equipment; stock transfers (new or secondhand) are also possible when needed.

13/Recently completed evaluation of the railway project (January 1987) carried out by consultants L.B.I. indicate the following ERRs -- medium traffic growth: 10.7%, low growth 5.8%; with the pipeline in place the ERR would drop by about 1.5 point; the consultants concluded that the opening year of the new railway could not be justified before year 2005.

(iii) Rehabilitation/Improvement of CDE and Strengthening/ Upgrading of Addis Ababa - Assab Road

5.49 This investment option includes both routes -- by road to Assab and by CDE railway to Djibouti. To certain extent it would be the continuation of the present situation, although the railway would be, as explained below, operating at a different level than at present. This scenario assumes that the road Addis Ababa - Assab would be strengthened/ upgraded according to an appropriate timing presented in Table III.3. Due to the anticipated shift of part of the road traffic to CDE (para. 5.52) the estimated years when the traffic would reach road capacity were delayed by about three years as compared to the case without the railway (para. 5.38). Consequently, the first section to reach capacity Addis Ababa-Mojo-Nazret (98 km) would be in 2013. Other sections will reach capacity much later (Table III.3).

5.50 In calculating the ERR for the road strengthening/upgrading, the methodology presented in paras. 5.39 - 5.40 was applied. Due to relatively limited changes in the inputs the ERRs are relatively close to the scenario of the road only. By sections the ERRs are as follows: i) Addis-Ababa-Mojo 41%, Mojo Awash 35%, Awash-Mile 23% and Mile-Assab 19% (Table V.4). Although the rehabilitation of the CDE Railway would cause some traffic loss to the road, the civil works on the Addis Ababa-Assab road remain still economically justified in the "low growth" scenario as well, with ERRs per road section ranging from 15-32%.

5.51 Under this scenario, it is assumed that the old railway could not continue to operate cost effectively in a mid and long-term period. Consequently, if the railway is to stay it would need to undergo a rehabilitation/improvement program which is estimated at US $129.5 million equivalent as presented in Volume II, Annex II, Table 6. The program would be carried out in the periods 1987-1993 and 1994-1999. In the absence of a feasibility study, the rehabilitation/improvement program is geared to address high priority needs. The investment would include, inter-alia, installing new ballast, replacement of the most urgent sections of the track (229 km), replacement of rolling stock, equipment for workshops and technical assistance and training to improve markedly efficiency of operations. With the "package" scenario it is therefore assumed that the CDE would surpass its past traffic volumes and the peak reached in mid-seventies. In reviewing the economic viability of rehabilitating the existing railway (781 km) it was assumed that for the growing Ethiopian demand for export/import long distance traffic accumulated in the central region and originating from Addis Ababa to the Red Sea, a viable option--alternative route is needed not only on strategic, but also for economic reasons, as certain goods could be transported by railway at lesser costs (Table V.1). It is assumed that the rehabilitation/improvement package would increase the present capacity of CDE from about 350,000 to 900,000 tons per year.

5.52 The projected long distance traffic volumes for CDE (Table V.2) i.e. 580,000 tons by 1994/95 and 820,000 tons by 1999/2000 and thereafter was done on the basis of comparison of transport costs on the Assab vs. Djibouti Route (Table V.1). In addition to the export/import traffic for

goods where CDE has cost advantage (petroleum, cereals, pulses, livestock) there will be also local traffic on the railway which is expected to reach about 140,000 tons by 1994/95 from about 70,000 tons in 1984/85. Allocation of the corridor traffic to the railway was made along two main criteria -- anticipated CDE capacity and estimated transport costs on the Assab versus the Djibouti route. Consequently, projected CDE exports/import traffic would somewhat exceed the ceiling of 15% of total Ethiopian external trade traffic to go via Djibouti, which was set by the Government; the traffic would reach about 17.5% by 1999/2000.

5.53 In the cost/benefit analysis of the CDE rehabilitation/improvement in addition to the estimated costs, railway invariable costs were also included. The economic benefits derived from comparing the rehabilitation package which would increase gradually CDE capacity to 900,000 tons/year with the "no package" scenario where the total CDE traffic was assumed to gradually decline further -- under 150,000 tons by about 1995 when the railway would close down. Most of the benefits would come from savings in freight transport costs when comparing transport per ton of dry and liquid cargo on the road versus the one on the railway. The comparison of rail/road transport cost included the costs per ton along the whole route, i.e. Addis-Assab against Addis-Djibouti (Table V.1). It was assessed that with the package the present transport cost on the railway itself will be reduced by about 30%, which would not only prevent further traffic diversion to the road but also increase competitiveness of the CDE to acquire new traffic i.e. most of it previously lost to the road. Also, cost/charges of Djibouti port for Ethiopian transport traffic were assumed to decrease once its volume increases markedly (forecasted by 1994/95). Actually, the port authorities in Djibouti expressed a possibility of negotiating preferential rates for the Ethiopian cargo if higher traffic volumes could be guaranteed by the Ethiopian Government. In addition, the economic analysis also includes some savings in avoided road maintenance costs (on Addis-Assab road) and passenger transport savings (900,000 passengers on CDE in 1985 to grow by about 3% per annum). Benefits from increased safety and decrease in accidents (quite relevant to CDE) are also expected from the rehabilitation/improvement package but due to difficulties in quantifying them they were not considered in the analysis.

5.54 In the road/CDE scenario, over an estimated 20-year economic life and the "base case" traffic forecast the ERR for the rehabilitation of CDE is about 10%.[14] In the sensitivity analysis, assuming the limit of 15% of external traffic to Djibouti route, ERR would fall to about 8%, the difference between the two ERRs is small since the estimated capacity of rehabilitated CED would actually allow less than 20% of the overall Ethiopian external traffic. In the "low growth" scenario the ERR would drop to about 7%. Overall, the rehabilitation/improvement of the railway has somewhat marginal economic viability. Yet when compared with the construction of a new railway line, CDE has an advantage due to much smaller economic and technical risks involved. For the reason of keeping an alternative route for Ethiopian external trade open, limited investments on CDE infrastructure could be considered and a full fledged feasibility study is warranted, provided that the pipeline is not constructed (para. 5.61).

14/Consultants L.B.I. analysis of a rehabilitation package for CDE yielded an ERR of 13%.

(iv) **Construction of a Petroleum Pipeline, Rehabilitation/ Improvement of CDE and Strengthening/Upgrading of the Road**

5.55 Under this scenario, the main elements are the same as in option (iii) except that a construction of a petroleum pipeline between Assab and Addis Ababa is added. For the purpose of the economic evaluation, pipeline investment and operating costs were compared with those of the competing modes -- the CDE and road transport of petroleum products by tanker-trailers. Due to its capacity limitation CDE would not transport all the petroleum; of 900,000 tons about 50% is expected to be petroleum by 1999/2000. CDE rail and road transport costs of petroleum are presented in Table V.1. The difference between the annual costs of transporting the forecasted quantity of petroleum products by rail/road on one hand and by pipeline would make a net benefit to the pipeline.

5.56 In determining the size of a pipeline that will carry white petroleum products from Assab to Addis, future petroleum demand is determining factor. The capacity of a 10-inch diameter (with 6 pump stations) pipeline is about 1.24 million ton/year or 180 m^3/hour and that volume is anticipated to be reached 12 years after the pipeline is constructed. Therefore, a 12-inch diameter was found to be more appropriate in estimated 25-year economic life considered in the analysis.

5.57 The volume of petroleum to be transported on the pipeline was estimated at only about 65-70% of total net imports; that will gravitate to the central part of the country using the pipeline to Nazret and Addis; the balance would remain in Assab refinery. Re-exports of petroleum products from the refinery in Assab were naturally excluded from analysis. The petroleum forecasts for the pipeline are as follows: about 775,000 tons in 1989/90, 1,060,000 in 1994/95 and 1,170,000 in 1999/2000. With six pump stations the maximum throughput of the pipeline would be 285 m^3/ hour or about 2 million tons/year -- sufficient to accommodate 20-year traffic development. The traffic forecast assumes diversion of petroleum traffic from both CDE (450,000 tons by 1999/2000) and the Addis-Assab road to the pipeline.

5.58 Because of a variety of factors, such as the pro-rating of fixed costs over increasing tonnages and the rise in maintenance costs with ge, operating costs per ton of product moved along the pipeline would vary with time. Operating costs were thus calculated for the expected opening year tonnage and for the close to capacity tonnage and were assumed to decrease per ton linearly between the two. Available (Consultants RITES and LBI) estimates on the operating costs of the 12-inch pipeline differ widely. In the absence of a study on the subject, an average of the two was taken in the analysis. Assuming economic costs of construction of US $ 222 million equivalent (about 14% higher than LBI estimates which was assessed to be on the low side) in 1989-90 the ERR is over 15% over the life period of 1991-2015. In the sensitivity analysis increase of costs by 20% brings the ERR to about 13%. If, however, the traffic develops at the "low growth" scenario, the ERR would be over 12%. The main data is presented in Table V.4. These preliminary calculations indicate that construction of a pipeline should be considered as an option for future petroleum transport. In addition to the road route, however, CDE operations would be seriously

affected (5.60). Also, in a pipeline project other factors (e.g. security) have also to be taken into account. Furthermore, in comparison with the new railway project there would be additional benefits to the economy by having the pipeline operational in 1991 versus the new railway in 1995. Recently the Bank Group approved an Energy Project to Ethiopia which includes, inter alia, an assistance (jointly with CIDA) in funding a feasibility study of a pipeline between Assab and Addis Ababa. The study is to start before the end of 1986.

5.59 The effect of building a 12-inch pipeline on the strengthening/improvement of the Addis Ababa-Assab road as conceived in Table III.3 would be limited. Namely, the loss of all petroleum traffic (base case) is estimated to be as follows:

1989/90: 525,000 tons (41 tankers/day)
1994/95: 610,000 tons (48 tankers/day)
1999/2000: 720,000 tons (56 tankers/day)

Assuming the above loss of traffic on the road, the ERRs for the civil works would be reduced to 18%-40% depending on the section, the lowest being on Assab-Mile section.

5.60 With regard to the CDE railway the loss of petroleum traffic would be a serious blow to its operations and ultimately to the viability of the rehabilitation package to the railway. Taking into account the rehabilitation package (para. 5.51) and estimated increased annual capacity to 900,000 tons the loss of traffic would be between 250,000 tons (1990) and 450,000 (1999), the estimated volume (para. 5.55) CDE could handle per year. However, some dry cargo traffic which was not originally included under 900,000 capacity ceiling of about 80,000 - 100,000 tons/year could be added to CDE traffic since in this scenario its capacity utilization would fall markedly leaving room for some cargo where the Djibouti route could be competitive with Assab route -- imports of bulk cargo (bagged). In that case by year 1999/2000 the total estimated traffic on CDE (including local traffic) would fall from 900,000 tons to about 600,000 tons. That major fall in the traffic volume and other related benefits would destroy the economic justification of the package since the ERR would be only about 5% with the "base" case traffic projection; with the "low" case projection the ERR would naturally be even lower.

(v) <u>Strengthening/Upgrading of the Road and the Pipeline Construction</u>

5.61 The previous scenarios indicate that rehabiliation of the CDE and construction of the new pipeline are not complementary projects and that there is no economic justification for undertaking a major rehabilitation of CDE if the pipeline is built. Under investment option (v) it is assumed that the Addis Ababa-Assab road will carry all dry cargo traffic while the pipeline, to be constructed in the 1989-91 period, would handle all petroleum traffic forecasted for the corridor (para. 5.57). In this scenario, CDE would phase out gradually by the early 1990's.

5.62 With regard to the road, the same cost of civil works, vehicle operating costs, road maintenance costs, etc. presented in investment option (iv) were retained except that the CDE's long distance dry cargo traffic will gradually be taken by the road, i.e. 1994/95: 280,000 tons and by 1999/2000: 370,000 tons. With construction of the pipeline and consequent elimination of long distance fuel transport by tanker/trailers (35,000 liters) -- it is estimated that the road daily traffic would lose from about 50 heavy vehicles (tankers) in 1991 to about 120 tankers per day by the year 2013. On the other hand, dry cargo gained from phasing out CDE would amount to 46 tractor-trailers in 1994/95 and 53 by 1999/2000. Therefore, more than half of the traffic lost to the pipeline would be offset by the gain in dry cargo taken over from CDE. Consequently, ERRs for the civil works of strengthening/upgrading of the four sections (para. 5.49) would be somewhat higher than in the scenario (iv), ranging from 20%-43%. Economic viability of civil works envisaged for the Addis-Assab road is therefore sustained.

5.63 In evaluating the pipeline there was basically no change from scenario (iv), namely the same construction cost estimates, operating costs, type of pipeline and the traffic was taken in the economic evaluation. However, without the CDE (assuming that CDE will gradually phase out) unit savings are somewhat higher when comparing cost of pipeline petroleum transport with road transport only. Therefore, with elimination of the CDE in the scenario, the economic justification of the pipeline construction becomes stronger with an FRR of 17%. In the "low growth" scenario the ERR would fall to about 13%, while the cost increase of 20% would bring the ERR to about 15%.

Extension/Modernization of Assab Port

5.64 Irrespective of the scenario taken, i.e. with or without the new railway and with or without the continuation of CDE the extension of the port is warranted due to the growing traffic (Table IV.3) estimated for the corridor. Eventual construction of the pipeline between Addis Ababa and Assab will be neutral to the port expansion, since its justification is based on dry cargo traffic development only, i.e. construction of new berth(s) is not relevant to fuel loading/unloading in the port. However, continuation of CDE with assumed rehabilitation program would have an impact on economic viability of the scope of the port extension.

5.65 The port of Assab is now operating at its optimum capacity, i.e. in average about 220 thousand tons/year per berth. In 1984/85 the total traffic handled by the port was 2.56 million tons (including petroleum); average berth occupancy was about 80%; higher occupancy rates would lead to longer and costly ship queuing time and congestion. In the short term some increase in port capacity could be accomplished by dredging berths (8, 9 and 10) and by the construction of a tug berth (to be financed under the recently approved Port Engineering and Construction Project). Gang output in the port compares favorably with other ports in the region. Inadequacy of cargo storage area in the port has been evident. With its own resources, MTA is now in a process of alleviating this problem which is coupled with lack of access to foreign exchange creating problems for MTA in maintaining port equipment.

5.66 In about 5-6 years, due to traffic growth (Table IV.3), berth occupancy is expected to increase again calling for major investments in expanding the port's infrastructure. The forecast of dry cargo traffic and anticipated pace of containerization is presented in Volume II, Annex III. At the time of appraisal of the Port Engineering and Construction project (1985) a two-stage approach was conceived, i.e. (i) construction of a tug berth and procurement of the most urgent port equipment, and (ii) construction of new multi-purpose berth(s) to be later converted for containerized cargo.

5.67 On the basis of a technical analysis the optimum handling capacity by berth in the port will be reached by 1991/92 (Volume II, Annex III). To avoid traffic congestion and costly ships queuing time new port facilities would be required to be put in service by that time. The total optimum capacity of the port with the new berth (no. 13) is estimated at about 2.6 million tons of dry cargo (of which about 660,000 tons containerized) expected to be reached by year 2004 when the new berth (no. 14) should be constructed. This case assumes existence of CDE. The economic analysis reviewed therefore two possibilities: (i) construction of one multi-purpose berth (no. 13) between 1989-91 with additional investments for upgrading the berth for containerized cargo (1997/98) and berth 14 construction (2001-2003); (ii) construction of two berths (no. 13 and 14) at the same time (1989-92).

5.68 The economic life of the capital investments is estimated at 25 years. The economic evaluation was made on the basis of site investigation and construction and maintenance cost estimates including acquisition of necessary equipment (Volume II, para. 3.07 and Annex III, Table 6) and benefits composed of savings in: ship berth hours, ship queuing time, cargo handling costs and cargo holding time. The port investments are to be reviewed from two options -- with and without CDE dry cargo traffic (280,000 tons by 1994/95) and 370,000 tons by 1999/2000). In the scenario without the CDE railway the ERR for the first option (stage construction approach) is over 16%. In the "low growth" scenario the ERR would be about 13%. The construction of the two berths at the same time (1989-92) has an ERR of over 13%, falling to 11% in the sensitivity analysis if benefits are down by 20%. If the costs are increased by 10% and the benefits reduced by 20% the ERR drops to 9%. Therefore the latter is demonstrably the less economically viable alternative.

5.69 In case the CDE Railway is rehabilitated/improved the loss of dry cargo traffic (up to 370,000 tons by 1999/2000) will cause ERR to go down. In the stage construction approach the ERR would be about 14%, i.e., still economically viable project. On the other hand, continuation of the railway would make economic justification of constructing two berths at one time (No.13 and 14) quite difficult. The estimated ERR over a 25 year period would fall to only 10%. It should be noted, however, that the quantification of benefits was based on somewhat outdated data (e.g. value of ship queuing time) and that the estimated ERRs could be higher. Since the extension of the Assab port will be considered for possible World Bank financing under forthcoming transport project an updated and more detailed economic (and financial) analysis of the investments will be carried out by consultants (to be financed under the port project Cr. 1676-ET), later in 1987.

Table V. 4

Summary of Economic Evaluation[a]/

		Addis/Ababa - Asaab Road				CDE	Port of Asaab		New Railway	Pipeline
		Addis-Mojo	Mojo-Awash	Awash-Mile	Mile-Asaab	Railway	Stage Const.	Two Berths	Addis-Asaab	Addis-Asaab
1.	Length (km)	73	150	300	360	781	240 m + 200 m	440 m	871	860
2.	Estimated [1]/ Economic Cost (Birr '000)	14,600	30,000	60,000	91,500	268,000	87,000 / 74,500 [4]/	115,000 / 48,000 [5]/	2,840,000	460,000
3.	Traffic Volume [3]/ in First Year of Benefits (tons' 000)	2,713 [2]/	1,271 [2]/	645 [2]/	511 [2]/	580 [6]/	1,732	1,732	2,720	815
4.	Estimated Economic Life (years)	15	15	15	15	20	25	25	30	25
5.	Average Annual [7]/ Growth of Benefits (%)	-3.0	2.6	5.5	5.5	2.3	4.0	4.0	4.3	4.0
6.	Investment Period (Year)	1998	1995-96	1990-93	1988-91	1988-93 1994-99	1989-91 2000-03	1989-92	1990-96	1989-90
7.	Economic Rate of Return % [8]/ Scenarios:									
	i) Road only	44	39	26	21	---	16	13	---	---
	ii) New Railway	---	---	---	---	---	16	13	8	---
	iii) Road/CDE	41	35	23	19	10	14	10	---	---
	iv) Road/CDE/Pipeline	40	33	22	18	5	14	10	---	15
	v) Road/Pipeline	43	37	24	20	---	16	13	---	17

a/ Excerpts from cost/benefit analysis are presented (in Volume II, Annex VII). Economic costs are based on consultants' studies/reports, i.e. for the new railway (RITES), for the pipeline (RITES, LBI), for the port (Bertlin and Partners); for CDE Railway and Addis-Asaab Road the costs were estimated by World Bank. The benefits are calculated on the basis of savings in transport costs by Route and made as presented in Table V.1 and on estimated traffic in the corridor (Table IV.3) taking into account the growth rates presented in footnote 8/; the traffic split between the road and CDE is presented in Table V.2; the traffic on the pipeline is in para. 5.58, while the loss of petroleum traffic to the Road and CDE is in paras. 5.59 and 5.60.

1/ Analysis was carried out in 1985 prices; costs net of taxes and duties; capital investment costs only; economic analysis also includes estimated maintenance costs for the road and the port and operating costs for the railway and the pipeline; no shadow pricing of foreign exchange was applied since the share of foreign exchange in both the estimated costs and benefits is close and the impact on ERR would be consequently marginal.

2/ Vehicles per day; 19-ton estimated average truck-trailer capacity; 0.60 average load factor for dry cargo; assuming CDE Rehabilitation; estimated per section in first year to of benefits is as follow: Addis-Mojo: 1999, Mojo-Awash: 1997, Awash-Mile: 1994; and Mile-Asaab: 1992. differ per road section;

3/ Long distance and local traffic combine;

4/ Second berth;

5/ Port equipment to be procured in 1996 and 2004;

6/ Without pipeline construction; with the pipeline the export/import traffic would decline to 280,000 plus local traffic of about 140,000 (1994/95);

7/ Difference in average annual growth rate of benefits is due to gradual reduction in unit savings in VOC caused by traffic volume.

8/ Base case traffic growth: 3.7% p.a. until 1989/90, 5.3% p.a. 1989-1994/95, 4.4% 1994/95-1999/2000; 4% thereafter; ERRs are rounded.

VI. INVESTMENT PRIORITIES IN THE CORRIDOR

(Conclusions)

6.01 The growing transport demand in Ethiopia puts particular pressure on the existing Addis-Red Sea corridor which carries over 85% of the country's export/import traffic. That in turn calls for rehabilitation, improvement and expansion of the existing infrastructure facilities. In the period 1980-1985 only limited investments were made on the corridor infrastructure totalling about Birr 160 million (US $ 77 million) mostly on the CDE railway 41% (replacement of old rolling stock, maintenance equipment and spares), Addis Ababa-Mile road 37% (road resurfacing and strengthening), 19% in the port of Assab (cargo handling equipment, new storage area and port buildings) and the balance (3%) for the relay facilities on Addis-Assab road. Actual investments in the port of Djibouti were not available for the period.

6.02 To determine the investment priorities in the corridor five possible scenarios were analyzed and investments to all the transport modes (except civil aviation) were tested. Altogether the possible projects add up to about Birr 3,850 million ($1.86 billion) which is about 80% of all invest- ments envisaged for the sector in the Government 10-year Perspective Plan.

6.03 In assessing the investment priorities in the corridor and future improvement of the infrastructure, investment options (ii) "new railway" and (iv) "road/CDE/pipeline" are not viable. Other conclusions could be derived for the short and mid-term future:

a) strengthening/upgrading of Addis-Assab road with priority to the Mile - Assab road section (366 km) in 1988-1991 period ($ 45 million) is the least cost solution and clearly an economically viable approach in all the investment options; eventual construction of the pipeline (Addis-Assab) and/or rehabilitation of CDE would reduce ERRs but would not question the economic justification of the civil works;

b) expansion/modernization of Assab port was not affected by various scenarios (road, new railway, pipeline) while the rehabilitation of CDE will have a limited effect; a staged expansion of Assab port -- construction of a multi purpose berth (no. 13) during 1989/91 period ($ 41 million) with upgrading of the berth to container terminal by 1997/98 ($ 9 million) appears as a viable project; later, in the period 2001-2003 another berth (no. 14) would be constructed to accommodate the growing traffic. Constructing the two berths at the same time seems to be the economically less viable project.

Under the ongoing Second Road Sector Project (Cr. 1404-ET) World Bank assistance to strengthen/upgrade part of Mile-Assab road section is being

considered. Complementary investments to road transport industry and freight forwarding will be address4ed under the forthcoming Transport Project. As for the Assab Port's future development, a more detailed economic (and financial) analysis will be carried out under a Bank Group financed port project (Cr. 1676-ET).

6.04 Construction of a new pipeline between Addis and Assab ($ 222 million) of 12 inches diameter (1989-1990) first with four pump stations and about 10 years later with two more stations appears to be sufficiently viable to call for a feasibility study. The study is actually about to start (under an IDA financed Energy Project).

6.05 The rehabilitation/improvement of the CDE railway over the 1987-93 and 1994-99 periods with $129.5 million equivalent should be assessed in two different scenarios -- with and without the pipeline Addis Ababa-Assab. In the investment option which excludes construction of the pipeline it would be a project with a marginal economic justification. The Government is and should be concerned to keep an alternative route to the Red Sea open with relatively moderate investments. Even in the absence of clear economic viability, the project should be carefully examined as a complementary/alternative route; however, if a positive decision is taken by the Government, the investment package should also include necessary reorganization of the CDE management (with Djibouti's concurrence) particularly regarding marketing, cost accounting and repair/maintenance of existing facilities. If the construction of the pipeline is aborted and it is decided to have a comprehensive rehabilitation of CDE it would be necessary to carry out an appropriate feasibility study. In case the pipeline is built, the economic viability of the CDE rehabilitation program disappears.

6.06 The construction of the new railway line over the 1990-1996 period with an estimated cost of US $ 1.372 million is not economically justified and the detailed engineering should not be started. Even if the ERR was 13% (assuming extraordinary traffic volumes forecasted by RITES consultants) that would still be insufficient taking into account size of investments and the r[illegible] associated with them (only preliminary cost estimates are available). The project is extremely costly and when resources for Ethiopia, both domestic and external, are very limited funds could be used for clearly higher priorities in the sector -- construction of rural roads,[15] modernization/expansion of road transport industry, etc. Therefore, the Government reconsideration of the railway priority is highly warranted. The development of the traffic and projections of future transport demand should be monitored. If the traffic volumes develop at a very high rate, i.e. well beyond the forecasted traffic in this report, the viability of the railway could be reviewed anew.

6.07 In addition to the recommendations stated above on possible investment options in the corridor, there are a few policy issues of relevant policy matters discussed in Chapter III, which if not addressed properly, may seriously impede future traffic flows irrespective of physical status of the facilities in the corridor:

15/ As an illustration the cost of the new railway is equivalent to the cost of building over 30,000 km of rural roads.

a) The role of the private sector -- associates in the road transport industry needs to be carefully addressed by the Government in order to facilitate their position on the

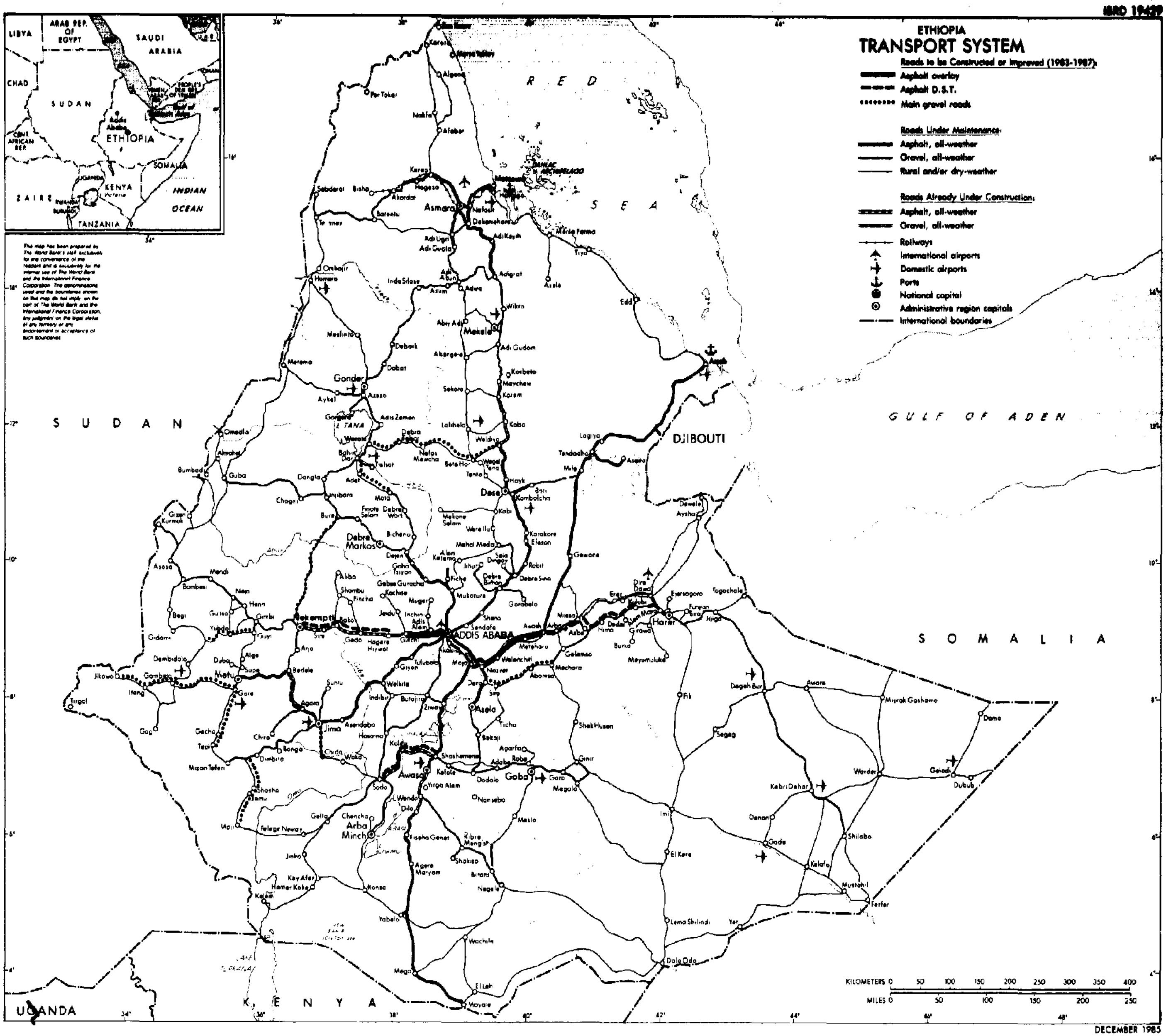
market through appropriate improvements in institutional arrangements (with FTC and PTC) and their accessibility to spare parts, tires and vehicle fleet renewal; the matter is planned to be addressed in specific terms under the upcoming transport project (FY89);

b) The related issue of the shortage of foreign exchange and its inavailability in a timely fashion hurts, in particular, the transport sector which depends heavily on imports; this problem stems, however, from a Government's overall policy in the area;

c) The Government should continue and intensify its efforts to negotiate with Djibouti special rates for Ethiopian transit cargo; however, that should be carried out in conjunction with decision to rehabilitate/improve CDE and abort the pipeline construction;

d) The freight forwarding agency (MTSC) is one of the major impediments on both routes in the corridor. In line with the consultants' recommendations from 1984, MTSC needs to be strengthened further. On the other hand, the lengthy administrative procedures between freight forwarding agency, customs, the ports and other transporting entities which have been addressed recently require a continuous and well-coordinated action on the part of the Government in order to reduce the time and enable more efficient transport of cargo and to shorten presently unduly long turn-around time for wagons and trucks on the corridor, and

e) Absence of cost related rates for transport services is one of the major issues, calling for urgent review of present accounting practices and introduction of cost accounting system (in the ports' subsector the matter will be addressed under the ongoing port project); necessary changes would not only bring the internal finances of the entities to a more realistic base, more importantly the cost-based tariffs would have a more meaningful effect on the traffic allocation; for road transport the matter will be dealt with under the forthcoming transport project.

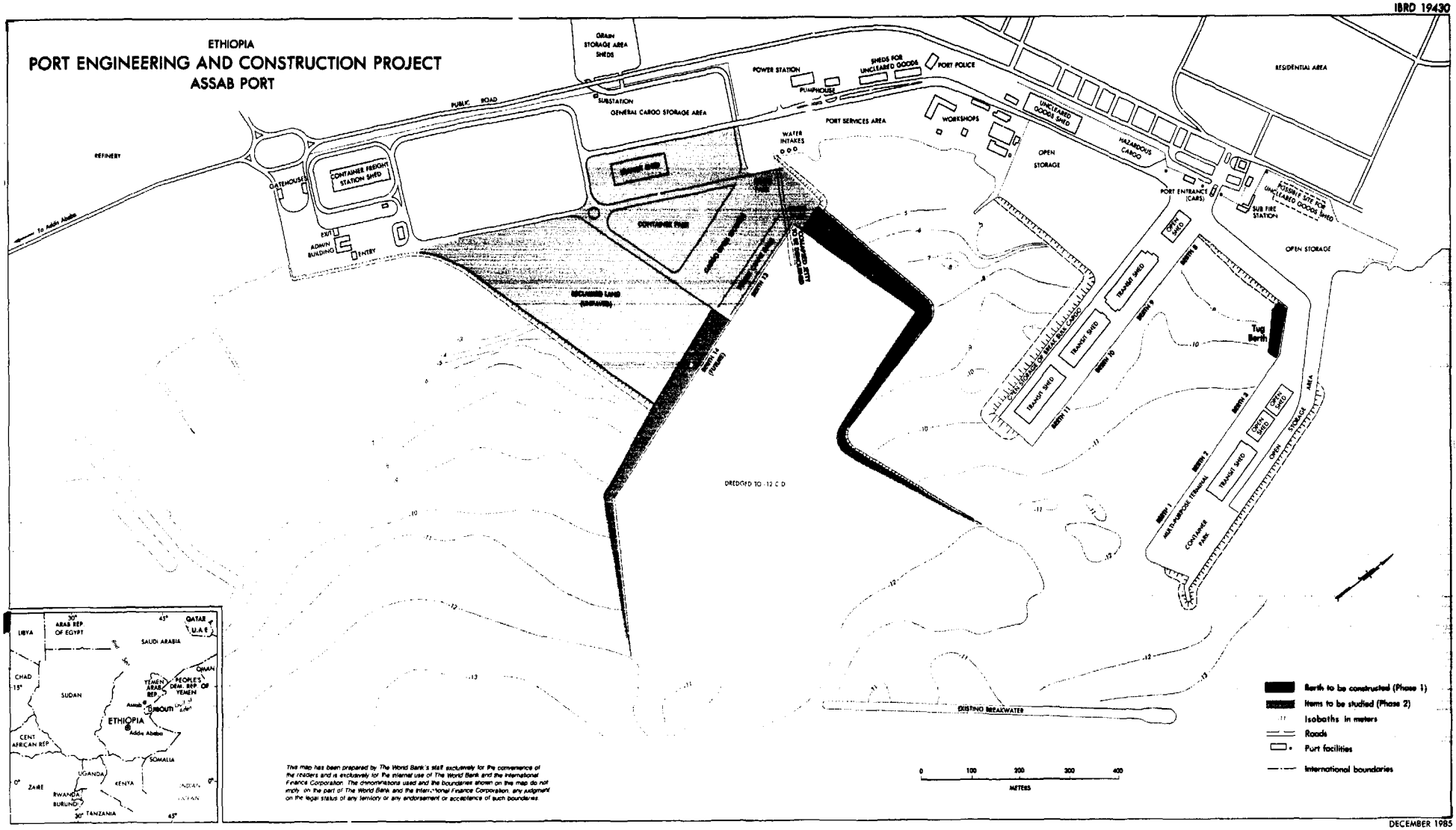

IBRD 19429
ETHIOPIA
TRANSPORT SYSTEM
Roads to be Constructed or Improved (1983-1987):
Asphalt overlay
Asphalt D.S.T.
Main gravel roads
Roads Under Maintenance:
Asphalt, all-weather
Gravel, all-weather
Rural and/or dry-weather
Roads Already Under Construction:
Asphalt, all-weather
Gravel, all-weather
Railways
International airports
Domestic airports
Ports
National capital
Administrative region capitals
International boundaries
R E D
S E A
GULF OF ADEN
DJIBOUTI
S O M A L I A
S U D A N
K E N Y A
UGANDA
ADDIS ABABA
Asmara
Gonder
Mekele
Dese
Debre Markos
Nekempti
Metu
Jima
Awasa
Asela
Goba
Harer
Arba Minch
Assab
Massawa
Dire Dawa
KILOMETERS 0 50 100 150 200 250 300 350 400
MILES 0 50 100 150 200 250
DECEMBER 1985

IBRD 19430

ETHIOPIA

PORT ENGINEERING AND CONSTRUCTION PROJECT

ASSAB PORT



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