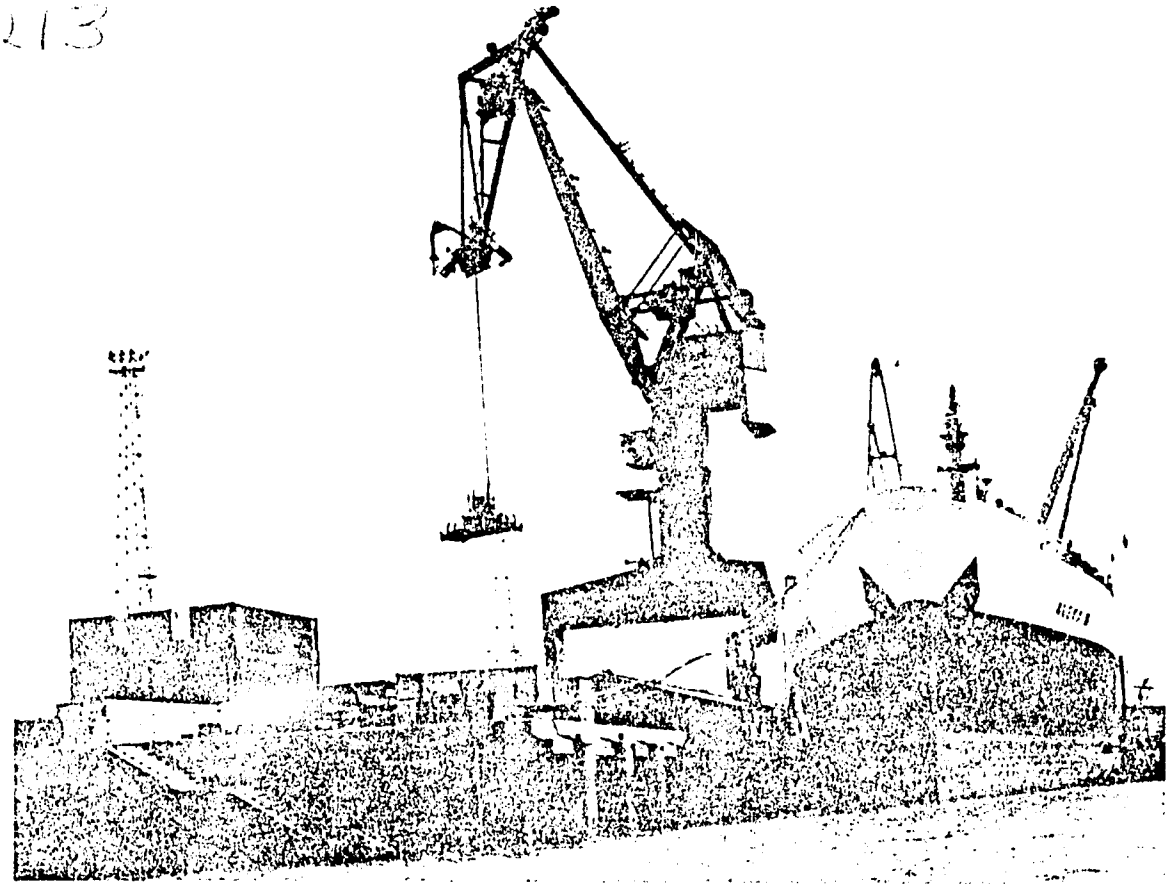
EVALUATION OF KENYA'S PORT OF MOMBASA



submitted to the

INTERNATIONAL DEVELOPMENT COOPERATION AGENCY
TRADE AND DEVELOPMENT PROGRAM

CE MAGUIRE, INC.

THE MAGUIRE GROUP

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EXECUTIVE SUMMARY

The activities of the Port of Mombasa are critical to the economies of Kenya and adjacent countries in East Africa. Annually, the Port of Mombasa handles approximately 7.5 million tons of waterborne commerce. Varied general cargoes, including coffee, tea and other agricultural products, as well as liquid and dry bulk commodities, pass through Mombasa, providing the East African hinterland with access to world markets. Continued development of the Port is required to facilitate the growth of the surrounding developing economies.

CRITICAL ISSUES

While there are several opportunities to enhance port activities, two overriding issues confront the maritime community of Mombasa. The first involves the impact of continued containerization of cargoes on the port and intermodal infrastructure of Kenya. The second is the lack of suitable waterfront land for large scale port development and related industrial expansion.

Improvements in container handling are underway in Mombasa and throughout the supporting infrastructure of Kenya. Containerized cargoes have increased drastically and projects, such as construction of inland consolidation depots, should sustain increased containerization. The Kenya Ports Authority appears capable of adjusting to the impacts of containerization. Factors surrounding the need for appropriate waterfront land required for bulk terminals and industrial expansion, however, appear more critical and appropriate for assistance from the Trade and Development Program of the U.S. State Department.

RECOMMENDED ACTION

Development of the Dongo Kundu region of the South Mainland has both immediate and long term benefits to Kenya. With development of KPA properties at Dongo Kundu, bulk cargo terminals to handle coal and grain, in concert with national policies in energy and food production, can relieve immediate pressures on facilities in the existing port area. Over the long range, water-dependent industries that heretofore have been constrained by unsuitable topography and congested waterfronts will be able to develop in Mombasa. A feasibility study of development of this South Mainland at Dongo Kundu is recommended. The development concept for Dungo Kundo should include required dredging and construction of several berths with depths alongside of ten meters, infrastructure and bulk terminals, including a coal import terminal and a terminal for import/export of grain. Additional consideration for adjacent industrial development, a free trade zone and transshipment facilities should also be addressed.

FUNDING, COORDINATION AND COST-SHARING

The study should evaluate the technical, financial, and economic

feasibility of development of Dungo Kundo and should proceed in two inter-related phases. The initial phase will address the engineering feasibility of development of Dongo Kundu, including hydrographic surveys, sea bed sampling, geotechnical tests, and siltation studies. Preliminary alternate designs will be prepared commensurate with investigations of possible uses and requirements. Preliminary cost estimates of alternate development scenarios for Dongo Kundu will be compared with estimates of benefits to the economy of Kenya. Phase 1 will cost U.S. $300,000 and should be accomplished within six to eight months.

Phase 2 of the recommended study will cost U.S. $200,000 and would proceed upon a positive feasibility resulting from Phase 1 investigations. Phase 2 will result in recommended port expansions and improvements at Dongo Kundu. Estimated costs and benefits will be in sufficient detail to allow subsequent implementation through funding from international sources.

A United States/Kenya cost-sharing arrangement is recommended. To match the U.S. involvement, the Kenya Ports Authority should provide in-kind services, support facilities and assistance, including staff time, office space, water transportation and existing technical data to supplement the recommended U.S. grants.

While outside the scope of this recommended feasibility study, a concurrent evaluation of possible crossings between the West Mainland and Dongo Kundu is highly recommended. The Kenyan government should pursue feasibility appraisals of this required crossing and coordinate the findings with the evaluation of appropriate port development at Dongo Kundu.

I. INTRODUCTION

A. Background and Purpose

The Port of Mombasa is the largest in East Africa, handling approximately 65 percent of all waterborne commence. Mombasa is a natural gateway for East Africa, linked by rail and road to other areas of Kenya as well as Uganda, Rwanda, Burundi, and the southern portion of the Sudan. Small volumes of trade from Zaire, Zambia, Ethiopia, and Somalia also utilize the port facilities at Mombasa. Figure 1 depicts the locations of East African seaports and the surrounding hinterland.

Prior to the dissolution of the East African Community in 1976, the Port of Mombasa was operated by the East African Harbours Commission, headquarted in Dar es Salaam, Tanzania. Originally, the modern Port of Mombasa was constructed as a railroad port for the Kenya Railway. The port is now operated by the Kenya Ports Authority (KPA), chartered by the Government of Kenya in 1977. As a result of discussions between officials of the Kenyan Embassy in Washington, the KPA, the U.S. Embassy in Nairobi, and the U.S. State Department's Trade and Development Program (TDP) regarding future port development at Mombasa, TDP contracted with the consulting firm of CE Maguire, Inc., to evaluate the Port of Mombasa and the KPA's plans for future development, in order to identify projects of interest to TDP for possible assistance. A Maguire team toured the port and had numerous meetings with KPA and government of-

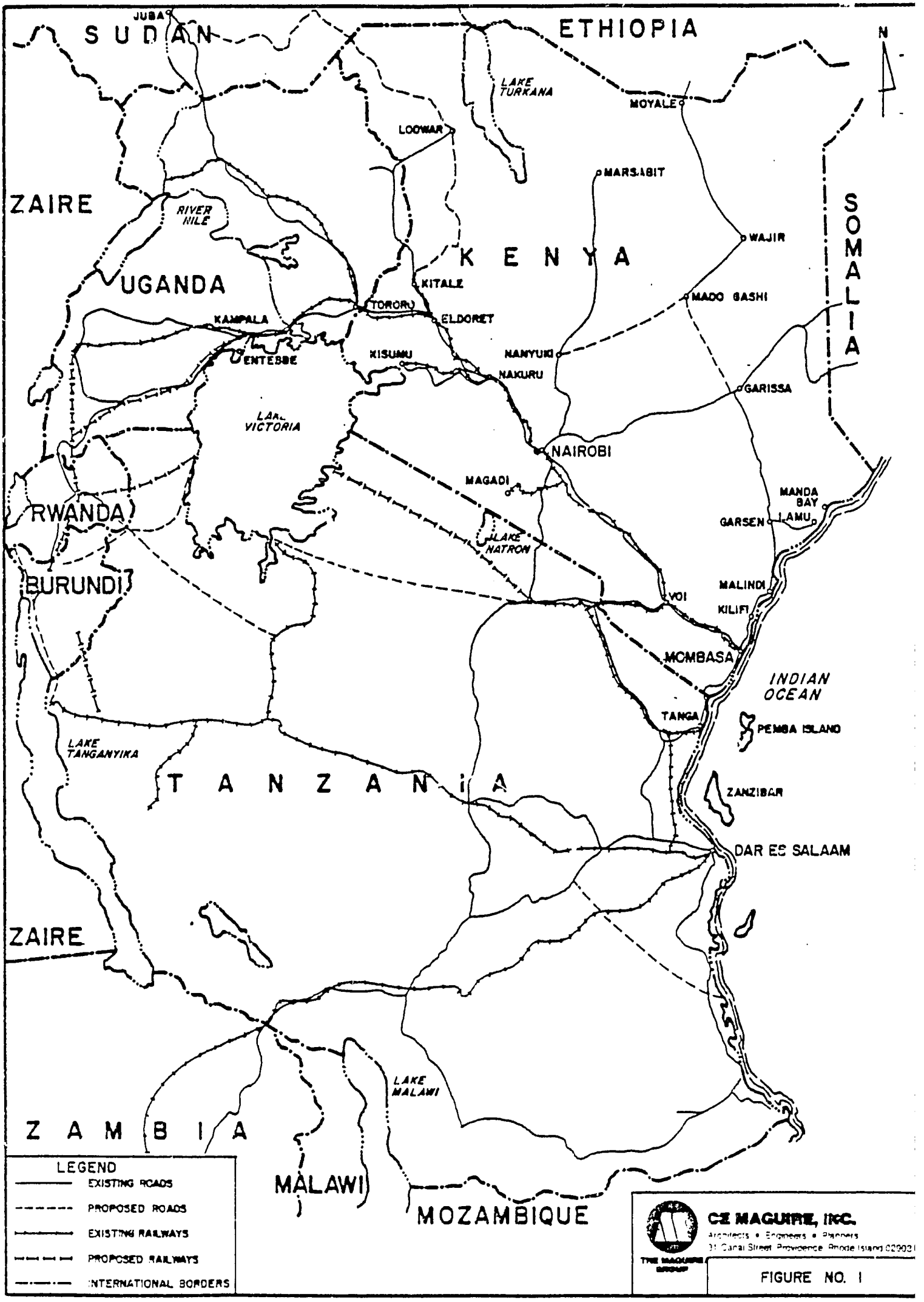
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FIGURE NO. 1

ficials, as wel' as users of the port. Available data and previous studies of the port were reviewed and analyzed. The results of that evaluation and analysis are presented in this report. Chapter II presents existing port conditions, while Chapter III presents and evaluates projects of potential interest to TDP and recommends two follow-on feasibility studies. Suggested Terms of Reference for these projects are included in Appendices A and B. Although both studies are important, the study of the proposed development of Dongo Kundu is of highest priority.

B. Scope

The mission of the Trade and Development Program is to encourage the export of U.S. goods and services by sponsoring project planning studies or related activities. Studies can be of three types:

- identification studies, to determine issues or problems requiring additional study;

- prefeasibility studies of potential development projects; and

- feasibility studies of potential development projects.

The scope of this study is to identify specific feasibility or pre-feasibility study projects within the Port of Mombasa which are necessary for the Government of Kenya's continued development of the port.

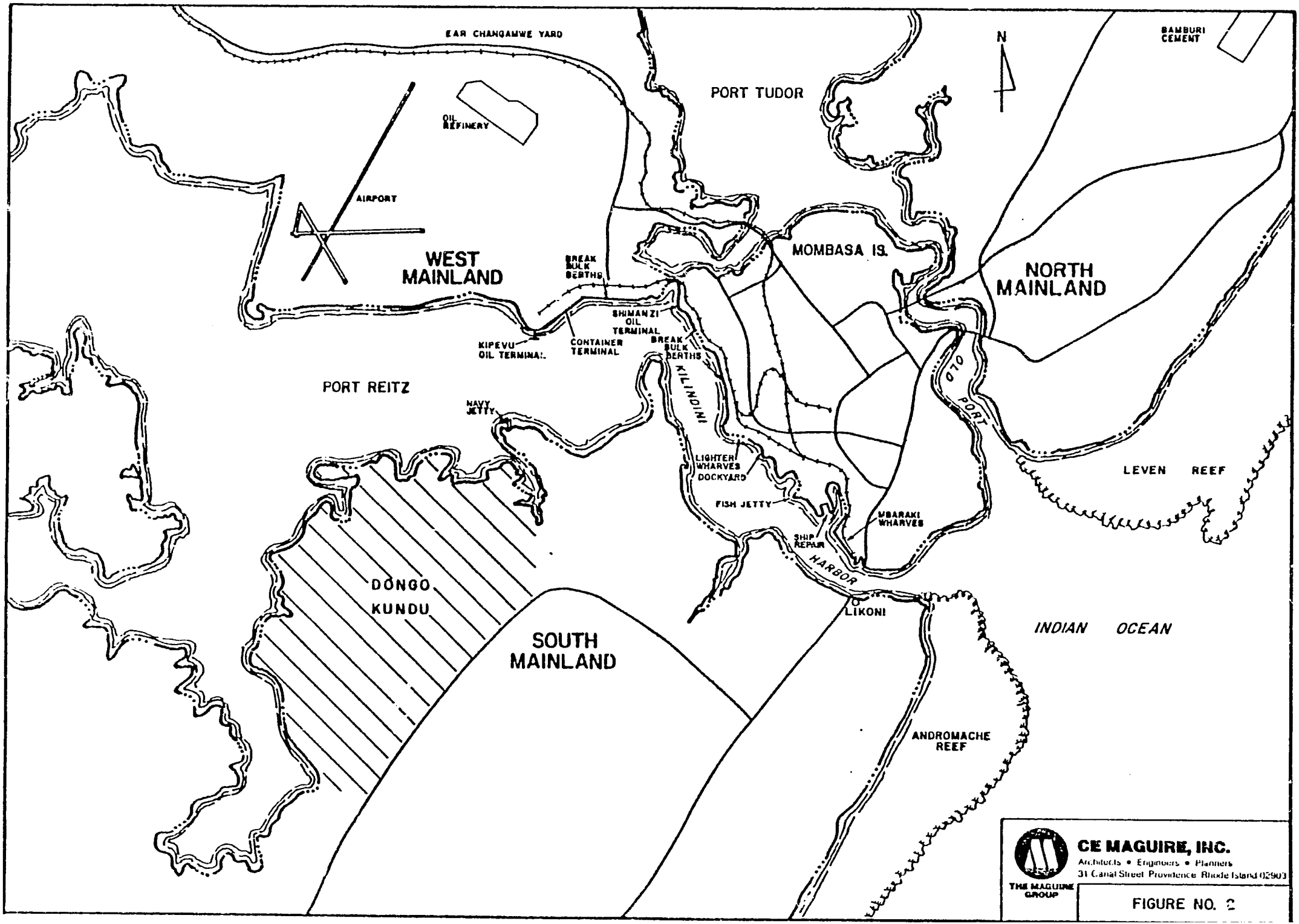
II. EXISTING PORT CONDITIONS

A. Facilities

The modern Port of Mombasa has grown up in Kilindini Harbor, on the south side of Mombasa Island, and in recent years has spread into Port Reitz, at Kipevu on the West Mainland. Figure 2 illustrates the layout of port facilities. The Old Port, located on the north side of the island, supports dhow traffic but is virtually unused for current commerce purposes. Its entrance is much narrower than Kilindini Harbor and leads only into the shallow waters of Port Tudor.

The present port complex in Kilindini harbor stretches from the bulk cargo handling facilities at Mbaraki Wharves, near the harbor entrance, westward across Makupa Creek to the crude oil import terminal at Kipevu. The majority of the port area consists of a series of marginal wharves (parallel to shore) with relatively narrow aprons and back-up areas, reflecting the handling and storage practices of break-bulk general cargoes, the presence of numerous rail sidings and yards, and the existence of bluffs and sloping terrain immediately behind the port facilities.

Sixteen berths along the marginal wharves accommodate general cargo. Berths 16, 17, and 18 were recently designated as the container terminal, while the remaining berths 1 through 14 (with a gap at berth 6) are equipped for break-bulk general cargo operations. Other facili-



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31 Canal Street Providence Rhode Island 02903
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FIGURE NO. 2

ties in Kilindini Harbor include: the bulk handling quay at Mbaraki, the Liwatoni Fish Quay, drydock and ship repair facilities, lighter wharves, and two oil terminals. A complete inventory of port facilities is included as Appendix C.

Conventional break-bulk operations remain the principal mode of cargo handling. Labor gangs assisted by numerous three to five ton mobile cranes and ships' gear handle bags, crates, pallets and other non-unitized cargo. Nearby transit sheds provide temporary storage between the pier apron and landside transportation. The most obvious development in cargo handling at Mombasa is the pervasive and rapid conversion of general cargo into containers. These twenty and forty-foot boxes, carried on multi-purpose, self-unloading vessels, are handled with ships' gear at virtually all general cargo berths, although the container terminal supports most container traffic. A single container crane of Finnish design services this terminal which utilizes a 50-acre open storage area. Three additional container cranes and supporting yard equipment have recently been purchased for the container terminal. Landside transportation at the port is shared between rail and road. Designed as a railroad port, Mombasa is a hub of long distance commerce. Kenya Railways, however, currently remains dedicated to carrying conventional general and bulk cargoes, and trucks are the dominant mode of transport for containers.

B. Commerce

Trade through seaports essentially reflects the nature and conditions of the regional economy served. Port developments should, likewise, respond to hinterland demands, as well as the needs of international commerce and appropriate marine and transportation technology. This section highlights Mombasa's maritime commerce by identifying important commodities in the export and import sectors, depicting total trade trends, and examining relevant characteristics of the economies and national policies of hinterland countries.

1. Historical Trade Flows

Approximately 7.5 million tons of waterborne commerce was handled in 1980 at the Port of Mombasa. The level of traffic has varied over the past several years, with the 1980 tonnages surpassing the average of six million tons per year handled during the previous five year period. There are normally more imports than exports in Mombasa's trade flows, primarily due to petroleum imports. Import tonnages of petroleum dominate trade statistics with over three million tons handled annually between 1976 and 1980.

Table 1 depicts a five year trend analysis of total traffic, including transshipments, handled at the Port of Mombasa. Statistics indicate that total traffic grew more rapidly during the first half of the 1970's than during the past five years. Estimates reveal that trade grew at an annual rate of 7.7 percent from 1970 through 1974, while tonnage

TABLE 1

TRAFFIC HANDLED AT THE PORT OF MOMBASA

000 DWT

	*DRY GENERAL CARGO				*DRY BULK CARGO			BULK LIQUIDS			TOTAL		GRAND TOTAL
	EXPORTS	IMPORTS	T/MENT	TOTAL	EXPORT	IMPORT	TOTAL	EXPORTS	IMPORTS	TOTAL	EXPORTS	IMPORTS	(including) T/Ment
1976	956	814	10	1,780	603	124	727	411	2,970	3,381	1,970	3,908	5,888
1977	821	1,170	9	2,000	686	167	853	461	2,617	3,078	1,168	3,954	5,931
1978	830	1,242	4	2,076	656	238	894	314	2,787	3,101	1,800	4,267	6,071
1979	1,014	877	5	1,896	590	160	750	474	2,822	3,296	2,078	3,859	5,942
1980	864	1,347	4	2,215	574	657	1,231	599	3,467	4,066	2,037	5,472	7,512
1979													
1st Qtr	266	186	1	453	138	15	153	115	591	706	519	792	1,312
2nd Qtr	284	210	1	595	154	66	220	137	924	1,061	575	1,200	1,776
3rd Qtr	245	199	1	445	148	16	164	114	594	708	507	809	1,317
4th Qtr	220	282	1	503	150	64	214	107	713	820	477	1,059	1,537
1980													
1st Qtr	276	359	1	636	114	101	215	91	993	1,084	481	1,454	1,935
2nd Qtr	218	313	1	532	165	215	380	169	862	1,031	552	1,391	1,943
3rd Qtr	194	305	2	501	165	267	432	85	937	1,022	444	1,487	1,955
4th Qtr	176	369		545	130	74	204	254	675	929	560	1,118	1,678

Source: Kenya Ports Authority

*Some adjustments have been made on previous years figures to correct some omissions or double counting which had taken place especially for dry general and dry bulk cargoes. The figures in this issue of the bulletin should be taken as the correct ones henceforth.

levels have remained stable since then. Records for 1980 through mid-year 1981 indicate more positive growth in total traffic volume. Political and economic problems in the major hinterland country of Uganda, as well as the rapid escalation in the price of oil, help explain the fluctuations in total Mombasa Traffic.

In addition to the large volumes of imported petroleum, numerous individual commodities, reflective of East Africa produce and economic requirements, comprise Mombasa's total cargo business. Coffee remains the leading general cargo export through Mombasa, with approximately 300,000 tons exported annually to destinations throughout the world. Tea is also an important export, earning vital foreign exchange. Nearly 100,000 tons of tea pass through Mombasa facilities each year. Other important general cargo exports include soda ash in bags - averaging 100,000 tons/year; tinned fruits - 50,000 tons/year; cement in bags - 40,000 tons/year; and sisal - 30,000 tons/year. Levels of general cargo exports, such as maize in bags and cotton, have fluctuated significantly because of regional industrial disruptions and adverse weather conditions.

Approximately 500,000 tons of bulk cement are exported annually through Mombasa. Fluorspar, soda ash, molasses, and oils represent other significant volumes of bulk cargo exports. Overall, exports total over two million tons per year.

Principal general cargoes imported include: iron and steel - 180,000 tons/year; fertilizer in bags - 90,000 tons/year; vehicle tires and

spare parts - 50,000 tons/year; and sugar 30,000 tons/year. Numerous consumer items are listed in the "other" category for general cargo imports. Gypsum and coal are traditionally important dry bulk cargo imports. Salt, wheat, and maize have been important dry bulk imports in recent years. Palm oil, tallow, and lubricating oil supplement the imported volumes of petroleum as significant liquid bulk imports. Tables 1 and 2 in Appendix D document the principal export and import commodities in Mombasa's waterborne trade.

Comparable trends in tonnage levels and cargo mixes continued through mid-year 1981. In fact, despite depressed economies, and in some cases because of it, the total cargo handled at the Port of Mombasa rose by 20.87 percent from 1.9 million tons in the second quarter of 1980 to 2.3 million tons in 1981. While traditional export cargoes of coffee, tea, and soda ash decreased during the second quarter of 1981, exports of bulk oil for bunkers and bulk imports of sugar and maize displayed significant increases over 1980.

Cargo statistics also reveal the rapid penetration of container handling as an element of the traffic mix in Mombasa. Table 2 presents the annual handlings of containers since 1976. The increase has been truly substantial, with the number of TEUs (twenty-foot equivalent units) handled doubling almost annually between 1977 and 1980. Contents of containers have included exports of coffee, tea, and canned fruits, and imports of chemicals, bagged fertilizer, and ironware. While the ratio of loaded to empty container handled has improved in recent years, nearly one-third of the containers handled in 1980 were

TABLE 2

CONTAINER TRAFFIC ANALYSIS: 1976 - 1980

Number of TEUs

MONTH/YEAR	1976	1977	1978	1979	1980
January	117	348	435	1,043	1,885
February	308	255	552	998	1,659
March	150	439	546	953	2,038
April	255	309	591	966	1,610
May	350	264	493	1,414	2,233
June	345	158	746	1,214	3,242
July	325	257	571	1,463	2,781
August	284	469	914	1,168	3,046
September	139	382	763	1,415	2,429
October	482	459	755	1,628	2,217
November	279	588	1,593	1,786	4,542
December	286	572	1,002	1,101	2,978
TOTAL	3,320	4,500	8,961	15,149	30,660
1st Quarter	575	1,042	1,533	2,994	5,582
2nd Quarter	950	731	1,830	3,594	7,085
3rd Quarter	748	1,108	2,248	4,046	8,256
4th Quarter	1,047	1,619	3,350	4,515	9,737

Source: Kenya Ports Authority

empty. Many of these empty containers are required for stuffing and stripping activities that take place on Mombasa's docks. The balance between export and import containers is essentially equal, which can be an important attraction for continued and increased ocean carrier service.

During the first half of 1981, the trend in container traffic continued upwards. For example, the number of TEU's handled rose by 45.2 percent from the second quarter of 1980 to the similar quarter of 1981. With the planned addition of specialized container cranes and handling equipment at the port and the construction of three inland consolidation centers, these trends should continue. Additionally, estimates indicate that much more of Mombasa's general cargo traffic is containerizable. Approximately 15 percent of potential container traffic is currently handled in containers in Mombasa. As much as 70 percent of all general cargoes are now containerized in trade between developed countries.

2. Trends in Hinterland Economies

The Port of Mombasa provides an international gateway for the East African countries of Kenya, Uganda, Rwanda, Burundi, and the southern region of Sudan. Lesser amounts of traffic from northeast Zaire, Zambia, Ethiopia, and Somalia are also handled at Mombasa. The economic development activities in each of these countries is directly relevant to the future business of the Port of Mombasa.

The country of Kenya operates through a planned economy, following objectives of five year development plans, targeted growth rates, and national policies, such as greater food production, import substitution, redistribution of income, and employment generation. Kenya is a politically stable country and has an open policy towards foreign investment. As a result, industrial expansion has been more rapid than in countries with less liberal foreign investment policies. Grants from donor countries as well as reinvestment of earnings from private companies have been substantial. Current policies seek investments in rural areas to bolster food production.

The boom in coffee prices, Kenya's leading foreign exchange earner, tended to counterbalance the rapid increase in oil prices during the mid-1970's. However, since the stabilization of coffee prices the Kenyan economy has had balance of payment deficits and has generally reflected the economic troubles of other East African countries and the world. In 1978, in reaction to growing balance of payment deficits and depleted reserves of foreign exchange, the Kenya government imposed an import substitution program which restricted or increased tariffs for certain imported goods. Passenger automobiles, for example, are not permitted to be imported into Kenya.

The potential of non-agricultural natural resources in Kenya is undetermined. Indigenous resources of soda ash and fluorspar are already exploited and make up substantial national exports through the Port of Mombasa. Agricultural products, imports for industrial ex-

pansion, and other raw materials should continue to comprise Kenya's trading needs. National policies concerning oil to coal conversion and export promotion should also directly translate to cargo business for Mombasa.

The business of Mombasa's port is directly dependent upon the economy of neighboring Uganda. By the end of the Amin era, the economy of Uganda was in total collapse. Production and exportation of sugar, cotton, tea, coffee, and tobacco had been severely curtailed. Coffee and tea have been Uganda's traditional export crops through Mombasa. Continued instability and an inability to attract foreign investment cloud the return to major export crop production. Products requiring processing, such as cotton and sugar, have been even more severely affected. Longer lead times will be required to rehabilitate the basic processing infrastructures.

Earlier estimates of rapid economic recovery in Uganda may have been optimistic. Improvements to transportation and communication have been identified as high priority items. The rehabilitation of Uganda railways is a high priority and will be an important determinant in the successful return to normalcy of Ugandan trade through Mombasa.

Rwanda's economy consists primarily of subsistence agriculture, so drought conditions have severely affected the economic health of this hinterland country. Primary cash crops are coffee, tea, cotton, and pyrethrum. Coffee represents over 70 percent of export earnings. While external trade principally uses Mombasa, alternative routes exist for using the port of Dar es Salaam, Tanzania.

While the closest port for Burundi traffic is also Dar es Salaam, Mombasa handles substantial volumes of its cargo. Traffic through Mombasa increased from a 1977 total of 6,774 tons to 16,909 tons in 1980. Mombasa has been particularly important in the Burundi import trade. Most of the Burundi cargoes use Dar es Salaam, despite the high average transit time of over 30 weeks. A northern route to Mombasa takes an average of only eight weeks, but the cost is nearly twice as high. The route to Dar es Salaam involves over 200 km of lake transport and 1,240 km of rail transport. This competition for hinterland cargoes is not reflected in Mombasa's operating policies, since most cargoes flow inherently to Mombasa as the only viable option.

Recently a road link between Juba, the administrative capital of the southern region of Sudan, and the Kenyan transportation network was completed. This linkage should provide helpful access, but potential traffic is minimal. An overwhelming majority of the population is nomadic or semi-nomadic and dependent on pastoralism and subsistence agriculture. A large number of Ugandan refugees live in this region. Possible traffic for Mombasa should consist of small volumes of cash crop exports and general import reguirements. In 1980, Mombasa did not handle any exports from Sudan and only 4,482 tons of imports.

Several other countries provide traffic for Mombasa but only in small volumes. Only 2,245 tons of Zambian traffic, for example, passed through Mombasa in 1980. Again, Dar es Salaam competes for much

TABLE 3

TRANSIT TRAFFIC

PARTICULARS		1977	1978	1979	1980
UGANDA:	Imports	103,070	75,982	82,279	112,102
	Exports	165,836	113,844	143,748	115,409
	Total	268,906	189,826	226,027	227,511
TANZANIA:	Imports	785	5,478	1,681	261
	Exports	709	55	39	176
	Total	1,494	5,533	1,720	437
BURUNDI:	Imports	910	5,775	20,049	16,751
	Exports	5,864	273	415	158
	Total	6,774	6,048	20,464	16,909
RWANDA:	Imports	61,172	82,089	69,804	56,592
	Exports	21,661	23,401	47,055	30,959
	Total	82,833	105,490	116,859	87,551
SUDAN:	Imports	15,160	4,106	3,314	4,482
	Exports	192	352	107	-
	Total	15,352	4,458	3,421	4,482
ZAIRE:	Imports	22,670	6,790	5,382	7,682
	Exports	53,169	52,663	24,230	11,234
	Total	75,839	59,453	29,612	18,916
ZAMBIA:	Imports	573	1,878	54	372
	Exports	4,382	-	32	1,873
	Total	4,955	1,878	86	2,245
SOMALIA:	Imports	-	-	147	8
	Exports	-	-	-	-
	Total	-	-	147	8
TOTAL:	Imports	204,340	182,098	182,710	198,250
	Exports	251,813	190,588	215,626	159,809
GRAND TOTAL		456,153	372,686	398,336	358,059

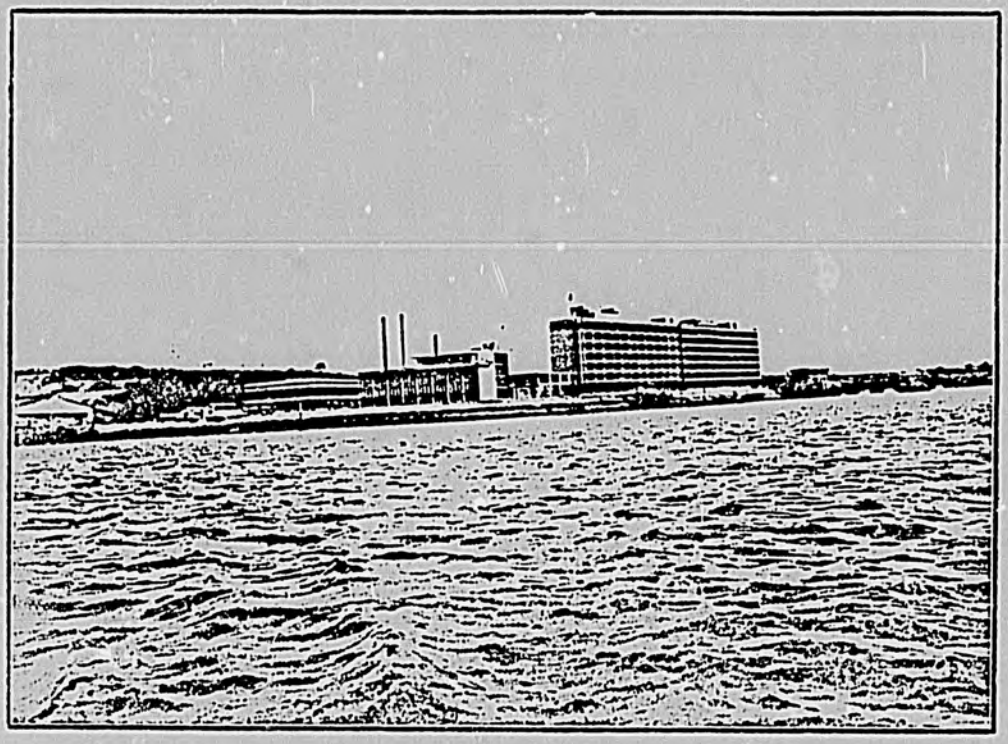
Source: Kenya Ports Authority

of this traffic. Difficulties in Uganda have also impeded through cargoes that depend on Ugandan inland transportation. Traffic from Zaire, for example, has been disrupted because of the Ugandan problems and Dar es Salaam has subsequently benefited. Table 3 portrays Mombasa's transit traffic from these hinterland countries during the years 1977 through 1980.

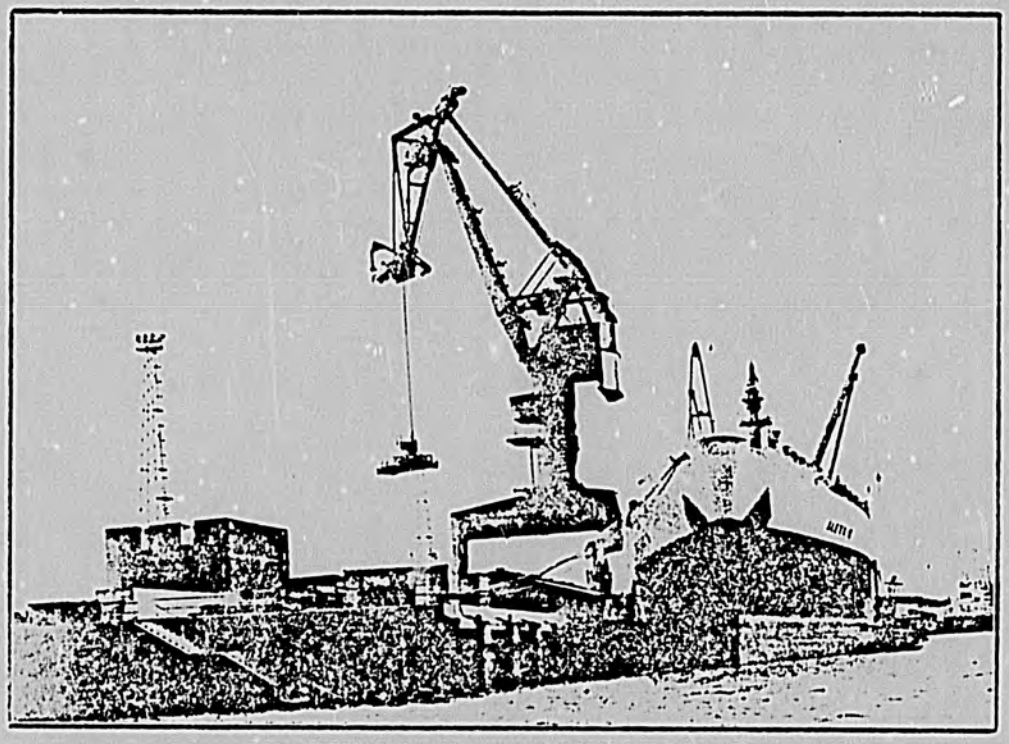
C. Outlook

1. Commerce and Facilities

As the trend towards containerization continues and national policies in export promotion and energy filter down to cargo movements, the Port of Mombasa will be confronted with requirements for rehabilitation and modification of existing facilities. Expected increases in coal imports to match national policies for conversion from oil, for example, will severely congest the existing handling procedures at the Mbaraki Wharves. Bamburi Portland Cement Company already expects to increase its consumption from 60,000 tons per year to 180,000 tons per year within the next year. While other demands are uncertain, the close proximity to the extensive coal reserves of southern Africa is certain to encourage large volumes of coal imports, particularly if the political situation in southern Africa stabilizes. Additionally, the increase in containers may strain the capacity of the new container terminal while relieving pressure on break-bulk berths.



KENYA PORTS AUTHORITY HEADQUARTERS
MOMBASA, KENYA



CONTAINER TERMINAL AT PORT
OF MOMBASA

Progress to improve Mombasa's container and intermodal capability is well underway. Three additional container cranes will soon be available for use at berths 16, 17, and 18. Inland consolidation centers are under contruction in three locations, including Nairobi. The Kenya Railways is sharing the cost of these inland depots with the KPA.

Additionally, a National Committee on Containers has been established to facilitate coordination, update customs procedures and documentation, and satisfy concerns of shippers, government, and the maritime community. These supportive efforts are extremely significant if the continued growth of containerization is to be successfully accommodated.

At optimal levels of utilization, the three berth container terminal (with the construction of three new container cranes) should be able to handle at least 200,000 TEU's per year, or two million tons per year of containerized traffic. The 1980 volume of containers exceeded 30,000 TEU's. For the 13 break bulk berths, an additional 1.7 million tons of general cargo capacity is available. Since berth 9 is also used for bulk cargo, the estimated break bulk capacity may be optimistic. Overall, the total general cargo capacity for Mombasa is approximately 3.5 million tons per year, well in excess of the 2.2 million tons of general cargo handled in 1980. According to forecasts provided by the KPA, this existing general cargo capacity will become insufficient between 1990 and 1995. Excluding the introduction of vast new quantities of bulk cargoes, both liquid and dry bulk terminal capacity appears similarly sufficient through the next decade.

As the hinterland economies stabilize and grow, traffic through the Port of Mombasa is likely to increase. Natural development of industry around the port has not occurred in Mombasa, as development historically has centered around Nairobi. The Mombasa regional economy, however, should grow more rapidly and seems a logical area for industrial development requiring ready access to low cost water transportation. Containerization will also grow, but with lower rates of increase than have occurred in recent years. Even at reduced growth rates, however, the capacity of the existing container terminal could become strained within five to ten years. This will necessitate conversion of additional breakbulk berths to container terminals, which in turn should increase the total general cargo handling capacity of the port. Major expansions, as required for a coal terminal and development of port-related industries, cannot be accomodated in the existing port complex at Kilindini.

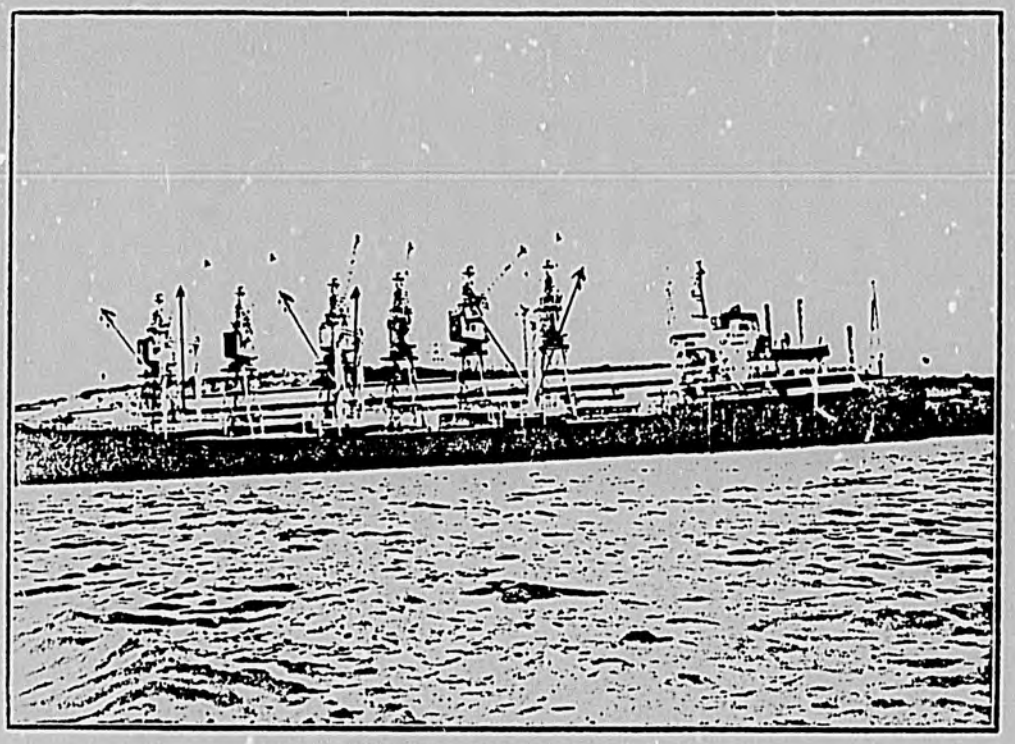
2. Investment Potential

The officers and staff of the Kenya Ports Authority appear highly competent and on par with counterparts in the United States and Europe; statistics maintained by the KPA surpass that of many U.S. port authorities. The ability to provide future port facilities, however, appears somewhat constrained by the inability of KPA to completely reinvest earnings and by requirements to attract foreign exchange. The KPA is keenly interested in the assistance of the U.S. government, as potential port development projects have significance to both the port and Kenyan economy. Specific projects

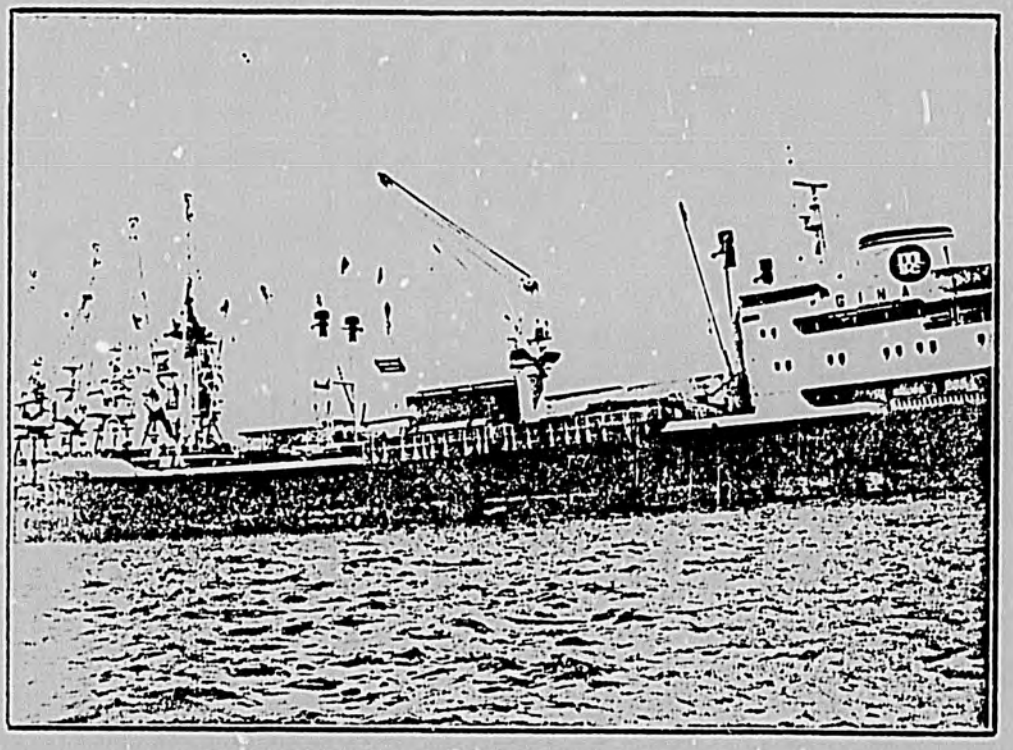
examined during the Maguire team visit reflect the priorities of the KPA and the need for practical and progressive port development in the region.

Projects of particular interest to this study are those with near-term potential implementation and reasonably secure financing. The Port of Mombasa has been the site of several recent investments and feasibility studies by foreign countries. It is evident that significant funds have been made available by various donor countries, and interest in Kenya continues to reflect its relative political and socio-economic stability. As evidence of these trends, Table 4 illustrates the myriad of activities provided by foreign countries relating to the port of Mombasa.

U.S. Embassy representatives in Nairobi and Mombasa believe the Port of Mombasa must continue to develop in order not to hinder and, indeed, to stimulate the eventual economic recovery of East Africa, and that funds from donor countries will be available for legitimate port projects. The Embassy "presumes that Saudi monies would be forthcoming for worthwhile projects in the Port of Mombasa". The Kenyan Ministries of Finance and Transportation and Communications confirmed that while food production was the primary national priority, the port was a high priority in the attraction and distribution of external aid, as well as the use of foreign currencies.



BREAKBULK BERTH
WITH NUMEROUS FIVE TO TEN TON
SHORESIDE CRANES



PORT DEPENDS ON HANDLING EQUIPMENT
OF SELF-UNLOADING VESSELS

Table 4

Selective Activities of Foreign Countries Impacting the Port of Mombasa

Country		Project
France	.	Purchase of Container Cranes and Equipment
Netherland	.	Purchase of Tugs
Japan	.	Construction of New Nyali and Mtwapa Bridges and Study of Total Transportation System in Kenya
Great Britain	.	Purchase of Sixteen Mobile Cranes and Study of Containerization in Mombasa
Australia	.	Study of Grain Marketing in Kenya
Austria	.	Study of Iron and Steel Mill
United States	.	Navy Dredging of Mombasa Entrance Channel and Construction of Support Facilities
Saudi Arabia	.	Various Road Construction

Source: CE Maguire, Inc., through interviews, 1981.

III. EVALUATION OF PORT NEEDS

A. Potential Port Development Projects

1. The project of primary interest to the KPA is development of the Dongo Kundu area on the South Mainland for bulk terminals and port-related industry. The area is currently undeveloped and the only land access is via the Likoni ferry and roads through Mombasa Island. Development plans call for a crossing by bridge, tunnel or causeway from the West Mainland, bypassing Mombasa Island. The site (3,000 acres of which are currently owned by the KPA) would include a coal terminal, grain terminal, and an area for port-related industry, perhaps including a free trade zone and steel mill. Future development could include a container transshipment terminal for feeder service to other East African and Indian Ocean ports.

As discussed previously, it appears that the existing port at Kilindini is adequate to handle projected traffic for the foreseeable future. It is likely that this would require renovation and modernization of existing facilities, with the conversion of some berths to containers or dry bulk, but projected port growth does not appear to be above the potential capacity of the existing port. Land area within the existing port is very limited, however, with expansion constrained by adjacent uses and a steep bluff running along the rear of the port. A study by Norconsult A.S. and Wilbur Smith Associates identified the following four potential areas for future port development:

- Dongo Kundu;

- West Mainland, between the Kipevu Oil Terminal and the airport;

- South Mainland, near Likoni ferry; and

- Renovation and redevelopment within existing port.

Renovation and redevelopment within the existing port appears reasonable for normal port growth requirements, but could not provide adequate land area for an industrial park or a sufficient buffer zone to allow environmentally-safe operation of a coal terminal. Based on analysis of potential port capacity and optimal facility use, it appears that the proposed grain terminal could be accommodated within the existing port, but the coal terminal and industrial zone could not. In addition, increased development within the existing port would increase congestion on Mombasa Island and its accessways.

The West Mainland is subject to the same topographic constraint as Mombasa Island, with a cliff-like bluff beyond the Kipevu Oil Terminal, and is currently in residential use. The shortage of housing in Mombasa results in a high value on residential land. The South Mainland is also residential and, for access, would require either a bridge at Likoni (approachways for which would create chaos on Mombasa Island) or a road ringing the port and

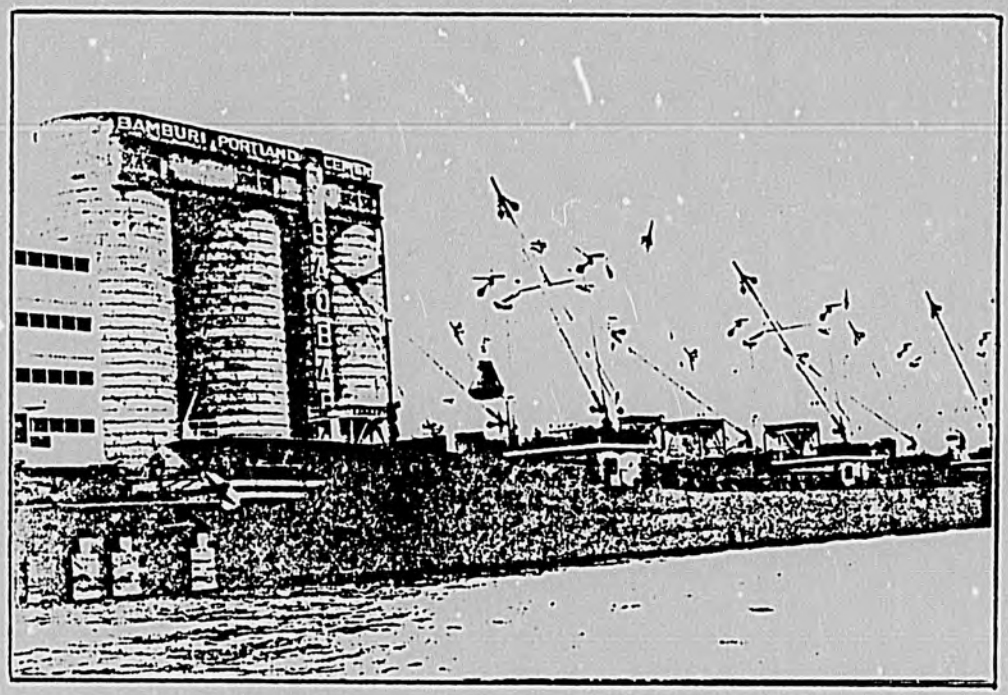
incorporating a crossing to the West Mainland in the same area as that required for Dongo Kundu. Based on these, and a number of other factors, Dongo Kundu seems the optimal site for development of a coal terminal and port-related industrial zone. Construction of a crossing is obviously a key issue in this development project and is of high priority to the Ministry of Transport and Communications. Discussions with the Deputy Secretary indicated that the Japanese government has been active in bridge construction in the past, including two bridges in the Mombasa area, and is interested in construction of a West Mainland crossing.

The development concept for Dongo Kundu includes dredging and construction of several berths with depth alongside of ten meters, infrastructure, and bulk terminals, including a coal import terminal and a terminal for import/ export of grain. No time frame has been established, but the Managing Director of the KPA stated that the project could be initiated during the 1983/ 1988 five-year plan. The project is also a priority with the Office of the Vice-President and Ministry of Finance, since it promotes official government policies regarding replacement of oil with coal, expansion of the economic base through light industry and manufacturing, and increased exports. Implementation of the project would be financed by international aid. The U.S. Embassy, Nairobi, presumes that funds for development of the Port of Mombasa are available from Arab sources; as mentioned previously, several foreign governments and the Port of Felixstowe are also currently involved in port development projects.

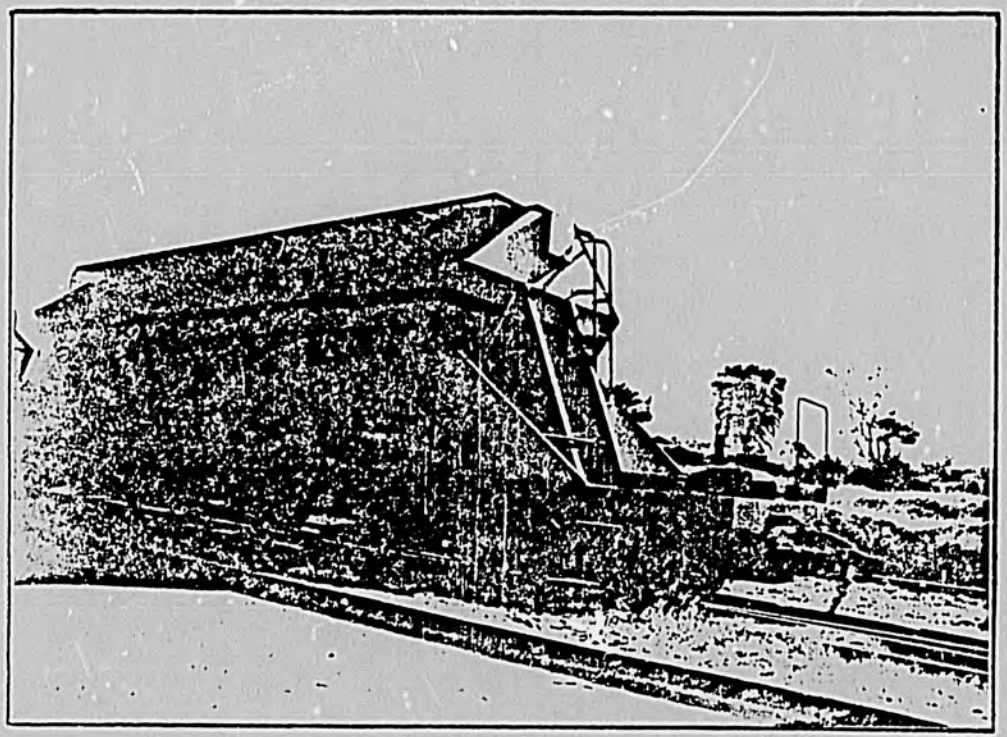
Other potential international sources of funds include the World Bank, African Development Bank, and the European Economic Community.

2. Plans currently exist for a third bulk wharf at Mbaraki for export of soda ash, which is now handled at berth 9 by a very inefficient system. Soda ash exports have been projected to increase to 150,000 tons per year by 1982 with further expansion as justified, and the new berth will improve operations. Design of the new facility has been completed and funding for construction is anticipated from the World Bank, but a delay has been encountered. Discussions with KPA personnel and other sources indicated differences of opinion as to why financing has been delayed. Several people felt it was a procedural delay, while others felt that the World Bank was not convinced of the feasibility of the project and wants to see a detailed analysis of transportation systems and world market trends before financing the construction.

3. The KPA is very interested in modernizing its information and data control system and recently issued tenders, responded to by Wang, IBM, and ICL, for purchase of a mainframe computer. In addition to improving port efficiency and productivity, the need for a port information control system has been greatly increased by the continuing trend toward containerization. Construction of inland consolidation centers will necessitate the use of an efficient information and documentation system. The



UNLOADING BULK GYPSUM AT MBARAKI WHARVES
USING BUCKETS AND A TRUCK HOPPER
(NOTE LINE OF TRUCKS ON WHARF)

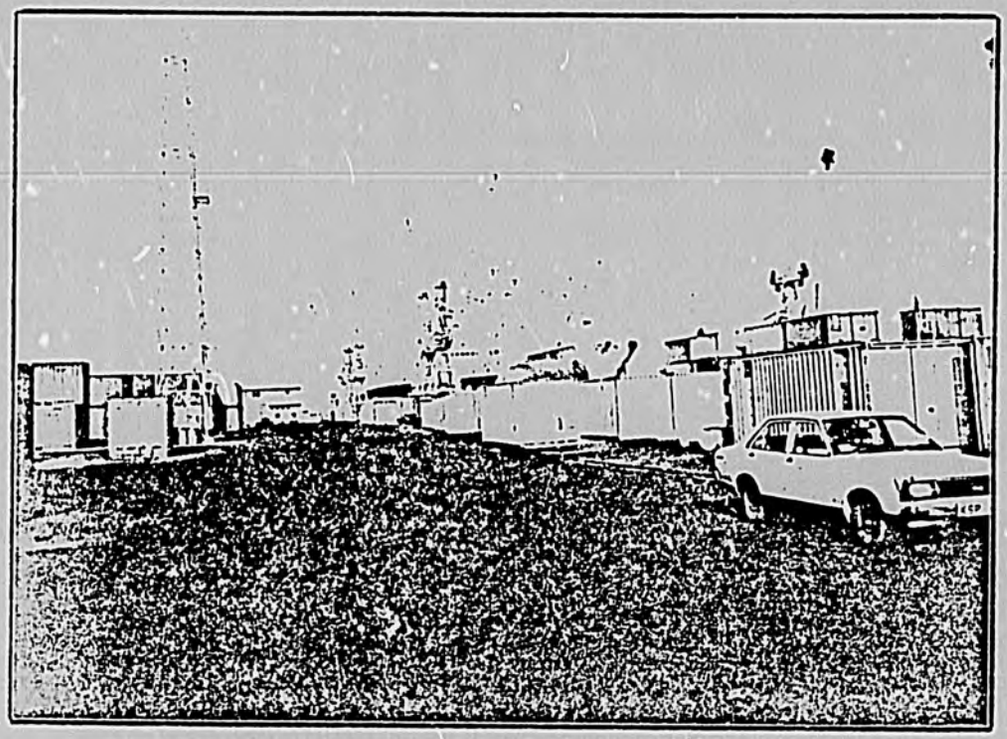


SPECIALIZED HOPPER CAR FOR SODA ASH
KENYA RAILWAYS

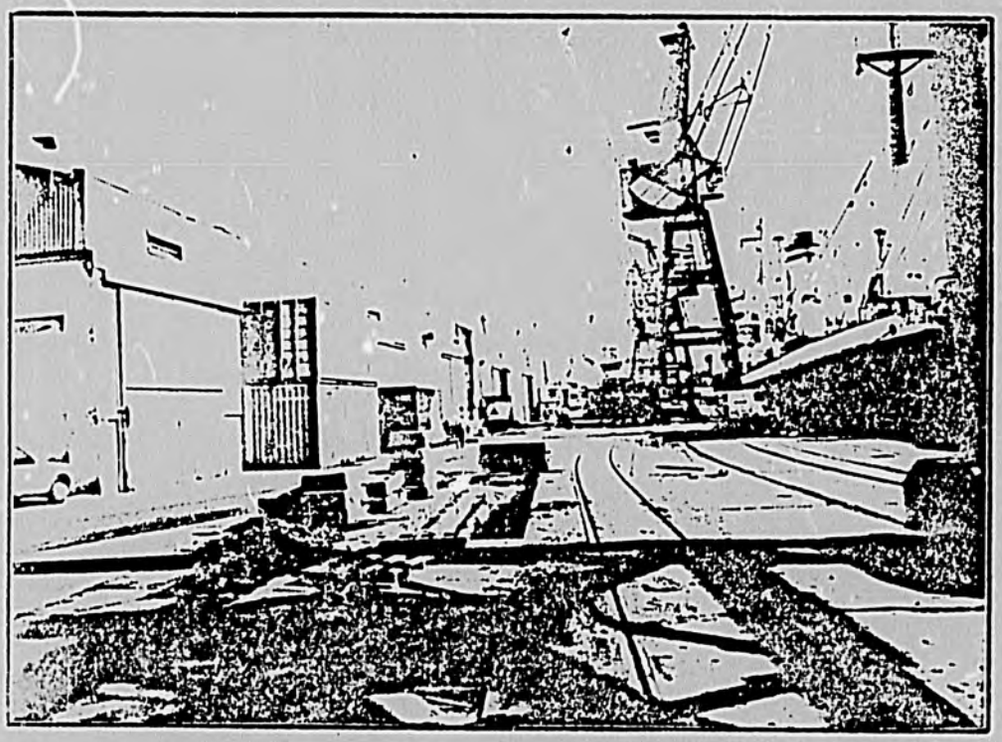
KPA recognizes the need for a comprehensive port management system, particularly as container traffic increases.

4. The trend to containerization in the Port of Mombasa has been rapid, with containerized traffic doubling almost yearly. This has resulted in increased congestion at the container terminal, increased traffic from container-carrying trucks, lack of off-port facilities for handling containers, and is likely to result in underuse of existing break-bulk facilities. Several actions have been taken, including designation of Berths 16, 17, and 18 as the container terminal, purchase of additional container handling equipment, construction of inland consolidation centers, and planned improvements to rail service, such as purchase of additional flat cars, bed and rail improvements, improvements to signallization, and establishment of scheduled train service for containers between Mombasa and Nairobi. The issue of containerization is presently under study for the KPA by the Port of Felixstowe.

Based on analysis of port conditions and trends, and discussions with users of the port, it appears that additional projects and improvements may be required. As discussed previously, it is estimated that the existing container terminal will reach its capacity within the next several years, and various sources estimated that the Kenya Railway is currently operating at 80% of capacity between Mombasa and Nairobi. Conversion of the many truck-carried containers visible on the Mombasa-Nairobi road to



CONTAINER STORAGE AT CONTAINER TERMINAL

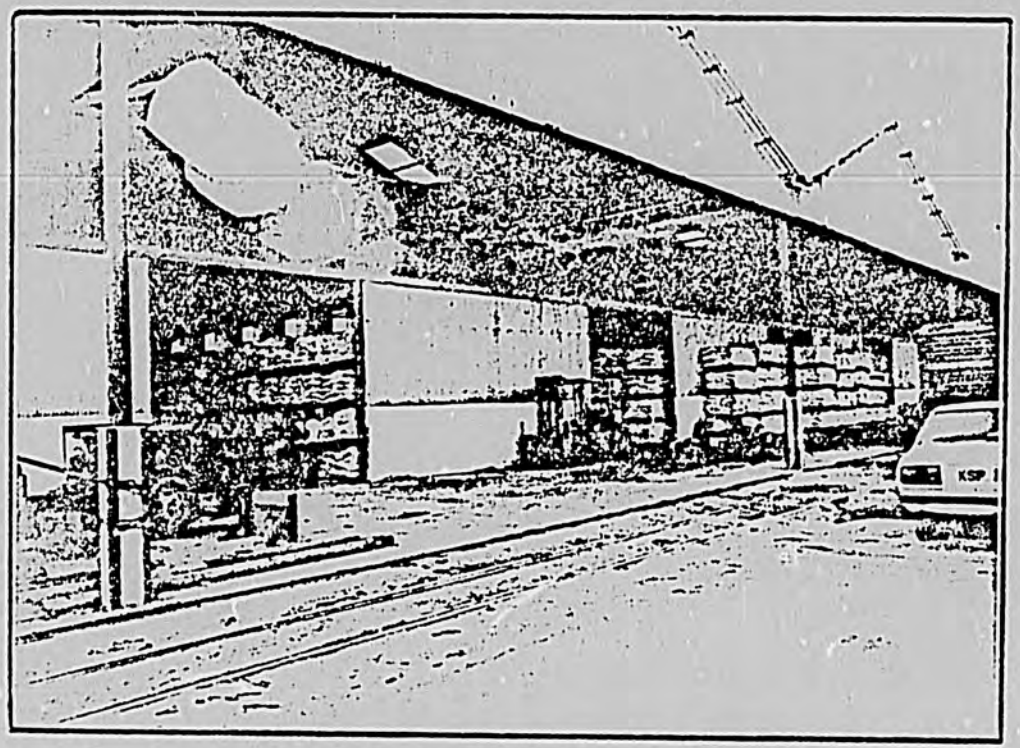


CONTAINERS STORED ON APRON OF BREAKBULK BERTH

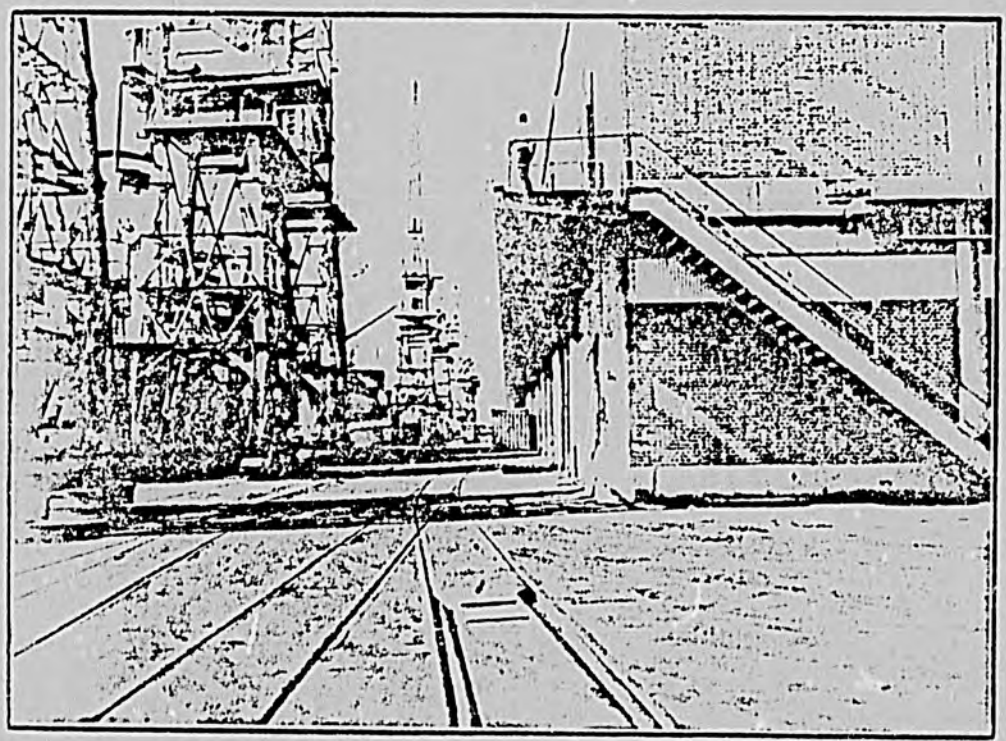
rail flat cars could result in excessive traffic on the line or increased delays at the terminals. It appears that additional development projects may be required to support the increased use of containers, but these are likely to be addressed in the Felixstowe study.

5. The Ministry of Transport and Communications recently issued terms of reference for a study of the feasibility of development of a second port on the north coast of Kenya. The concept of a second port has been discussed previously by the Kenyan government, but the high costs of development and construction of road and rail access, and the apparent lack of a need for a second port to support projected cargo growth in the foreseeable future, make this a long range project.

6. The 1981/85 KPA Development Plan lists a number of development and improvement projects within the existing port area, including construction of berths 6 and 15, removal of excessive rail sidings behind berths 11 and 12, demolition of minor buildings, new fenders, and dredging for a wider and deeper entrance channel. Dredging will be performed in connection with U.S. Navy use of the port. Other projects will be completed as conditions warrant and funds are available.



TRANSIT SHED WITH PALLETIZED CARGO
AND FORKLIFT TRUCKS



NARROW APRON, HANDLING EQUIPMENT
AND TRANSIT SHED OF BREAKBULK BERTH
(NOTE CONTAINER STORED ON APRON)

B. Potential Study Projects

1. Study of the Feasibility of Development of Dongo Kundu

The Managing Director of the KPA stated that he considered this to be the most important study for the future of the port. As a minimum, such a study should include:

- feasibility, costs, and impacts of development of berths, infrastructure at this site;

- feasibility of development of a coal terminal at this site;

- feasibility of development of a grain terminal at this site;

- feasibility of development of a port-related industrial, free trade zone at this site;

- potential feasibility of development of a container trans-shipment terminal at this site; and

- optimal land use plan.

This project appears to satisfy TDP funding criteria with regard to likelihood of near-term implementation of a discrete development project and likelihood of involvement of U.S. exports of goods or service; the project appears to be of high priority to

the Government of Kenya and adequate funds appear to be obtainable. U.S. firms would likely be competitive in design, construction, construction management, and tender of equipment for coal and grain handling and transportation. American marine firms with a presence in Mombasa include Great Lakes Dredging and Drydock and TAMS, involved with U.S. Navy projects, and CE Maguire, Inc., with an office in Lagos, Nigeria, and an associate firm in Nairobi. In addition, conditions appear favorable for other U.S. private enterprise to participate in the port industrial/free trade zone, since Kenya is well-disposed to free enterprise and foreign (particularly western) investment, is relatively stable, and has an adequate supply of low cost, English-speaking labor. Development of Dongo Kundu is contingent on construction of a crossing of Port Reitz and, while the feasibility study of Dongo Kundu development must be closely coordinated with planning of the crossing, it does not appear that the two should be addressed in the same study. Planning and preliminary design of the crossing would also involve a major work effort and the natures of the two projects differ significantly. Responsibility for development of Dongo Kundu lies with the KPA, while responsibility for construction of the crossing lies with the Kenyan Ministry of Transport and Communications, and it appears that it would be more advantageous to approach each issue in an individual study.

2. Study of the Feasibility of Implementation of a Port Information Control System

This project would analyze the feasibility of a comprehensive Port Information Control System, identifying and defining the various information requirements of port operations and developing a conceptual framework for the design of several integrated systems or applications to meet these requirements. Elements of training and systems familiarization for KPA staff should also be included in order to equip them for full participation in system design and specification.

It appears likely that U.S. firms could be involved in implementation of this project, since Wang and IBM responded to the request for tenders for a mainframe computer and a number of U.S. firms and ports are among world leaders in port information management and control systems. Implementation appears less assured, however; KPA officials and officials at the Ministry of Transport and Communications and the Ministry of Finance expressed interest in such a project and some steps have been taken to purchase a new mainframe, but the results of implementation on port operations will be less obvious than, say, facility construction or purchase of equipment, and economic benefits will be in the form of savings and improved productivity, rather than increases in traffic or revenues. These factors may be disadvantageous in the competitive process for expenditure of foreign currency and use of foreign aid.

3. Study of the Feasibility of Construction of a Third Wharf at Mbaraki for Export of Soda Ash

As mentioned previously, design for this project has been completed and the KPA intends to proceed with construction once financing is resolved. It is unlikely, therefore, that the KPA would be interested in such a study, unless it is necessary in order to secure financing by the World Bank or other foreign aid sources. If so, the study should include analysis of the ability of on-land transport systems to support the projected increase in exports and an analysis of world market conditions and trends for soda ash. The potential for export of U.S. goods and services would be limited, however, since design has been completed, construction and construction management could be handled by local firms (including Bertlin and Partners, who performed the design), and equipment would be purchased by the Magadi Soda Ash Company, rather than the KPA.

4. Study of the Feasibility of Development of a Coal Terminal

The KPA intends to locate a coal terminal at Dongo Kundu and has contacted various industries and East African Power and Light for projections of future coal use. At this time, no estimate has been made as to the effect of the availability of a low cost energy source on attraction of new industry to the area, but this could be even more significant than conversion of existing oil users. If development of Dongo Kundu is not im-

plemented in the near future, it may be necessary to locate a coal terminal at another site. This study could evaluate future demand for coal, facility and access requirements, and an optimal site. Given the KPA's intention to develop Dongo Kundu, however, it appears unlikely that this project would be implemented prior to construction of the crossing and infrastructure at Dongo Kundu.

5. Study of the Feasibility of Rehabilitation/Modernization of Existing Port Systems to Meet Projected Demands

The continuing trends toward containerized, bulk, and neo-bulk handling of dry general cargoes have created a need for analysis of future demands and facility requirements. Such a study should consider potential overcapacity of break-bulk berths, and demand for additional berths, equipment, and support facilities for other types of cargo. The study could also consider location of a grain terminal within the existing port area as well as construction of berths 6 and 15.

While this study would provide useful information to the KPA, it appears that the KPA staff conducts a similar analysis on an annual basis, while updating the five-year development plan. It should be noted that both the KPA and the Kenya Cargo Handling Service (KCHS) have very professional, well-organized staffs, which appear to be responding to the shift in commodities, while following a cautious approach. In addition, it ap-

pears unlikely that a study such as this would result in export of U.S. goods or services for discrete projects.

C. Recommendations

Criteria for evaluation of projects of potential interest to TDP include:

- likelihood of near-term implementation of a discrete development project;

- likelihood of involvement of U.S. goods or services in implementation of the development project; and

- importance of the project to practical and progressive port and economic development in the region.

Based on these criteria, either the study of the feasibility of development of Dongo Kundu, the study of the feasibility of implementation of a port information control system, or both, are recommended.

Both of these projects will contribute significantly to port development at Mombasa, appear to have a realistic potential for implementation, and are likely to involve the export of U.S. goods or services. The other projects of potential interest to TDP presented in this report are lacking in one or more of the criteria used, as discussed above. Of these two recommended projects, the Dongo Kundu feasibility

study is preferable, since implementation appears to be more likely than the information control system, for reasons presented earlier.

Suggested Terms of Reference for each of these recommended projects are presented in Appendices A and B.

APPENDICES

APPENDIX A

Terms of Reference: Study of the Feasibility of Development of Dongo Kundu

Background and Problem Statement

The Kenya Ports Authority (KPA) oversees all aspects of the Port of Mombasa and other smaller ports throughout the country. At present, modern facilities in the port are located in Kilindini Harbor, on the south side of Mombasa Island. These facilities include bulk wharves at Mbaraki, 13 breakbulk berths, three berths forming a container terminal, the Liwatoni Fish Quay, Kipevu and Shimanzi Oil Terminals, drydock and ship repair facilities, and lighter wharves. While existing port facilities appear adequate, with some rehabilitation and modification, to handle projected cargo growth for at least the next ten years, land area within the port area is very limited, with expansion constrained by adjacent uses and a steep bluff running along the rear of the port. Kenyan government policies and KPA development plans call for replacement of oil with coal in utilities and industries, where possible. It is unlikely that a coal terminal could be located within the existing port, particularly considering the historic trend toward containerization of cargo and the large back-up areas required for container storage. There are also plans to increase traffic in other bulk commodities and, while these commodities could possibly be accommodated in the existing port area with some modifications, location outside the existing port would be safer and involve fewer environmental and societal impacts on the City of Mombasa.

Expansion of the economic base in manufacturing and light industry and increased exports are goals of the Government of Kenya. The KPA proposes to develop a port industrial zone in the Port of Mombasa, taking advantage of the port's role as a unique link in Kenyan and international transportation system, particularly with regard to exports. Such an industrial area could include a free trade zone or other export inducements.

In order to accommodate bulk terminals, particularly for coal, and a port industrial zone, expansion of the Port of Mombasa is required. Analysis of potential development areas within the existing port and in adjacent areas has identified the Dongo Kundu area of the South Mainland as the optimal location for port expansion. Land area measuring 3005 acres has been acquired by the KPA for this purpose, and additional area is available. The purpose of this study is to perform a study of the technical, financial, and economic feasibility of development of Dongo Kundu and provide the KPA with recommendations indicating the optimum land use and layout of the waterfront facilities, identifying development projects which would require definitive action, and presenting respective development strategies.

Proposed Project Description

The study will concentrate on the Dongo Kundu area of Mombasa port and proceed in two phases. The study shall include:

- Engineering Investigations
- Environmental Aspects
- Transport Network System
- Industrial Schemes
- Bulk Handling Schemes
- Free Trade Handling Zone
- Unit Load Operations
- Urban Development Aspects
- Compatibility of the System
- Financial Management of the Systems
- The Need for Additional Land
- Financial and Economic Evaluations
- Recommended Port Investments
- Other Relevant Considerations

The consultants shall perform all technical, operational, financial, and economic studies and analyses, field and laboratory investigations, and related work herein described as required to achieve the objectives set forth above. The consultants shall review all available pertinent data, report of previous relevant studies, and port improvements currently in progress. In the course of their work the consultants shall cooperate fully with the interested government and public authorities which may be called upon to provide data, reports, or services as necessary. The consultants shall coordinate their work with other relevant studies and surveys, if any, being carried out by other consultants. However, the consultants shall be solely responsible for the analysis and interpretation of all data received and for the findings, conclusions, and recommendations contained in their report.

Proposed Project Phases

Phase I of the project shall consist of analysis of the technical feasibility and preliminary analysis of the economic and financial feasibility of development of Dongo Kundu. Phase II shall consist of detailed investigation of economic and financial feasibility, recommendations with regard to operations management of the system, investments, and the need for additional land, and review of technical investigations conducted in Phase I to insure their validity in light of information developed in Phase II. Details of the tasks listed above and the proposed project phases are presented in the following sections.

I. Phase I

Phase I shall consist of the following tasks:

A. Engineering Investigations

Engineering investigations will include:

(i) Hydrographic surveys and, if required, topographic surveys;

(ii) Sea bed sampling and seismic profiling as necessary;

(iii) Geotechnical field and laboratory investigations and tests; and

(iv) Siltation studies.

The consultants shall prepare optimum design criteria, based on current, wind, and soils data, present and future characteristics of ships and expected cargo units, and recommended mechanical equipment. Preliminary alternate designs shall be prepared, including required storage facilities, types, capacities, and number of required cargo handling equipment. The consultants shall also consider (i) initial and maintenance dredging; (ii) navigational aids; (iii) demolition and removal of wrecks; (iv) electricity, water supply, and other utilities; and (v) port maintenance facilities.

B. Environmental Aspects

Environmental aspects to be considered should include:

(i) effects on fish and other wildlife of proposed dredging and/or reclaimation, as well as disposition of dredged material;

(ii) effects on the marine environment of possible leakages, spills, or dumping of chemicals, crude oil, petroleum products, and other pollutants from any of the recommended projects; and

(iii) any other environmental effects of the development schemes.

Alternatives which will reduce adverse environmental effects or enhance the marine environment will be evaluated qualitatively and considered in the choice of optimum solutions.

C. Transport Network System

The consultants shall identify construction of roads and rail facilities required in the study area.

D. Industrial Schemes

The consultant shall investigate potential water-dependent, port-related or other industrial development likely to occur at the site, and identify those developments with the greatest potential for occurrence, including those resulting from implementation of a free trade zone.

E. Bulk Handling Schemes

The consultants shall determine a bulk handling development scheme for the Dongo Kundu area commensurate with estimated traffic projections. These shall include the potential principal commodities which might be handled in bulk (e.g., coal, iron ore, grains, fertilizers, sugar, etc.), methods of handling, location, and capacities of the facilities required for berthing and storage, as well as the required bulk handling equipment.

F. Unit Load Operations

The consultants shall make recommendations regarding any future container and Roll-on/Roll-off operations likely to occur in the study area.

G. Free Trade Zone Concept

The consultants shall make recommendations on the extent to which the Dongo Kundu area could be used as a free port area--that is, a traffic center of international movement of goods where there are no customs formalities and customs clearance which tend to restrict traffic operations or cause trade barriers. The consultants shall determine the structural features signifying the technical, administrative, and customs conditions of such a port, the advantages of the concept to shippers, importers, the export economy, and its importance to the economic region as a whole.

The consultants shall determine the suitability of the location of Mombasa for a free port area and the likely benefits that would be derived in the immediate surroundings and in other sectors of the economy by implementation of the free port area concept.

In their recommendations, the consultants shall include the required essential facilities (e.g., facilities for handling of ships and cargo traffic, the infra and suprastructure, availability of labor force, organization of customs with respect to changes required by the free port concept, and the presence of service companies, e.g. banks, forwarding agents, brokers, etc.) which are decisive for the efficient and economic importance of a free port or free trade zone.

H. Preliminary Financial and Economic Evaluations

(i) Cost Estimates for Port Facilities

The consultants shall estimate to within 25 percent (based on current costs), the construction costs of major facilities and infrastructure required, including dredging, berths, utilities, equipment, and site preparation. Estimates shall include tabulations of quantities and unit prices for all major items of work.

(ii) Economic Evaluations

The consultant shall estimate net benefits to the economy of Kenya attributable to the proposed project. Benefits shall include savings in transportation costs and reduced congestion, income based on tariff or service charges, savings in and generation of foreign exchange, employment, and industrial expansion.

I. Deliverables

The consultant shall prepare and submit the following reports:

(1) An inception report, giving a summary of the initial findings and the schedule of work for the next reporting period (25 copies in English);

(2) Progress Reports, giving information on work performed during the reporting period, the schedule of work for the next reporting period, and a summary of interim findings, as well as arrival and departure dates and days worked for each staff member of the consultants engaged in the study (25 copies in English);

(3) A draft Final Report, summarizing all work performed in Phase I and the findings and recommendations of the consultants, including maps, photographs, plans, computer programs, drawings and diagrams (25 copies in English); and

(4) A Final Report, incorporating all revisions deemed appropriate by the consultants following receipt of KPA and Government of Kenya comments on the draft Final Report (100 copies in English).

The reports mentioned in (1), (3) amd (4) above shall contain concise first chapter summaries of all major findings and recommendations by the consultants, and estimated costs and benefits. All financial and economic analyses which support the consultants' conclusions shall be presented in sufficient detail to allow checking of calculations without supplementary data. The draft Final Report (3) shall be carefully edited and complete, so that production of the Final Report (4) can proceed without delay following comments.

Any mathematical models and computer programs developed for this study shall become the property of the Kenya Ports Authority, and the consultants shall furnish sufficient information to facilitate further use of such models and programs by KPA.

J. Cost/Schedule

The above outlined Phase I can be produced for approximately U.S. $300,000 and will require six to eight months to complete. A schedule of deliverables is given below.

(1) Inception Report within two months of the commencement date;

(2) Progress Reports every 30 days after submittal of the Inception Report;

(3) Draft Final Report within 6 months of the commencement data; and

(4) Final Report within one month of receipt of comments on the draft Final Report.

K. Data, Local Services, and Facilities to be Provided by the Kenya Ports Authority

(a) The KPA shall provide the consultants with the available basic raw inputs such as statistics, maps, and reports of previous port studies and related transportation studies, etc., which are considered necessary for the purpose of the study.

(b) The KPA (and the Government of Kenya) shall ensure that cooperation is maintained with other interested organizations so as to enable consultants to have access to all information required for the completion of the study.

(c) The KPA will provide an office, secretary, and drafting support for the use of the consultants while working in Kenya.

(d) The KPA will provide water transportation for the consultants as necessary.

(e) The KPA will assign as appropriate and, on a full time basis, qualified counterparts to work with the key personnel of the consultants for the purposes of liaison, training, and review of the findings and recommendations of the consultants.

II. Phase II

Phase II shall consist of the following tasks:

A. Urban Development Aspects

The consultants shall determine the spin-off and linkage effects of development of Dongo Kundu and the likely port-oriented industries, satellite urban development programs such as housing, etc., and other development facilities that might be undertaken.

B. Compatibility of the System

(i) The consultants shall determine the compatibility of the recommended developments with the urban structure plans.

(ii) In making their recommendations, the consultants shall ensure that the logistics and dimensions of the proposed facilities are compatible with future requirements.

The consultants shall also make recommendations on the zoning of various areas for various types of cargoes so as to allow for rational and efficient handling, storage, and transfer of the cargoes within and outside the area.

C. Operations Management of the System

The consultants shall make recommendations on how best the operations management of the system would be ensured. These shall include operations planning, equipment and manpower planning, distribution, monitoring and control of productivity, and any other relevant considerations.

D. The Need for Additional Land

The consultants shall examine the need for required additional land for future port development and recommend the land acreages to be acquired, improved or reclaimed.

E. Review of Phase I Findings

The consultants shall review the findings of Phase I, in light of information developed in Phase II, and adjust the Phase I data as necessary.

F. Financial and Economic Evaluations

(i) Cost Estimates for Port Facilities

The consultants shall estimate to within 15 percent (based on current costs), the construction costs of alternate facilities for which preliminary designs are prepared, and shall give tabulations of quantities and unit prices for all major items of work for the proposed facilities. The consultants shall also determine the annual cost of operating and maintaining the recommended port facilities over a twenty (20) year period.

(ii) Economic Evaluation

Using the lowest cost alternatives for facilities, the consultants shall estimate and analyze the economic costs and benefits of the recommended developments to the country, and shall compare them with those corresponding alternate schemes which would accommodate the expected development.

The benefits shall include the net gains to the economy of Kenya directly attributable to the proposed port investments, taking account of the extent to which this might be

influenced by tariff adjustments. The costs shall include those of engineering construction, equipment acquisition, operation, and maintenance appropriately adjusted from a financial to an economic basis.

The economic analysis shall include full supporting data, including tabulation of economic benefits and costs for each year of the project's life for each of the alternatives considered, and shall include a comparison of their economic justification after discounting to present values. For this purpose permanent installations shall be considered to have an economic life of twenty years. For the alternative selected as the optimum solution on the basis of this analysis, the consultants shall provide an estimated construction schedule showing expenditures by quarters for each major elements.

The economic analysis shall also include, to the extent required by the size of investment, an estimate of the optimum timing of the initial investment and any subsequent stages of investment. The sensitivity of the conclusions to appropriate changes in values of key variables in the analysis should also be tested.

G. Recommended Port Investments

Based on analysis of the economic and technical feasibility for development of Dongo Kundu, the consultants shall make recommendations for the appropriate port expansions and improvements. The recommended program shall define the scope of the proposed developments and improvements, give time estimates for additional studies such as geotechnical investigations, engineering design, construction works and other activities relevant to overall implementation of the program, and provide estimates of the foreign and domestic currency cost components.

The foreign currency expenditure estimates shall include such items as imported equipment, materials, and supplies, as well as the indirect foreign currency component of local materials and supplies, wages and overheads of foreign personnel, who might be employed to carry out the works.

H. Deliverables

The consultants shall prepare and submit the following reports:

(1) An Inception Report, giving a summary of the initial findings and the schedule of work for the next reporting period (25 copies in English);

(2) Progress Reports, giving information on work performed during the reporting period, the schedule of work for the next reporting period, and a summary of interim findings, as well as arrival and departure dates and days worked for

each staff member of the consultants engaged in the studies (25 copies in English);

(3) A draft Final Report, summarizing all work performed and the findings and recommendations of the consultants, including maps, photographs, plans, computer program, drawings, and diagrams of the proposed port improvements (25 copies in English); and

(4) A Final Report, incorporating all revisions deemed appropriate by the consultants shall be submitted following receipt of KPA and the Government of Kenya comments on the draft Final Report (100 copies in English).

The reports mentioned in (1), (3) and (4) above shall contain concise first chapter summaries of all major findings and recommendations by the consultants, and estimated costs and benefits. All financial and economic analyses which support the consultants' conclusions shall be presented in sufficient detail to allow checking of calculations without supplementary data. The draft Final Report (3) shall be carefully edited and complete, so that production of the Final Report (4) can proceed without delay following comments.

Any mathematical models and computer programs developed for this study shall become the property of the Kenya Ports Authority, and the consultants shall furnish sufficient information to facilitate further use of such models and programs by KPA.

I. Cost/Schedule

The above outlined phase can be produced for approximately U.S. $200,000 and will require four to six months to complete. A schedule of deliverables is given below:

(1) Inception Report within one month of the commencement date;

(2) Progress Reports every 30 days after submittal of the Inception Report;

(3) Draft Final Report within four months of the commencement date; and

(4) Final Report within one month of receipt of comments on the Draft Final Report.

J. Data, Local Services, and Facilities to be Provided by the Kenya Ports Authority

(a) The KPA shall provide the consultants with the available basic raw inputs such as statistics, maps, and reports of previous port studies and related transportation studies, etc., which are considered necessary for the purposes of the study.

(b) The KPA (and the Government of Kenya) shall ensure that cooperation is maintained with other interested organizations so as to enable consultants to have access to all information required for the completion of the study.

(c) The KPA will provide an office, secretary, and drafting support for the use of the consultants while working in Kenya.

(d) The KPA will provide water transportation for the consultants as necessary.

(e) The KPA will assign as appropriate and, on a full time basis, qualified counterparts to work with the key personnel of the consultants for the purposes of liaison, training, and review of the findings and recommendations of the consultants.

APPENDIX B

Terms of Reference: Study of the Feasibility of Implementation of a Port Information Control System

Background and Problem Statement

The Kenya Ports Authority (KPA) oversees all aspects of the Port of Mombasa and other smaller ports throughout the country. It also provides data processing support to the Kenya Cargo Handling Services (KCHS). The KPA is deeply committed to containerization at Mombasa and realizes that while the physical infrastructure to support a higher level of container traffic can be provided in the form of already ordered container cranes, proposed new berths, and inland container depots, matching information handling capability is not available. Similar fears are expressed by KCHS, customs officials, and shippers. Container location is already a problem and paper flow problems result in significant delays. Some present contraints are structural, as with customs procedures. Others result from procedures that are largely manual and coordinated.

The KPA Management, particularly the Management Services Department, are aware of the problem and propose to develop a number of computer based systems for the port. Their first priority is for a container control system and they are investigating available packages. A more comprehensive Port Management System is also under consideration. They realize that their capacity for such development, particularly real-time and communications-oriented development, is limited due to a lack of experienced staff and machine resources for development. The planned purchase of a new mainframe computer will give greater machine power, but will not ease the development constraints.

The KPA are quite receptive to the idea of developing a comprehensive Port Management System framework based upon several port control systems and a commonly accessible data base. However, due to the demands of day-to-day operations, time and resources cannot be devoted to the design of this framework. Systems produced without such a framework cannot be expected to be coherent or easily integrated. External assistance with close internal coordination is seen as the most likely and efficient way to achieve the objectives.

Proposed Project Description

The study will concentrate on the identification and definition of the various information requirements of port operations and a conceptual framework for the design of several integrated systems or applications to meet the requirements identified. A central element of this effort will be the specification of the port information data base. This data base will support both operational and financial/ administrative functions and will allow information transfer between the various systems. The consultants will provide a data communications

structure for the port and for the remote container terminals. This communications structure will have to meet the needs of KCHS and the customs service, as well as those of KPA.

The consultants will also include elements of training and systems familiarization for KPA staff, so as to equip them for full participation in system design and specification. A part of the training element will be the provision of technical reference materials in relevant areas of system design and programming. The management of KPA has stressed the need for the full involvement of their staff so as to allow KPA to pursue the project to completion and maintain it with confidence.

Deliverables

The consultants shall prepare and submit the following deliverables:

(1) Port information flow study;

(2) Container operations study;

(3) Customs and container depot study and recommendations;

(4) Port Information Control System conceptual design and development plan;

(5) Port Operations Data Base requirements and scheme;

(6) Container Control System specification;

(7) Library of technical materials for KPA;

(8) Assessment of available software packages;

(9) Hardware acquisition and implementation plan; and

(10) Final report and recommendations.

Cost/Schedule

The above outlined study can be produced for approximately US $225,000 and will require about nine months to complete.

APPENDIX C
Inventory of Existing Facilities

1.	Deepwater Berths		
	(i)	Number	16.00
	(ii)	Total Length (m)	3044.00
	(iii)	Draft (m)	10.00
2.	Bulk Oil Jetties (Tanker Berths):		
	(i)	Number	2.00
	(ii)	Draft (i) SOT(m)	9.75
		(ii) KOT(m)	13.40
3.	Cased Oil Jetty:		
	(i)	Number	1.00
	(ii)	Draft (m)	4.30
4.	Container Berths:*		
	(i)	Number	1.00
	(ii)	Length (m)	230.00
5.	Bulk Cement Berths:		
	(i)	Number	2.00
	(ii)	Total Length (m)	315.00
	(iii)	Number of Silos	3.00
	(iv)	Capacity per Silo (Tons)	6,000.00
6.	Lighterage and Dhow Wharves:		
	(i)	Number	2.00
	(ii)	Total Length (m)	412.00
	(iii)	Handling Points (Number)	9.00
7.	Explosives Jetty (Handling Lighters), No.		1.00
8.	Dhow Jetties (Old Port)		2.00

*(i) Length and number included in 1 above
(ii) Berths 16/17 still being used for both general and container traffic

Source: Kenya Ports Authority

APPENDIX D

Principal Commodities Handled at the Port of Mombasa

Table 1 EXPORTS ('000 DWT)

COMMODITY	1976	1977	1978	1979	1980
Coffee	324	302	275	259	234
Tea	84	96	101	111	91
Maize	128	8	24	159	1
Cashew Nuts	13	4	2	2	8
Beans, Peas, Pulses	12	19	12	7	9
Oil Cake	18	7	2	4	2
Oil Seeds	8	8	10	13	-
Wattle Extract	16	13	10	12	12
Cotton	26	11	14	5	6
Sisal	25	25	27	26	36
Hide & Skin	14	13	13	13	8
Tinned Fruits, Vegetable and Juice	35	57	56	50	51
Lube Oil in Drums	15	25	22	26	26
Scraps	7	4	2	4	2
Soda Ash	92	98	148	196	196
Blister Copper	2	2	1	-	-
Zambia Copper	10	1	-	-	-
Other Mineral Ores	4	10	1	2	8
Cement in Bags	69	65	9	37	29
Others	139	120	103	121	183
TOTAL GENERAL CARGO	1041	888	832	1047	902
Cement Bulk	434	533	523	426	460
Cement Clinker	77	42	29	81	14
Fluorspar	91	111	104	78	97
TOTAL BULK DRY	602	686	656	590	571
Molasses	36	41	38	65	79
Bulk Oils & Bunkers	375	417	276	409	520
TOTAL BULK LIQUIDS & OIL	411	458	314	474	599
TOTAL BULK EXPORT	1013	1144	970	1064	1135
GRAND TOTAL	1054	2032	1802	2111	2072

Source: Kenya Ports Authority

APPENDIX D

Principal Commodities Handled at the Port of Mombasa

Table 2 IMPORTS ('000 DWT)

COMMODITY	1976	1977	1978	1979	1980
Lubricating Oil	6	7	6	5	6
Pipes & Fittings	41	10	15	6	5
Sugar	46	38	53	57	2
Rice	-	-	-	-	25
Gunnies	20	20	17	5	9
Railway Materials	8	8	39	32	10
Fertilizer in Bags	76	108	100	37	145
Salt in Bags	21	28	28	-	16
Iron & Steel	136	188	205	160	216
Vehicles Types & Spares	39	60	75	43	72
Agric. & Other Machinery	10	12	16	13	14
Wheat in Bags	17	2	1	2	15
Maize in Bags	-	-	-	-	43
Chemicals (Insecticide)	2	3	1	2	9
Paper	8	9	6	9	9
Tallow & Oils in Cases and Drums	14	13	15	8	13
Malt	4	8	12	1	2
Others	409	518	609	539	625
TOTAL GENERAL CARGO	857	1032	1198	919	1236
Coal	68	57	61	62	46
Wheat in Bulk	-	33	88	34	78
Maize In Bulk	-	-	-	-	444
Gypsum	11	22	15	29	47
Fertilizer in Bulk	23	7	10	8	5
Salt in Bulk	-	15	37	27	15
Burnt Ore	18	11	25	-	23
Sulphur	-	20	-	-	-
Loose Bauxite	-	-	2	-	-
Iron Ore	-	-	1	-	-
TOTAL BULK DRY	120	165	239	160	658
P.O.L.	2924	2571	2732	2761	3387
Palm Oil	37	38	45	49	61
Tallow	8	3	7	3	10
Alkane	3	2	2	3	4
Crude Coconut Oil	1	2	1	-	-
Linseed Oil	-	-	-	4	-
Turpentine	-	1	1	-	1
Chemical (Polyovorand)	-	-	1	1	4
TOTAL BULK LIQUIDS	2973	2617	2789	2821	3467
GRAND TOTAL	3950	3814	4226	3900	5361

Source: Kenya Ports Authority

APPENDIX E

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APPENDIX F

People Contacted

Kenya Government

Hon. John P. Mbogua
Ambassador to the United States

J.B.O. Omondi
Deputy Secretary
Ministry of Transport and Communications

A.S. Amisi
Director of External Aid
Office of the Vice President
and Ministry of Finance

Kenya Ports Authority

J.D. Mturi
Managing Director

E.A. Karanja
Operations Manager

B.A. Odera Ongola
Chief Planning

M.W. Ng'ang'a
Principal Planning Officer (Research)

A.C. Mumba
Principal Planning Officer (Statistics)

L.N. Obondo
Project Analyst, Planning

A.O. Rogo
Chief Engineer

C. Wambugu
Director, Management Services

K. Singo
Principal Systems Analyst

S. Ondego
Public Relations Manager

D.M. Gacanja
Principal Finance Officer

Kenya Cargo Handling Service

E. Halwenge
Managing Director

P. Henrard
Technical Consultant

R. Cummings
Administrative Officer

Kenya Railways

J.D. Omolo
Managing Director (Mombasa)

World Bank

Malise Dick
John Lethridge

United States Government

Dwayne Butcher
Counselor for Economic Affairs, U.S. Embassy

Robert E. Gribbin
Consul of the United States (Mombasa)

Cmdr. David Carl
U.S. Navy (Mombasa)

Satish P. Shah
U.S. AID (Nairobi)

Shane McCarthy
U.S. AID Officer for Kenya & Uganda

Anthony Tumarello
U.S. AID Engineer

John Hardy
U.S. Trade and Development Program

Lawrence Marinelli
U.S. Trade and Development Program

Joe Guardiano
U.S. Trade and Development Program

Ray Dinkin
U.S. Trade and Development Program

Other Contacts

John Walters
Chief Executive, Ellerman Lines Kenya, Ltd.

P.K. Jaipal
Engineer, Bertlin and Partners (Kenya)

J.C. Rosenberg
Telecom Development Corp. (Nairobi)

Manfred Lehman
Project Marketing Consultants