PNAAM-425
ISN-27618
EG-AAB-437 53

MINISTRY OF DEVELOPMENT AND NEW COMMUNITIES

ARAB REPUBLIC OF EGYPT

MASTER PLANNING AND INFRASTRUCTURE DEVELOPMENT FOR THE PORT OF DAMIETTA

INTERIM REPORT

APRIL 1979

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1.0

ROLE OF THE PORT OF DAMIETTA

1.0
ROLE OF THE PORT OF DAMIETTA

1.1 INTRODUCTION

The Government of the Arab Republic of Egypt, acting through the Advisory Committee for Reconstruction of the Ministry of Development and New Communities in January 1979 engaged the professional services of Frederic R. Harris, Inc., Dr. Hassan Ismail and Associates, and Engineer Marshall, Morsi A. Morsi to study the development of a new port industrial complex at Damietta. The scope of the study consists of three interdependent parts:

- Study of functions, location and master plan for the port[1]
- Study of the feasibility and functions of an international container transshipment terminal
- Study of the regional infrastructure requirements for port development.

This report covers the progress of the study at its interim point. The purpose of the report is to delineate, preliminarily, the spatial and functional relationships between the port, the growth the port induces, the baseline growth of the region, and the selection of the recommended port layout from among a number of alternatives. It is hoped that the submission of interim conclusions, described in some detail, will stimulate the comments and suggestions of all those concerned with the development of the port, and of the Damietta Region. The summary and conclusions developed in this study are presented in Section 11.

---

1. Including within the master plan the transshipment terminal.

11

1.2 THE LOGICAL STRUCTURE OF THE REPORT

Figure 1.1 illustrates the logical structure of the analysis described by this study. The first level of analysis shown on Fig.1.1 describes the subjects covered in this section. i.e.,

The role of the Port of Damietta in the context of:

- Service areas of Eygpt
- The growth of the other ports of Egypt
- International shipping system
- Inland transportation system
- Industrial development
- New communities policy

The second level corresponds to the development of programs for all the elements of the region:

- port
- industrial complex and foreign trade zone
- inland transportation system
- urban system

The aim of this analysis, described in Sections 2 through 6, is to delineate the programmatic requirements of each activity; area requirements, employment, urban inhabitants, and linkages with other elements.

The third level in the analytical logic deals with the criteria (the constraints and potentials) that will dictate the location and direction of growth within the region of all activities. Under this heading **Sections** 7 and 8 will discuss such factors as:

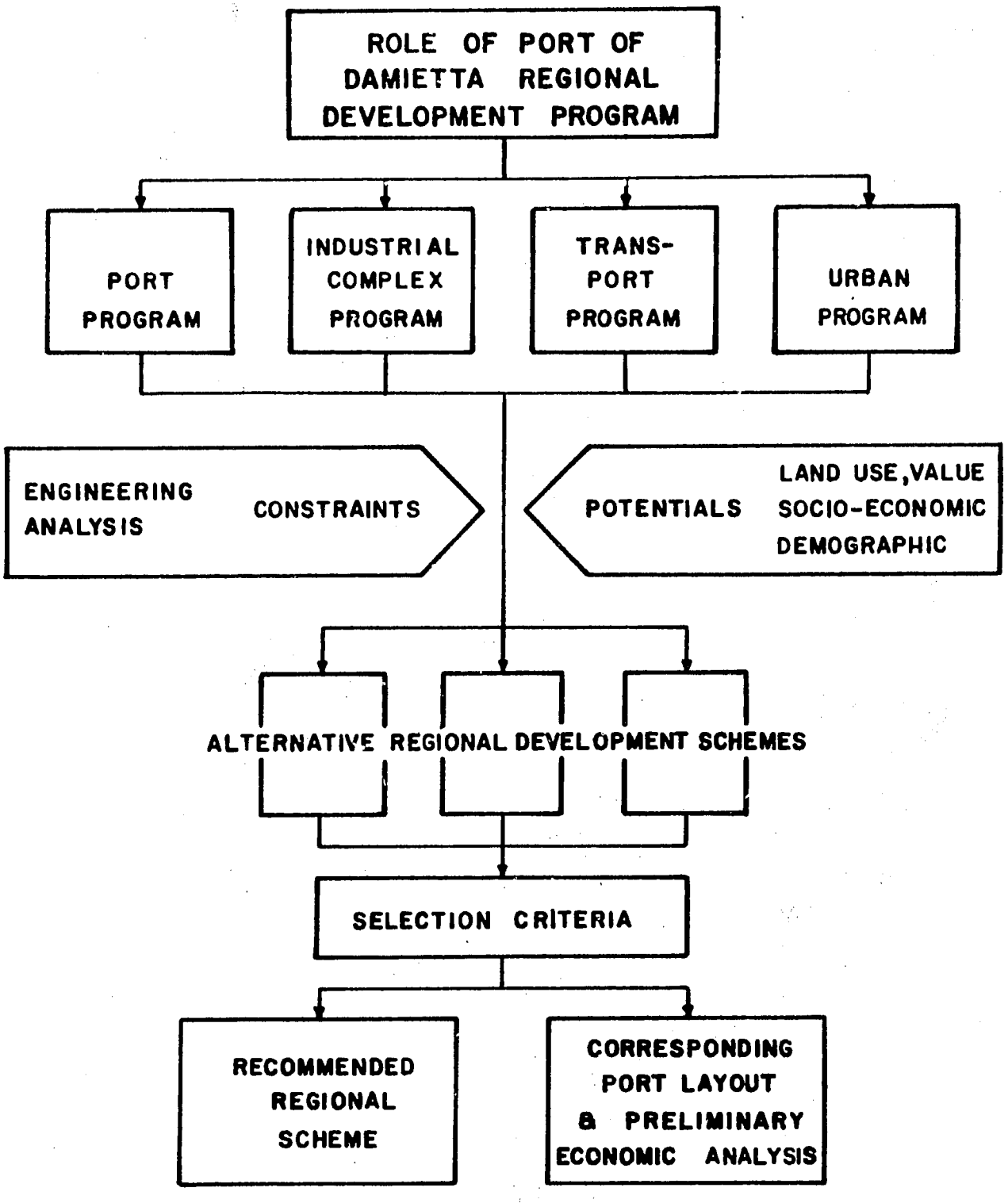

FIGURE 1.1

LOGICAL STRUCTURE OF THE REPORT

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- Existing land uses of the region
- The value of land in the area
- Erosion and sedimentation
- Wind and wave action
- Soil conditions
- Offshore topography
- Optimum breakwater and access channel configuration
- Other

These factors will be further summarized into a "regional constraints and potentials map. This map synthesizes the implications of the above factors for the location of regional activities.

The fourth level of the analysis shown on Figure 1.1 develops a series of alternative regional development schemes which present different configurations of activities, all of which satisfy, to some extent, the constraints and potentials.

The fifth level symbolizes the selection and presentation of the recommended regional development scheme, i.e., that configuration which best satisfies selection criteria. Parallel with the above analysis, alternative port layouts are identified which correspond to the selected regional scheme and the recommended port layout selected.

1.3 SERVICE AREAS OF THE PORTS OF EGYPT

The Alternate Site Evaluation Study[1] concluded that a port on the eastern Mediterranean would be more advantageous than a port located within the Suez Canal. The Development Policy for the Ports of Egypt[2] concluded that, with the aim of minimizing the foreign trade transportation cost outlays of the Egyptian economy, a new major port should be developed at Damietta. As pointed out in the above cited study, the minimum transportation cost savings to the economy resulting from the development of the port over the next least cost routing would be approximately 10 million LE (Egyptian Pounds) in the first year of operation, 1985[3].

The service areas for the ports of Egypt are presented in Figures 1.2 and 1.3. The map of Egypt, it will be noted, has been divided into service areas with each service area labelled by the port through which shipping services to specific foreign origins (or destinations) can be obtained most economically. Each of the illustrations on Figures 1.2 and 1.3 represents a different combination of trade routes and cargo handling categories. The illustration in the upper lefthand corner of Figure 1.2 for instance, shows the least cost port for shippers and consigners located in Benha (pt. 0004) would be Damietta, for container shipments over trade routes via Gibraltar. In terms of the size of its service area, the key role of the Port of Damietta can be seen on these figures.

---

1. Alternative Site Evaluation Study, Port of Port Said Master Plan (Ministry of Housing and Reconstruction 1977)
2. Development Policy for the Ports of Egypt, Strategy for 1980 through 2000 (Ministry of Housing and Reconstruction 1977)
3. Ibid, page 1-4. It should be noted that these savings owing to the operation of the Port of Damietta assume that all other ports are operating at equal productivity with no demurrage.
4. Ibid, pp. 5-1, 5-4. Illustrations taken without modification from original text.

CONTAINER - CARGO ROUTED VIA GIBRALTAR AND MEDITERRANEAN

NEOBULK - CARGO ROUTED VIA GIBRALTAR AND MEDITERRANEAN

CONTAINER - CARGO ROUTED VIA RED SEA

NEOBULK - CARGO ROUTED VIA RED SEA

FIGURE 1.2

SERVICE AREAS FOR PORTS OF EGYPT

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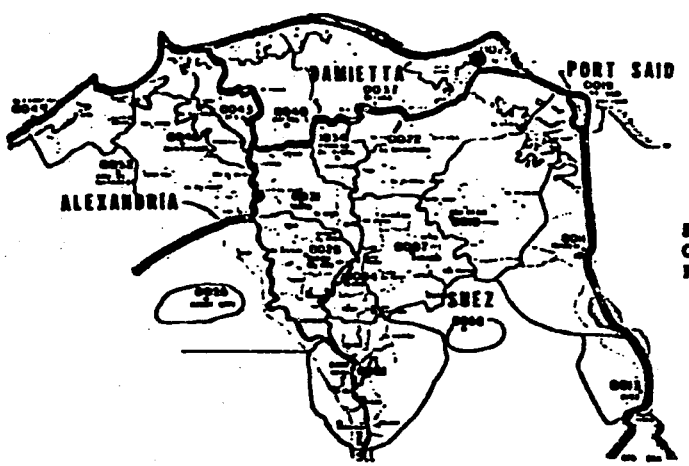
SPECIAL HANDLING - CARGO ROUTED VIA GIBRALTAR AND MEDITERRANEAN

DRY BULK - CARGO ROUTED VIA GIBRALTAR AND MEDITERRANEAN



SPECIAL HANDLING - CARGO ROUTED VIA RED SEA

DRYBULK - CARGO ROUTED VIA RED SEA

FIGURE 1.3

SERVICE AREAS FOR PORTS OF EGYPT

1.4 THE GROWTH OF THE OTHER PORTS OF EGYPT: ALLOCATION OF CARGO TONNAGES

The size of the service area for each of the ports of Egypt does not itself indicate the volume of cargo that will be allocated to that port. The amount of cargo generated by the domestic zones in the service area, together with the demand or supply from the corresponding foreign ports, defines the amount of cargo allocated to the port.[1] Detailed commodity import and export forecasts for all the ports of Egypt, from 1985 to 2000, are given in Appendix A.[2] Figure 1.4 provides an aggregate view of the forecast demand for the services of the ports of Egypt. It will be noted that, in spite of the development of a new port at Damietta, the port of Alexandria together with the new Port of Dekheila must undergo major expansions to accommodate the future demand for services. Figure 1.5 summarizes the cargo tonnages for the ports of Egypt in 1985 and 2000, by cargo handling category.

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1. Ibid, for a description of the operation of the allocation model see Section 2.0.

2. These forecasts, published for the first time herein, are the results of a continuing effort on the part of the consultant to update the cargo throughput forecasts for the ports of Egypt.

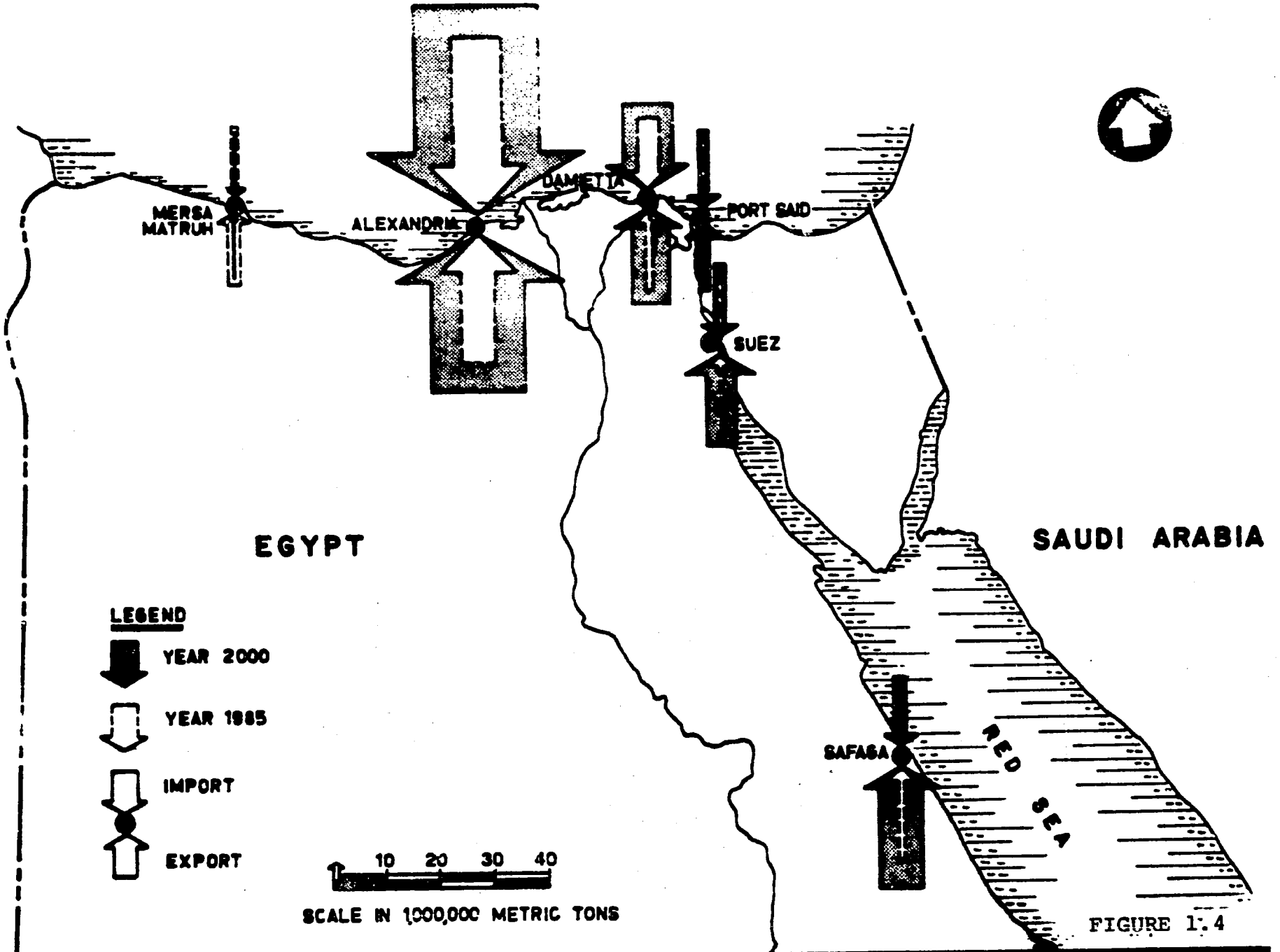

FIGURE 1.4

AGGREGATE PORT THRUPUT (1985-2000)

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CARGO ALLOCATIONS TO THE PORTS OF EGYPT

(NON-CONSTRAINED)

SUMMARY

CARGO HANDLING CATEGORIES	MARSA MATRUH		ALEXANDRIA		DAMIETTA		PORT SAID		ISMAILIA		SUEZ		SAFAGA		TOTAL FOR EGYPT	
	IMPORT	EXPORT	IMPORT	EXPORT	IMPORT	EXPORT	IMPORT	EXPORT	IMPORT	EXPORT	IMPORT	EXPORT	IMPORT	EXPORT	IMPORT	EXPORT
A	1500	200	455000	602910	552610	221610	111710	68190	0	0	68480	77030	232600	101570	1421900	1071510
B	53400	36690	1042330	340580	692720	441550	570030	69460	0	0	204730	84730	242800	339000	2806010	1312010
C	6000	0	331000	468000	1559620	67400	52310	0	0	0	173980	4600	54100	40000	2177010	580000
D	5100	0	7327120	4786410	1976300	80000	561600	48640	0	0	939380	5370	899500	1565590	11709000	6486010
YEAR 1985 TOTAL TONS	66000	36890	9155450	6197900	4781250	810560	1295600	186290	0	0	1386570	171730	1429000	2046160	18113920	9449530
A	3700	64400	921100	5853730	1174400	2121710	261400	532470	0	0	141490	563910	493900	78780	2995990	9615000
B	0	0	1385700	1760490	863310	2213110	311460	369970	0	0	126540	209730	304000	1777700	2991010	6331000
C	0	0	1067900	1775000	3704620	247100	162510	0	0	0	245970	52900	0	75000	5181000	2150000
D	0	0	20369210	7682400	3310100	2826000	1030000	156010	0	0	1659190	4846090	1619500	6782500	27988000	22293000
YEAR 2000 TOTAL TONS	3700	64400	23743910	17071620	9052430	7407920	1765370	1058450	0	0	2173190	6072630	2417400	8713980	39156000	40389000

NOTE: IN METRIC TONS

ALLOCATIONS ARE BASED ON LEAST TRANSPORT COST, IRRESPECTIVE OF CURRENT PORT CONDITIONS.

FIGURE 1.5

1.5 INTERNATIONAL SHIPPING SYSTEM: ROLE OF THE PORT OF DAMIETTA AS A TRANSSHIPMENT TERMINAL

Beyond its role as a port serving the foreign trade of Egypt, the Port of Damietta will also play a major role in international commerce. Owing to its location near the head of the Suez Canal, the Port will provide a facility where steamship lines can interface cargoes bound for destinations other than Egypt. Like the Suez canal, the facility would export transportation services to the international shipping industry. Figure 1.6 provides a conceptual description of the type of services to be provided by the terminal. Section 2 of the report describes in greater detail the preliminary results of analysis as regards the feasibility of the terminal.

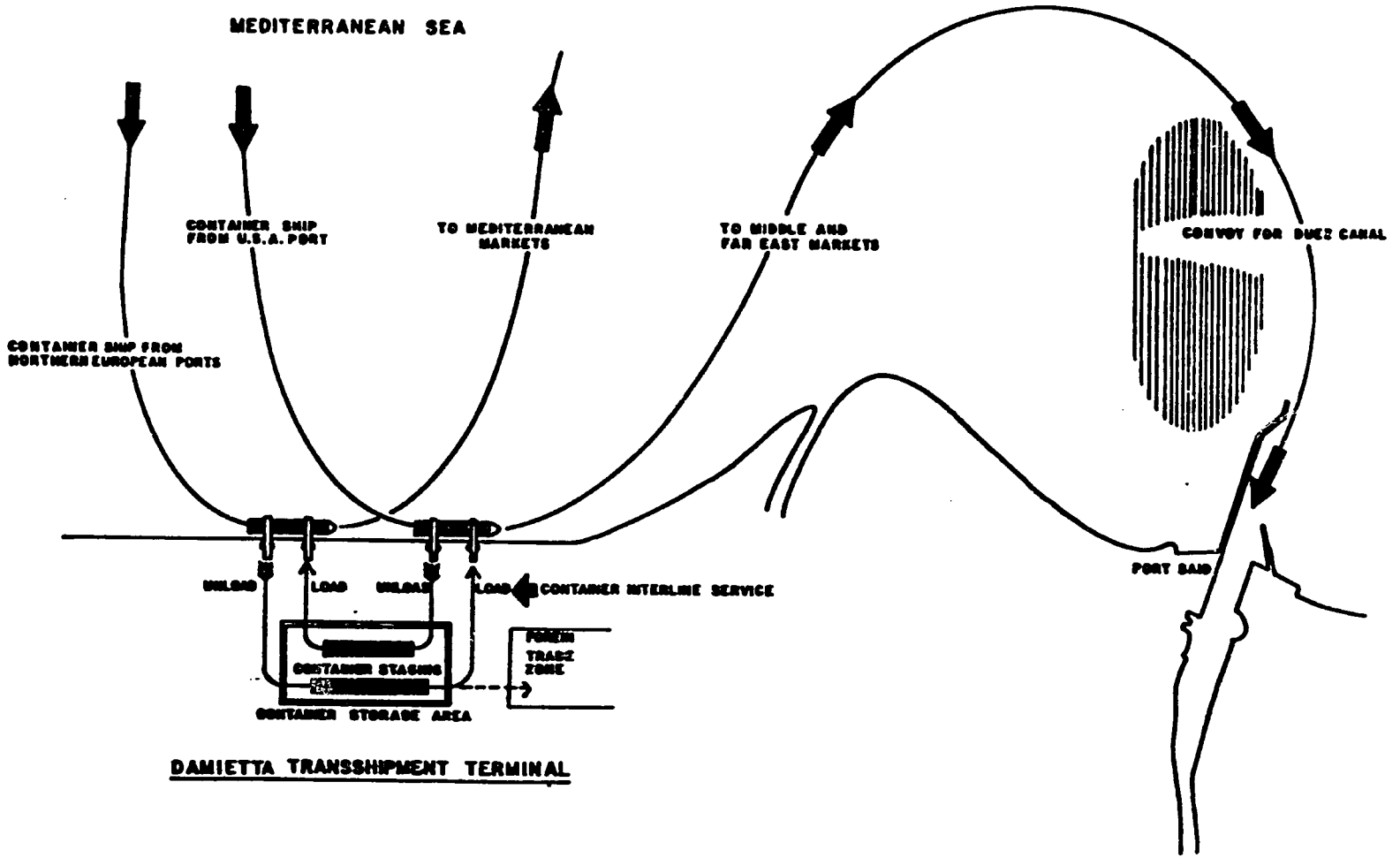
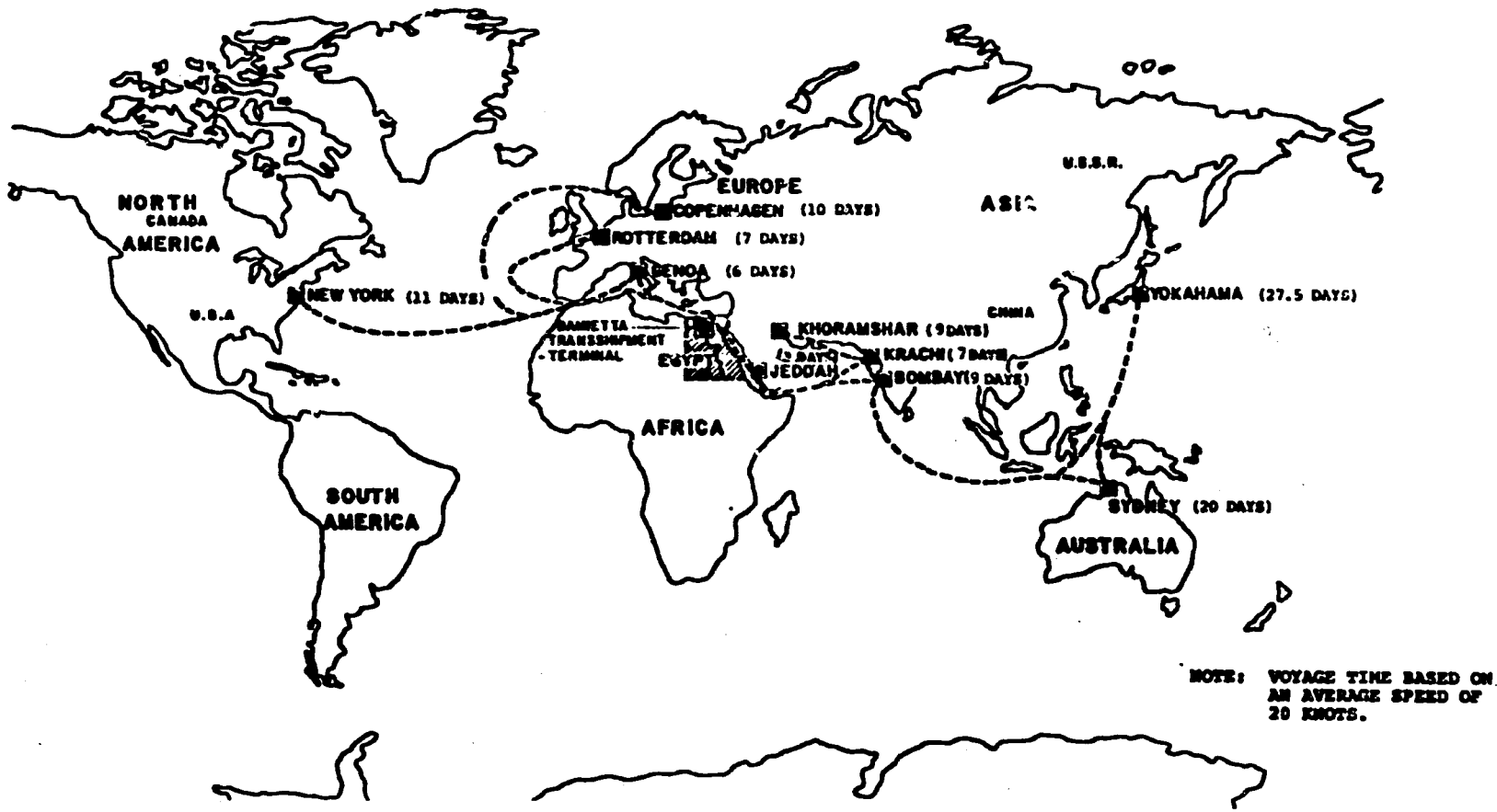


FIGURE 1.6

CONCEPT OF DAMIETTA TRANSSHIPMENT TERMINAL

1.6 INLAND TRANSPORTATION SYSTEM: RELATIONSHIPS OF DOMESTIC AND INTERNATIONAL PORT FUNCTIONS AND ECONOMIC DEVELOPMENT

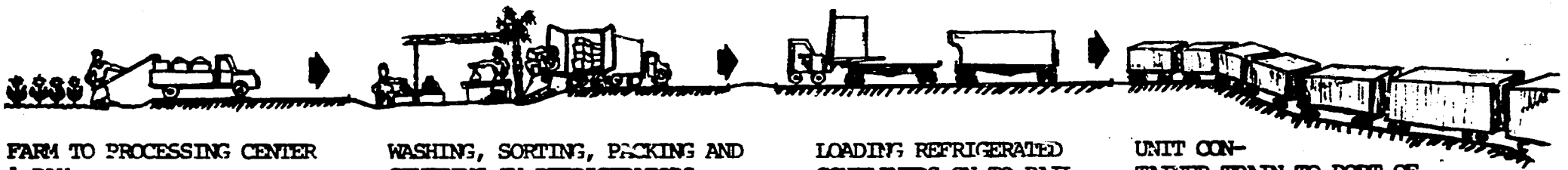
The location of a transshipment terminal within the structure of the Port of Damietta to serve the international shipping industry, will place the port in a key position on international trade routes. While stopping in Damietta for their own purposes (interlining of cargoes) steamship lines can also be expected to encourage the containerized shipment of Egyptian imports and exports on board their vessels. As can be seen on Figure 1.7, containership service to the Port of Damietta will make possible the fastest possible delivery of Egyptian goods to foreign origins or destinations. The importance of this to the economy of Egypt can be understood in light of the role of the Port of Damietta as an outlet for the exports of fresh vegetables and fruits. Utilizing the concept of the "inland port" as described in Figure 1.8, and dealt with in detail in Section 4, these commodities can be containerized and delivered with minimum time lapse and spoilage to foreign markets. In this manner the growth in exports of these and other commodities, key to the future balance of trade of the country, can be maximized.



NOTE: VOYAGE TIME BASED ON AN AVERAGE SPEED OF 20 KNOTS.

FIGURE 1.7

INTERNATIONAL SHIPPING LANES

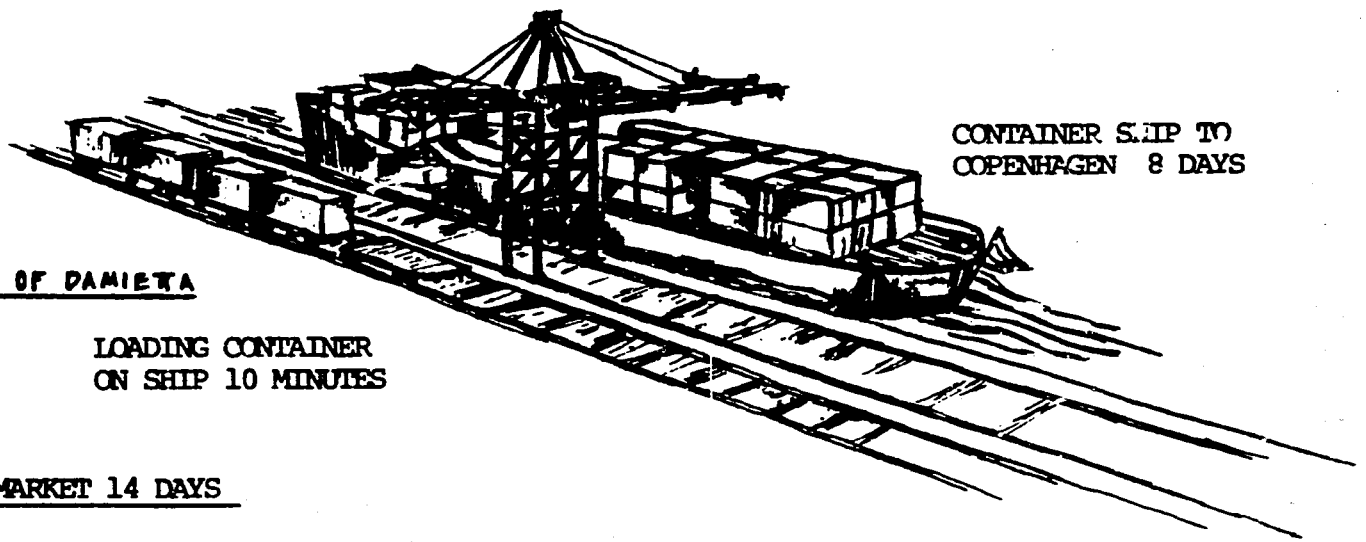


FARM TO PROCESSING CENTER
1 DAY

WASHING, SORTING, PACKING AND STUFFING IN REFRIGERATORS CONTAINERS 3 DAYS

LOADING REFRIGERATED CONTAINERS ON TO RAIL CARS 5 MINUTES

UNIT CONTAINER TRAIN TO PORT OF DAMIETTA 7 HOURS



CONTAINER SHIP TO COPENHAGEN 8 DAYS

PORT OF DAMIETTA

LOADING CONTAINER ON SHIP 10 MINUTES

FARM TO FOREIGN MARKET 14 DAYS

* THE SUCCESS OF EGYPT'S ECONOMIC DEVELOPMENT PROGRAM DEPENDS IN PART UPON ACHIEVING AN EXPORT GOAL OF 3 MILLION TONS OF FRESH VEGETABLES BY 1995

* THE GROWTH OF THE PORT OF DAMIETTA DEPENDS ON THE SUCCESS OF EGYPT'S EXPORTS OF VEGETABLES

* IN TURN, THE SUCCESS OF VEGETABLE EXPORTS DEPENDS ON THE DEVELOPMENT OF THE PORT OF DAMIETTA

FIGURE 1.8

TYPICAL INLAND PORT CENTER

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1.7 INDUSTRIAL DEVELOPMENT AND NEW COMMUNITIES POLICY

The development of a new port to the size envisaged for Damietta can be expected to be accompanied by the large scale expansion of industrial and urban areas. This report deals with this expansion, both in terms of its program and its linkages with other elements of the port region. Specifically, the study analyses the industries that can be expected to locate at Damietta (in the vicinity of the port) owing to the commodity flows through the port. The development of a foreign trade zone is also analyzed. The results of this analysis are described in Section 3 of this report. Sections 5 and 6 cover the future urban growth requirements induced by the port. It is pointed out in Section 6 that, above and beyond important functions related to the handling of cargo, the development of a port at Damietta also serves the goals of Egypt's new communities policy.

2.0

PORT DEVELOPMENT PROGRAM

2.0

PORT DEVELOPMENT PROGRAM

2.1 INTRODUCTION

The function of a port is to provide for efficient and least cost inter and intra modal transfer, inspection, storage, form change, and control of cargo. Cargoes come in various physical forms such as liquid bulk, dry bulk, parcel or neobulk; containerized, palletized, unitized, breakbulk and others.

Ports are critical junctions between major transportation modes. In the chain of transportation, the port is the only link where the cargo comes to rest. Because the port handles, manipulates or services cargo, port costs generally exceed direct ocean transport costs. It is for this reason that today's ports must include time saving devices - usually in the form of specialized berths and cargo handling machinery.

Today, it must be recognized that the function of a port is not to provide a separate and distinct service, but to serve as an integral part of the chain of transport designed to move cargoes from origins to destinations. Ideally, therefore the port should provide a capability for continuous flow of material between land and ocean transport modes.

In planning a new port, the opportunity exists to achieve the aim of efficiency by making a careful analysis of the variables which have an effect on the size and efficiency of the port. In this section the variables are presented and the analysis carried out. The factors weighed are:

- Volumes of cargo, by handling characteristics, expected to move during the foreseeable future.

- Cyclical or seasonal variations of such cargoes.

- Capacity of berths designed for the anticipated handling characteristics based upon the average sized quantities to be moved, the size vessel engaged and the efficiency of the handling methods.

- A rational plan of phasing the construction and introduction of berths into the system over a reasonable period of time.

- Spatial requirements to preserve efficiency of design.

- Employment by functions.

2.2 SUMMARY OF COMMODITY MOVEMENTS

The summary of commodity import and export movements through the port of Damietta projected for the years 1985 and 2000 are shown in Figure 2.1. Tables detailing import and export movements by cargo-handling categories for inland destinations can be found in Appendix B.

SUMMARY OF COMMODITY MOVEMENT THROUGH THE PORT OF DAMIETTA

CARGO HANDLING CATEGORY	COMMODITY	1985 IMPORT	1985 EXPORT	1985 TOTAL THRUPUT	2000 IMPORT	2000 EXPORT	2000 TOTAL THRUPUT
A CONTAINERIZABLE	MEAT	24,900	--	24,900	69,700	--	69,700
	FISH	500	4,000	4,500	--	8,800	8,800
	VEGETABLES	99,700	43,400	143,100	213,800	1,473,800	1,687,600
	CONSUMER GOODS	75,100	31,120	106,220	155,800	64,110	219,910
	CHEMICALS	328,000	--	328,000	684,000	--	684,000
	ELECTRIC MACHINES	24,410	--	24,410	51,100	--	51,100
	COTTON & TEXTILES	--	101,590	101,590	--	116,300	116,300
	FRUITS & NUTS	--	41,500	41,500	--	458,700	458,700
	SUB-TOTAL	552,610	221,610	774,220	1,174,400	2,121,710	3,296,110
B NEOBULK	RAW COTTON	610	41,340	41,950	--	--	--
	FLOUR	106,700	--	106,700	--	--	--
	CEMENT	311,600	--	311,600	--	--	--
	FATS & OIL	259,000	--	259,000	834,000	--	834,000
	TOBACCO	14,810	--	14,810	29,310	--	29,310
	RICE	--	334,600	344,600	--	1,989,400	1,989,400
	OIL CAKE	--	26,910	26,910	--	31,110	31,110
	ONION	--	28,700	28,700	--	192,600	192,600
	SUB-TOTAL	692,720	441,550	1,134,270	863,310	2,213,110	3,076,420
C SPECIAL HANDLING	WOOD	628,200	--	628,200	2,624,400	--	2,624,400
	MACHINERY	123,610	--	123,610	260,410	--	260,410
	IRON & STEEL	807,810	67,400	875,210	819,810	247,100	1,066,910
	SUB-TOTAL	1,559,620	67,400	1,627,020	3,704,620	247,100	3,951,720
D DRY BULK	WHEAT	1,774,000	--	1,774,000	3,218,400	--	3,218,400
	SALT & SULPHUR	22,400	--	22,400	91,700	--	91,700
	IRON & PYRITES	49,400	--	49,400	--	--	--
	CORN & MAIZE	160,500	--	160,500	--	974,200	974,200
	FERTILIZER	--	80,000	80,000	--	83,600	83,600
	CEMENT	--	--	--	--	1,768,200	1,768,200
	SUB-TOTAL	1,976,300	80,000	2,056,300	3,310,100	2,826,000	6,136,100
	TOTALS	4,781,250	810,560	5,591,010*	9,052,430	7,407,920	16,460,350**

* Projected total commodity thruput in 1985.
** Projected total commodity thruput in 2000.

FIGURE 2.1

2.3 MONTHLY VARIATION OF COMMODITIES

Most of the commodites flowing through the port will be well-spaced over the course of the year. Exceptions are: the seasonally produced crops of rice, winter exports of vegetables and onions to Europe and North America, and the summer import of wood and lumber from Europe. As indicated in Figure 2.2 peak demands offset sharp reductions of seasonal commodities to produce a relatively even flow of commodities through the port. Where demands overlap in the spring and fall there may be some surge, however, the design capacity of the berths, will contain sufficient over capacity to absorb these variations.

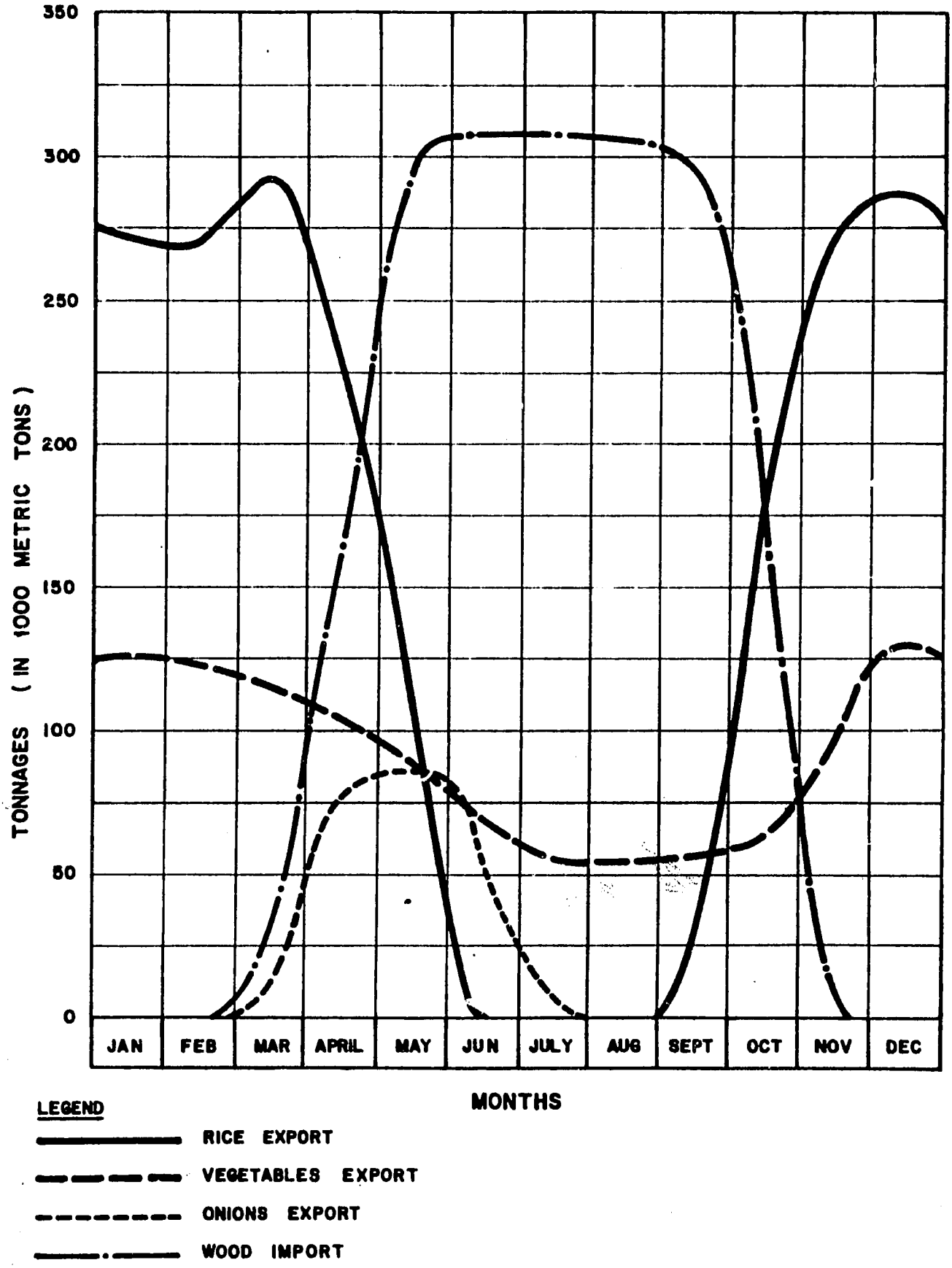

FIGURE 2.2

HARRIS

CYCLES OF SEASONAL COMMODITIES, IMPORT AND EXPORT TONNAGES

2.4 VESSEL SERVICE TO THE PORT

Container traffic through the port will consist of transshipment containers to be interchanged by interline arrangements and containerized goods destined to or originating in Egypt. In the early stages, medium sized ships of 16,000 DWT (Dead Weight Tonnage) class carrying 2,000 tons of cargo per voyage can be expected. As the traffic increases larger ships to 40,000 DWT carrying 10,000 tons will be calling by the year 2000.

Breakbulk cargo is presently being carried in average loads of 500 tons in ships of 10,000 to 15,000 DWT class. By the year 2000, ships of up to 20,000 DWT class can be anticipated with average loads of 1,000 to 1,500 tons. Improved efficiency in cargo handling within the port will permit the capacity of the port to increase, and to reduce the number of additional berths required.

Neobulk cargoes in quantities of 5,000 to 10,000 tons are currently arriving at Egyptian ports in 12 & 16,000 DWT ships. Expected rice exports should increase shipment sizes and attract larger vessels of up to 20,000 tons by the year 2000.

Special cargoes of wood, steel and machinery utilize the same class of ship as breakbulk and neobulk, but shipment lots are in the range of 8,000 to 10,000 DWT of steel and machinery and 6 to 10 million board feet of lumber. By the year 2000, ships of 20,000 DWT should be in this service.

Drybulk shipments of grain are averaging 25,000 tons per ship in up to 70,000 DWT class. Projections by consultants to the Ministry of Supply and Frederic R. Harris, agree that by the year 1995 ships of 100,000 DWT will be bringing cargoes of 40 to 50,000 tons.

Grain discharge productivity will increase from 5,000 tons per day to 15,000 tons permitting the 2 berths initially constructed to handle the volume offered through the year 2000 with reserve capacity sufficient to avoid delays.

The projected ship calls and number of berths required for the cargo throughput during the years 1985 and 2000 are shown on Figure 2.3.

PROJECTED SHIP CALLS AND BERTH REQUIREMENTS

YEAR / TYPE OF CARGO	1985			2000		
	NO. SHIPS	NO. BERTHS	% OCCUPANCY	NO OF SHIPS	NO OF BERTHS	% OCCUPANCY
CONTAINER	424	1	62	340	3	74
BREAKBULK	961	4	70	920	6	75
NEOBULK	226	4	55	308	6	75
SPECIAL	325	3	75	395	5	70
DRYBULK	69	2	60	127	2	62
TOTALS	2005	14	64	1990	22	73

FIGURE 2.3

2.5 INLAND COMMODITY FLOWS

The cargo moving through the Port of Damietta either originates or terminates at points within the Delta down to Cairo. Volumes of cargo at each of the points are shown graphically in Figure 2.4. Rates of growth are quite uniform throughout the area with the exception of Mahalla El Kubra where the production of export cement will bring about an increase in the dry bulk volume from approximately 93,000 tons to more than 2 million tons between the years 1985 and 2000.

A detailed analysis of types and volumes of cargoes moving through Damietta and the mode of transport is contained in Section 4. Complete cargo statistics by commodity are in Appendicies B and C.

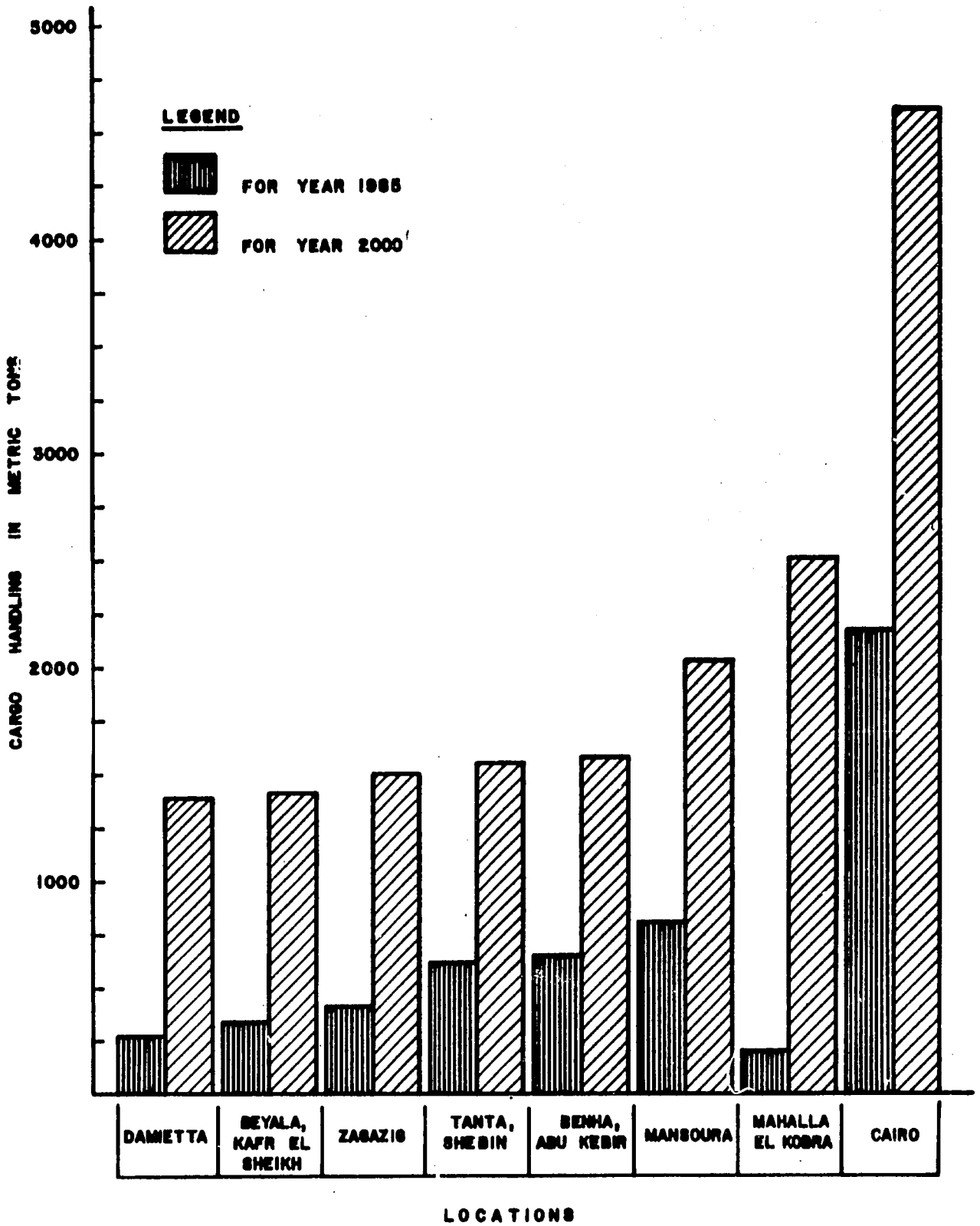

FIGURE 2.4

HARRIS

DISTRIBUTION OF CARGO TONNAGE THROUGH PORT OF DAMIETTA

2.6 OVERVIEW OF PORT ACTIVITIES AND CARGO SYSTEMS LAYOUT

An overview of the Port integrated commodity flows subsystems is provided on Figure 2.5. Denoted are cargo handling systems required to handle the defined commodity mix. For each cargo handling subsystem, the essential activities that must be provided are delineated and the relationships between activites illustrated.

Essentially, this diagram outlines the cargo handling system layout for the port/industrial park/foreign trade zone/transshipment terminal complex when the port is in full operation and offering all of the potential services.

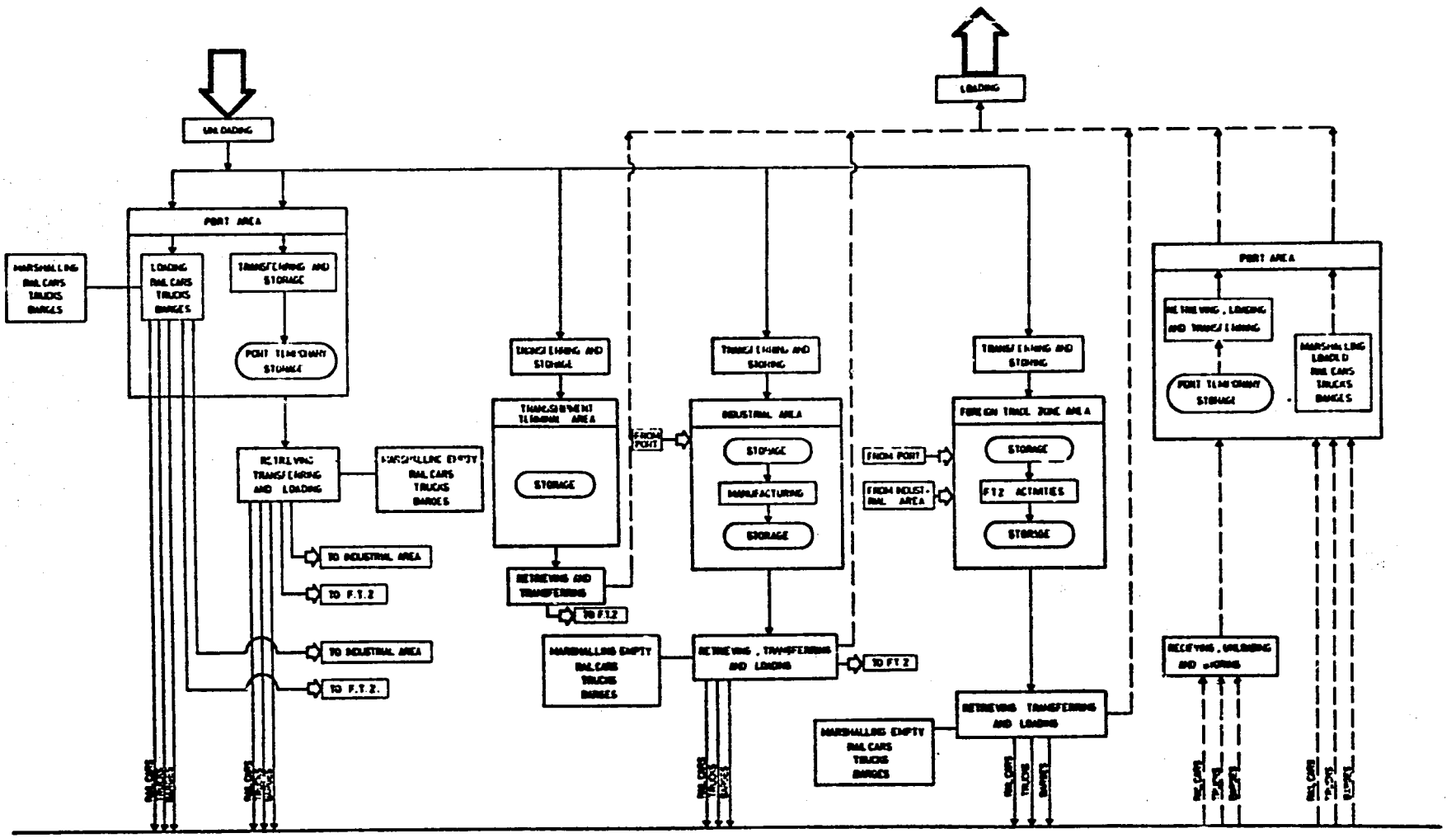

FIGURE 2.5

HARRIS

INTEGRATED COMMODITY FLOW SUBSYSTEMS

2.7 PORT THROUGHPUT CAPACITY

Port capacity is a measurement of the number of cargo units (usually tons) which can move through the port in a unit of time (usually a year). In its simplest form, it is a statement of the productivity of the port workers. The formula is composed of the number of gang shift tons times the number of shifts per day, times the number of work days available during the measurement period.

Tons X shifts X days = capacity

However, this formula does not include economic considerations which assume increasing importance as costs rise. As a rule, whenever vessel waiting time exceeds a ratio of 25% of vessel service (working) time, demmurage or surcharges are applied by the vessel. In order to include this factor in the formula, Frederic R. Harris constructed a Berth Capacity Model which integrates economics and arrives at a least cost percent occupancy rate from which occupancy curves are plotted. By applying the productivity, average vessel load and delay ratio factors to the projected annual throughput, the number of berths required to provide the needed capacity is determined.

2.8 PORT REQUIREMENTS

The computer model analysis of Egyptian foreign trade indicates an increasing demand on the Port of Damietta as a major link in the servicing of that trade. The development of the port has been phased to provide facilities as the throughput demand occurs. Figure 2.6 depicts the spatial requirement for each specialized berth, the number of each type required and the manpower necessary to staff and operate the port in each phase. Administration buildings, maintenance complex and the various other services also require land space. Therefore, total spatial needs for the foreseeable future are all considered in determining the ultimate size and shape of the port.

BERTH REQUIREMENTS IN NUMBER,
SPACE AND MANPOWER

BERTH TYPE	DIMENSIONS	SERVICES	MANPOWER REQUIRED			
			1985	1990	1995	2000
CONTAINER ROLLON/ROLLOFF	WHARF LENGTH 350 M STORAGE AND WORK AREA 100,000 M^2	RAIL & TRUCK	(1) 61	(2) 122	(3) 183	(3) 183
BREAKBULK GENERAL	WHARF LENGTH 200M STORAGE AND WORK AREA 30,000 M^2	RAIL & TRUCK	(4) 796	(5) 995	(6) 1194	(6) 1194
NEOBULK UNITIZED GENERAL	WHARF LENGTH 200M STORAGE AND WORK AREA 30,000 M^2	RAIL & TRUCK	(4) 872	(4) 872	(4) 872	(6) 1308
SPECIAL HEAVY LIFT	WHARF LENGTH 200M STORAGE AND WORK AREA 30,000 M^2	RAIL TRUCK & BARGE	(3) 438	(4) 584	(4) 584	(5) 730
DRY BULK	WHARF LENGTH 300M STORAGE DICTATED BY COMMODITY CHARACTERISTICS	RAIL TRUCK & BARGE	(2) 56	(2) 56	(2) 56	(2) 56
		ADMIN. OVERHEAD	719	740	746	782
		MANPOWER TOTAL	2942	3369	3635	4253

( ) NUMBER OF BERTHS

43

FIGURE 2.6

2.9 INTERNATIONAL TRANSSHIPMENT TERMINAL

2.9.1 The Transshipment Concept

The term "transshipment" as it applies to ocean shipping has a specific meaning. It is the enroute transfer of cargo or containers between two or more vessels in the fulfillment of a port-to-port service. The geographic location where the transfer takes place is the transshipment terminal. Transshipments, however, can take many forms. It can be between different carriers or between vessels of the same carrier. It can be between origin and destination vessel and feeder vessel or between two origin and destination vessels.

The benefits, derived from transshipments, also vary. In broad terms, they are:

- Reduced port-to-port transportation cost
- Increased capacity of the vessel fleet
- Extends market reach, serve ports presently not served
- Increased voyage load factor
- Increased revenue

The benefits are interrelated and will be discussed in detail later in this section.

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2.9.2 Focus on Container And Ro/Ro Shipments

The transshipment analysis forcused on container and roll-on roll-off shipments as the only viable kinds of shipments for the transshipment facility to handle during the early years of its development. Although breakbulk is a potential for transshipment, the integration could cause congestion problems that would adversely effect the efficient flow of containers. Breakbulk cargo generally requires additional handling and covered storage. Also, breakbulk vessels require more time at berth, tying up berthing space. Thus transshipment cargoes should be limited to containerized shipments. This applies only to transshipment cargo, not Egyptian exports and imports or foreign trade zone shipment.

2.9.3 Integrated Terminal Complex

The port of Damietta should be an integrated terminal handling Egyptian exports and imports, foreign trade zone and transshipment cargo simultaneously over the same berths. Since most vessels will carry a mix of cargo, it is not practical from a time, cost and logistical viewpoint to develop separate facility for transshipment. To do so would reduce the economic benefits to carriers and discourage the use of the port for transshipment.

Vessels calling at the port will also be a mix of container, roll-on roll-off, breakbulk and lash. Since vessel types arrive, on a random basis all berths should be able to accommodate all types of vessels and cargo. The port complex must be integrated to handle all cargoes.

2.9.4 Transshipment Concepts

There are two basic types of transshipment transactions - feeder services and interline arrangements. Both types are described below.

2.9.4.1 Feeder System

Feeder systems are the use of smaller vessels, referred to as feeder ships, that operate out of a load center port, such as the port proposed for Damietta, that deliver and pickup cargo from other ports. Large containerships, referred to as origin and destination vessels, carry the cargo between load center ports. Feederships are small in size, frequently they are tug-barge operations that have low operating costs. By minimizing the number of ports-of-call of the larger vessel, the annual number of voyages can be increased which results in expanded cargo capacity.

Feeder services benefit ocean carriers in the following ways:

- Expand the number of ports to which the carrier can offer port-to-port services.

- Increased capacity of existing fleet of vessels by minimizing the number of ports-of-call, reducing voyage time and increasing the number of voyages of the big vessel.

- Both of the above benefits result in an improved equipment utilization and increased annual revenue per vessel.

- Reduced operating costs by the use of the smaller less costly vessels to pick-up and deliver cargo.

2.9.4.2 Interline Systems

Interline systems can be between two or more carriers or with the same steamship company. Containerized cargo is transferred between vessels enroute, each vessel serving different world markets. Two carriers agree to interchange cargo or containers in order to provide a service between two ports or regions where neither carrier calls on both ports. For example: a United States carrier operating between New York and the Eastern Mediterranean ports enters into an interline agreement with a European carrier operating between Bremen and the Persian Gulf. The United States carrier can solicit cargo for the Mid-East from his New York customers, carry the cargo to a Mediterranean port where it is turned over to the European carrier for delivery to Mid-East. Thus the United States carrier has increased his market area, but shares the total revenue with the European carrier. Most interline agreements are for containerized shipments only.

Cargo or containers from one vessel are loaded onto another vessel for carriage to the destination port. The transshipment point is a geographic location where the loading takes place. The two vessels can be owned by the same company or by different companies.

2.9.5 Trade Routes

There are 30 major container trade routes connecting world markets. Of these, 6 go through the Suez Canal. In addition, there are 4 trade routes that serve the Mediterranean and Black Sea ports. Containership and Roll-on routes are candidates for the transshipment facilities. A detailed description of the trade routes via the Suez Canal is provided in Figure 2.7.

MAJOR WORLD CONTAINER TRADE ROUTES

1. EUROPE ORIGIN OR DESTINATION TRADE ROUTES VIA SUEZ CANAL

1.1 Mediterranean and Black Sea

- o United Kingdom and Eire Ports to Mediterranean and Black Sea Ports
- o Scandinavia and Baltic Ports to Mediterranean and Black Sea Ports
- o Europe Ports to Mediterrean and Black Sea Ports

1.2 Asia

- o United Kingdom and Eire Ports to India, Persian Gulf, Red Sea, Pakistan and Burma
- o Scandivania and Baltic Ports to India, Persian Gulf, Red Sea, Pakistan and Burma
- o Europe Ports to India, Persian Gulf, Red Sea, Pakistan and Burma
- o United Kingdom and Eire Ports to Indonesia, Malaysia and Singapore
- o Scandinavia and Baltic Ports to Indonesia, Malaysia and Singapore
- o Europe Ports to India, Persian Gulf, Red Sea, Pakistan and Burma
- o United Kingdom and Eire Ports to Far East
- o Scandinavia and Baltic Ports to Far East
- o Europe Ports to Far East

1.3 Africa

- o United Kingdom and Eire Ports to East Africa
- o Scandinavia and Baltic Ports to East Africa
- o Europe Ports to East Africa

1.4 Australia

- o United Kingdom and Eire Ports to Australia and New Zealand
- o Scandinavia and Baltic Ports to Australia and New Zealand
- o Europe Ports to Australia and New Zealand

2. UNITED STATES ORIGIN OR DESTINATION TRADE ROUTES VIA SUEZ CANAL

2.1 Mediterranean and Black Sea

- o U.S. North Atlantic Ports to Mediterranean and Black Sea Ports
- o U.S. South Atlantic and Gulf Ports to Mediterranean and Black Sea Ports.

2.2 Asia

- o U.S. Atlantic and Gulf Ports to India, Persian Gulf, Red Sea, Pakistan and Burma
- o U.S. Atlantic and Gulf Ports to Indonesia, Malaysia and Singapore

FIGURE 2.7

2.9.6 Ocean Carrier Oriented Financial Evaluation

The potential financial impact on carriers' operating revenue and profits, as a result of implementation of feeder services and/or interline agreements, are being analyzed by means of a computerized transportation network model. Preliminary results indicated that both concepts can have very favorable impacts on carriers' gross profits. Proforma statements comparing the operating costs and revenues with and without transshipment services are provided in this section. They indicate the magnitude of benefits that carriers can derive from utilization of the concepts.

The transportation network model is comprised of selected trade routes and selected ports on each trade route. The aim of the model is to calculate the total voyage costs per vessel over alternative routing -- with transshipment services and without transshipment services -- and forecast the annual net operating profiles by vessel. By comparing the net operating revenues and profits, the potential benefits from transshipment services are derived.

Summarized on Figure 2.8 are selected trade routes and ports that comprise the network model. The model contains two containerships:

- Feeder ship: 300 TEU Capacity
16 knots

- Origin/Destination Containership: 1595 TEU Capacity
23 knots

SELECT TRADE ROUTES AND PORTS THAT COMPRISE THE TRANSPORTATION NETWORK MODEL

1. **United States Atlantic and Gulf Ports to Eastern Mediterranean, Black Sea and Red Sea Ports**

New York	Foss	Odessa	Yenbo
Baltimore	Genoa		Jeddah
Norfolk	Naples		Port Sudan
Savannah	Piraeus		
Houston	Damietta		

2. **United States Atlantic and Gulf Ports to Asia**

New York	Damietta	Bombay
Baltimore	Bahrain	Colombo
Norfolk	Kuwait	Madras
Miami	Bandar Abbas	Calcutta
New Orleans	Jeddah	Chittagong
Houston	Karachi	

3. **Europe to Asia and Australia**

South Hampton	Damietta	Bombay	Australia
Rotterdam		Calcutta	
Le Harve		Bangkok	
		Yokohama	
		Hong Kong	
		Keelung	

FIGURE 2.8

Voyage cost factors used in the model are:

a. Time in Port

- The fully allocated vessel cost per day calculated as follows:
  - $28,232 for the O & D vessel
  - $11,382 for the feeder vessel

- Days the vessel spends in port per voyage is a function of the rate of container loading and unloading (20 containers per hour at United States, European and Damietta ports and 15 per hour at other ports). An additional 4 hours of dockage time was assumed for each port-of-call.

b. Time At Sea

- The fully allocated vessel cost per day was calculated at:
  - $38,600 for the O & D vessel
  - $13,120 for the feeder ship

- Total days at sea is a function of nautical miles and speed of vessel, plus a delay factor of 24 hours for the Suez Canal.

c. Container Loading and Unloading Cost

This cost was estimated at $150.00 per lift, whether container was full or empty.

The transshipment cost at Damietta was estimated at $300.00 per container.

2.9.7 FINANCIAL EVALUATION OF FEEDER SERVICES

The two most likely feeder services to operate out of the Port of Damietta are to Eastern Mediterranean and Black Sea ports and to the Red Sea ports. Figures 2.9 and 2.10 are financial proformas for each service, comparing the total and net operating revenues with a feeder service and without a feeder service.

The scenario assumes that the O & D vessel makes direct calls on the U.S. and Western Mediterranean ports, but uses a feeder service to ports in the Eastern Mediterranean and Red Sea. Both proformas show that the routing using the feeder result in significant financial benefits to the carriers from two sources:

a. By using the smaller less costly vessel to service the Eastern Mediterranean and Red Sea ports, total operating costs are reduced and net operating revenue increased.

b. More significant, however, is when feeder ships are used for portions of the voyages, total voyage time for the O & D vessel is reduced resulting in increased number of voyages per year. Thus feeder services increase the capacity of the fleet without adding new ships.

2.9.8 FINANCIAL EVALUATION OF INTERLINE SERVICES

Interline arrangements can take many forms. The three main forms which are evaluated herein are:

INTERLINE AGREEMENT BETWEEN U.S. AND EUROPEAN CARRIERS WITH EACH SERVING DIFFERENT WORLD MARKETS

Described on Figure 2.11

PROFORMA

FEEDER VS. DIRECT SERVICE TO
EASTERN MEDITERRANEAN PORTS

Vessels Profile	TEU Capacity	Knots	Costs Per Day in Port	Costs Per Day at Sea
Origin/Destination Vessel	1595	23	$28,232	$38,600
Feeder Vessel	300	16	$11,392	$13,120

Alternative Routings

Direct Service: New York, Baltimore, Savannah, Foss, Genoa, Naples, Damietta, Beirut, Istanbul, Odessa, Piraeus, New York

Direct/Feeder Service:
Direct: New York, Baltimore, Savannah, Foss, Genoa, Naples
Transshipment: Damietta
Feeder: Beirut, Istanbul, Odessa and Piraeus

Cost Comparison

	Factor	Direct/Feeder	Factor	Direct
Loading Containers(1)	1276-40ft. containers(2)	190,000	same	190,400
Days in Port				
Direct Vessel	8 days	211,740	11 days	310,552
Feeder Vessel	4.5 days	51,264		
Days at Sea				
Direct Vessel	22.0 days	849,200	25 days	965,000
Feeder Vessel	7.0 days	91,840		
Unloading Containers(1)	1276-40 ft. containers	190,400	same	190,400
Transshipment	320-40 ft. containers	64,000		
Port Changes				
Direct Service	7 ports	37,478	11 ports	58,894
Feeder Service	5 ports	5,250		
Direct Operation Costs Per Voyage		1,691,581		1,719,246
Voyages Per Year	12.0		10.0	
Average Revenue Per 40 ft. Container	$3,500	$ 3,907,750		$ 3,907,750
Potential Annual Gross Revenue	12 Voyages	$46,893,000	10 Voyages	$39,077,500
Estimated Annual Gross Revenue		$46,893,000		$39,077,500
Estimated Annual Operating Costs		$20,298,922		$17,152,490
Net Operating Revenue		$26,594,078		$21,925,010

(1) Round trip cost to load a 40 ft. container onto ship is $150.00. The same rate for off loading, full or empty.

(2) Assumes that vessel is operating at 80% capacity to Mediterranean ports and 60% capacity to U.S. ports. Container left used in calculations includes empties.

FIGURE 2.9

PROFORMA

FEEDER VS. DIRECT SERVICE TO
RED SEA PORTS

Vessels Profile	TEU Capacity	Knots	Costs Per Day in Port	Costs Per Day at Sea
Origin/Destination Vessel	1595	23	$28,232	$38,600
Feeder Vessel	300	16	$11,392	$13,120

Alternative Routings

Direct Service: New York, Baltimore, Houston, Foss, Genoa, Piraeus, Damietta, Yenbo, Jidda, Port Sudan, New York

Direct Feeder Service:
Direct: New York, Baltimore, Houston, Foss, Genoa, Piraeus, Damietta, New York
Transshipment: Damietta
Feeder: Yenbo, Jidda, Port Sudan

Cost Comparison

	Direct/Feeder Factor	Direct/Feeder Cost	Direct Service Factor	Direct Service Cost
Loading Containers (1)	1276-40 ft.	$ 190,400	1276-40 ft.	$ 190,000
Days in Port				
Direct Vessel	7.4 days	211,740	9.5 days	268,204
Feeder Vessel (2)	6.5 days	62,656		
Days at Sea				
Direct Vessel	26.5 days	1,022,900	31.5 days	1,215,900
Feeder Vessel	5.5 days	72,160		
Unloading Containers (1)	1276-40 ft.	190,400		190,400
Transshipment	320-40 ft.	64,000		
Port Charges				
Direct Vessel	7 ports	37,478	10 ports	53,540
Feeder Vessel	2 ports	4,200		
Canal Charges				
Feeder Vessel	2 passages	14,450		
Direct Vessel			2 passages	68,700
Total Voyage Operating Costs		$ 1,870,384		$ 1,986,844
Number of Voyages Per Year (3)	3.4 days	10.5	41 days	8.8
Estimated Annual (4) Revenue	$3.6 million/ voyage	37,869,000		31,486,400
Estimated Annual Operating Cost		19,639,032		17,484,227
Net Operating Profit		$17,929,968		$14,003,173
Net Differential		+3,927,795		

(1) Round trip charge for loading or unloading containerie $150.00 per lift, full or empty. Assume that vessel is always carrying 80% of container capacity.

(2) Assume that feeder service operates 12 day service to interface with 12 day service of direct vessel.

(3) Direct/Feeder service requires 3 direct vessels offering 12 days service and 1 feeder vessel with 12 day service. For direct service, 4 vessels are required offering 11 day service.

(4) Assumes 80% cargo capacity U.S. to Mediterranean/Red Sea and 60% cargo capacity Mediterranean/Red Sea to U.S. Feeder service 100% of containers are full to Red Sea and only 10% are full from Red Sea. Estimated revenue per 40 ft. container: $3,500 to Mediterranean ports and $4,500 to Red Sea Ports.

FIGURE 2.10

PROFORMA

INTERLINE AGREEMENT BETWEEN EUROPEAN AND U.S. CARRIERS SERVING DIFFERENT MARKET AREAS

Vessels Profile: 1595 TEU, 23 Knots, $28,232 per day in port, $38,600 per day at sea

Routing: (U.S. Carrier) New York, Norfolk, Houston, Damietta, Bahrain, Kuwait, and Bandar Abbas
(European Carrier): South Hampton, Rotterdam, Le Harve, Damietta, Bombay, Calcutta and Bangkok
Transshipment: Damietta

	Interline Routing		Non Interline[1]	
U.S. Service	Factors	Costs	Factors	Costs
Loading Container[2]	90% capacity	$ 107,662	75% capacity	$ 89,718
Days in Port[3]	9 days	225,857	7	197,624
Days at Sea	37 days	1,428,200	37	1,428,200
Transshipment	240 TEU's	48,000		
Unloading Container	1435 TEU's	107,662	1196 TEU's	89,718
Port Charges	8 ports	42,832	6 ports	32,124
Suez Canal	2 passages	68,700	2 passages	68,700
Total Operating Costs Per Voyage	Round Trip	$2,028,912		$1,906,084
Estimated Operating Revenue Per Voyage[4]	$3,800	$4,681,325		$3,944,650
Estimated Operating Costs Per Voyage		2,652,413		1,906,084
Net Operating Revenue Per Voyage		$2,652,413		$2,038,566
Net Annual Operating Profits (8 voyages)		$21,219,304		$16,308,528
Net Differential		$ 4,910,776		

(1) The Non-Interlining service does not stop at Damietta.
(2) Assumption: By interlining, vessel increases payload by 15%.
(3) Assumption: Vessel using transshipment terminal receives preferential placement on canal convey scheduling.
(4) Assumption 90% and 75% revenue load factor outbound and 70% and 55% revenue load factor inbound.
(5) The foreign carrier interlining would receive equivalent scope of increased revenues.

FIGURE 2.11

INTERLINE AGREEMENT BETWEEN EUROPEAN CARRIERS SERVING DIFFERENT WORLD MARKETS
Described in Figure 2.12

INTERLINE ARRANGEMENT OF VESSELS OPERATED BY SAME CARRIER
Described on Figure 2.13

2.9.9 United States Liner Tonnage By Trade Routes

Summarized on Figure 2.14 are United States exports and import tonnages for the selected trade routes. Based on typical container stowage factors, the number of TEU's are also shown for each trade route.

Shown on Figure 2.15 is the total volume of general cargo that moved through the Suez Canal during 1977. The Figure also shows the origins and destinations of the cargo north and south of the canal. The table also denotes containerized cargo tonnages and estimated number of TEU's, calculated on the basis of 12 tons per TEU.

2.9.10 Potential Transshipment Tonnage, Savings and Revenues

Preliminary estimates of the market in terms of containers handled per year, for transshipment services are as follows:

FORECAST VARIENT	CONTAINER FORECAST IN TEU'S 1985	2000
High	285,300	464,900
Medium	152,200	247,900
Low	95,100	154,800

Using a weighted average of cost savings to shipping lines,[1] see Figures 2.9 through 2.13, shipping lines will benefit from the existence of the Port of Damietta transshipment terminal by saving on the average $217 per container.

1. Varients defined on basis of percentage of total market captured.

PROFORMA

INTERLINE AGREEMENT BETWEEN EUROPEAN CARRIERS
SERVING DIFFERENT WORLD MARKETS

Vessels Profile: 1595 TEU's, 23 Knots, $28,232 per day in port, $38,600 per day at sea

Routing: (European Carriers[1]) South Hampton, Rotterdam, Le Harve, Karachi, Colombo and Calcutta
(European Carriers[2]) Helsinki, Stockholm, Copenhagen, Oslo, Damietta, Yokohama, Hong Kong and Keelung
(Transshipment): Damietta

			Interline Routing	
European Carrier #1	Factor	Costs	Factor	Costs
Loading Container[2]	85% Load Factor	$ 203,362	75% Load Factor	$ 179,400
Days in Port[3]	7.4 days	208,917	5.6 days	158,099
Days at Sea	47.2 days	1,821,920	46.9 days	1,810,340
Transshipment	160 TEU's			
Unloading Container	85% Load Factor	203,362	75% Load Factor	179,400
Port Charges	9 ports	48,186	7 ports	37,478
Suez Canal	2 passages	68,700	2 passages	68,700
Total Operating Costs Per Voyage		$2,554,447	RT	$2,433,417
Estimated Operating Per Voyage	$3,700/40 ft.	$5,016,275		$4,426,125
Estimated Operating Costs Per Voyage		2,554,447		2,433,417
Net Operating Revenue Per Voyage		$2,461,828		$1,992,708
Net Annual Operating Profit	6.6 voyages	$16,248,064	6.9 voyages	$13,749,685
Net Differential		$ 2,498,379		

(1) The Non-Interlining service does not stop at Damietta.
(2) Assumption: By interlining, vessel increases payload by 15%.
(3) Assumption: Vessel using transshipment terminal receives preferential placement on canal convey scheduling.
(4) European Carrier #2 will benefit of equivalent scope.

FIGURE 2.12

PROFORMA

INTERLINE VESSELS FROM SAME STEAMSHIP COMPANY

Vessels Profile: 1595 TEU's, 23 Knots, $28,232 per day in port, $38,600 per day at sea

Routing: (U.S. Vessel #1) U.S. North Atlantic Ports to Jeddah, Karachi, and Bombay
(U.S. Vessel #2) U.S. Gulf ports to Colombo, Madras, Calcutta and Chittagong
(Transshipment): Damietta

	Two Vessel Interline Routing (1)		Two Vessel Non-Interline Routing (2)	
U.S. Services	Factor	Costs	Factor	Costs
Loading Containers	85% Capacity	$ 406,800	85% Capacity	$ 406,800
Days in Port #1	8.2 days	463,005	7.0 days	395,248
#2	8.2 days		7.0 days	
Days at Sea #1	34.1 days	2,717,440	37.2 days	3,142,040
#2	36.3 days		44.2 days	
Transshipment	1,100 Containers	220,000		
Unloading Containers	1,356 TEU's	406,800	1356 TEU	406,800
Port Charges	16 ports	85,664	18 ports	96,372
Suez Canal Charges	4 passages	137,400	4 passages	137,400
Total Operating Costs Per Voyage for 2 Vessels	2 RT	$4,437,109	2 RT	$4,584,660
Estimated Operating Revenue (3)	$4,000/40 ft.	$8,613,000		$8,613,000
Estimated Operating Costs	4,437,10	4,437,109		4,584,600
Net Operating Revenue		$4,175,891		$4,029,400
Net Annual Operating Profits - Avg. 8.3 voyages/vessel		$34,659,895	Avg. 7.5 voy/vessel	$30,220,500
Net Differential		$ 4,439,395		

(1) Two vessels, each calling at select ports, with transshipment at Damietta

(2) Two vessels, both calling at all ports

(3) Assume 85% load factor eastbound and 50% load factor westbound

FIGURE 2.13

U.S. LINE TONNAGES BY TRADE ROUTE
1977

Trade Routes	Total Tons	Containerizable Tonnage	Number of TEU's	Total Tons	Containerizable Tonnage	Number of TEU's
1. U.S. Atlantic & Gulf Ports & Azores, Med. & Black Sea	2,555,500	894,425	74,535	1,825,000	638,750	53,229
2. U.S. Atlantic & Gulf Ports & India, Persian Gulf, Red Sea	2,283,000	684,900	57,075	592,000	177,600	14,800
3. U.S. Atlantic & Gulf Ports & Malaysia & Indonesia	495,000	99,000	8,250	776,000	155,200	12,933
TOTAL	5,333,500	1,678,325	139,860	3,193,000	971,550	80,962

FIGURE 2.14

GENERAL AND CONTAINERIZED CARGO MOVEMENTS
VIA THE SUEZ CANAL BY TRADE ROUTES
1977

Origins and Destinations of Cargo North of the Canal	General Cargo Tonnage (Short Tons)		Containerized Cargo Tonnnage (Short Tons)	Estimated Number of Container (TEU's)
North & Western Europe & U.K. Ports	23,201,727	27.9%	5,313,081	442,757
Baltic Sea Ports	2,812,331	3.6%	644,010	53,668
North Mediterranean Ports	19,608,194	25.1%	4,490,179	374,181
East & Southeast Mediterranean Ports	7,812,029	10.0%	1,788,914	149,076
West & Southwest Mediterranean Ports	3,281,052	4.2%	751,345	62,612
Black Sea Ports	13,046,088	16.7%	2,987,490	248,958
American Ports	6,562,104	8.4%	1,502,690	125,224
Others	1,796,767	2.3%	411,451	34,288
TOTAL	78,120,292	100%	17,899,160	1,490,764
Origins and Destinations of Cargo South of the Canal				
Red Sea Ports	13,983,533	17.9%	3,202,160	266,846
East Africa & Aden.	3,906,014	5.0%	894,458	74,538
India, Pakistan, Sri-Lanka & Burma	11,718,044	15.0%	2,683,374	223,615
Arabian Gulf Ports	21,717,441	27.8%	4,973,186	414,433
Southeast Asia & Sunda Islands	11,014,961	14.1%	2,522,372	210,198
Far East	12,186,766	15.6%	2,790,709	232,559
Australia	3,359,172	4.3%	769,234	64,103
Others	234,361	.3%	53,667	4,472
TOTAL	78,120,292	100%	17,889,160	1,490,764

FIGURE 2.15

Although subject to change, current indications are that beyond the $150/container movement to be charged by the port for its services, the port can also absorb 25% of the shipping line savings and still remain competitive. The estimated charge per container movement would be: $150 unload + $150 load + $54 = $354/load/unload. Assuming these estimates prove out, annual gross revenue to the terminal in 1985 would be $33.6 million, at which approximately 28% would be net revenue, or $9.4 million.

3.0

INDUSTRIAL DEVELOPMENT PROGRAM

3.0

INDUSTRIAL DEVELOPMENT PROGRAM

3.1 PURPOSE OF SECTION

The purpose of this section is to describe, in preliminary form, the basic characteristics of the industries proposed for the Damietta port complex. The economic activities discussed are limited to those which will expand or be established as a direct consequence of the new center of growth created by a major international seaport located at Damietta.

The industries examined are those identified by research as being directly related to the import-export commodity flows through the port. These industries depend upon foreign trade through a combination of input requirements and export potentials. Activities have been isolated by a detailed examination of the resource endowment of the port hinterland and of the existing economic structure of the Damietta area. A second category of industry is indicated by a consideration of the activities that would be attracted to the Damietta region by the presence of the port, in order to utilize the favorable location in terms of comparative transport costs, access to imported inputs and export markets as well as the entire range of specialized services provided by an international shipping facility. The analysis does not, however, contemplate the growth of commercial and industrial activity induced by the heightened income generated by the port, that is, not directly related to the import/export flow. It can be expected that these changes will be substantial and beneficial, but are not investigated at this level of analysis.

The underlying assumption of this section is that a seaport provides a dynamic stimulus to the economy of the region in which it is located through the direct linkage created to foreign markets. The level of trade, along with the services that make up a port, constitute a pole of growth which radiates from the port to the interior. Given Egypt's natural advantages in agricultural resources, a large labor pool, and an integrated national market, increased foreign trade will permit a heightened degree of economic activity, beyond the level created by internal resources and demand.

This section discusses the nature of the proposed port industrial capacity in terms of the kind of activity, employment generation and land requirements from 1985 to 2000. The results of this investigation have been taken into consideration in the planning and layout of the port facilities. The outline does not analyze the characteristics of the port itself, which is projected to handle a thruput of 16,500,000 tons of cargo, employ approximatly 6,000 workers and occupy 12.5 million square meters of land by the year 2000. (See Figure 3.1).

The analysis is the product of consultations with various ministries and agencies of the A.R.E., of statistics supplied by official sources concerning existing programs and projections of the future growth of the public and private sectors, and of interviews with businessmen operating industries that are included in the port complex.

The time frame of this section, covering the period from 1985 to 2000, requires that the conclusions and plans be periodically revised in line with unforeseen developments and updated policy options.

EMPLOYMENT IN PORT OPERATIONS

	1985	1990	1995	2000
STAFF REQUIREMENTS				
MANAGEMENT AND OFFICE	284	284	292	292
SUPERVISORS, FOREMEN & INSPECTORS	217	217	277	349
TECHNICIANS, REPAIRMEN & MECHANICS	2754	4033	4097	4169
EQUIPMENT OPERATORS	181	211	343	426
LABORERS	469	654	666	690
TOTAL	3906	5460	5675	5926
LAND REQUIREMENT (M^2)	12250000	M^2		

FIGURE 3.1

3.2 EXISTING INDUSTRIAL ACTIVITIES

The building of a Port at Damietta will obviously stimulate the expansion of economic activity in that region. A number of industries that currently occupy an important place in the local economy can be expected to utilize their existing base to exploit the opportunity presented by the seaport, through the penetration of export markets, the lowering of input costs via transportation savings thereby strengthening their position in the Egyptian market, a greater level of processing prior to sale, or some combination of these trends.

3.2.1. VEGETABLES, FRUITS, AND RELATED PRODUCTS

Damietta is located in one of the most fertile agricultural zones in the world, the Nile Delta. The prodigious productive power of the land and the skill of the local farmers is legendary. Based on this situation, the port of Damietta will provide the location for an agro-industrial complex which will allow optimum utilization of this natural advantage. Prime quality vegetables and fruit will be exported in refrigerated containers to markets in the Middle East and in Europe during the off season months. These exports are of great growth potential. In addition to foreign exchange earnings much needed by Egypt, these exports will help increase the income of the poorer sectors of local society through the purchase of their products at a premium price, and by locating the receiving, selecting, grading, and packing components of the operation in rural areas. This design has the added advantage of minimizing handling of the crops. The refrigerated container, once loaded, would be transported by truck or rail to Damietta for export. It is estimated that local fruit and vegetable exports will increase from

4,000 tons in 1985 to 112,000 in tons in 2,000, generating a significant income flow.

The employment effects of this agricultural product and export activity is also expected to be significant. Other local production to be benefited by the new port are the nut crops and the candy industry, presently an important regional specialty of Damietta.

The basic structure of the processing and packaging operation in the port is shown in Figure 3.2.

3.2.2 Rice Processing

Egyptian government projections indicate that rice production is to expand six-fold in the years from 1985 to 2000. Significant amounts of this crop, much of it grown in the Damietta region, will be available for export. A maximization of revenue and employment accruing to Egypt from these exports will be assured by processing the rice prior to leaving the country. To realize this objective, a rice milling and bleaching facility is planned as part of the port industrial complex, to serve both the internal and external markets. Figure 3.3 shows the capacity, employment and land requirements for the proposed milling and bleaching operation.[1]

---

1. Damietta Port Technical Paper, "Rice Milling and Bleaching Facility."

VEGETABLES, FRUITS, NUTS AND CANDIES - PROCESSING AND PACKAGING OPERATIONS

	1985	1990	1995	2000
APPROXIMATE CAPACITY ANNUAL PRODUCTION (MT/YR) DAILY OUTPUT (MT/DAY @ 250 DAYS)	8300 33.2	17300 69.2	33000 120.0	33000 120.0
STAFF REQUIREMENTS				
MANAGEMENT AND OFFICE	2	3	4	4
SUPERVISORS, FOREMEN & INSPECTORS	13	26	45	45
TECHNICIANS, REPAIRMEN & MECHANICS	8	14	24	24
EQUIPMENT OPERATORS	16	33	50	50
LABORERS	65	136	236	236
TOTAL	104	212	359	359
LAND REQUIREMENT (M^2)	3600	5800	7000	7000

FIGURE 3.2

RICE BLEACHING AND MILLING OPERATIONS

	1985	1990	1995	2000
APPROXIMATE CAPACITY				
ANNUAL PRODUCTION (MT/YR)	67500	111750	175500	282000
DAILY OUTPUT (MT/DAY @ 250 DAYS)	270	447	750	1128
STAFF REQUIREMENTS				
MANAGEMENT AND OFFICE	9	15	24	38
SUPERVISORS, FOREMEN & INSPECTORS	23	38	59	95
TECHNICIANS, REPAIRMEN & MECHANICS	58	96	150	240
EQUIPMENT OPERATORS	128	212	334	537
LABORERS	610	1010	1586	2550
TOTAL	828	1371	2153	3460
LAND REQUIREMENT (M^2)	50000	65000	83000	83000

FIGURE 3.3

3.2.3 Timber Sawmill, Storage and Distribution Facility

The existence of a major furniture manufacturing complex in Damietta, currently consuming ½ of Egyptian lumber imports, points to the new port as an optimum location for the processing of timber imports, which are required to meet virtually all of the nation's needs.[1] A Frederic R. Harris study indicates that a facility that would process rough or stripped logs into finished and sized lumber would be capable of handling 2/3 of Egypt's projected import needs. Figure 3.4 outlines the basic features of this facility.

3.2.4 Fish Cleaning, Processing, Packaging and Freezing Facility

Fishing is an important economic activity in the Damietta region. The construction of the port will allow a substantial improvement in the operating conditions of local fishermen. This, in addition to the refrigerator container traffic proposed for Damietta, make a fish processing plant an obvious candidate for the agro-industrial complex. Figure 3.5 describes the size and characteristics of this facility, whose output will be primarily destined for the national market, although export potential cannot be overlooked.[2]

---

1. Damietta Port Technical Paper, Infrastructure Requirements for Timber, Sawmills Storage and Distribution Facility.

2. Damietta Port Technical Paper, Infrastructure Requirements for Fish Cleaning, Processing, Packing and Freezing Facilities.

LUMBER SAWMILL

	1985	1990	1995	2000
APPROXIMATE CAPACITY				
RAW TIMBER INPUT (M^3/DAY)	3000	5000	8000	12600
FINISHED LUMBER OUTPUT (BOARD FEET/DAY)	960000	1550000	2500000	4000000
STAFF REQUIREMENTS				
MANAGEMENT AND OFFICE	5	8	11	18
SUPERVISORS, FOREMEN & INSPECTORS	5	8	13	21
TECHNICIANS, REPAIRMEN & MECHANICS	10	16	26	42
EQUIPMENT OPERATORS	58	93	150	244
LABORERS	12	20	30	50
TOTAL	90	145	230	375
LAND REQUIREMENT (M^2)	54000	91000	145000	227000

FIGURE 3.4

FISH CLEANING, PROCESSING, PACKING AND FREEZING OPERATIONS

	1985	1990	1995	2000
APPROXIMATE CAPACITY ANNUAL PRODUCTION (MT/YR) DAILY OUTPUT (MT/DAY @ 250 DAYS)	10600 42.4	11600 46.4	11600 46.4	11600 46.4
STAFF REQUIREMENTS				
MANAGEMENT AND OFFICE	4	5	5	5
SUPERVISORS, FOREMEN & INSPECTORS	3	4	4	4
TECHNICIANS, REPAIRMEN & MECHANICS	2	2	2	2
EQUIPMENT OPERATORS	5	5	5	5
LABORERS	73	81	81	81
TOTAL	87	97	97	97
LAND REQUIREMENT (M^2)	3600	3600	3600	3600

FIGURE 3.5

3.3 PORT INDUCED INDUSTRIAL ACTIVITIES

The locating of a port at Damietta will attract investment in new activities as a consequence of the trade flow the port will generate. Damietta will be required to carry a portion of Egypt's trade and relieve congestion in the other national ports. The following analysis, identifies facilities that will be required to meet the import and export requirements of a growing Egyptian national economy through the year 2000.

3.3.1 Wheat and Corn Storage and Distribution

Wheat imports are a major component of existing trade flows at the present time and projections indicate that it will continue to be a large portion of the national import requirements. Limited existing capacity to efficiently handle these imports leave no doubt that an unloading storage and distribution facility at Damietta is needed.[1] Figure 3.6 indicates the characteristics of the terminal planned for the new port. In addition increasing corn production will permit exports by 1990, and the Damietta facility is designed to accommodate these exports.

---

1 Damietta Port Technical Paper, Infrastructure Requirements for a Wheat and Corn Storage and Distribution Terminal

WHEAT AND CORN STORAGE TERMINAL

	1985	1990	1995	2000
APPROXIMATE CAPACITY (MT/DAY)	9000	10000	15700	19400
STAFF REQUIREMENTS				
MANAGEMENT AND OFFICE	5	5	5	5
SUPERVISORS, FOREMEN & INSPECTORS	8	9	9	10
TECHNICIANS, REPAIRMEN & MECHANICS	61	72	87	103
EQUIPMENT OPERATORS	77	82	88	94
LABORERS	271	289	313	336
TOTAL	422	457	502	548
LAND REQUIREMENT (M^2)	4800	4800	4800	4800

FIGURE 3.6

3.3.2 Fats and Oils Refining, Storage and Distribution

Egyptian government studies indicate that domestic supply of fats, oils and tallows will be insufficient to meet domestic demand and will require increased imports through the year 2000.[1] Storage capacity limitations necessitate the construction of added facilities to meet these demands. Although Alexandria is expected to continue as the primary import point, Damietta will be required to channel some of the flow to the interior. Here it is proposed that unloading facilities and a refinning plant for seed oil be located in the agro-industrial complex. Figure 3.7 provides the basic outline of this facility.

3.3.3 Meat Imports, Sampling, Inspection and Storage

The potential for expansion of meat production is limited for Egypt, and imports are expected to grow from 11,000 tons in 1975 to 52,000 tons in 1985 and continue increasing through the analysis period. Damietta has been shown to be an optimum location for imports, and their flow will require facilities to handle the unloading, inspecting and storage for distribution to internal markets.[2] Figure 3.8 indicates the characteristics of the proposed Damietta facility.

---

1. Damietta Port Technical Paper Infrastructure Requirements for Fats and Oils Refinning, Storage and Distribution.

2. Damietta Port Technical Paper, Meat Import Sampling Inspection and Short Term Storage.

FATS AND OILS STORAGE TERMINAL

	1985	1990	1995	2000
APPROXIMATE STORAGE CAPACITY (TONS)	25000	35000	60000	85000
STAFF REQUIREMENTS				
MANAGEMENT AND OFFICE	6	6	7	7
SUPERVISORS, FOREMEN & INSPECTORS	6	6	6	9
TECHNICIANS, REPAIRMEN & MECHANICS	10	13	22	29
EQUIPMENT OPERATORS	18	24	49	70
LABORERS	14	21	41	60
TOTAL	54	70	125	175
LAND REQUIREMENT (M^2)	80000	80000	80000	80000

FIGURE 3.7

MEAT IMPORT SAMPLING, INSPECTION AND SHORT-TERM

STORAGE FACILITY

	1985	1990	1995	2000
APPROXIMATE CAPACITY STORAGE CAPACITY (MT) INSPECTION & SAMPLING CAPACITY (MT)	1000 25000	1500 40000	2200 55000	2800 70000
STAFF REQUIREMENTS				
MANAGEMENT AND OFFICE	2	2	3	3
SUPERVISORS, FOREMEN & REPAIRMEN	1	1	2	2
TECHNICIANS, INSPECTORS & MECHANICS	8	8	11	14
EQUIPMENT OPERATORS	2	2	3	4
LABORERS	6	6	9	11
TOTAL	19	19	28	34
LAND REQUIREMENT (M^2)	2000	2500	4100	5800

FIGURE 3.8

3.3.4 Animal Feed and Fertilizer

The siting of the fish processing, meat handling and sawmill in the port will produce significant levels of waste material. Economic use of these wastes will be provided by using them as inputs for animal feed and fertilizers for local or export markets.

A preliminary indication of the nature of this facility can be found in Figure 3.9.

3.3.5 Container Manufacture

In order to minimize transportation costs, the import and export flows through the port of Damietta must utilize the most modern technology in ocean transport. This dictates that a substantial portion of the port thruput will move in containers. In the case of some of the products, containerization is the only feasible mode.

This large and growing number of containers, many equipped with refrigeration units, represents a large investment. Foreign currency costs and local value added can be maximized by manufacturing (within Egypt) the containers required for the national trade flow. The capacity and employment projects for the manufacturing facility are outlined in Figure 3.10.

3.3.6 Foreign Trade Zone

The trade flow through Damietta puts the port in the international shipping lanes. These ship movements can be utilized to generate additional economic activity in Egypt through the creation of a Foreign Trade Zone.

ANIMAL FEED AND FERTILIZER PROCESSING PLANT

	1985	1990	1995	2000
APPROXIMATE CAPACITY ANNUAL PRODUCTION (MT) DAILY OUTPUT (MT @ 260 DAYS)	25000 100	37500 150	44000 175	44000 175
STAFF REQUIREMENTS				
MANAGEMENT AND OFFICE	8	9	10	10
SUPERVISORS, FOREMEN & INSPECTORS	10	12	14	14
TECHNICIANS, REPAIRMEN & MECHANICS	11	15	19	19
EQUIPMENT OPERATORS	15	21	27	27
LABORERS	106	143	180	180
TOTAL	150	200	250	250
LAND REQUIREMENT (M^2)	50000	65000	83000	83000

FIGURE 3.9

CONTAINER MANUFACTURING FACILITY

EMPLOYMENT AND LAND REQUIREMENT

	1985	1990	1995	2000
NUMBER OF CONTAINERS (TeU'S)*/DAY	106	106	312	706
MANAGEMENT & ADMINISTRATION	74	74	218	493
RECEIVING AND ORDERING	90	90	265	600
FOREMEN	106	106	312	707
PRODUCTION WORKERS	530	530	1560	3532
FINISHING	200	200	589	1324
TOTAL	1000	1000	2944	6656
LAND REQUIREMENT (M^2)	80000	80000	235520	532480

* NOTE: TWENTY FOOT CONTAINER EQUIVALENTS

FIGURE 3.10

A **customs privilege** area can take advantage of local labor conditions and port infrastructure to transform raw material or intermidiate commodities into final consumer goods destined for foreign markets. Research has identified a number of promising industrial activities to be located in the Damietta Foreign Trade Zone, all of which relate to existing or planned activities in the port area.[1] Figure 3.11 indicates the characteristics of these industries with the graphic representation of the growth of employment and land use illustrated in Figure 3.12

Another component of the Foreign Trade Zone which offers great potential is a Transshipment Terminal. The service offered would include the breaking down of containers according to different destinations and the packaging or bottling of goods shipped in bulk form. The products would then be reloaded on ships for final destination, without the cost of local customs duties and taxes. The capacity and size of the proposed facility are given in Figure 3.13. The phased development of the transshipment terminal is shown graphically in Figure 3.14

---

1. Damietta Port Technical Paper, Infrastrucutre Requirements for Foreign Trade Zone.

EMPLOYMENT IN FOREGIN TRADE ZONE

INDUSTRY	1985	1990	1995	2000
FURNITURE	1200	1500	1800	2000
SHOES	300	350	400	460
CLOTHING	800	1000	1200	1400
LEATHER PRODUCTS	150	180	200	220
LUMBER	45	145	160	370
CAN FABRICATION	120	75	80	185
CANNING	420	525	630	720
TOTAL	3035	3810	4550	5285
LAND REQUIREMENT $(M)^2$	271100	381150	479900	617925

FIGURE 3.11

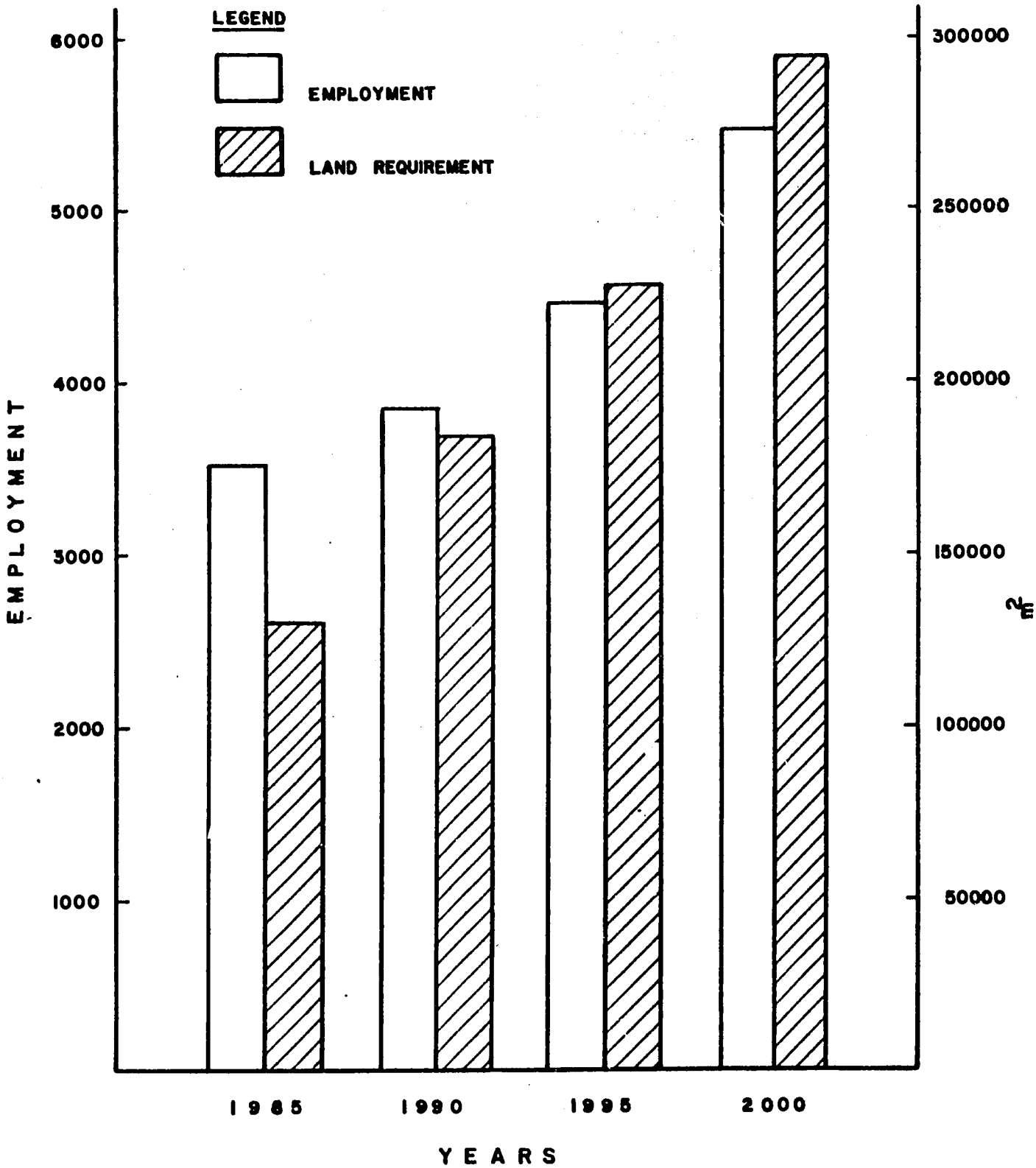

FIGURE 3.12

HARRIS

PHASED DEVELOPMENT OF FOREIGN TRADE ZONE MANUFACTURING ACTIVITIES

EMPLOYMENT IN TRANSSHIPMENT TERMINAL RELATED

FOREIGN TRADE ZONE

	1985	1990	1995	2000
STAFF REQUIREMENTS	36	36	36	36
MANAGEMENT & OFFICE	288	369	471	527
SUPERVISORS, FOREMEN, INSPECTORS	564	722	837	927
TECHNICIANS, REPAIRMAN, MECHANICS	216	277	322	355
EQUIPMENT OPERATORS	2400	2070	3561	3933
LABORERS				
TOTAL	3504	4474	5227	5772

FIGURE 3.13

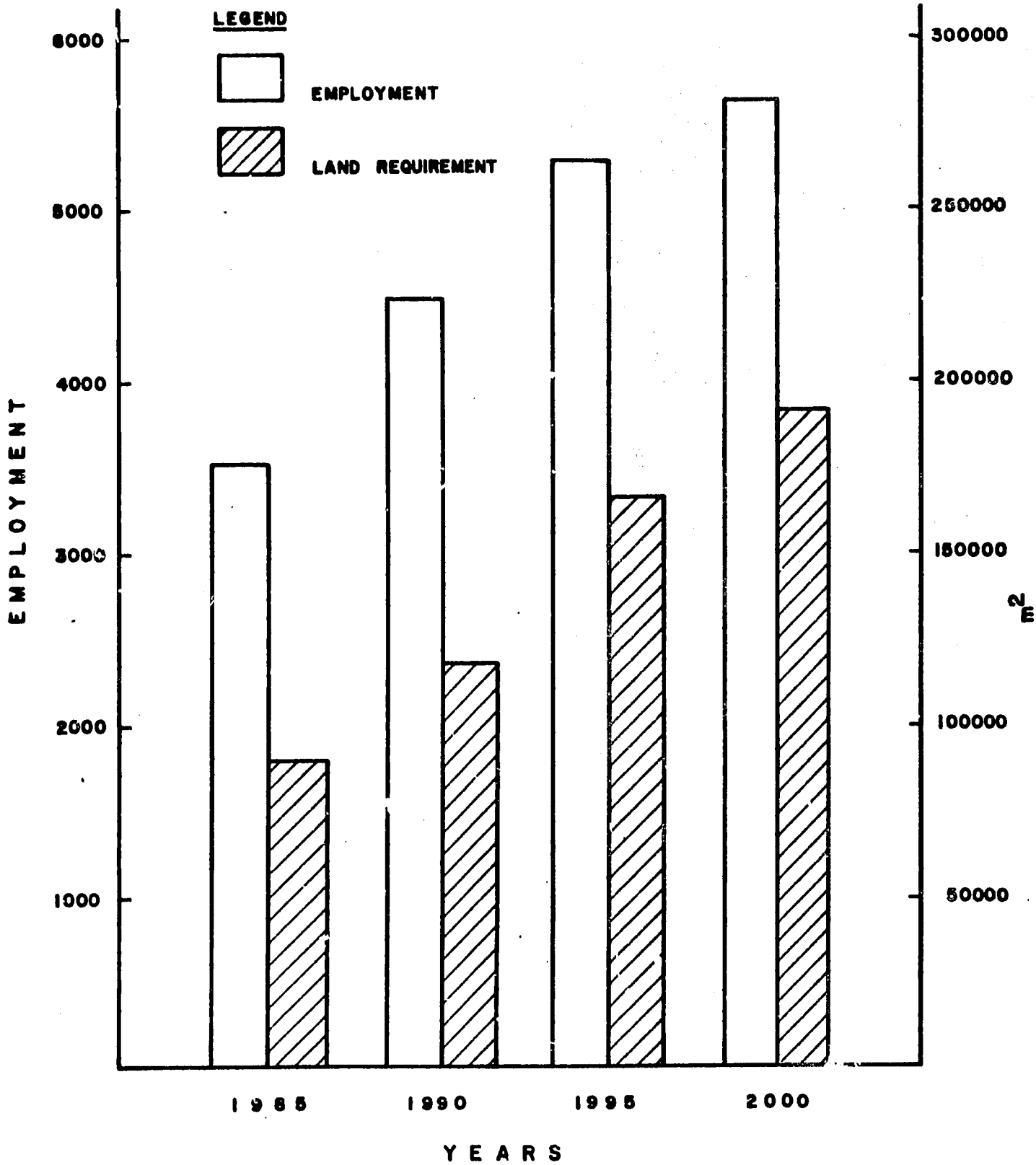

FIGURE 3.14

PHASED DEVELOPMENT OF FOREIGN TRADE ZONE RELATED TO TRANSSHIPMENT TERMINAL

HARRIS

3.4 CONCLUDING REMARKS

The agro-industrial complex outlined in the section in conjunction with the port will be a major addition to the productive structure of Egypt. The land requirements and employment projections for the port industries are developed in Figure 3.15. The aggregate totals for all the different activities of the entire port are shown in Figure 3.16 while Figure 3.17 isolates the employment effects.

The total effect of the port and trade based complex will provide much-needed increases in employment and production for Egypt. The wider impact of the building of the port and its related facilties will have a multiplier effect on the regional and national levels, the magnitude of which is unclear at present, but which in the long term, will undoubtedly be larger than the economic expansion discussed in this section.

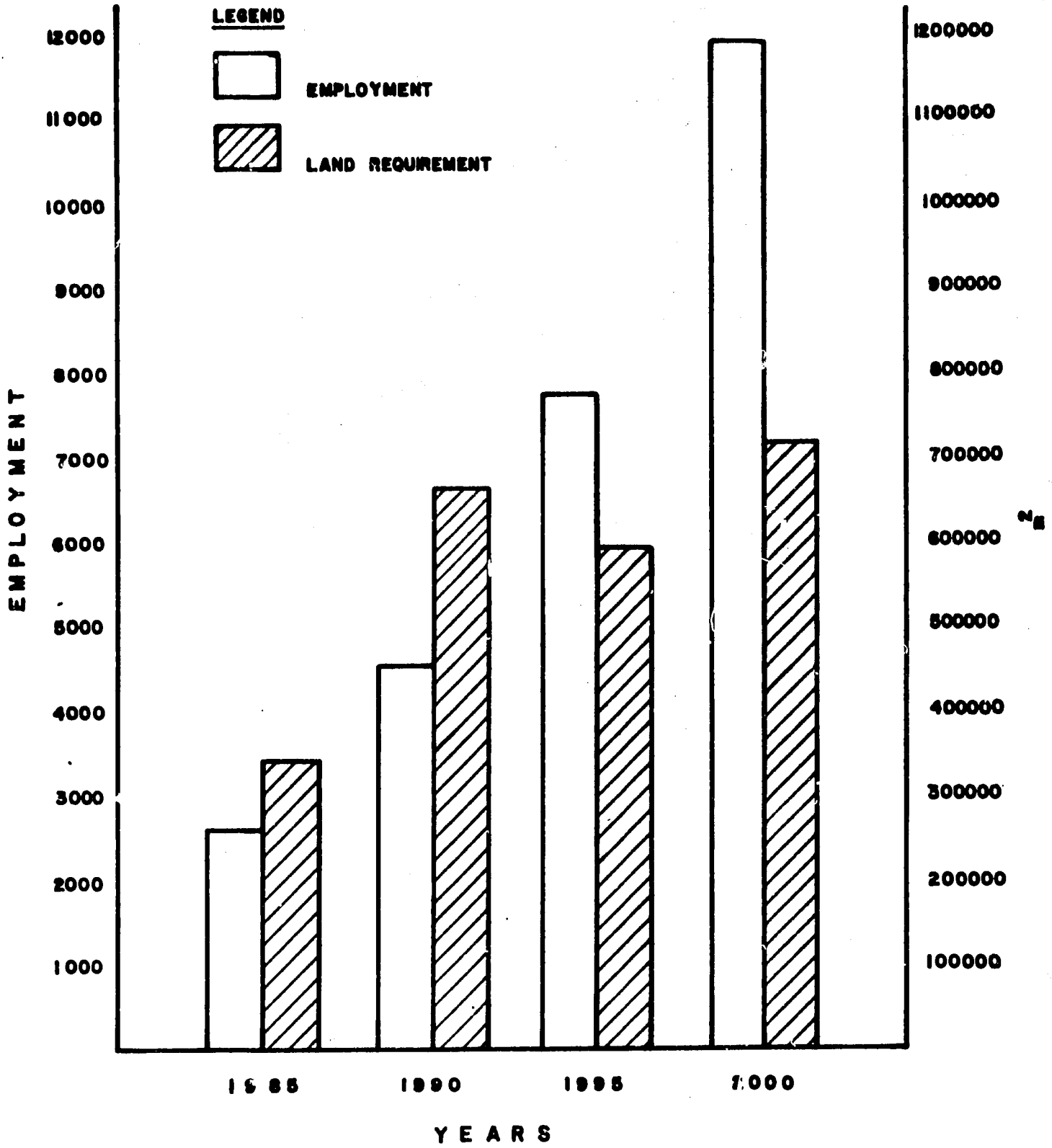

FIGURE 3.15

PHASED DEVELOPMENT OF INDUSTRIAL COMPLEX EMPLOYMENT, AND LAND REQUIREMENTS

AGGREGATE TOTALS OF THE PORT RELATED ACTIVITIES

ACTIVITY	1985			1990			1995			2000		
	ANNUAL CAPACITY (MT)	EMPLOYMENT (NUMBER)	LAND (M^2)	ANNUAL CAPACITY	EMPLOYMENT (NUMBER)	LAND (M^2)	ANNUAL CAPACITY (MT)	EMPLOYMENT (NUMBER)	LAND (M^2)	ANNUAL CAPACITY	EMPLOYMENT (NUMBER)	LAND (M^2)
1. PORT	6500000	3906	127 5000	8500000	5460	12250000	12500000	5675	12250000	16500000	59 5	12500000
2. INDUSTRY												
- WHEAT & CORN STORAGE TERM.	1904000	422	4800	2599037	457	4800	3388000	502	4800	4192600	548	4800
- FATS & CORN STORAGE TERM.	25000	54	80000	35000	70	80000	60000	125	80000	85000	175	80000
- FISH PROCESSING	10600	87	3600	11600	97	3600	11600	97	3600	11600	97	3600
- MEAT INSPECTION & STORAGE	25000	19	2000	40000	19	2500	55000	28	4100	70000	34	5800
- LUMBER SAWMILL	628200	90	54000	1011657	145	91000	1629261	230	145000	2624400	375	227000
- ANIMAL FEED & FERTILIZER MFG.	25000	150	50000	37500	200	65000	44000	250	83000	44000	250	83000
- FRUITS, NUTS & CANDY MFG.	8300	104	3600	17300	212	5800	33000	359	7000	33000	359	7000
- RICE MILLING	67500	828	50000	111750	1317	65000	175000	2153	85000	282000	3460	85000
- CONTAINER MANUFACTURING	*	1000	80000	*	1000	80000	*	2940	235000	*	6650	532000
TOTAL INDUSTRY	2694200	2754	328000	3863844	3517	397700	5395861	6684	647500	7342600	11948	2028200
3. FOREIGN TRADE ZONE												
- MANUFACTURING	*	3035	303300	*	3810	423450	*	4550	539700	*	5470	683775
- TRANSSHIPMENT TERMINAL		3504	813300		4474	1143450		5187	1439700		5772	1853775
TOTAL FT		6539	1116600		8284	1566900		9737	1979400		11342	2537550
TOTAL EXPORT BASE	9194200	13199	13694600	12363844	17261	14214600	17895861	22096	14876900	23842600	29216	16065750

* NOT APPLICABLE

FIGURE 3.16

EXPORT BASE EMPLOYMENT PROJECTIONS

ACTIVITY	1985	1990	1995	2000
PORT	3906	5460	5675	5926
GRAIN STORAGE TERMINAL	422	457	502	548
FATS & OIL STORAGE TERMINAL	54	70	125	175
FISH PROCESSING	67	97	97	97
MEAT INSPECTION & STORAGE	19	19	28	34
LUMBER SAWMILL	90	145	230	375
ANIMAL FEED & FERTILIZER MFG.	150	200	250	250
FRUIT,NUTS & CANDY MFG.	104	212	359	359
RICE MILLING	828	1371	2153	3460
CONTAINER MFG.	1000	1000	2940	6650
FOREIGN TRADE ZONE	3035	3810	4550	5470
TRANSSHIPMENT TERMINAL	3504	4474	5187	5772
TOTAL	13199	17315	22096	29116

FIGURE 3.17

4.0

REGIONAL TRANSPORT

4.0

REGIONAL TRANSPORT

4.1 OBJECTIVE

The objective of this section is to develop basic information required to achieve optimum development of inland transport networks, i.e., Highways, Railways and Waterways that will cater to the future transport demand generated by the port of Damietta and related activities (New Damietta City, Industrial Park, Free Zone.) Optimality is based on the multi-objective consideration of each of the following:

- Least cost of transportation
- Higher level of service from the point of view of:
  - Rapidity
  - Reliability
  - Flexibility
  - Safety

4.2 METHODOLOGY

The regional traffic analysis involved the following:

- Inventory of existing transport infrastructure to determine the existing traffic volume and capacities.

- Determination of the future commodity flows between the port of Damietta and the domestic zones. Modal split and traffic assignment between the different links of the modal networks will then follow.

- Determination of the normal traffic growth for the different transportation network links. This traffic growth is generated due to normal social and economic development of the different cities and industrial centers inside the market area of Damietta port and related regions.

- Comparison of current and future traffic link capacity as a base for future expansion plans.

- Description of the main expansion requirements over periods of time for:

  - highways
  - railways
  - locks and canals

- Development of inland ports, which initiated the following:

  - Determination of traffic flows for import and export goods at the centers of the domestic zones inside the market area of Damietta Port.
  - Location of inland ports and phases of implementation.
  - Mode of delivery to load centers.

4.3 INVENTORY OF EXISTING CONDITIONS

4.3.1 INTRODUCTION

Damietta city, which is located at the end of the Damietta branch of the Nile has good accessibility to regional highway and railway networks. However, accessibility of the city to the inland waterway networks is poor. Factors contributing to the inaccessibility are the existence of the Faraskour earth dam, and low water draft in the Damietta branch between Damietta city and Mansoura city in some periods of the year, also the Enania lock at the entrances of Enania canal behind Faraskour dam which also acts as a water regulator and consequently causes larger lockage time.

In the following items, description of the modal networks related to Damietta city and Port together with current traffic levels are given.

4.3.2 REGIONAL TRANSPORT LINKAGES IN DAMIETTA CITY

Figure 4.1 gives a description of regional transport linkages in Damietta City. Each type is discussed below.

4.3.2.1 Highways

- Highway west of Damietta branch running parallel to the railroad has a width of 6.5 meters. Surface condition is bad.

- East highway from Damietta to Mansoura via Faraskour has a pavement width of 6.00 meters. There is a project in progress now to widen it to 7.50 meters and also to resurface the road with an overlay of asphalt mix 10 centimeters thick.

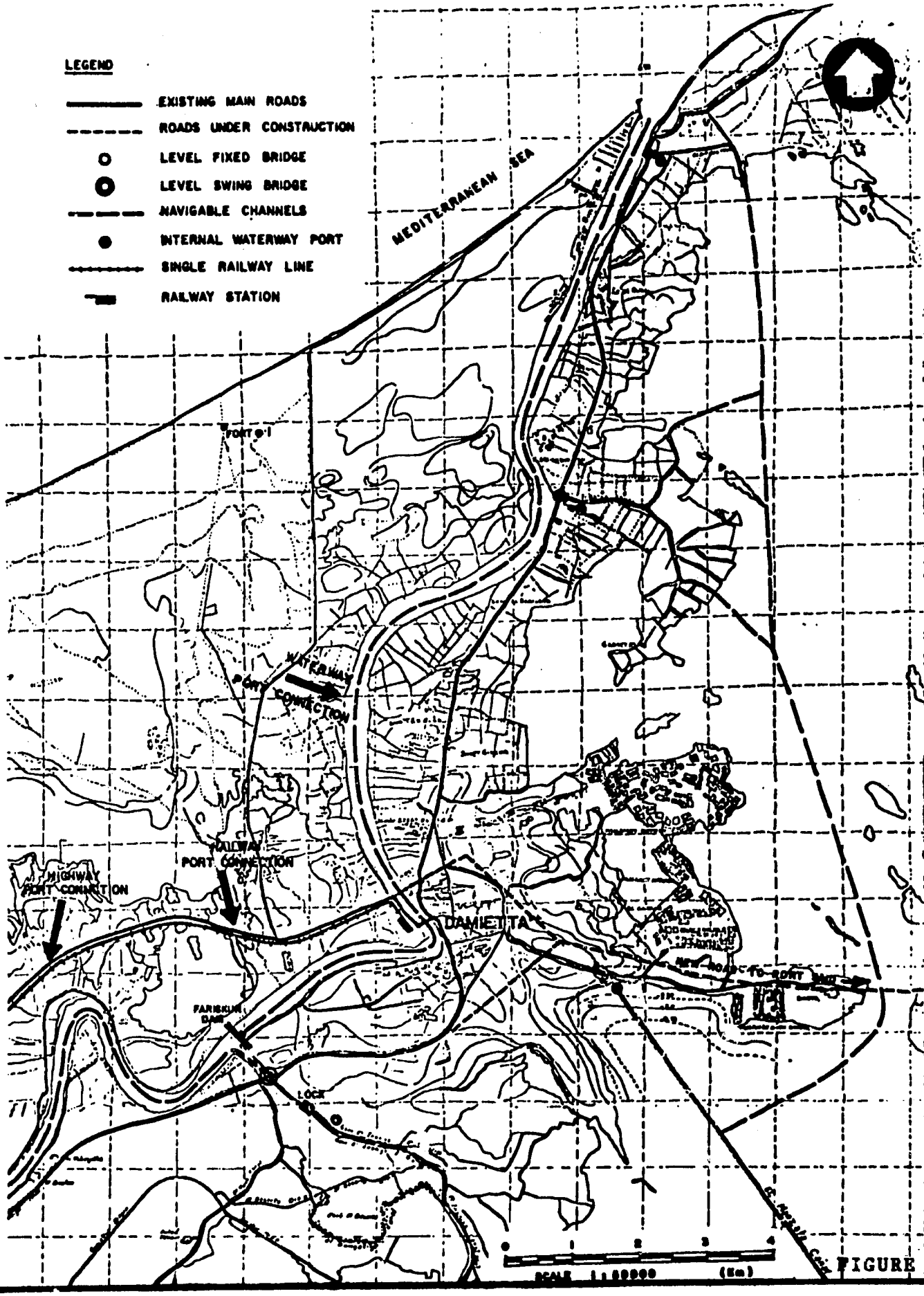

FIGURE 4.1

REGIONAL TRANSPORT LINKAGES
DAMIETTA AREA

HARRIS

- There is a project now in progress for the construction of a highway link connecting Damietta city with Port Said across the Manzala Canal. This new road is connected by the western road via a new bridge crossing Damietta branch north of the city. The road across Manzala Lake, together with the bridge has a 4-lane divided carriageway. The right-of-way of the road is 30.0 meters wide. The new road across the Manzala Lake will be connected to the eastern road by a new link east of Damietta city.

- The new bridge crossing the Nile is an overhead bridge leaving the Nile navigable. East and west roads running parallel to the Nile within the urbanized Damietta area pass under the bridge (i.e. free intersection).

4.3.2.2 Railways

Damietta is served by single railway line ending with a terminal station west of the Nile. Figure 4.2 gives a sketch of Damietta Railway station together with the usage of its sidings.

4.3.2.3 Waterways

Faraskour Earth Dam and Canals East of Damietta Branch

This earth dam derives its name from Faraskour City where it was originally located. However, it has gradually moved towards the north with its present location at Enania, kilometer 222.00 measured from Cairo. Its present permanent location (after building the Aswan High Dam) is just north of Enania Canal, where the excess sweet water of the river Nile is diverted to Manzala Lake.

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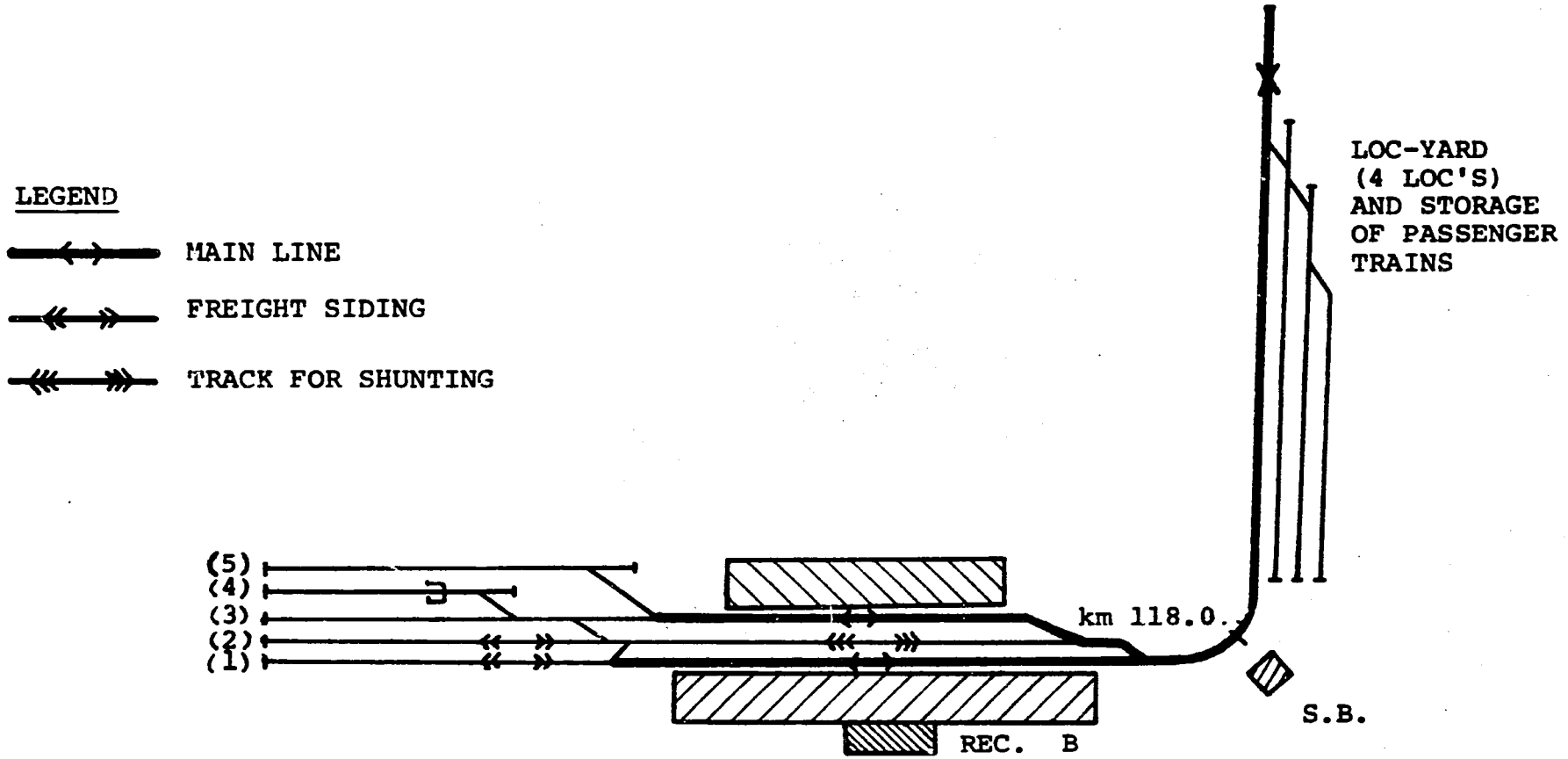

NOTE:

TRACK (1) : ARRIVAL AND DEPARTURE OF PASSENGER TRAINS, USEFUL LENGTH 268.9 MTS. (12 COACHES)

TRACK (2) : FOR SHUNTING AND STORAGE OF FREIGHT CARS WITH USEFUL LENGTH OF 140 MTS.

TRACK (3) : ARRIVAL AND DEPARTURE OF PASSENGER TRAINS WITH USEFUL LENGTH OF 157.20 MTS.

TRACK (4) : FOR FREIGHT CARS, LOADING AND UNLOADING AND CAN BE USED ALSO FOR STORAGE OF PASSENGER TRAINS.

FIGURE 4.2

DIAGRAMATIC SKETCH FOR DAMIETTA RAILWAY STATION

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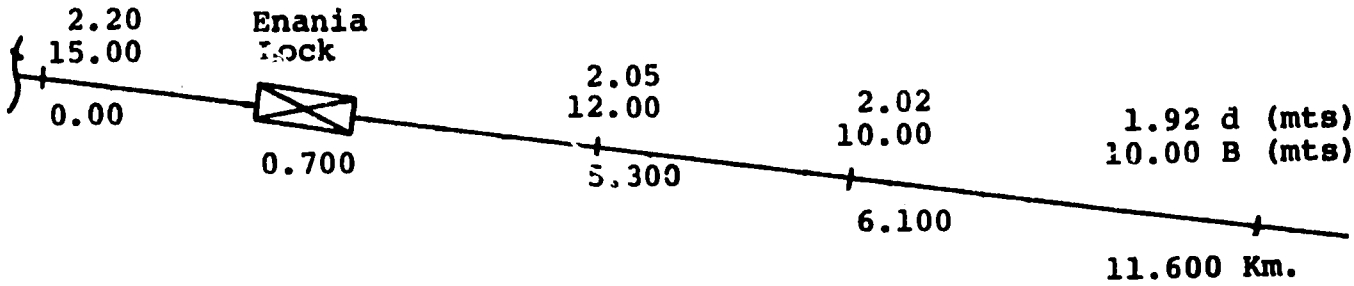
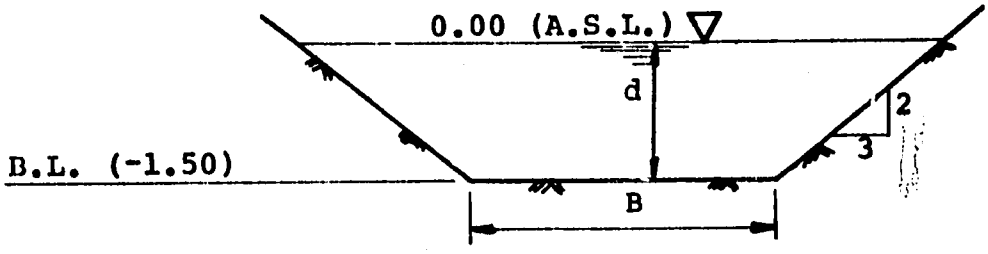
The Enania Canal is a navigable Canal connecting Port Said and Mataria (passing through Manzala Canal) with Damietta. Cross section of the Canal is as given in Figure 4.3. If Damietta Port has to be provided with an inland waterway connection, the waterway link must be connected north of Enania. It should be noted that entering Damietta Branch from the Sea is very difficult; entering the Nile is always difficult, even for a small mechanical fishing boat, because of silting. The clear breadth of the entrance is about 2.0 meters and dredging has to continue all year to keep the entrance in operation.

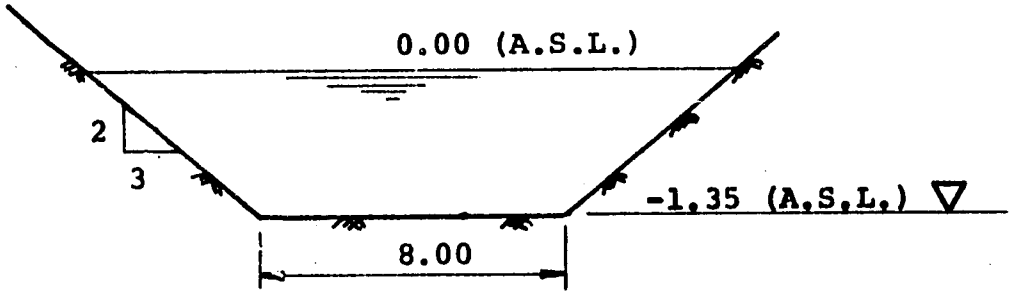
In the existing situation fishing boats and sailing boats could enter the Nile south of Enania through Souffara Canal, El Farcha Canal, El Ratma Canal and then Enania Canal, through the Enania lock and then to the Nile south of the existing Faraskour Earth Dam. However, this waterway connection cannot be entered from the sea side at present, because of the two level fixed bridges at the Souffara and Ratma Canal on the road east of Dametta branch connecting Damietta to Port Said via El Borg village. The River Nile from south of Faraskour Earth Dam to Mansoura is navigable with a draft of about 1.50 meters. This draft can be raised very easily to 1.80 meters, especially after building the barrage. Cross sections of Souffara and Ratma Canals are given in Figure 4.3. Dredging of Souffara Canal, in progress, will provide a bed level of 1.50 (A.S.L.) and a bed width of 12.0 meters. The length of Souffara Canal is 4,200 kilometers. However, El Ratma Canal has only a water draft of 1.45 meters at kilometer (4.250) and 1.20 meters at its end.

The dimension of Enania Lock is 136.0 X 9.25 meters. There are proposed projects to enlarge the cross section of this canal to irrigate the proposed reclaimed land in Manzala Lake. However, the proposed cross section has to be decided.

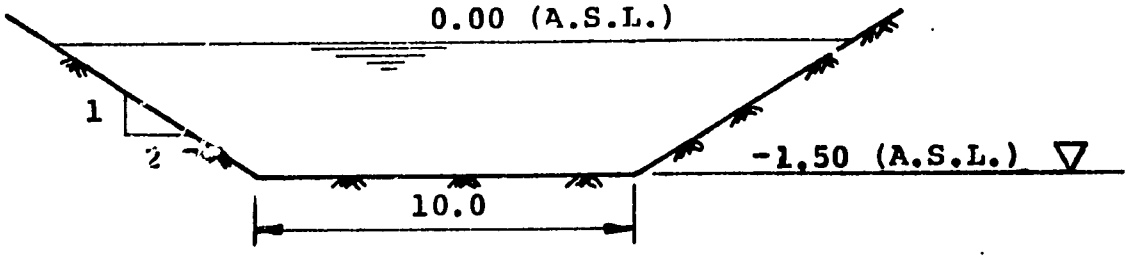




A) CROSS-SECTION OF ENANIA CANAL



B) CROSS-SECTION OF SOUFFARA CANAL



C) CROSS-SECTION OF EL RATMA CANAL AT KM 0.00 (END OF BURG SWEET WATER CANAL)

FIGURE 4.3

CROSS-SECTION OF THE INLAND WATERWAY CHANNELS EAST OF DAMIETTA BRANCH

It is also proposed to build a new barrage in the place of the existing Faraskour Earth Dam which will raise the water level south of it to a minimum of +1.80 (A.S.L.) This new barrage will allow traffic to pass into the Nile. Also, the barrage will have a lock with standard dimensions which can allow mechanical barge units to pass through to the Damietta branch.

4.3.3 NATIONAL TRANSPORT NETWORKS IN MARKET AREA OF DAMIETTA PORT.

4.3.3.1 Highways

Figure 4.4 shows the national main roads exisiting within the market area of Damietta Port. Geometrical and traffic characteristics of these roads are given in Figure 4.5. Information given in Figure 4.5 are explained hereafter.

Column (1): Code number of the highway link corresponding to that given in Figure 4.4

(2): Pavement width classification

class I: 4-lane divided carriageway, each direction having 7.5 meters width excluding shoulders.

class II: 2-lane carriageway with a pavement width equal to or more than 7.0 meters.

class III: 2-lane carriageway with a pavement width between 6.0 meters and 7.0 meters.

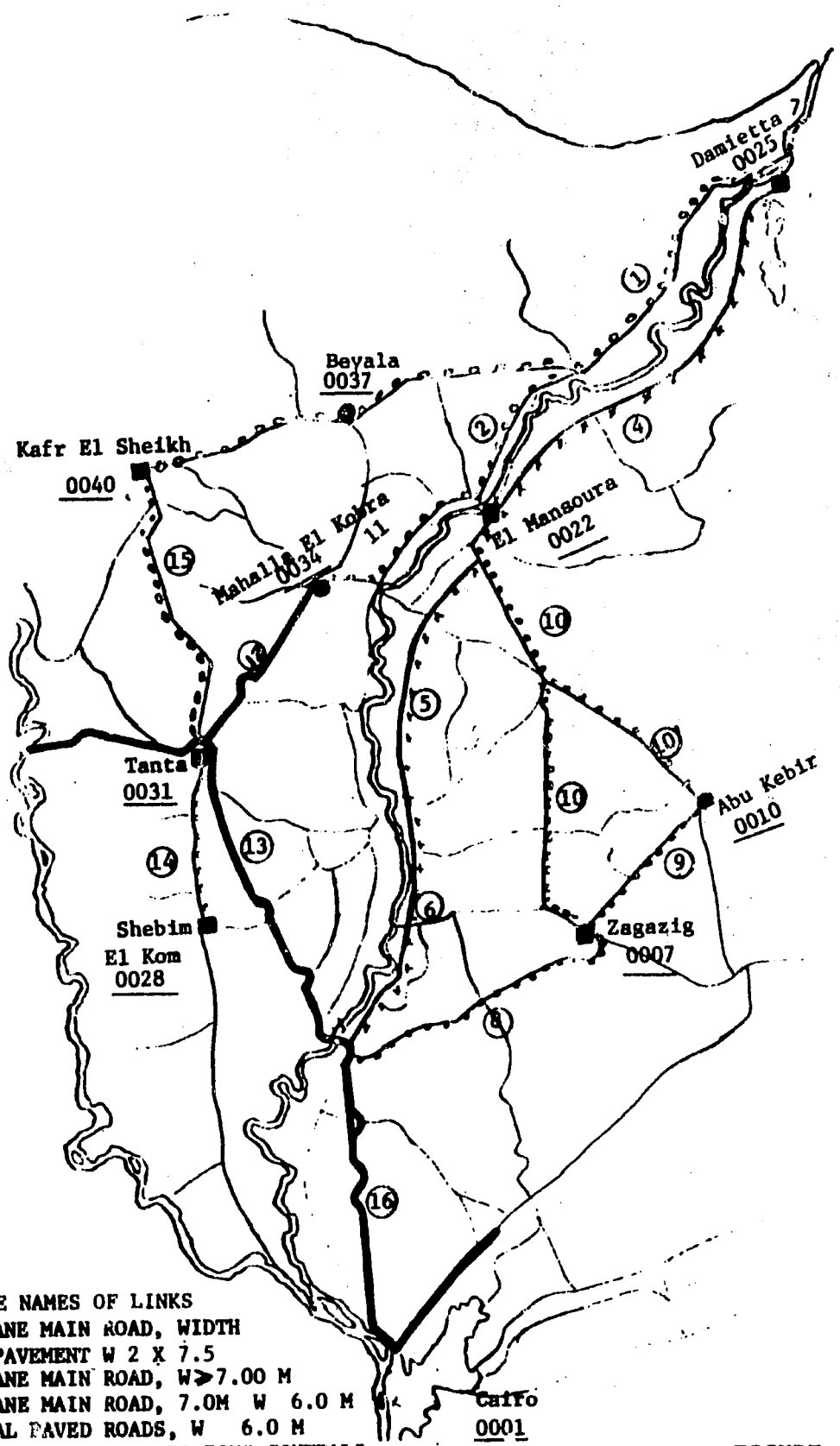


FIGURE 4.4

MAIN NATIONAL HIGHWAY LINKS IN DAMIETTA PORT MARKET AREA

HARRIS

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TRAFFIC CHARACTERISTICS OF NATIONAL ROADS

IN DAMIETTA PORT MARKET AREA

ROAD NAME	CODE NO	PAVEMENT WIDTH MTS	CURRENT CAPACITY "C" P.C.E/hr	CURRENT TRAFFIC VOLUME							V/C 1979
				AADT 1975 VEHICLES	COMPOSITION OF TRAFFIC (%)			1975 A.A.D.T P.C.E.	1975 PEAK HR. V(P.C.E.)	1979 PEAK HR. V(P.C.E.)	
					CARS & TAXIS	TRUCKS	BUSES				
	1	2	3	4	5	6	7	8	9	10	11
DAMIETTA - SHERBIN	1	III	800	2345	55.8	34.7	9.5	4307	431	569	0.71
SHERBIN - TALKHA	2	III	800	1575	56.2	34.7	9.1	2883	288	381	0.48
SHERBIN - KAFR EL SHEIKH	3,3	III	800	673	68.6	24.1	7.3	1071	107	141	0.18
DAMIETTA - FARISKUR - MANSOURA	4	II	1000	2556	74.6	20.0	5.5	3792	379	501	0.50
MANSOURA - ZEFTA	5	II	1000	4950	68.0	28.1	3.9	8022	802	1059	1.05
ZEFTA - BENHA	6	II	1000	5369	70.0	25.4	4.6	8467	847	1118	1.12
DAMIETTA - PORT SAID	7	III	800	1050	65.5	26.8	7.7	2236	224	295	0.37
ZAGAZIG - BENHA	8	III	800	2284	68.9	24.3	6.8	3627	363	479	0.60
ABU KEBIR - ZAGAZIG	9	III	800	2610	68.5	26.6	4.9	4190	419	553	0.69
MANSOURA - SINBILLAWEIN - ABU KEBIR	10,10	III	800	2087	55.0	38.2	6.8	3894	389	514	0.64
MANSOURA - MANIAL EL KOBRA	11	III	800	4160	58.0	29.1	12.9	7386	739	975	1.22
MAHALLA - TANTA	12	I	3600	3910	53.1	41.3	5.6	7468	747	986	0.27
TANTA - BENHA	13	I	3600	10464	67.4	28.1	5.5	17313	1731	2285	0.63
TANTA - SHEBIN EL KOM	14	III	800	1890	67.7	21.8	10.5	3012	301	380	0.48
KAFR EL SHEIKH - TANTA	15	III	800	2559	50.1	33.2	16.7	4899	490	647	0.81
BENHA - CAIRO	16	I	3600	15529	67.8	27.4	4.8	25157	2516	3321	0.92

FIGURE 4.5

Column (3): Current capacity of the highway link in both directions given in passenger car equivalance (P.C.E.'s). Following standards are adopted:

Class I roads	Practical capacity for both directions 3600 P.C.E.'s per hour
Class II roads	Practical capacity for both directions 1000 P.C.E.'s per hour
Class III roads	Practical capacity for both directions 800 P.C.E.'s per hour

Column (4): The Average Annual Daily Traffic (AADT). These volumes are taken from the counts of Water and Highway Authority (WHA) of the Ministry of Transport done in the first quarter of 1975. The volumes given in column (4) are in vehicle units irrespective of the traffic compositions.

Column (5): (6), (7) The percentages of traffic compostion as measured by WHA.

Column (8): Converts the vehicular traffic volume into passenger car equivalance volume. Following assumptions are made:

1 single truck = 3 P.C.E.'s
1 bus = 2.5 P.C.E.'s

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1. MIT/CU Conference documents, June 1978
2. National Transport Study, Chapter IV, 1977

Column (9): Hourly peak traffic volume given in P.C.E.'s An assumption of a rush hour factor[1] equal to 10% of AADT has been made.

Column (10): Peak hour traffic in P.C.E.'s for the year 1979. Except the highway links number 1, an assumption has been made for an annual growth rate of 8%.

Column (11): Gives the volume over practical capacity ratio (V/C). When this ratio reaches unity, this means that a level of service B according the AASHO definition has been reached and when it exceeds 1.0 means that intolerable congestion occurs.

4.3.3.2 Railways

Figure 4.6 shows the main railway lines existing in the market area of the Port of Damietta. Physical and traffic characteristics of these lines are given in Figure 4.7 and are explained hereafter:

Column (1): Code number of railway link which corresponds to the numeration given in Figure 4.6

Column (2): This gives the railway line type; whether it is single or double railway line. The single lines are classified into two types;

single I: Which has forward storage tracks for freight trains.

single II: Which has backward storage tracks for freight trains.

1. National Transport Study, Chapter IV, 1977.

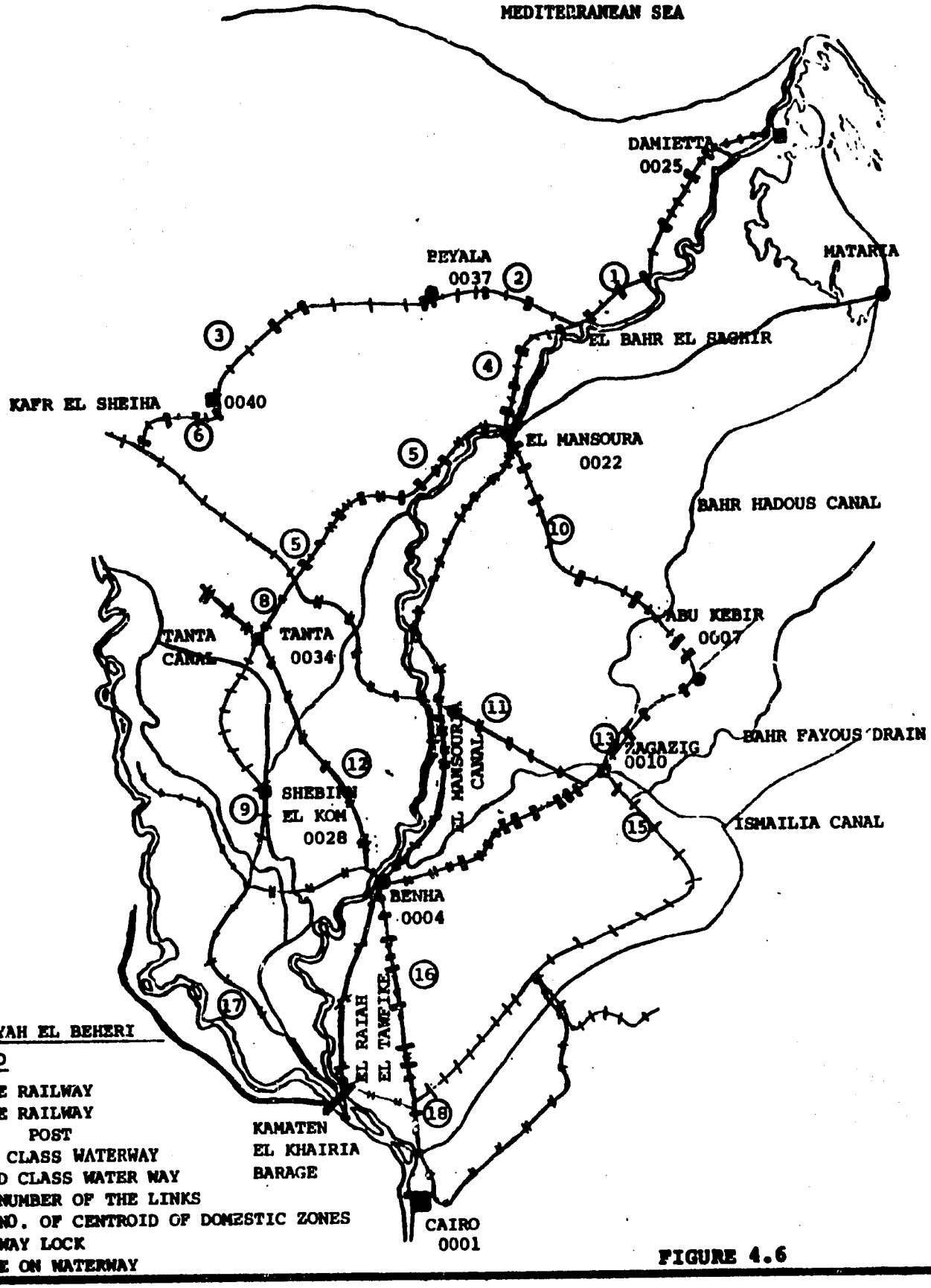

FIGURE 4.6

MAIN NATIONAL RAILWAY & WATERWAY
LINKS IN DAMIETTA PORT MARKET AREA

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TRAFFIC CHARACTERISTICS OF RAILWAY LINES

IN DAMIETTA PORT MARKET AREA

LINK NAME	CODE NO	PHYSICAL CHARACTERISTICS			LINE CAPACITY TR./DAY	TRAFFIC VOLUME 1979				SPARE CAPACITY
		LINE TYPE	SIGNAL SYS.	BLOCK-SECT. LENGTH (KM)		PASSENGER TRAINS	EXPRESS TRAINS	FREIGHT TRAINS	TOTAL	
	1	2	3	4	5	6	7	8	9	10
DAMIETTA - SHERBIN	1	SINGLE I	MECH.	8	51	15	11	--	26	25
SHERBIN - BEYALA	2	SINGLE II	MECH.	7	32	19	8	--	27	5
BEYALA - KAFR EL SHEIKH	3	SINGLE II	MECH.	7	32	19	8	--	27	5
SHERBIN - TALKHA	4	SINGLE I	MECH.	5	59	17	11	4	32	27
TALKHA - MAHALLA EL KOBRA	5	DOUBLE	MECH.	6	91	26	13	4	43	48
MAHALLA EL KOBRA - MAHALLA ROH	5'	DOUBLE	MECH.	6	91	24	13	4	41	50
KAFR EL SHEIKH - KELLIN	6	SINGLE II	MECH.	7	32	19	8	--	27	5
KELLIN - MAHALLA ROH	7	SINGLE II	MECH.	5	41	22	4	--	26	15
MAHALLA ROH - TANTA	8	DOUBLE	MECH.	6	104	46	17	4	67	37
TANTA - SHEBIN EL KOM	9	SINGLE II	MECH.	6	36	26	4	2	32	4
MANSOURA - SINBELLAWEIN - ABU KEBIR	10	SINGLE II	MECH.	7	34	16	7	--	23	11
MAHALLA ROH - MIT GHAMR - ZAGAZIG	11	SINGLE II	MECH.	7	36	22	--	2	24	12
TANTA - BENHA	12	DOUBLE	MECH.	4	120	48	65	2	115	5
ABU KEBIR - ZAGAZIG	13	SINGLE II	MECH.	7	34	16	7	--	23	11
ZAGAZIG - BENHA	14	DOUBLE	MECH.	7	86	20	28	2	50	36
ZAGAZIG - BELBEISS - QALIUB	15	SINGLE II	MECH.	6	39	28	5	4	37	2
BENHA - QALIUB	16	DOUBLE	ELECT.	4	250	12	92	6	110	140
TANTA - MENUF - QALIUB	17	SINGLE I	MECH.	7	52	26	4	2	32	20
QALIUB - CAIRO	18	DOUBLE	ELECT.	4	250	74	105	6	185	65

FIGURE 4.7

4.4 TRAFFIC ANALYSIS FOR COMMODITY FLOWS GENERATED BY DAMIETTA PORT

From the study of Development Policy of Ports of Egypt delivered to the Ministry of Housing and Reconstruction January 1978, and from the supplementary report submitted in June 1978 and also the different computer runs done for cargo allocation to the ports of Egypt, including Damietta Port, it becomes possible to determine the commodity flows through the Port of Damietta and also their domestic origins and destinations for the years 1985 till the year 2000, (see appendices B and C). Modal split analysis for the transport of these different types of commodities has been carried out. It is well known that the mode chosen for transport depends on the following :

- Type of commodity
- Volume to be transported
- Transport distance
- Availability of modes of transport and their reliability, rapidity and safety.
- Transport cost and consequently the tarrif rates offered

The type of commodity and volume to be transported, are summerized in the above mentioned appendices. The transport distance from Damietta to the centroids of the domestic zones served by Damietta Port are given in Figure 4.8. The modes available for serving Damietta Port are illustrated in section 3 of this chapter. However, with respect to waterways, the only reliable, economical and fairly rapid route compared with other navigable routes is through the Damietta branch to Mansoura, and then the Mansoura Canal, Rayah El Tawfiki and the Nile to Cairo.

MODAL DISTANCE MATRIX (IN KMS) FROM DAMIETTA TO THE CENTROIDS OF DOMESTIC ZONES SERVED BY DAMIETTA PORT

DOMESTIC ZONE	HIGHWAY	WATERWAY	RAILWAY
CAIRO	187	237	205
BENHA	136	158	160
TANTA	115	141	118
MAHALLA EL KOBRA	90	100	91
ZAGAZIG	121	102	135
SHEBIN EL KOM	142	168	146
EL MANSOURA	64	83	65
ABU KEBIR	95	154	126
BEYALA	75	83	72
KAFR EL SHEIKH	108	220	104

FIGURE 4.8

Taking into consideration all the above mentioned parameters, the consultant has assumed modal split factors for each commodity and for each O/D pair. Results of multiplying these factors by the volume of commodities moving between the different O/D pairs are aggregated together under the four commodity handling categories in the part and given in Figures 4.9 a, b, c, d separately for imports and exports for the years 1985 and 2000.

Manual traffic assignment analysis is then carried out, to assign the commodity flows to highway, railway and waterway networks. Commodity flows between the O/D pairs are then converted into vehicular movements. Here following assumptions are made:

Road Transport:

Average loading capacity of single unit truck for containerized and dry bulk commodities equals 10 tons.

Average loading capacity of single unit truck for neo bulk and special commodities equals 8 tons.

Rail Transport:

Average loading capacity of a train carrying containerized commodities equals 500 tons (i.e. 50 tfe containers)

Average loading capacity of a train carrying dry-bulk commodities equals 1000 tons.

Inland Waterway Transport:

Average loading capacity of a barge equals 400 tons.

MODAL SPLIT FOR TRANSPORT OF IMPORT GOODS TO DOMESTIC ZONES

YEAR 1985

DESTINATION ZONES \ CARGO CATEGORY	UNITS	CONTAINERIZABLE			NEOBULK			SPECIAL CARGO			DRY BULK		
		TRUCK	TRAIN	BARGE	TRUCK	TRAIN	BARGE	TRUCK	TRAIN	BARGE	TRUCK	TRAIN	BARGE
CAIRO	TONS	238060	79353		181610			926920	200530	90990	219200	93100	88700
	%	75	25		100			76	16	8	55	23	22
BENHA	TONS	35850	11950		14000			81900	20000		103500	35400	35400
	%	75	25		100			80	20		70	15	15
ZAGAZIG	TONS	13280	4430		80200			51000			157180	46125	—
	%	75	25		100			100			77	23	
ABU KEBIR	TONS	5480	1830		45300			26000			102900	—	—
	%	75	25		100			100			100		
MANSOURA	TONS	15750	5250		145000			46200			355900	—	
	%	75	25		100			100			100		
DAMIETTA	TONS	3980	1330		49810			25700			100000	—	
	%	75	25		100			100			100		
SHEBIN EL KOM	TONS	600	200		8800			21300			143325	46075	
	%	75	25		100			100			86	14	
TANTA	TONS	67130	22380		80000			35700			153100	48000	
	%	75	25		100			100			86	14	
MAHALLA EL KOBRA	TONS	30000	10000		42700			15600			50900	42000	
	%	75	25		100			100			68	32	
BEYALA	TONS	4350	1450		36400			11500			97000		
	%	75	25		100			100			100		
KAFR EL SHEIKH	TONS				8900			6300			44625	14875	
	%				100			100			86	14	
TOTAL	TONS	414480	138173		692720			1248120	220530	90980	1526630	325575	124100
	%	75	25		100			80	14	6	77	17	6

FIGURE 4.9(a)

MODAL SPLIT FOR TRANSPORT OF EXPORT GOODS TO DOMESTIC ZONES

YEAR 1985

DESTINATION ZONES \ CARGO CATEGORY	UNITS	CONTAINERIZABLE			NEOBULK			SPECIAL CARGO			DRY BULK		
		TRUCK	TRAIN	BARGE	TRUCK	TRAIN	BARGE	TRUCK	TRAIN	BARGE	TRUCK	TRAIN	BARGE
CAIRO	TONS	7440	2480					46050	7675	7675			
	%	75	25					75	12.5	12.5			
BENHA	TONS	72380	24130					4500	1500				
	%	75	25					75	25				
ZAGAZIG	TONS	17000	5670		54540								
	%	75	25		100								
ABU KEBIR	TONS	10280	3450		25800								
	%	75	25		100								
MANSOURA	TONS	2700	900		163310								
	%	75	25		100								
DAMIETTA	TONS	36910	9470		34800						80000		
	%	80	20		100						100		
SHEBIN EL KOM	TONS	3200											
	%	100											
TANTA	TONS	7290	1430		9400								
	%	84	16		100								
MAHALLA EL KOBRA	TONS	7650	2120		8900								
	%	78	22		100								
BEYALA	TONS	2500	400		68400								
	%	86	14		100								
KAFR EL SHEIKH	TONS	3230	1080		76400								
	%	75	25		100								
TOTAL	TONS	170580	51130		441550			50550	9175	7675	80000		
	%	77	23		100			75	14	11	100		

FIGURE 4.9(b)

MODAL SPLIT FOR TRANSPORT OF IMPORT GOODS TO DOMESTIC ZONES

YEAR 2000

DESTINATION ZONES \ CARGO CATEGORY	UNITS	CONTAINERIZABLE			NEOBULK			SPECIAL CARGO			DRY BULK		
		TRUCK	TRAIN	BARGE	TRUCK	TRAIN	BARGE	TRUCK	TRAIN	BARGE	TRUCK	TRAIN	BARGE
CAIRO	TONS	509790	183910					1672710	428675	92475	69750	313875	313875
	%	73	27					76	20	4	10	45	45
BENHA	TONS	66320	23590					112200	20000		25520	114840	114840
	%	74	26					85	15		10	45	45
ZAGAZIG	TONS	23000	13800					196200			41240	336960	
	%	63	37					100			11	89	
ABU KEBIR	TONS	9570	5740					101400			1500		
	%	63	37					100			100		
MANSOURA	TONS	21130	12680					176600			149325	212590	212590
	%	63	37					100			26	37	37
DAMIETTA	TONS	6310	3790					101900			145700		
	%	63	37					100			100		
SHEBIN EL KOM	TONS	8880	5330					73300			36910	332190	
	%	62	38					100			10	90	
TANTA	TONS	133940	51760					108000			73340	332460	
	%	72	28					100			16	82	
MAHALLA EL KOBRA	TONS	59750	23050					30760			53320	145980	
	%	72	28					100			27	73	
BEYALA	TONS	7560	4540					372400			159500	—	
	%	63	37					100			100		
KAFR EL SHEIKH	TONS							218000			12390	111420	
	%							100			10	90	
TOTAL	TONS	846250	328190					3163470	448675	92475	768485	1900315	641305
	%	72	28					85	12	3	23	58	19

FIGURE 4.9(c)

MODAL SPLIT FOR TRANSPORT OF EXPORT GOODS TO DOMESTIC ZONES

YEAR 2000

CARGO CATEGORY / DESTINATION ZONES	UNITS	CONTAINERIZABLE			NEOBULK			SPECIAL CARGO			DRY BULK		
		TRUCK	TRAIN	BARGE	TRUCK	TRAIN	BARGE	TRUCK	TRAIN	BARGE	TRUCK	TRAIN	BARGE
CAIRO	TONS	12690	7620					167330	27890	27890	68500		
	%	63	37					75	12.5	12.5	100		
BENHA	TONS	251500	150900					18000	6000				
	%	62.5	37.5					75	25				
ZAGAZIG	TONS	313630	188180		364500								
	%	62	38		100								
ABU KEBIR	TONS	172570	103[illegible]0		202300						34800		
	%	63	37		100						100		
MANSOURA	TONS	132570	79540		919900						15100		
	%	63	37		100						100		
DAMIETTA	TONS	177500			219100						710100		
	%	100			100						100		
SHEBIN EL KOM	TONS	27250	16350										
	%	63	37										
TANTA	TONS	161130	96680		35700								
	%	63	37		100								
MAHALLA EL KOBRA	TONS	71190	42710		77600						1468450	529050	
	%	63	37		100						73.5	26.5	
BEYALA	TONS	72630	43580		392400								
	%	63	37		100								
KAFR EL SHEIKH	TONS				1610								
	%				100								
TOTAL	TONS	1392660	729100		3452260			185330	33890	27890	2296950	529050	
	%	66	34		100			75	14	11	81	19	

FIGURE 4.9(d)

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Number of working days per year is assumed to be 300 days.

Yearly fluctuation factor is assumed to give 10% more than the annual average daily traffic.

The results of the assignment of the vehicular movements between the O/D pairs on highway and railway networks are given in Figures 4.10 a, b for the years 1985 and 2000. Inland waterway traffic generated by the port on the route Damietta branch/ Mansoura Canal/Rayah El Tawfiki is estimated to be 6 barges in year 1985 and 14 barges in year 2000 as an average daily volume.

ASSIGNMENT OF TRAFFIC GENERATED BY

DAMIETTA PORT ON HIGHWAY NETWORK

(AVERAGE DAILY NUMBER OF SINGLE TRUCKS)

LINK NAME	CODE NO	YEAR 1985		YEAR 2000	
		IMPORT	EXPORT	IMPORT	EXPORT
DAMIETTA/SHERBIM	1	1518	259	1954	2028
SHERBIM/TALKHA	2	1452	191	1616	1820
SHERBIM/BEYALA	3	66	68	338	208
BEYALA/KAFR EL SHEIKH	3'	19	36	105	1
MANSOURA/ZEFTA	5	385	27	532	104
ZEFTA/BENHA	6	385	27	532	104
MANSOURA/ZAGAZIG	10	196	47	165	431
SENBILLAWIM/ABU KABIR	10'	73	16	52	169
MANSOURA/MAHALLA EL KOBRA	11	644	42	765	789
MAHALLA EL KOBRA/TANTA	12	587	35	709	189
TANTA/BENHA	13	385	27	532	104
TANTA/SHEBIM EL KOM	14	68	1	51	10
BENHA/CAIRO	16	675	24	980	107

FIGURE 4.10 (a)

ASSIGNMENT OF TRAFFIC GENERATED BY

DAMIETTA PORT ON RAILWAY NETWORK

(AVERAGE DAILY NUMBER OF TRAINS)

LINK NAME	CODE NO	YEAR 1985		YEAR 2000	
		IMPORT	EXPORT	IMPORT	EXPORT
DAMIETTA-SHERBIM	1	3.210	3.210	11.389	7.929
SHERBIM-BEYALA	2	0.066	0.066	0.404	0.320
BEYALA-KAFR EL SHEIKH	3	--	--	0.371	--
SHERBIM/EL MANSOURA	4	3.144	3.144	10.985	7.609
EL MANSOURA/TANTA	5	2.89	2.89	8.713	4.886
EL MAHALLA EL KOBRA/ MAHALEL ROH	5'	2.663	2.663	8.008	2.148
MAHALEL ROH/TANTA	8	2.663	2.663	8.008	2.148
TANTA/SHEBIM EL KOM	9	0.171	0.171	1.257	0.120
EL MANSOURA/ABU KABIR	10	0.215	0.215	1.379	2.140
TANTA/BENHA	12	1.152	1.152	5.152	1.319
ABU KEBIR/ZAGAZIG	13	0.310	0.310	0.042	0.760
BENHA/QALIUB	16	1.842	1.842	4.466	0.184
QALIUB/CAIRO	18	1.842	1.842	4.466	0.184

FIGURE 4.10 (b)

4.5 FUTURE TRAFFIC AND MAIN REQUIREMENTS IN TRANSPORT INFRASTRUCTURE

4.5.1 HIGHWAYS

After adding normal traffic growth to the traffic generated by the port as illustrated in Figure 4.11 and comparing it with prevailing capacities of the different links, the following expansion requirements can be concluded.

Year 1985:

a) Widening the Highway Between Damietta and Talkha to a 4-lane Divided Highway. Traffic on this road is mainly generated by the new port.

b) Highway Links:

Mansoura-Zefta
Zefta-Benha
Mansoura-Mahalla El Kobra

need to be widened from 2-lane to 4-lane divided highway. Future traffic on these links is mainly generated from normal traffic growth. Port traffic represents only from 12 to 20 percent of total traffic. The expansion of these roads is also proposed by the Ministry of Transportation in their future plans.

c) Highway Link between Benha and Cairo:

This link needs to be widened from 4-lane divided highway to 6-lane divided highway. However, the port traffic represents less than 8% of the expected traffic. The Cairo Entrance Study carried out by MOHR in 1976 proposes widening of this road to 6-lane divided highway by year 1985.

EXPANSION REQUIREMENTS OF HIGHWAY LINKS (1985, 2000)

LINK NAME	CODE NO	DESIGN HOURLY VOLUME BY YEAR 1985 (P.C.E.)					DESIGN HOURLY VOLUME BY YEAR 2000 (P.C.E.)				
		PORT TRAFFIC	NORMAL GROWTH	TOTAL	CAPACITY 1979	EXPANSION REQUIRED	PORT TRAFFIC	NORMAL GROWTH	TOTAL	CAPACITY 1985	EXPANSION REQ.
DAMIETTA SHERBIM	1	911	842	1753	800	*	1217	1525	2742	3600	
SHERBIM TALKHA	2	871	564	1435	800	*	1092	1021	2113	3600	
SHERBIM BEYALA	3	41	207	248	800		203	378	581	800	
BEYALA/KAFR EL SHEIKH	3'	27	207	234	800		63	378	441	800	
MANSOURA/ZIFTA	5	231	1567	1798	1000	*	319	1567	1886	3600	
ZIFTA/BENHA	6	231	1655	1886	1000	*	319	2996	3315	3600	
MANSOURA/ZAGAZIG	10	118	761	879	800		259	1378	1637	800	*
SENBILLAWIN/ABU KEBIR	10'	44	761	805	800		101	1378	1479	800	*
MANSOURA/MAHALLA EL KOBRA	11	386	1443	1829	800	*	473	2613	3086	3600	
MAHALLA EL KOBRA/TANTA	12	352	1459	1811	3600		425	2643	3068	3600	
TANTA/BENHA	13	231	3382	3613	3600		319	6124	6443	3600	
TANTA/SHEBIM EL KOM	14	41	562	603	800		31	1018	1049	800	
BENHA/CAIRO	16	405	4915	5320	3600	*	588	8900	9488	5400	*

NOTE: * INDICATES THE NEED FOR HIGHWAY LINK EXPANSION.

FIGURE 4.11

road to 6-lane divided highway by year 1985.

Year 2000:

a) Highway links between:

Mansoura-Zagazig
Senbiliwain-Abu-Kebir

have to be widened from 2-lane to 4-lane divided highway. The port traffic represents only 16 and 7 percent respectively of the forecasted traffic.

b) The highway between Benha and Cairo needs a corridor having 10-lanes. Port traffic represents only 6% of total traffic. Such requirements are also proposed in the Cairo Entrance Study.

4.5.2 RAILWAYS

Comparing the total line capacity (number of daily trains) which can be run on the different lines, the spare capacities by the years 1979 and 1985 with port generated traffic, as given in Figure 4.12. The following recommendations can be given:

Year 1985:

No expansion is required in line capacities even for the line Damietta - Sherbin - Talkha. It should be mentioned that the railway fleet is now undercapacity and it has to be increased to cope with the port traffic requirements, which the Egyptian railways are going now. There is no need for the narrow gauge railway line east of Damietta branch, which has partially been removed because of economical inefficiency.

EXPANSION REQUIREMENTS OF RAILWAY LINKS (1985 ,2000)

LINK NAME	CODE NO.	1985 TRAFFIC (AVERAGE DAILY NO. OF TRAINS)				2000 TRAFFIC (AVERAGE DAILY NO. OF TRAINS)			
		1979 TRAFFIC CAPACITIES		PORT TRAFFIC	EXPANSION REQUIRED	1985 TRAFFIC CAPACITIES		PORT TRAFFIC	EXPANSION REQUIRED
		TOTAL	SPARE			TOTAL	SPARE +		
DAMIETTA-SHERBIN	1	51	25	6	DAMIETTA EXPANSION	51	19	22	*
SHERBIN-BEYALA	2	32	5	2		32	3	2	
BEYALA-KAFR EL SHEIKH	3	32	5	-		32	5	2	
SHERBIN-EL MANSOURA	4	59	27	6		59	21	22	*
EL MANSOURA-TANTA	5	91	48	6		91	42	16	
TANTA-SHEBIN EL KOM	9	36	4	2	NO EXPANSION	36	2	2	
EL MANSOURA-ABU KEBIR	10	34	11	2		34	9	4	
TANTA-BENHA	12	120	5	2		120	3	10	*
ABU KENIR-ZAGAZIG	13	34	11	2		34	9	2	
BENHA-KALUIB	16	250	140	4		250	136	8	
KALUIB-CAIRO	18	250	65	4		250	61	8	

* SHOWS NEED FOR EXPANSION

\+ SPARE CAPACITY IRRESPECTIVE OF NORMAL TRAFFIC GROWTH CAUSED BY FACTORS OTHER THAN DAMIETTA PORT.

FIGURE 4.12

Year 2000

a) Increase the capacity of the single railway line Damietta-Sherbin-Talkha by electrifying the signalling system, shortening the block section length down to 4.0 kms and keeping the lines as single railway lines. This will increase the line capacity up to about 80 trains per day, which can handle the port traffic as well as a large increase in passenger traffic on railways from Damietta area to domestic zones.

b) Railway Line Tanta - Benha

Line capacity to be increased by electifying the signalling system. However, this is a continuation of existing plans of the Egyptian Railway which extends the electrifying of the signaling system already started on the links Cairo-Qaliub and Qaliub-Benha. This extension is due to the increase in passenger traffic on the Cairo-Tanta-Alexandria corridor.

4.5.3 Waterways:

For a more reliable, flexible and economical inland transport system from the port of Damietta to the domestic zones especialy to the Cairo area and upper Egypt, the construction of a lock within the plan of the Faraskour new barrage is recommended by the consultant.

4.5.4 REGIONAL TRANSPORT LINKAGES TO THE PORT WITHIN THE DAMIETTA URBANIZED AREA

According to the recommended layout of the port of Damietta and its location, regional highway, railway and waterway linkages have to be provided to the appropriate quays of the port. Connections of these linkages to the regional modal transport networks are recommended as shown in Figure 4.1.

4.6 CONTAINERIZATION AND THE INLAND PORT SYSTEM FOR DAMIETTA:

4.6.1 INTRODUCTION:

Systems involving the use of containers to develop inland ports are now operating in a few areas in the United States and some of the other highly developed countries.

Because the port of Damietta will be a completely new port with no existing installations or systems to interfere, the opportunity exists to make it the most modern that existing technology can conceive. Most other ports have had to compromise; Damietta will not.

The port of Damietta can, therefore, become a showplace for the world where all of the most advanced technologies in transport and materials handling have been incorporated into a unified design and operating system to serve the inland areas of Egypt.

In order to create such a port it will be necessary to plan the total system in more specific detail than would be required for a traditional port, i.e., plans will have to be formulated for cooperative planning to match container availability, packing capability, and ship connections with export production. Communications and control procedures will have to be devised to manage the movements of the fleet of containers between the seaport and the inland ports. Origin and destination studies of cargo movements will have to be studied to to determine where inland ports can most expeditiously be located, as well as to determine which ones are to be principally for export or for import, or both. And of course, the design requirements of the physical facilities will have to be established to insure security and compliance with governmental regulations and procedures as well as to satisfy the operating requirements of the port.

The study program given in appendix D includes the elements necessary to define the inland port system to serve Egypt from the port of Damietta. It will also indicate the areas in which additional detailed planning will subsequently be required as a concurrent activity in the design for the port of Damietta.

In this section, analysis of import and export goods that can be containerized and handled at inland ports, location of inland ports, and mode of delivery to and from them are going to be carried out.

4.6.2 CONTAINER FLOWS BETWEEN DAMIETTA PORT AND DOMESTIC ZONES:

Based on commodity forecasts for containerized commodities given in Appendix (B) and assuming that the average loading capacity of a the container equals 10 tons, number of working days in a year equal 300 days and a fluctuation factor of 1.10, then the container flows between the Port of Damietta and the domestic zones are calculated. Results of these calculations are given in Figure 4.13. It has been assumed also that 50% of the containerized commodities by the year 1985 and 75% by the year 2000 are going to be transported in containers. The other 50% and 25% respectively are going to be transported as breakbulk. Figure 4.13 also gives the modal split between highway and railway for the transport of con-containers to domestic zones.

4 6 3 PHASES OF IMPLEMENTATION OF THE INLAND PORTS

The phases of implementation according to the volume of traffic of the inland ports are proposed for 1985 and 2000 as shown in Figure 4.14 a and Figure 4.14 b respectively.

CONTAINER FLOWS ON INLAND MODE OF TRANSPORT

BETWEEN DAMIETTA PORT & DOMESTIC ZONES

DOMESTIC ZONES	DAILY NUMBER OF CONTAINERS 1985				DAILY NUMBER OF CONTAINERS 2000			
	IMPORT		EXPORT		IMPORT		EXPORT	
	TRUCK	TRAIN	TRUCK	TRAIN	TRUCK	TRAIN	TRUCK	TRAIN
CAIRO	29	29	1	1	57	61	1	3
BENHA	4	4	8	8	7	8	28	50
ZAGAZIG	2	2	2	2	3	6	35	63
ABU KEBIR	1	1	1	1	1	2	19	35
EL MANSOURA	2	2	1	1	2	4	15	27
DAMIETTA	1	1	4	3	1	1	20	
SHEBIM EL KOM	1	1	1		1	2	3	5
TANTA	8	8	1	1	4	17	18	32
MAHALLA EL KOBRA	4	4	1	1	7	8	8	14
BEYALA	1	1	1	1	1	2	8	15
KAFR EL SHEIKH			1	1				
TOTAL	53	53	22	20	84	111	165	244

FIGURE 4.13

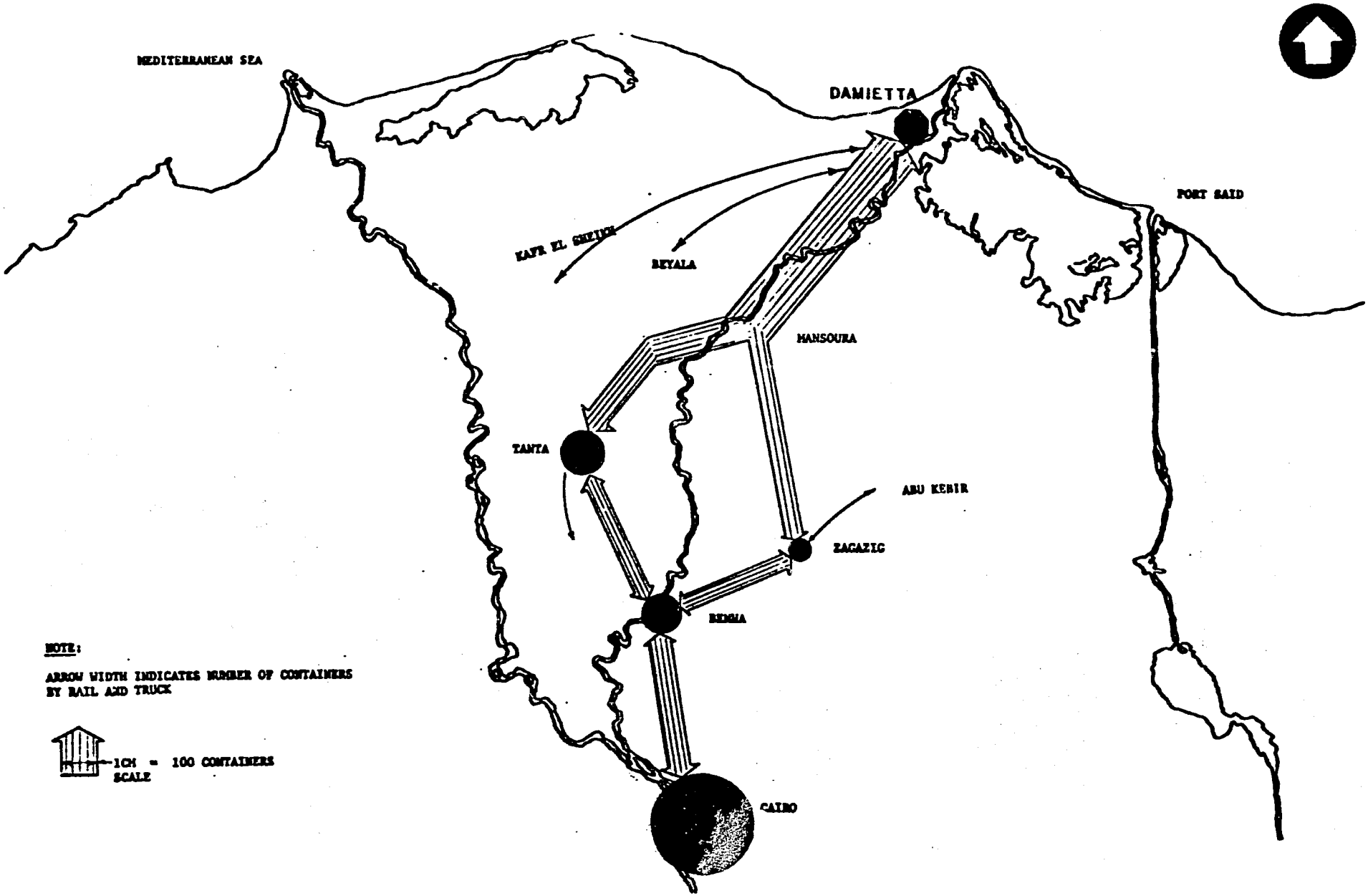

FIGURE 4.14 (a)

CONTAINER FLOW (YEAR 1985) BETWEEN INLAND PORTS

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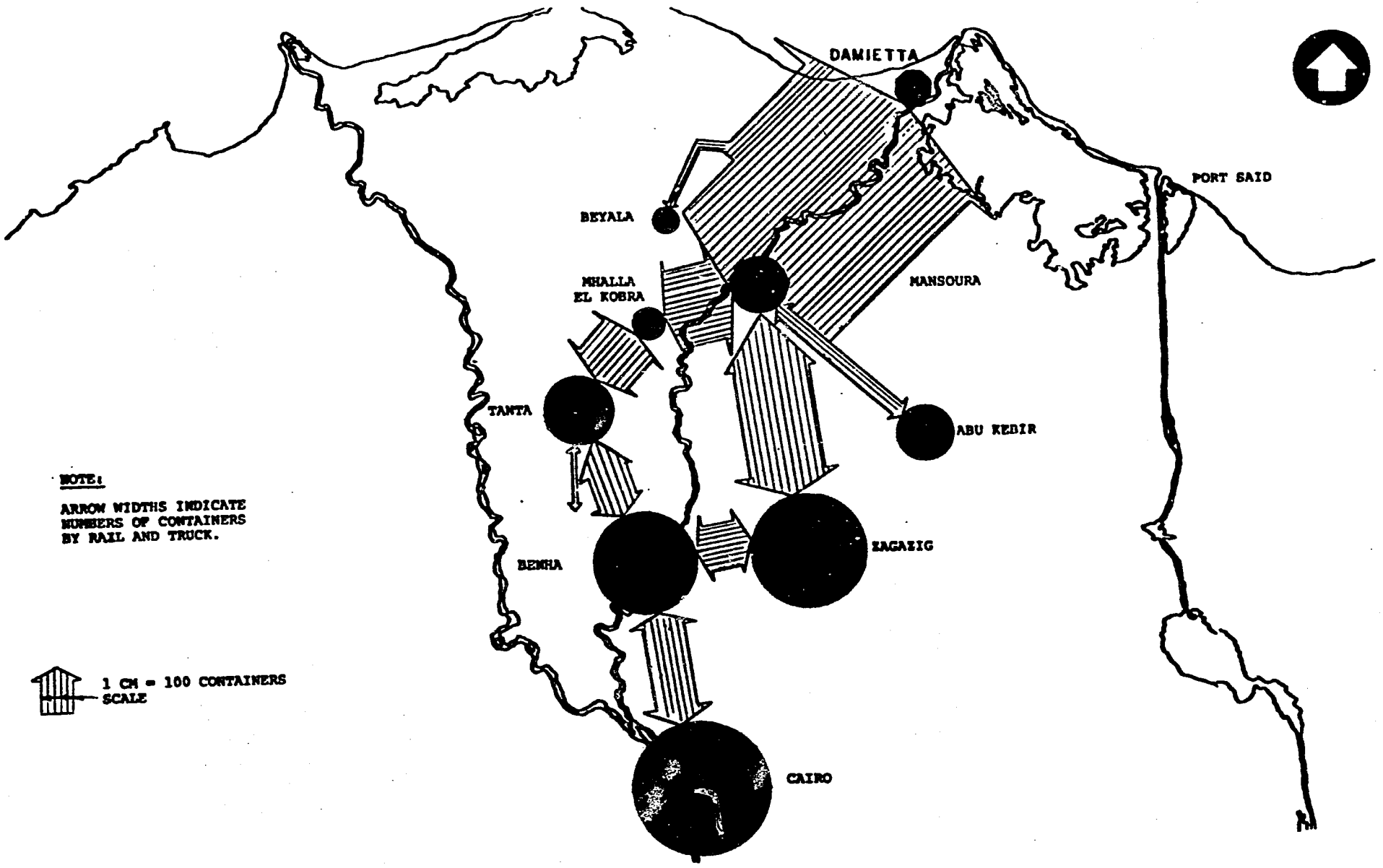

FIGURE 4.14 (b)

CONTAINER FLOW (YEAR 2000) BETWEEN INLAND PORTS

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5.0

REGIONAL EMPLOYMENT AND POPULATION PROGRAM

5.0

REGIONAL EMPLOYMENT AND POPULATION PROGRAM

5.1 EXPORT BASE

The Export base employment is the economic base for the new port area community in Damietta. It is taken as the basis for the calculation of the total population. The three main sections of the export base employment are: port, industry and foreign trade zone (FTZ). Employment income from export base will generate further employment in other sectors of activity. This can be estimated using multiplier process which is described in section 5.2. The activity rate is then used to calculate the total induced population due to port development.

In carrying out this analysis, attention is paid to the national structure of active population rather than a simple extrapolation of the Damietta existing structure. This is due to the fact that the development region of Damietta has, in general, industrial activities different from those existing within the governorate.

During the different phases of the port area development, the induced industries will grow as well. A calculation of the possible industries and port activities employment is given in Figure 5.1.

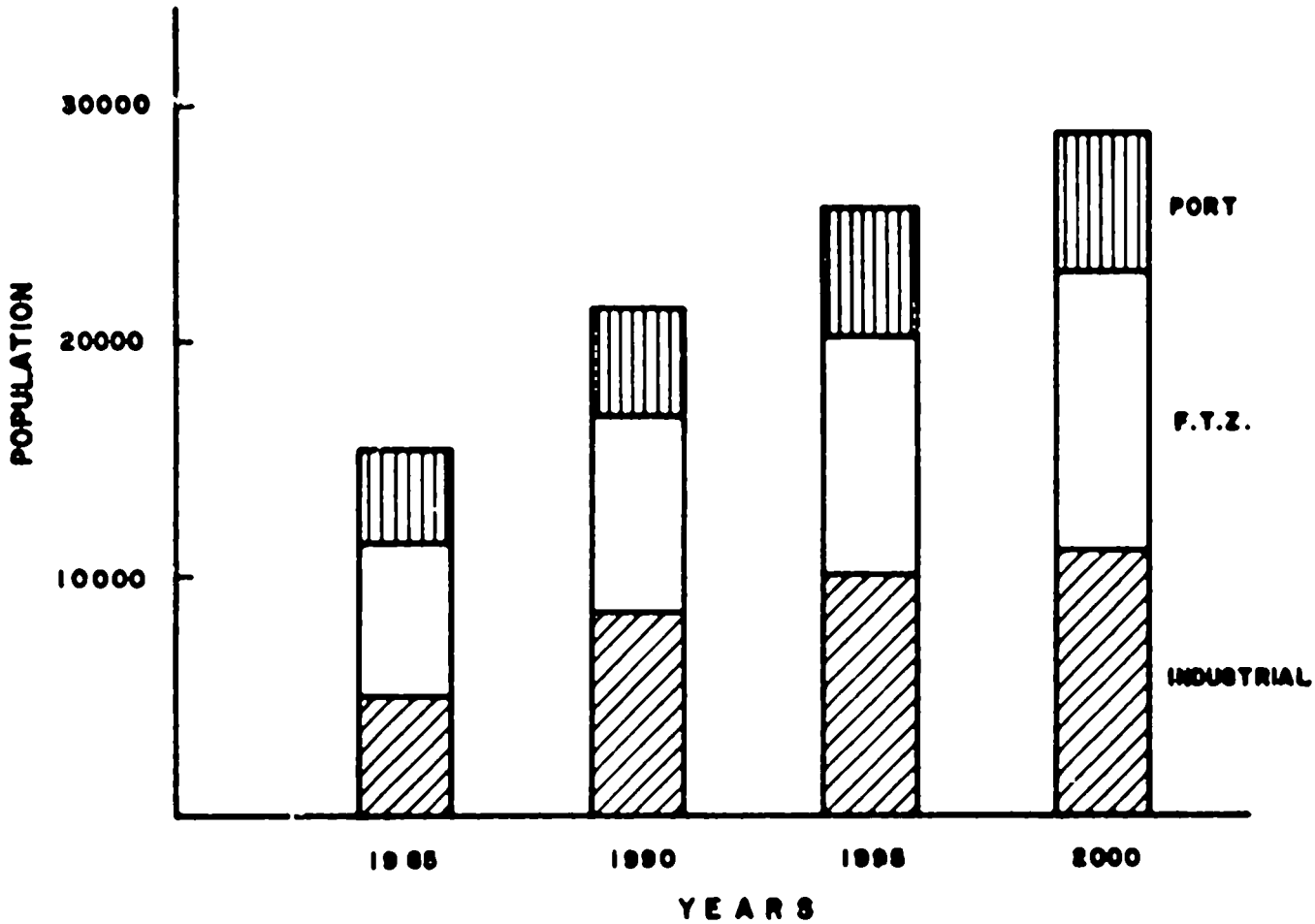

FIGURE 5.1

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GROWTH OF THE EXPORT BASE SECTOR

5.2 DYNAMICS OF SECTORS OF ACTIVE URBAN POPULATION

This section will discuss the trend of population growth in urban localities with the objective of predicting the possible future structure of Damietta area. Two factors are taken into consideration, the existing population structure in Damietta area, and the general behaviour of growth of the Egyptian urban localities (especially the transport oriented regions.)

Damietta as a governorate is different in structure from other governorates of similar size in its high percentage of manufacturing activity and low percentage of agriculture. This is mainly due to the presence of furniture manufacturing.

To study the growth of urban regions in Egypt, two approaches are available. The first is to take one city as a sample and observe its growth over a period of time. In the second, from the census of a certain year and cities of different sizes, a pattern is found relating the two together. Due to inconsistency of error in results from one census to another, the second approach is preferable.

To estimate the growth of Damietta governorate, it was compared with urban localities in governorates having common features such as: transport centres, high manufacturing, port activity,etc. Accordingly, five governorates from Lower Egypt (Delta) were selected. These are: Cairo, Alexandria, Gharbia, Khalioubia, and Damietta itself.

A regression analysis was carried out on the sectorial division of the five governorates. The results are plotted in Figure 5.2, which shows the dynamics of each sector with population size. It should be noted that the unusual negative slope value of the manufacturing sector is due to the presence of Damietta in the data. This means that, if the population stays low, the present Damietta structure (high manufacturing) will be dominant. On the other hand, if the population grows high, the structure will follow the national pattern of urban localities.

*(r^2 = correlation coefficient)

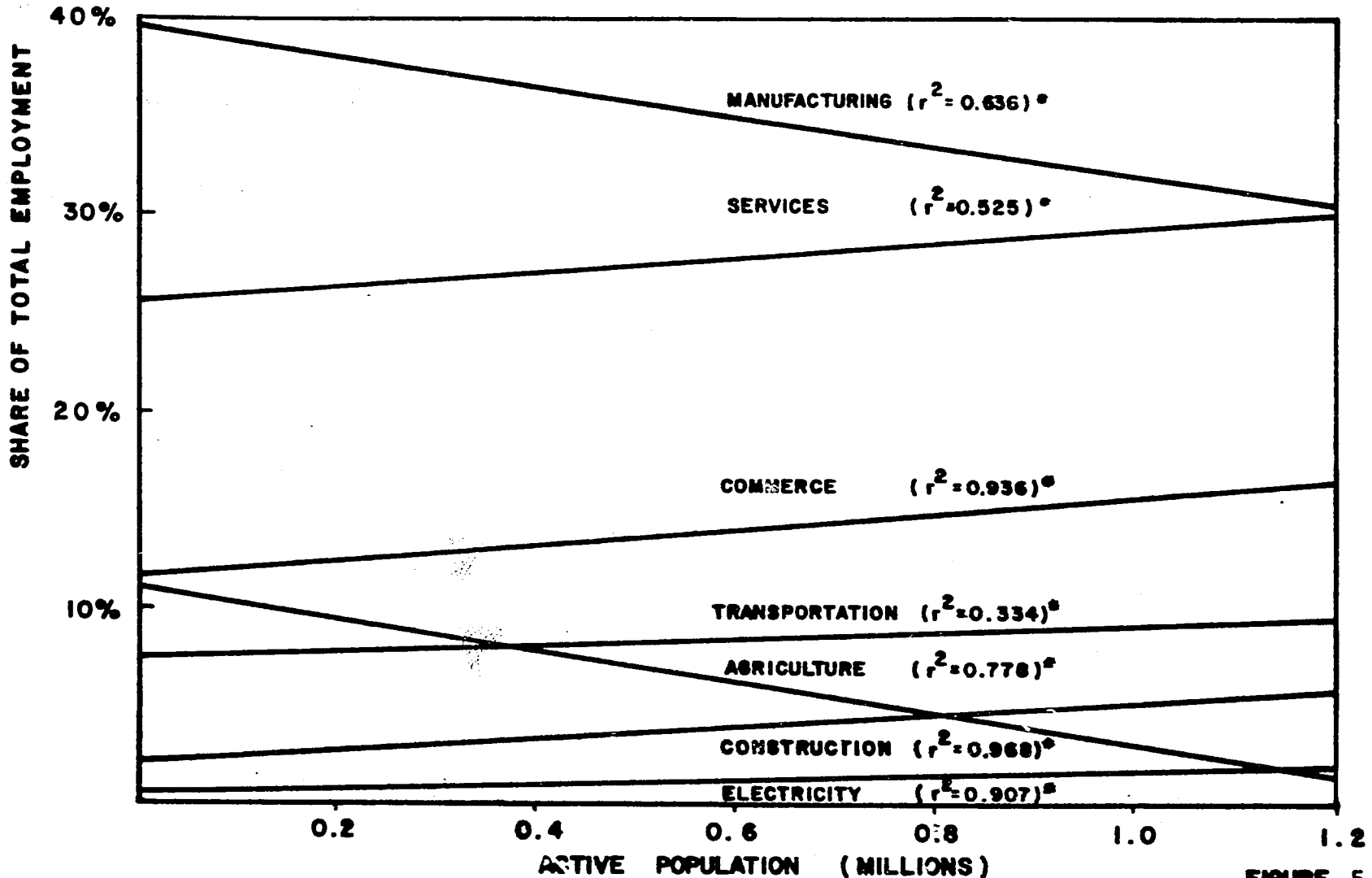

FIGURE 5.2

DYNAMICS OF SECTORS OF ACTIVE POPULATION IN EGYPTIAN URBAN LOCALITIES

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5.3 TOTAL EMPLOYMENT POPULATION FOR NEW DAMIETTA REGION (NDR)

The process of calculating the total population goes according to the following stages: (1) The induced manufacturing sector is calculated from the addition of the port, FTZ, and industrial employments as given in Section 5.1 (2) The regression analysis results are used to generate multipliers from which the induced total active and sectorial population is found, and (3) The baseline excess population is calculated. This assumes that, starting from the year 1985, the urban areas of Damietta will be saturated with population and all excess population is absorbed by the New Damietta Region (NDR) (this is discussed in detail in Section 6). Given the excess baseline population, and using the regional activity rate, the baseline active population, as well as, the total employed population by sector for New Damietta Region population is calculated by adding the induced section to the excess baseline.

Figure 5.3 shows the increase over time of New Damietta Region work force by sector of employment and households.

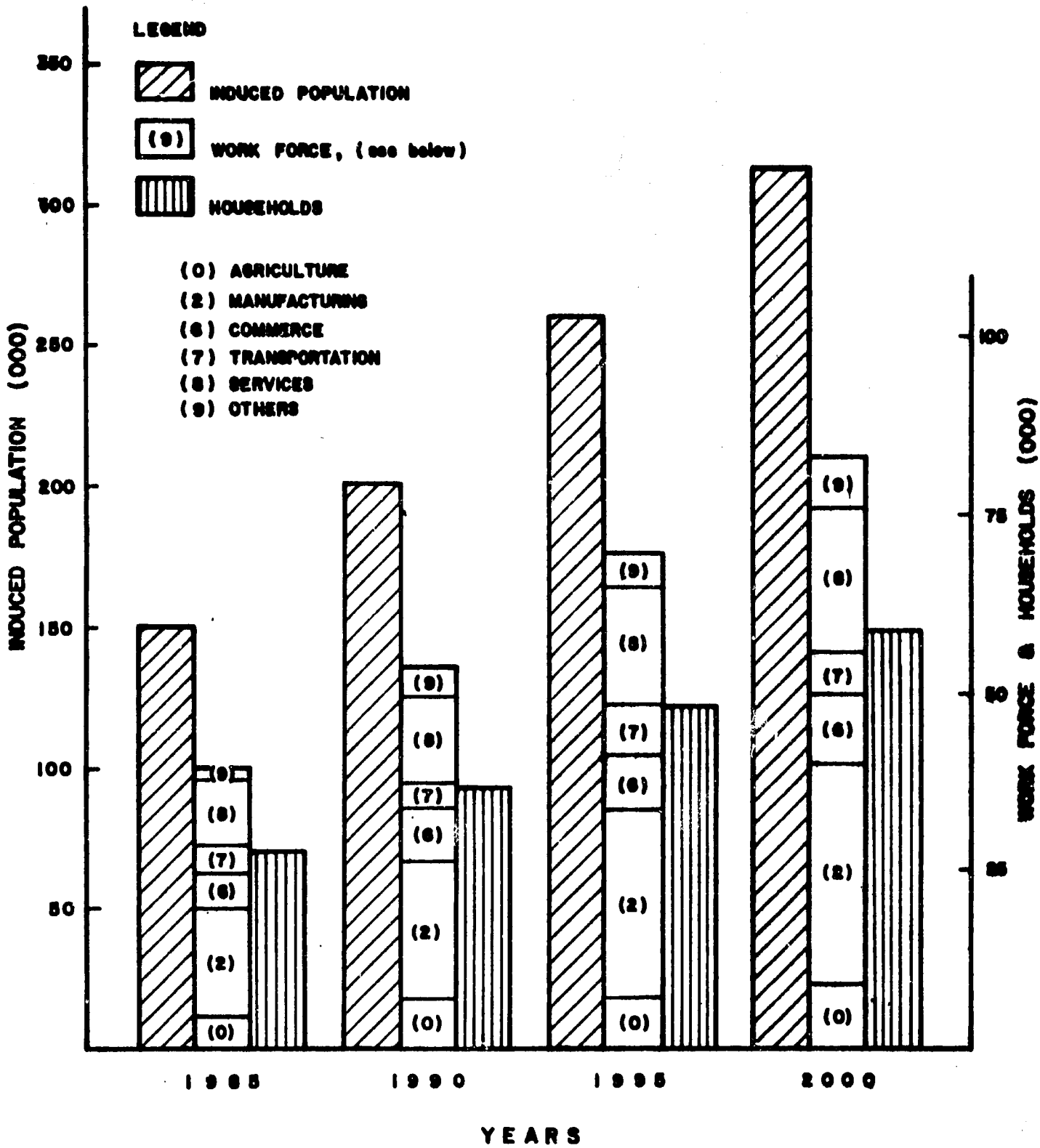

FIGURE 5.3

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POPULATION, WORK FORCE AND HOUSEHOLD GROWTH

5.4 MIGRATION ANALYSIS

A simple migration analysis method is applied to calculate the migration trends from nearby governorates to Damietta to meet with the induced population needs of Damietta. This method is based on the general diffusion law, which assumes that the amount of people diffusing from one region to another is directly proportional to the density of population in the governorate of origin, and inversely proportional to the distance between their capitals measured on the main transportation roads. Figure 5.4 shows the expected percentage migration from each governorate based on the above analysis.

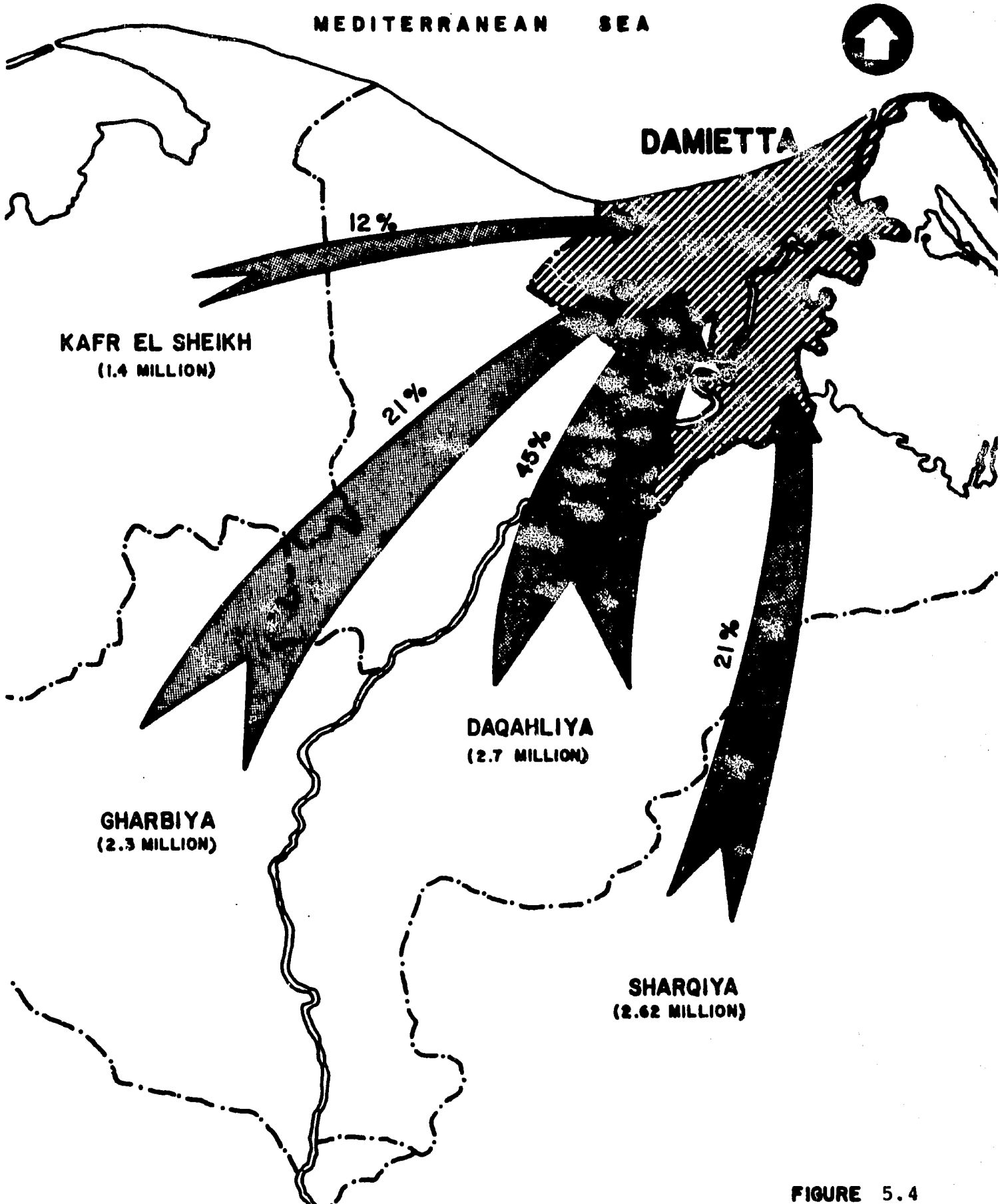

FIGURE 5.4

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MIGRATION TRENDS

6.0

COMMUNITY DEVELOPMENT PROGRAM

6.0
COMMUNITY DEVELOPMENT PROGRAM

6.1 INTRODUCTION

Port Development will have a considerable impact on the Region of Damietta and its future development.

The port should be considered in the context of an integrated regional development plan. If this plan is not prepared and executed in proper time, severe difficulties will arise and they will deteriorate the ecology of the region as well as hindering benefits of the port.

6.2 GROWTH POTENTIALS AND LIMITATIONS OF THE REGION WITHOUT THE PORT

The Damietta governorate occupies 599.5 square kilometers in the northeast section of Egypt. With a population of 557,115 persons in 1976. Figure 6.1 shows the baseline population development. Results of the last three census show that the Damietta governorate is attracting people from other nearby governorates, due to their prosperous industrial activities. Damietta is famous for its furniture, engaging 4,000 workshops which produce 60% of the total production of Egyptian furniture. It also has a reputation for its shoe and milk products. Besides manufacturing the governorate produces rice, cotton and fruits.

The 1976 census showed that there is a shortage of both water supply and electricity in the governorate. The water supply shortage being approximately 50% and electricity being approximately 40%. In addition, sewerage treatment is the most difficult utility problem in the governorate. With only one treatment plant existing in the governorate,

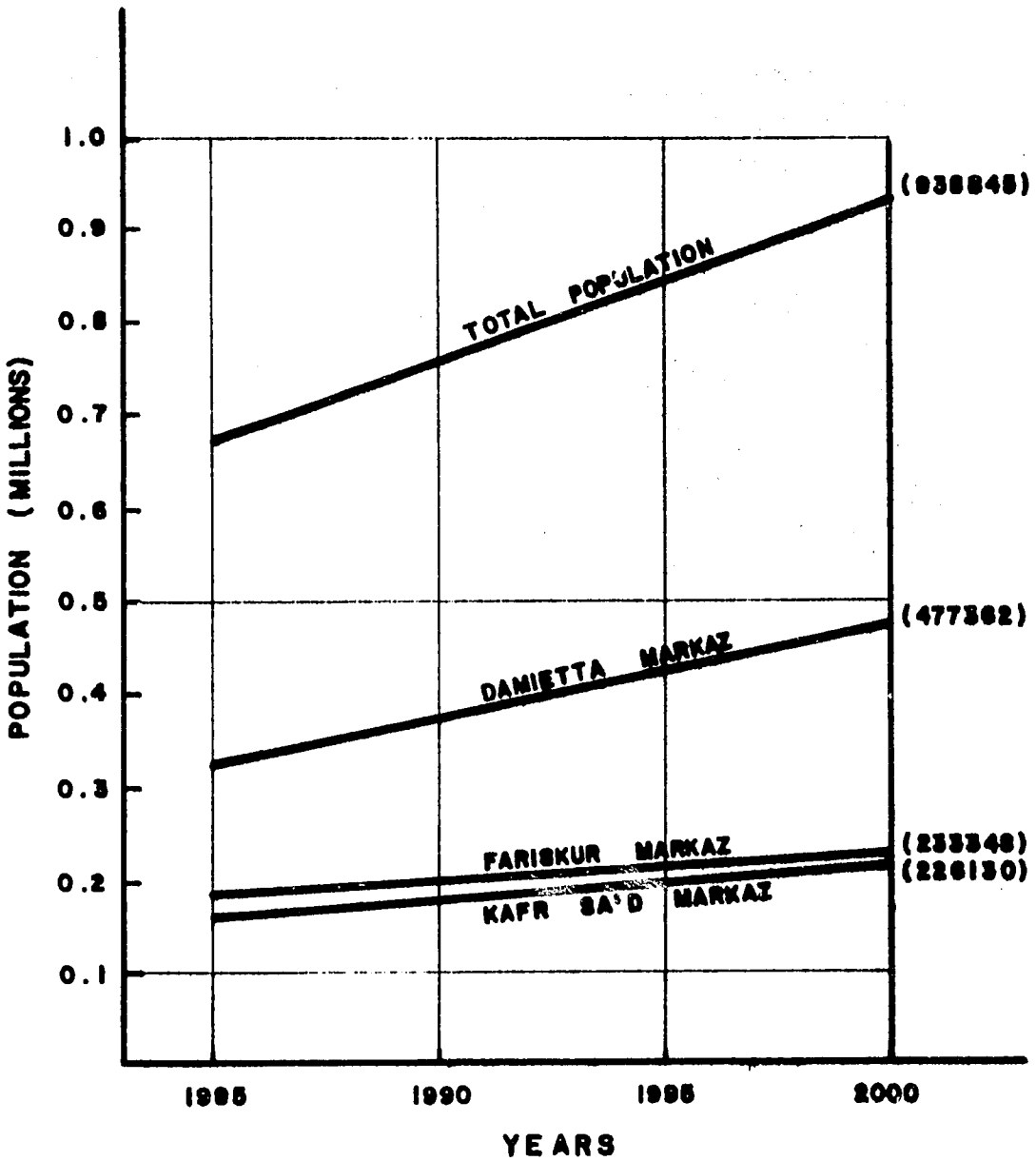

FIGURE 6.1

BASE LINE POPULATION PROJECTION

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which serves only 25% of the requirements of Damietta City. Sewerage not treated in the treatment plant is channeled into public drains, which is a health hazard.

Urban population represents approximately 26% of the total governorate. The majority of this population is concentrated in Damietta City, which represents approximately 17% of the total governorate and 65% of urban population.

The internal migration trend within the governorate is from Faraskour markaz towards Damietta and Kafr Saad markaz. Damietta markaz is the closest point to the port location, and consequently, it will be most affected by the port creation. A closer examination of this markaz is essential to determine the impact of the port on the Region.

6.2.1 DEVELOPMENT OF THE DAMIETTA CITY REGION

In 1976 the Damietta markaz represented approximately 30% of the total population of the governorate, and by the year 2000 it will represent (according to baseline projections) 51% of total population.

The density of Damietta City has reached 425 persons per hectare. Eventually all available land within the administrative borders of the City will be used. This means that any increase in population will result in increased density. By the year 2000 the density of Damietta will reach 549 persons per hectare, creating overloads on all utilities servicing the city.

Damietta City is an old fortress type city, having roads 4-6 meters wide which causes transportation problems.

The housing shortage is estimated to be 20%, although the existing number of flats is greater than the number of families.

The ground floor of all buildings are used as workshops or as commercial outlets. More than 20% of the first floors are either used as storage, leather workshops or offices. A good part of the old houses are unsafe to live in being built 50-100 years ago.

All these factors illustrate the difficulties that will arise from a population increase of Damietta City.

Examination of utilities of the city reveals that 10% of the buildings are not connected to water supply. The gross average water supply is 240 liters per day per capita. This is one half of the gross consumption rate for new cities. To overcome this deficiency, the water supply should be doubled.

The sewerage situation is more drastic, the treatment plant serves only approximately 25% of the city with the remainder channeled into Lake Manzalla. Due to frequent breakdowns of the treatment plant, it is usually drained into the Nile River or Sharkawia Canal.

The above was caused by uncontrolled expansion of the city outside its borders. Expansion took place in four districts, to the north; joining the city with Ezbet El Lahan and Sheikk Dourgam; the east, where is reaches Shata and to the south at El Shoara, and to Sinnoniya on the western bank of the Nile. All these expansions are in fertile land. Uncontrolled expansion keeps space for roads at a minimum, and are poorly served with utilities.

Available land for further expansion is limited to 2 square kilometers and almost all of it will be developed by the year 1985. After the year 2000 if the actual amorphous expansion continues more than 700 feddans of fertile land will be destroyed.

6.3 REGIONAL DEVELOPMENT WITH PORT CONSTRUCTION

Creation of a large port in the region will create approximately 13,200 new jobs by the year 1985 and approximately 29,100 by the year 2000. The corresponding induced population will be approximately 149,650 and 308,000 respectively. Total population by 1985 will be approximately 828,800 and 1,246,800 by the year 2000, all seeking residence in urban areas around the port. This will increase the population of these areas by approximately 116% and 196% respectively.

The question now raised is, "what will happen to the urban areas if no planning takes place"? As mentioned before, urban areas will hardly be able to support their baseline population up to 1985, let alone support it thereafter. If urban population is doubled, an additional 890 feddan of fert le land will be consumed by the year 1985. Lost fertile land amounts to 1850 feddan by the year 2000. Opportunity value lost will amount to 6.9 million LE, which is equal to 20% of the actual annual governorate agriculture production. Such a situation will deteriorate a major part of the fertile land around Damietta city, as well as an increase of population at a rate of approximately 22,440 persons per year starting from 1985. The utilities will not be able to cope with the increase. Deterioration of both the urban and agriculture potential of the region will be imminent.

6.3.1 INTEGRATED URBAN PLAN INCLUDING THE PORT

Port creation will transform the region into a major pole of population attraction. Migration flow will relieve mid-delta highly dense urban areas. Thus minimizing the use of

fertile land for non-agricultural use, which is a recognized national goal.

Any further growth of existing urban areas in the governorate can only be at the cost of fertile land. Therefore, all future urban development should take place on desert (arid) soil. It should be mentioned that approximately 30% of the land of the governorate is desert (arid) and much of it, fronting on the ocean is eminently suitable for urban development.

In programming the development of the future urban area of Damietta, to hold the Port 1985 baseline population growth for existing urban areas as well as that growth induced by the new port, the current and short-term state of the city of Damietta should be kept in mind. The development plan for "New Damietta" should also deal with the rehabilitation of "Old Damietta". In other words, a "Greater Damietta" plan should be executed which blends over space and time, the satisfaction of the needs of the old with the potentials of the new. While the new residential, commercial, manufacturing, and transportation areas will be located off fertile land, they will in fact form a single metropolitan area, with no part more than 20 minutes distance by public transport from the Old Damietta.

Figure 6.2 gives the spatial requirements of the New Damietta, and Figure 6.3 gives statistically the program for the New Damietta. Note that future growth will require the settlement on the average of over 37,000 people per year between 1985 and 2000.

This section has attempted to describe the future urban requirements of the region both in baseline condition and in the condition with population and activity increases

MEAN SPATIAL REQUIREMENT OF NEW DAMIETTA

AREA BREAKDOWN	% of Total Area	1985	1990	1995	2000
Population		149650	272831	418098	567672
Residential Area	55	3.74	6.82	10.45	14.19
Services + CBD	8	0.449	0.82	1.25	1.70
Roads	30	1.945	3.55	5.44	7.38
Green Area	7	0.449	0.82	1.25	1.7
Total Urban Area (km^2) (excluding port)	100	6.58	12.01	18.39	24,97
Density Persons/ha		227.43	227.16	227.35	227.34
Port and Related Industries Area		13.69	14.21	14.87	16.07
Total Area (km^2)		20.27	26.22	33.26	41.04

Source: Community Development Technical Report - New Damietta

FIGURE 6.2

HOUSING, UTILITIES AND SERVICE REQUIREMENTS OF

THE NEW CITY OF DAMIETTA GOVERNORATE

CATEGORIES	1985	1990	1995	2000
POPULATION	149650	272831	418098	567672
DWELLING UNITS	28236	51478	78886	107108
WATER SUPPLY M^3/DAY	67343	122774	188144	255452
ELECTRICITY MW	16.1	29.4	45.0	61.1
SEWERAGE M^3/DAY	53874	98219	150515	204362
PRIMARY SCHOOLS	29	53	81	110
PREPARATORY SCHOOLS	15	27	41	55
SECONDARY SCHOOLS	9	17	26	34
HEALTH CENTER	4	8	12	16
GENERAL HOSPITAL	1	2	3	4
SPECIAL HOSPITAL	2	4	6	8
POLYCLINIC	-	-	-	- 1

FIGURE 6.3

due to the development of the port. It has tried to describe in as vivid terms as possible one more facet about Damietta.

The development of a port in the governorate will have an immeasurably positive impact on the urban centers already existing in Lower Egypt. This is in line with the new communities policy, but as with all major opportunities, its achievement comes with conditions. Without planning, the population pressure upon the poorly developed urban infrastructure will result in intolerable conditions, i.e., the consumption of thousands of hectares of fertile soil or the densification of cities. Signs of the outcome are already visable. Already land values have increased in areas thought by local inhabitants to be near the location of the future port. Already fertile land is being consumed by speculative housing projects designed to capitalize on future demand. Because of this it is highly recommended that planning for a greater Damietta begin immediately with establishment of proper land use controls.

7.0

REGIONAL LAND USE AND VALUES

7.0

REGIONAL LAND USE AND VALUES

7.1 EXISTING SPATIAL PATTERNS

Two major axis of agglomeration of settlements can be perceived; the Northeast/Southwest axis, parallel to the Nile Course, along which the majority of population and settlements are located. The second axis is minor, curved and almost perpendicular to the first going Northwest. Along which minor population and settlements are located. Analysis of settlement distribution and hierarchies indicates the existence of agglomeration to the east and dispersion of settlements with relatively increasing spacing to the West and the North.

7.2 EXISTING REGIONAL LAND USES

Fertile agricultural areas extend along the Damietta Branch of the Nile, while margional agricultural areas, mainly reclaimed, extend toward the coast. The coastal area is vacant where sand dunes occur. The major urban developments are radial corridors eminating from Damietta City. Some urban sprawl extends along the Nile and along major roads. Salt beds encircle the Northeast areas. Figure 7.1 gives the Regional Land use Budget. Figure 7.2 represents existing land use at the Damietta Region. The figure was prepared from surveys carried-out by the Consultant in February and March of 1979.

REGIONAL LAND USE BUDGET

LAND USE	AREAS IN HECTARES		% AGE
AGRICULTURAL AREAS "CLASS A"	6100	--	--
AGRICULTURAL AREAS "CLASS B"	5800	--	--
TOTAL AGRICULTURAL AREAS		11900	38.08
URBAN SETTLEMENTS AREAS	893	--	--
RURAL SETTLEMENTS AREAS	307	--	--
TOTAL SETTLEMENTS AREAS	--	1200	3.85
SAND AREAS	3110	--	--
VACANT AREAS	5300	--	--
TOTAL VACANT AREAS	--	15753	50.40
RIVER AREAS	687	--	--
CANAL AREAS	70	--	--
TOTAL "SWEET" WATER AREAS	--	757	2.42
TRANSPORTATION AREAS	--	175	0.56
SALT-BEDS AREAS	--	1465	4.69
GRAND TOTAL	--	31250	100%

FIGURE 7.1

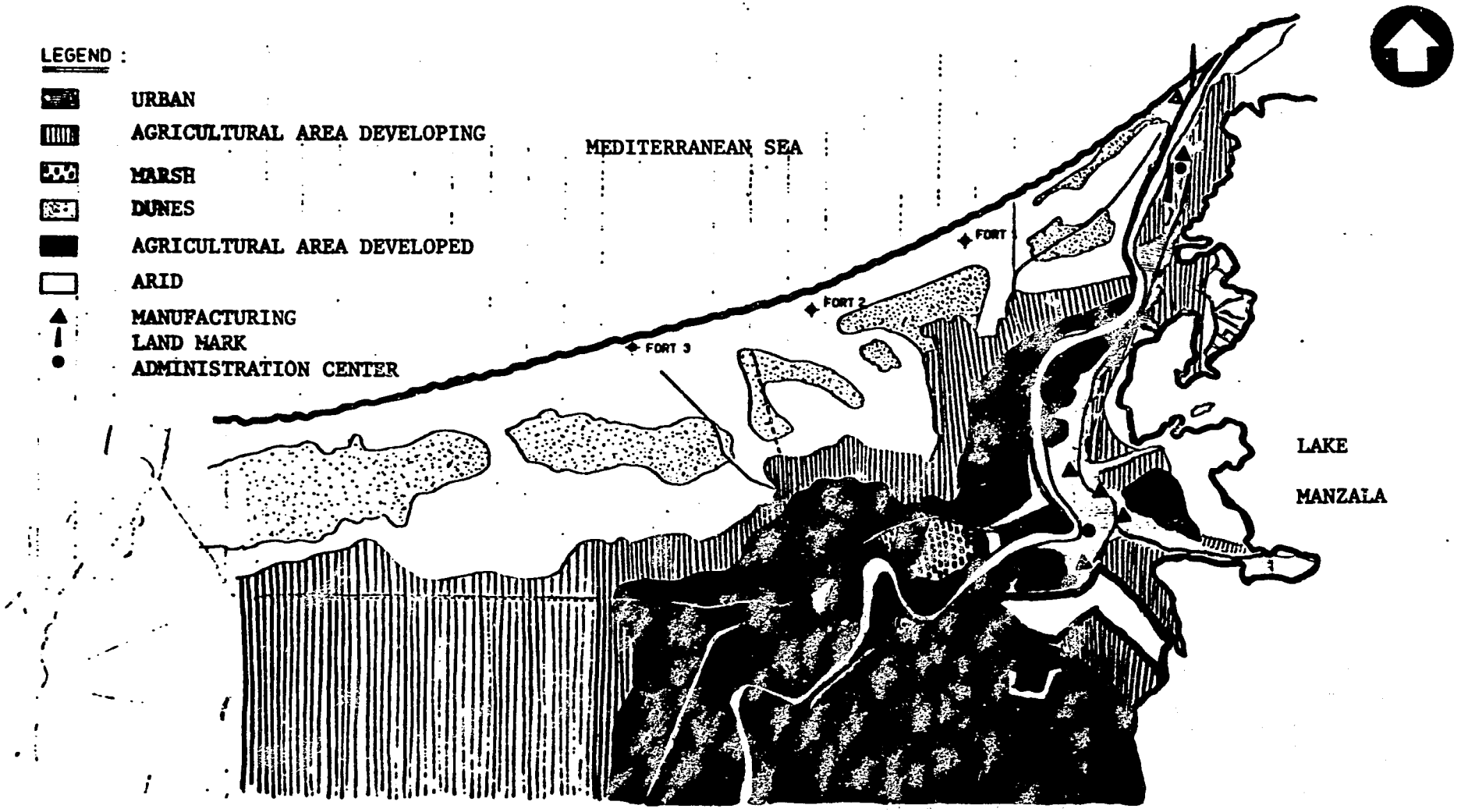

FIGURE 7.2

EXISTING REGIONAL LAND USE MAP

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7.3 REGIONAL LAND VALUES

The existing pattern of the regional land values can be described by having one superior pole of higher values, i.e., Damietta City, and a second pole of less value at Ras-El-Bar beside dispersed points of relatively high values in urban settlements. For agricultural land an axis of higher values exists along the Nile outward from these higher value poles and axis, the value generally decreases evenly with some exceptions. The Table below gives the margins of the existing selling land values.

Existing Selling Values (L.E. per Feddan)

	MAX	MIN
Agricultural	15,000	1,000
Vacant, non reclaimed, Salt beds	1,000	500
Urban	500,000	20,000

Preliminary investigation and market analysis indicate that values of agricultural land represent an imperfect market, i.e., sales values are not parallel or near to opportunity costs. Figure 7.3 illustrates the market value of land in the Damietta Region in terms of price isobars. Each isobar represents the value of land in Egyptian Pounds per feddan. Values shown on Figure 7.3 are derived from a survey carried out by the Consultant of sample selling price in the last 6 months. Where such prices were unavailable, sales prices for similar land in other nearby regions was used.

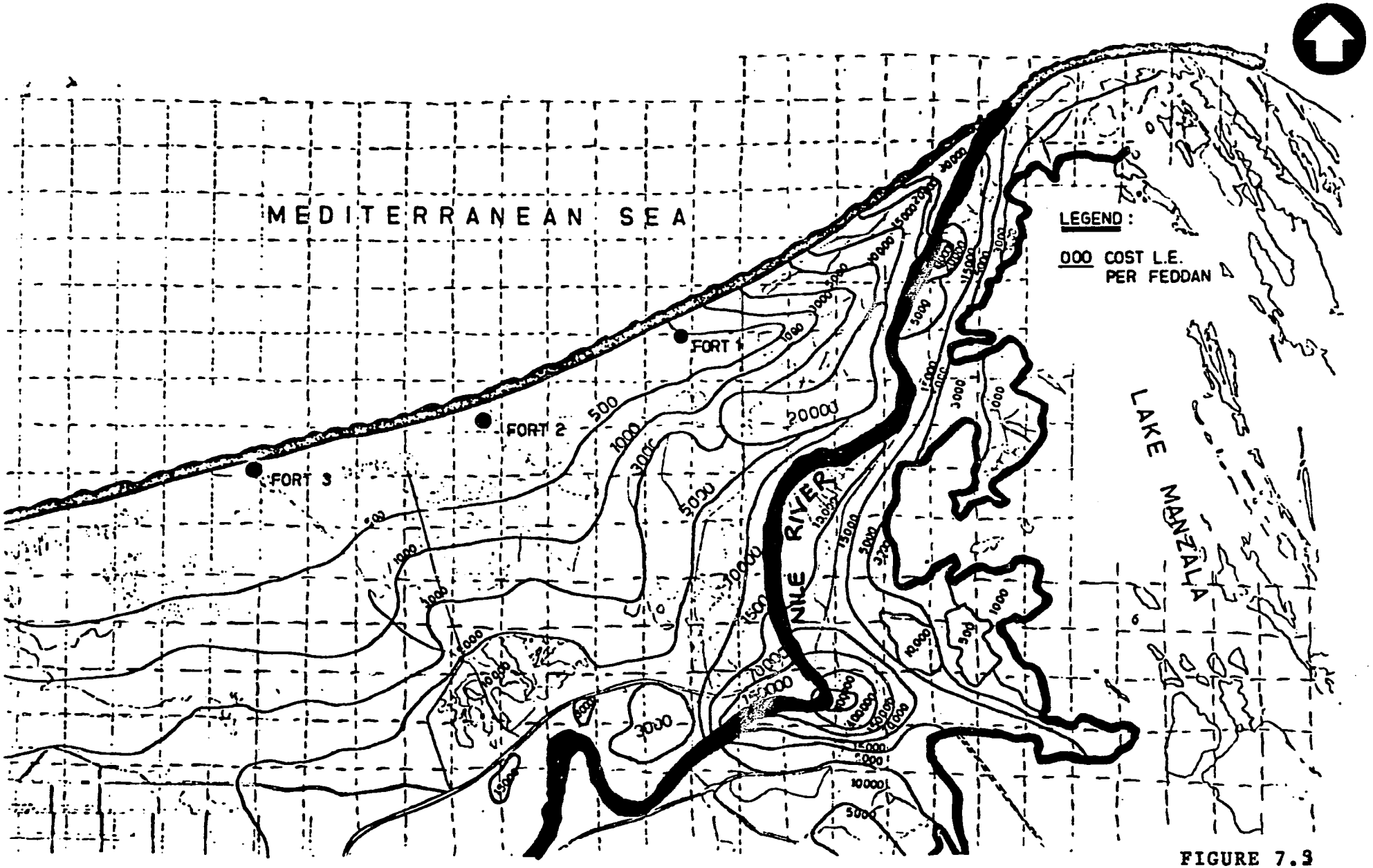

FIGURE 7.3

REGIONAL LAND VALUE MAP

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8.0

ENGINEERING CRITERIA

8.0
ENGINEERING CRITERIA

8.1 OFFSHORE TOPOGRAPHY AND WATER LEVELS

Figure 8.1 shows water depth contours offshore of the Damietta cone. The map is based on bathymetric surveys conducted by the United States Navy in 1978.

Annual average water levels are:

Mean water level:	+ 0.24m
Mean high water level:	+ 0.32m
Highest high water level:	+ 0.79m
Mean low water level:	+ 0.15m
Lowest low water level:	+ 0.39m

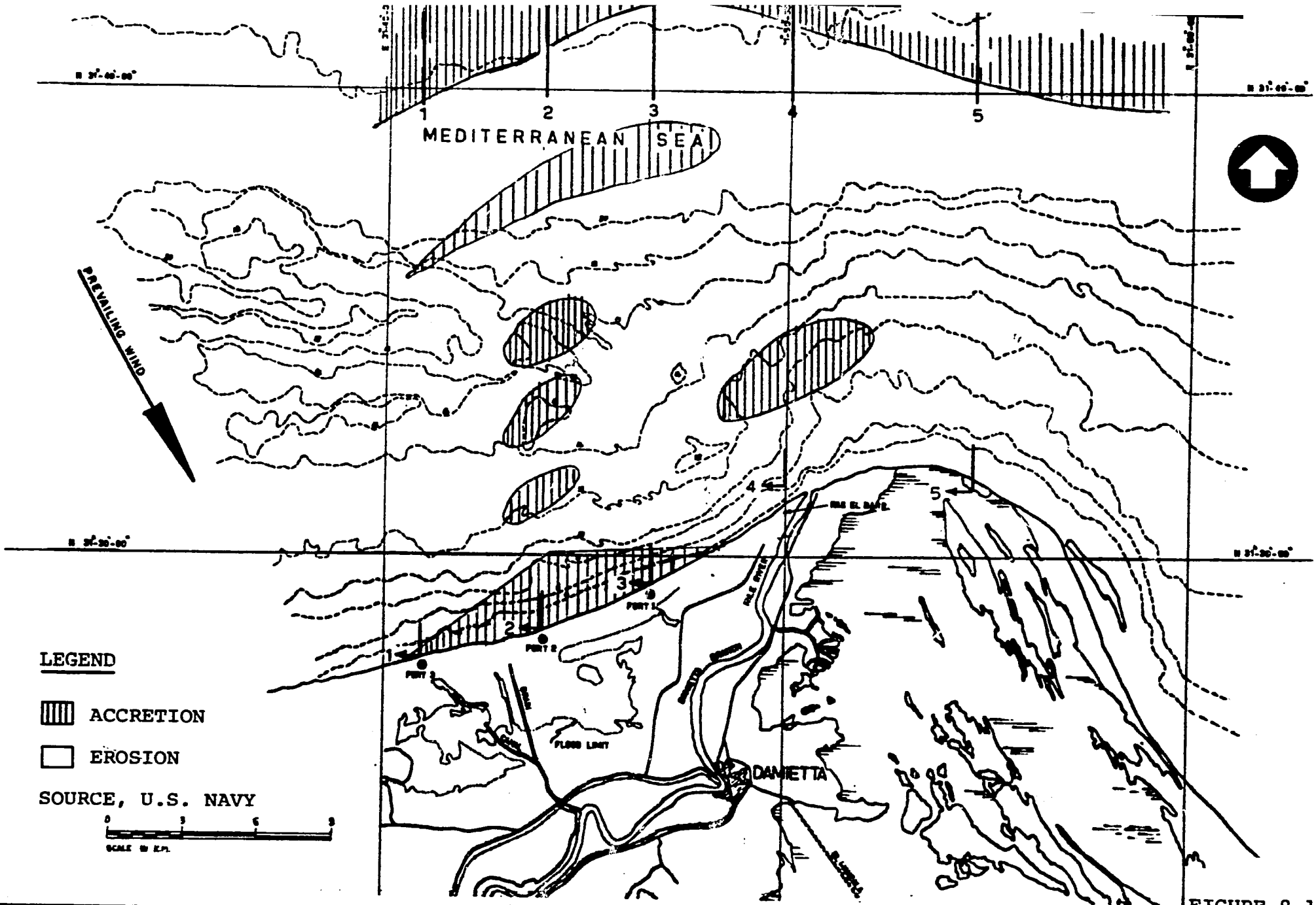

FIGURE 8.1

OFFSHORE TOPOGRAPHY

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8.2 SHORE EROSION SEDIMENTATIONS

Figures 8.2 through 8.6 are coastal profiles comparing the 1919 British Admiralty bathymetric survey and the 1978 United States Navy survey. From these profiles the estimated rate of accretion and/or erosion were established. The estimated year 2000 coastline was based on these profiles.

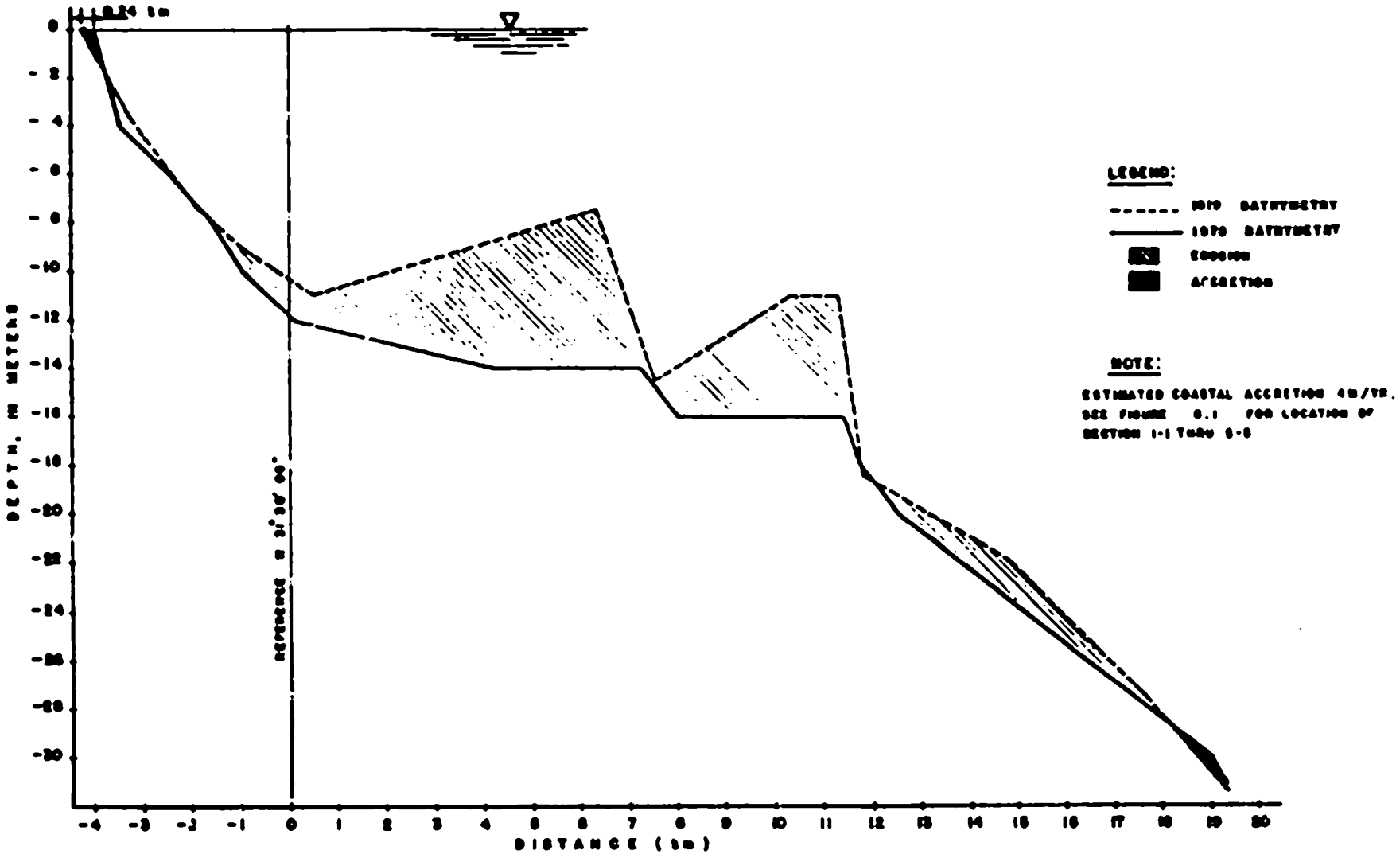

FIGURE 8.2

COASTAL PROFILE AT SECTION 1-1

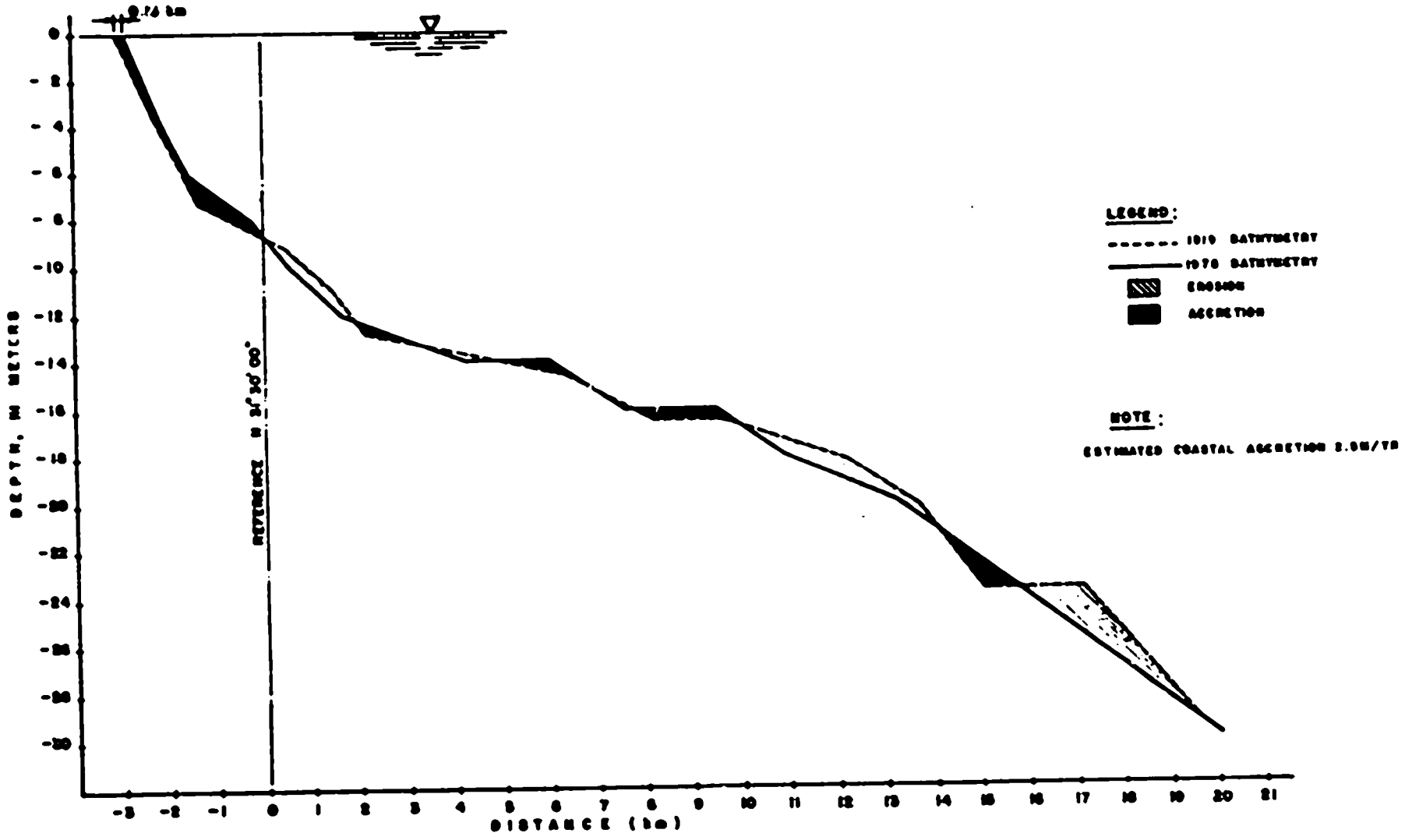

FIGURE 8.3

COASTAL PROFILE AT SECTION 2-2

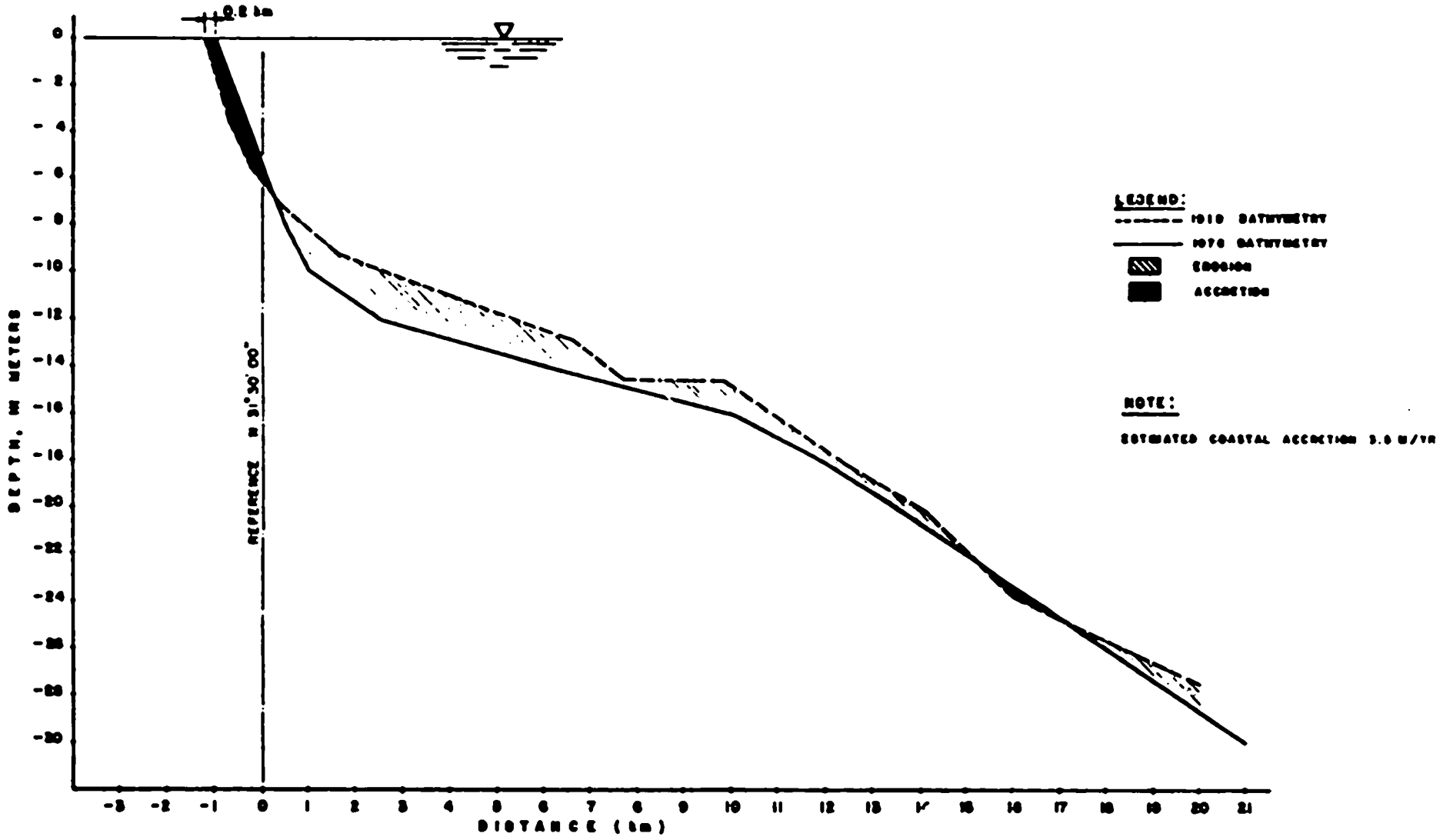

FIGURE 8.4

COASTAL PROFILE AT SECTION 3-3

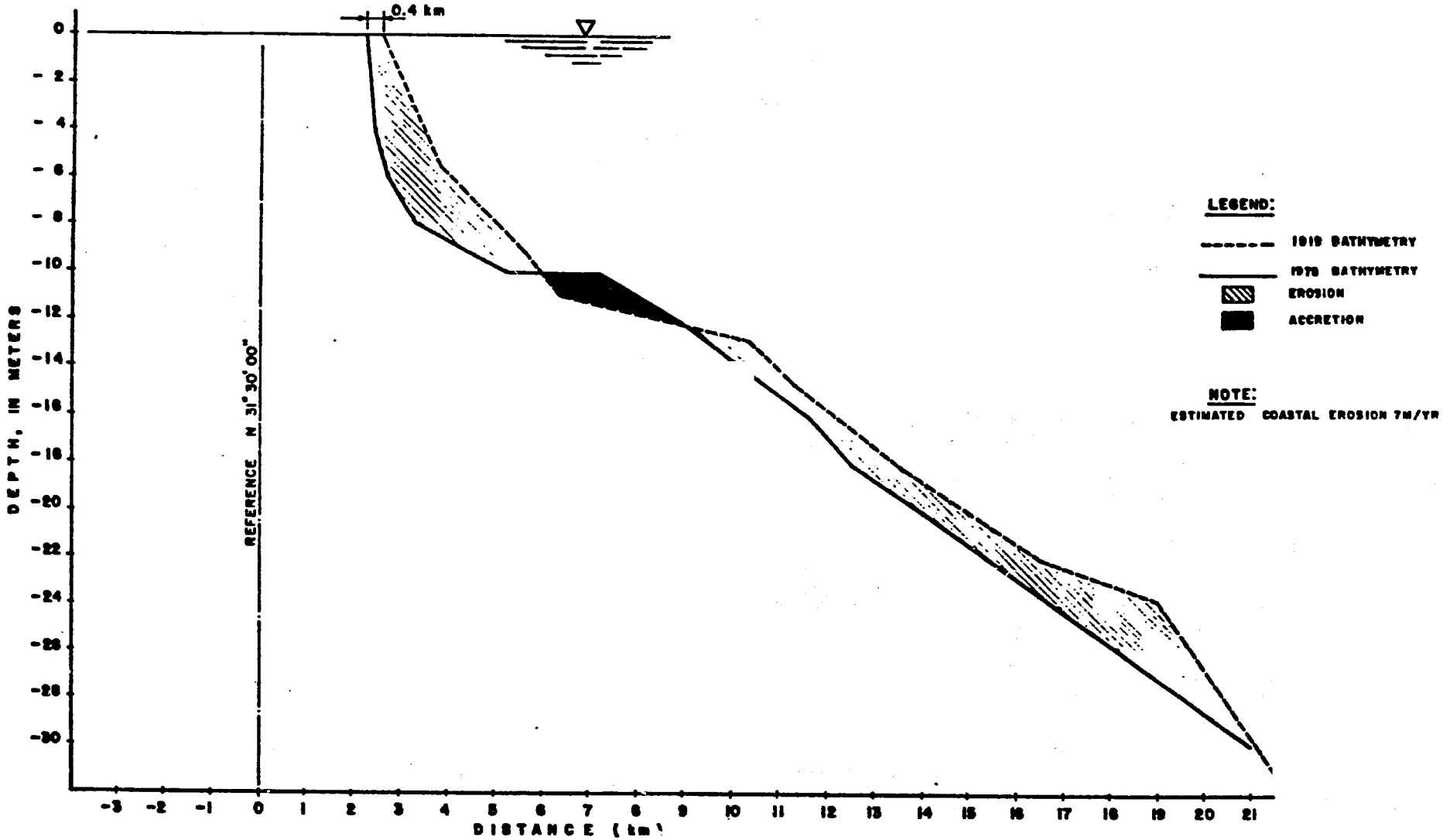

FIGURE 8.5

COASTAL PROFILE AT SECTION 4-4

HARRIS

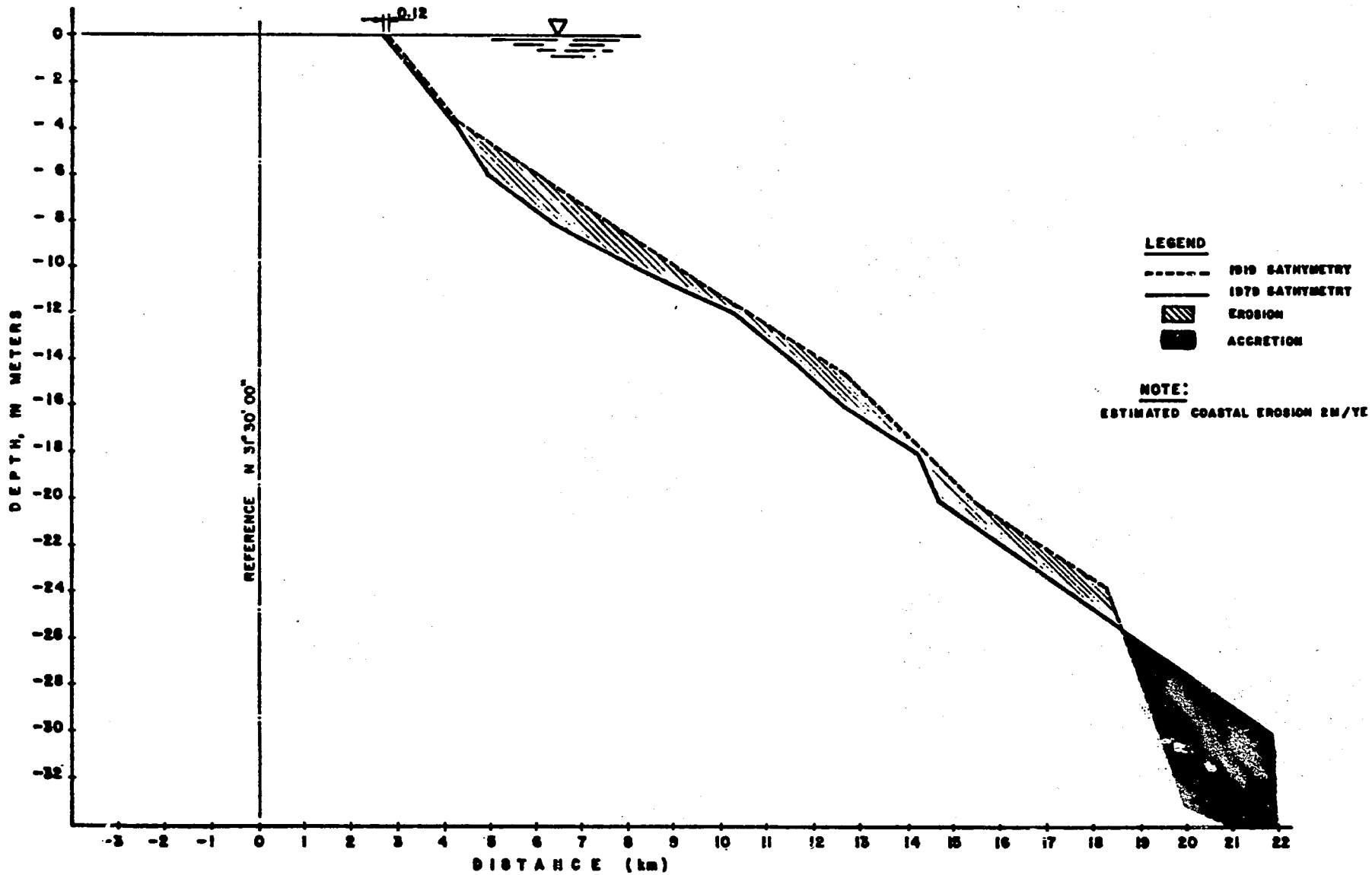

FIGURE 8.6

COASTAL PROFILE AT SECTION 5-5

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8.3 WIND AND WAVE ACTION

8.3.1 WIND ROSE

The average annual wind rose for the offshore Damietta area is shown in Figure 8.7. From the Figure, the annual wind velocities are as follows:

Percentage of Time	Wind to Equal to or Greater Than (knots)
10	13.7
20	14.5
30	10.0
40	9.5
50	7.5

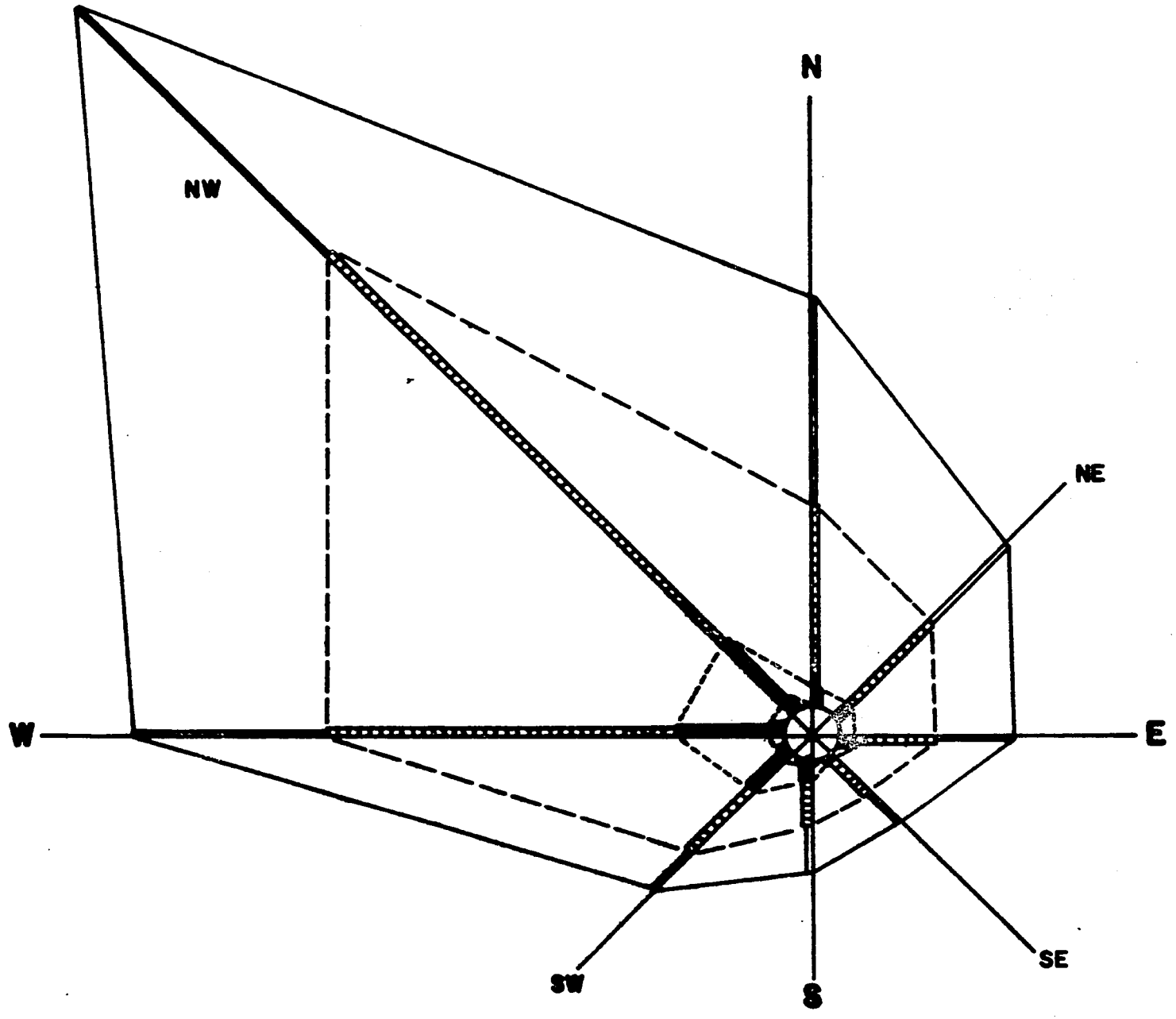
8.3.2 PREVAILING WINDS

Wind Direction	Percentage of Time
N	13.7
NE	8.0
E	5.8
SE	3.4
S	3.6
SW	6.5
W	21.4
NW	33.2

The predominant wind direction is the northwest quadrant from which the wind blows 68.3% of the time.

8.3.3 WAVES

The following annual wave heights were extracted from ship observations published in the Summary of Synoptic Marine Observations:



LEGEND :

- 0–6 KNOTS
- 7–16 KNOTS
- 17–27 KNOTS
- 28–40 KNOTS
- > 41 KNOTS

NOTE

FREQUENCY SCALE

1 CM = 2 %

(50749 OBSERVATIONS)

FIGURE 8.7

AVERAGE ANNUAL WIND ROSE (1860-1970)

Percentage of Time	Wave Heights Greater Than or Equal to (meters)
10	1.7
20	1.16
30	0.95
40	0.75
50	0.61

The deep water design wave for a 30-year return period is established as 6.25 meters.

8.4 SUBSURFACE EXPLORATION PROGRAM

A subsurface exploration program has been initiated at the site of the proposed port. This program includes the drilling of 21 land and 5 marine borings as well as laboratory testing of representative soil samples recovered in the borings. The approximate location of the borings are presented in Figure 8.8 This work is being performed by Raymond International of Delaware,Inc., with the borings being drilled under the continuous inspection of a Frederic R. Harris,Inc. Engineer.

The land boring program, which was completed January 29, 1979, consisted of 18 borings drilled approximately 25 meters deep and 4 borings drilled approximately 40 meters deep. The marine boring program is scheduled to begin in mid-April, when sea conditions are more favorable for offshore drillings.

Standard Penetration Tests were performed in all borings at approximately 5 foot intervals in both the granular and cohesive soils. Undisturbed Shelby samples were extracted in the cohesive soils at specified depths so representative samples of the entire strata could be recovered. Field tests performed included Tor-vane shear resistance and Pocket Penetrometer resistance.

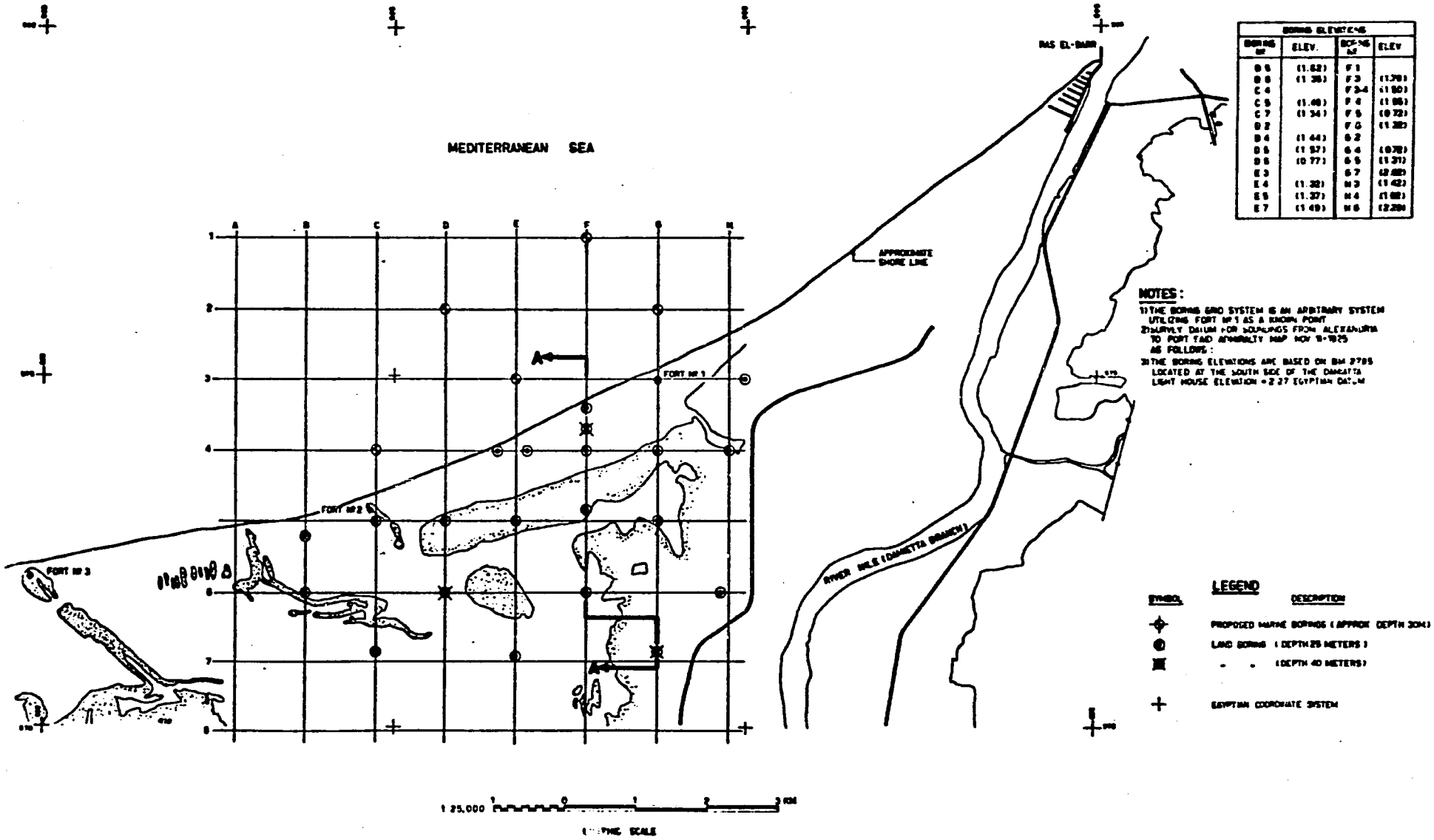


FIGURE 8.3

BORING LOCATION PLAN

165

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8.5 LABORATORY TESTING PROGRAM

The land laboratory testing program includes the performance of both basic physical property tests and performance characteristics tests. The program has not yet been completed, therefore only preliminary soil design parameters have been developed to date. These parameters are presented in Figure 8.9.

PRELIMINARY SOIL PARAMETERS

PARAMETER \ SOIL LAYER	1	2	3	4	5
PHYSICAL PROPERTIES					
UNIFIED SOIL CLASSIFICATION	SP	SM	MH	SP	CL
MOISTURE CONTENT (W) %	-	-	52	-	31
LIQUID LIMIT (WL) %	-	-	64	-	53
PLASTIC LIMIT (WP) %	-	-	33	-	33
SAT-UNIT WEIGHT (SAT) t/m^3	1.9	1.8	1.66	2.0	2.1
RELATIVE DENSITY (Dr) %	0.35-0.7	0.35-0.6	-	0.4-0.85	-
MODULUS OF ELASTICITY (E) $\frac{kg}{cm^2}$	200	200	-	700	-
PERFORMANCE PROPERTIES					
STRENGTH					
ANGLE OF INTERNAL FRICTION (ϕ)	35°	33°	10.5	38	-
COHESION (C) $\frac{kg}{cm}$	-	-	.2	-	2
SENSITIVITY RATIO (s_r)	-	-	6.5	-	-
COMPRESSION					
INITIAL VOID RATIO (c_o)	-	-	1.49	-	-
PRE CONSOLIDATION PRESSURE (T/m^2)	-	-	17	-	
COMPRESSION INDEX (Cc)	-	-	0.55	-	0.3
COEFFICIENT OF CONSOLIDATION (C_v) Cm^2/sec	-	-	7×10^{-4}	-	-

FIGURE 8.9

8.6 SUBSURFACE STRATIGRAPHY

Utilizing the boring information obtained from the land boring program a subsurface profile and generalized soil stratigraphy have been developed. The location of the soil profile is shown on Figure 8.8 and the profile and generalized subsurface stratigraphy are shown on Figure 8.10 and 8.11 respectively.

The subsurface stratigraphy throughout the proposed site is relatively uniform as indicated from the soil profile Figure 8.10. The soil layers are as follows:

Silty Sand	A light brown medium dense, medium to medium fine silty sand approximately 11.5 meters thick extends from ground surface to elevation - 10 ED (Egyptian Datum, E.D., which is mean sea level measured at Alexandria)
Clayey Silt	A soft organic clayey silt approximately 15 meters thick underlies the silty sand and extends to approximately elevation - 25 E.D.
Sand	A brown dense, course to fine sand approximately 10 meters thick underlies the clayey silt. This layer extends from elevation - 25 E.D. to elevation - 35.E.D.
Clay	A brown very stiff clay underlies the sand strata. This layer was only encountered in one boring.

Ground water readings were taken in all borings. Generally the ground water level lies within one meter of the groud surface at approximately elevation + 1 E.D.

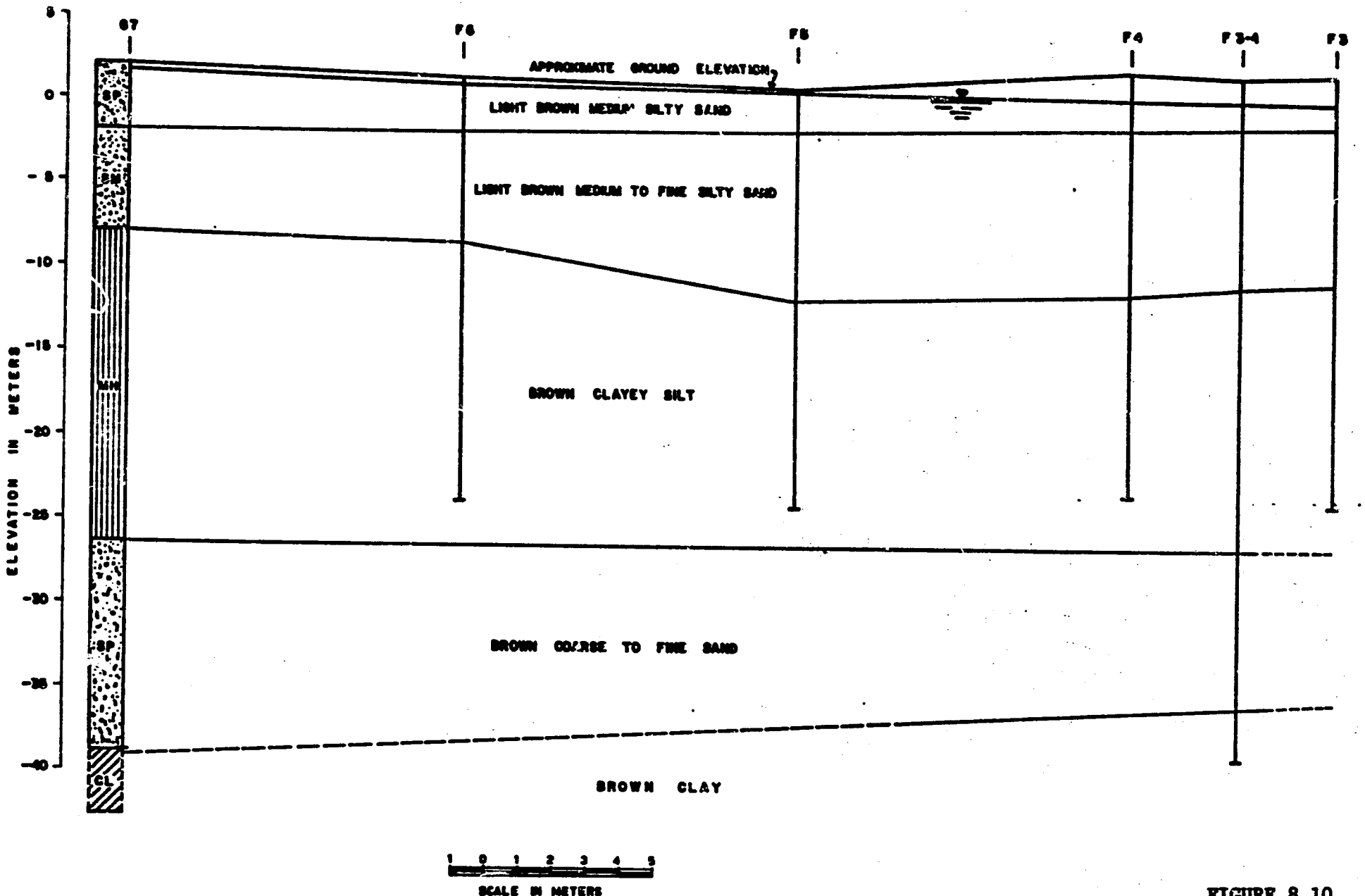

FIGURE 8.10

SUBSURFACE PROFILE A-A'

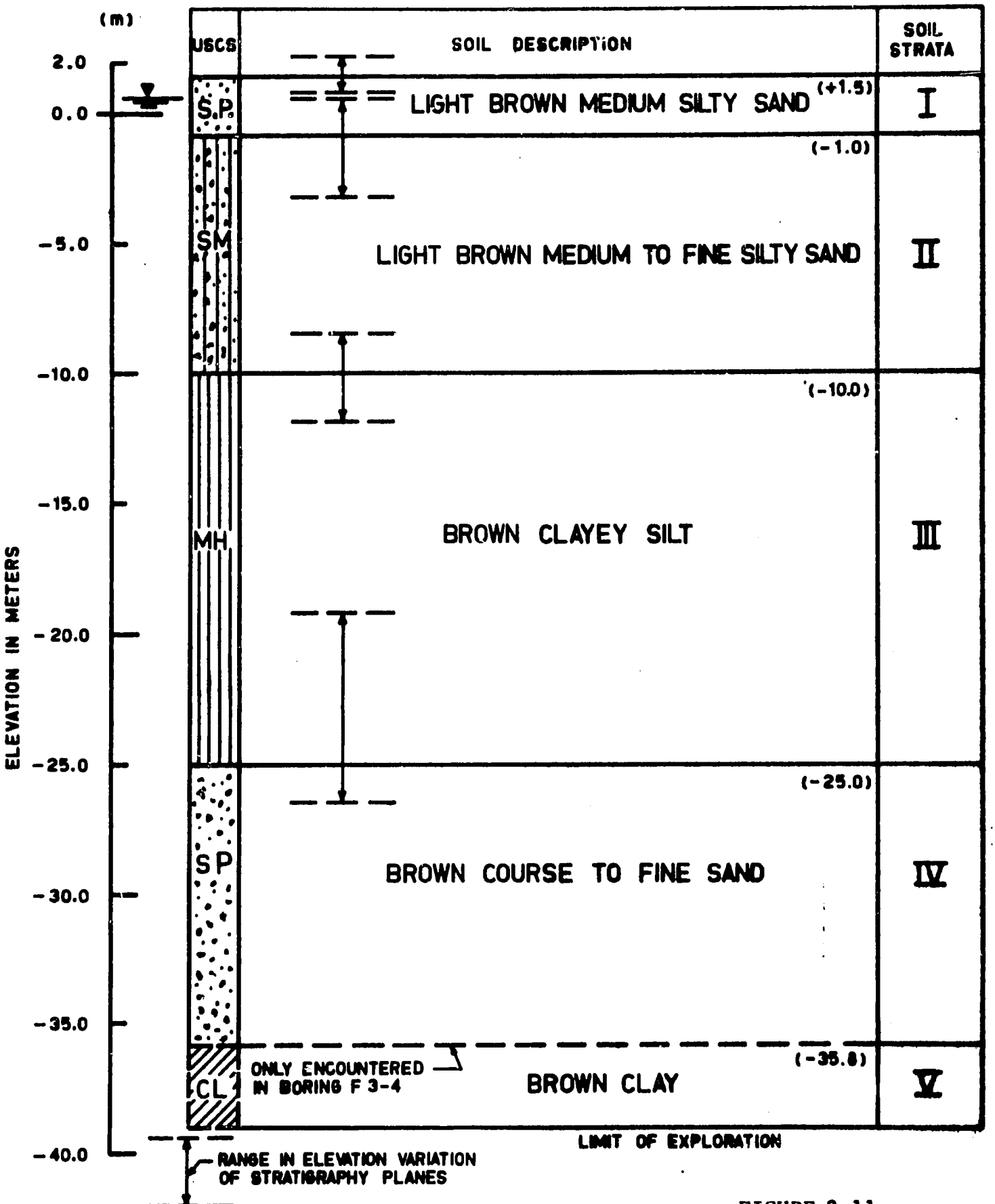

FIGURE 8.11

GENERALIZED SOIL STRATIGRAPHY

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9.0

PORT LOCATION AND LAYOUT

9.0
PORT LOCATION AND LAYOUT

9.1 OPTIMUM PORT LOCATION

The three alternative port locations including breakwater configuration and channel alignment which were investigated are shown in Figure 9.1. Moving the port location west of Fort 1 increases the breakwater and the channel lengths, due to the flatter offshore contours, thus increasing construction costs. Preliminary computations reveal the following, taking location 1 as the base:

	Location 1	Location 2	Location 3
Breakwater length (meter)	100	118	140
Channel dredging (meter)	100	126	160

Any location east of Fort 1 is undesirable for two reasons. First, as shown in Figure 9.2, considerable erosion is occurring. Secondly, the port would conflict with Ras El Bar expansion plans. Location 1 is the optimum port location.

9.1.1 LOCATING THE PORT INLAND

Figure 8.1 in section 8 presents the offshore topography in the vicinity of the porposed port. Figures 8.2 thru 8.6 are profiles of the sea bottom plotted for the years 1919 and 1978. These profiles indicate the area is eroding with only local pockets of acretion, notably in the coastal areas of Forts 1, 2 and 3.

The coast from Gamasa to Ras El Bar has a wide, flat beach without large cusps. Traces of older shorelines show that the western part of the stretch has been advancing. At Fort No. 3, 13 kilometers east of Gamasa, the Coastal Protection Institute reported that the shoreline was 50 meters from the

Fort in 1909 advancing to 200 meters in 1945, receding to 100 meters in 1956, and increasing again thereafter. This is an indication of the overall instability of the coast.

In addition, preliminary estimates indicate a port built on the coastline will be approximately 10 - 15% more expensive than a port built inland. Moreover, an inland port can be constructed much faster than a port on the coast. This is due to the fact the wharf construction can start simultaneously with the breakwater construction, and can be continuous all year round.

Therefore a one kilometer buffer zone between the port and the coast was established to insure the integrity of the port. The distance will have to be verified by on site engineering surveys and investigations during final design.

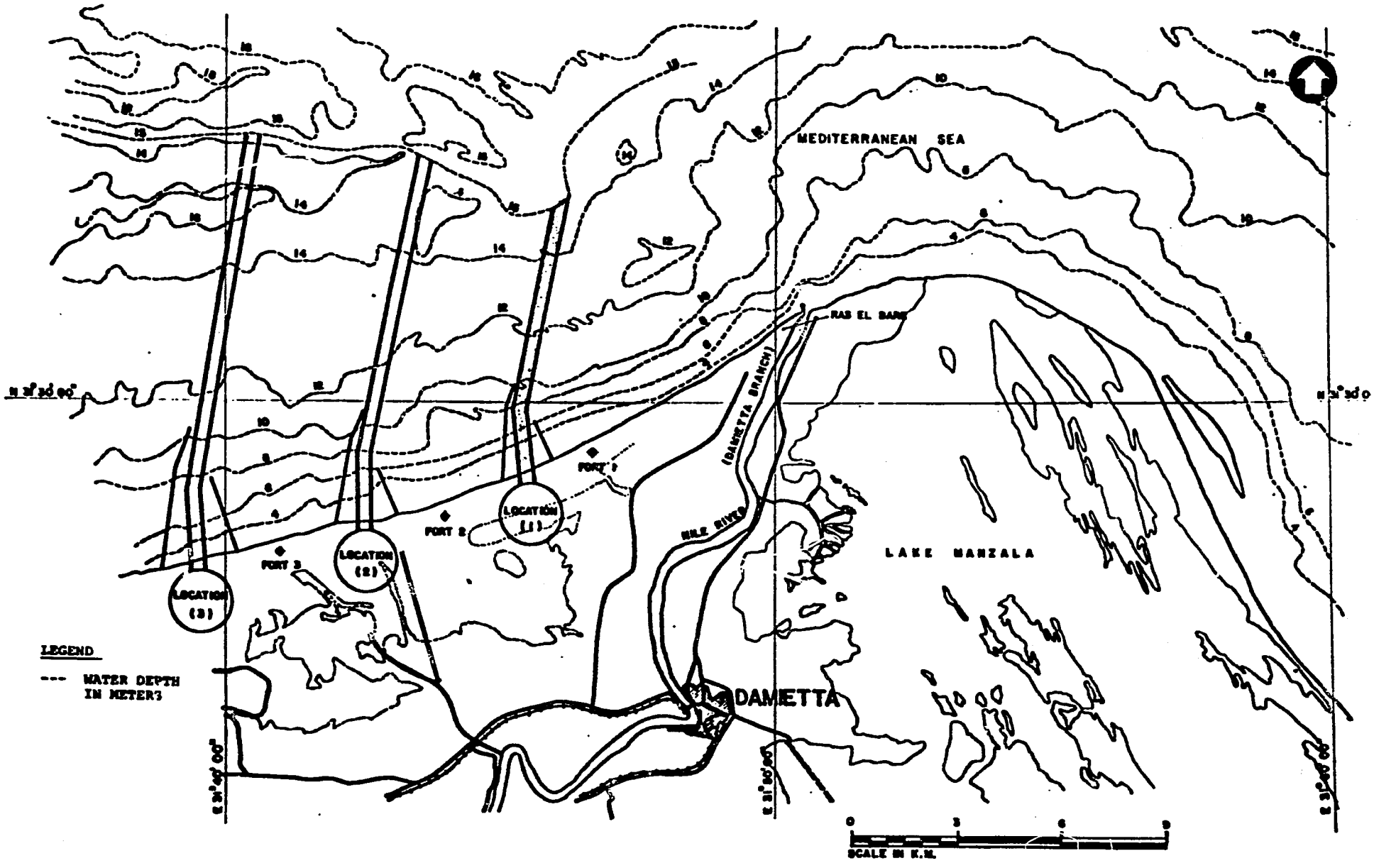

FIGURE 9.1

ALTERNATIVE PORT LOCATIONS

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9.2 ENTRANCE CHANNEL AND BREAKWATER LENGTH

The breakwater functional design should provide the optimum economic protection for the navigation channel and protect the inner harbour against penetrating waves. To obtain the optimum breakwater length, Figure 9.2 was prepared. From the figure, it can be seen that as the breakwater length increases, the construction cost increases. Also, at the same time, the amount of sediment accumulations in the navigation channel decreases. The annual total cost of breakwater construction and maintenance dredging are combined. The optimum breakwater length is the length that gives a total minimum cost. At location 1, extending the breakwater to a depth of 5.0 meters with a total length of 1100 meters would give the optimum economic length.

However, this length leaves the entrance to the port wide open to penetrating northerly waves. Thus the channel has to be curved at the entrance and the western breakwater extended to overlap, or at least prevent these northerly waves from coming into the harbour proper. This will probably mean extending the breakwater to depths of 9 or 10 meters, with a length of approximately 2700 meters.

The chosen site is sufficiently far away from Ras El Bar to have any effect on its coast. However, there will be an expected amount of erosion very close to the eastern breakwater, due to diffracted waves. This location must be adequately protected against this erosion.

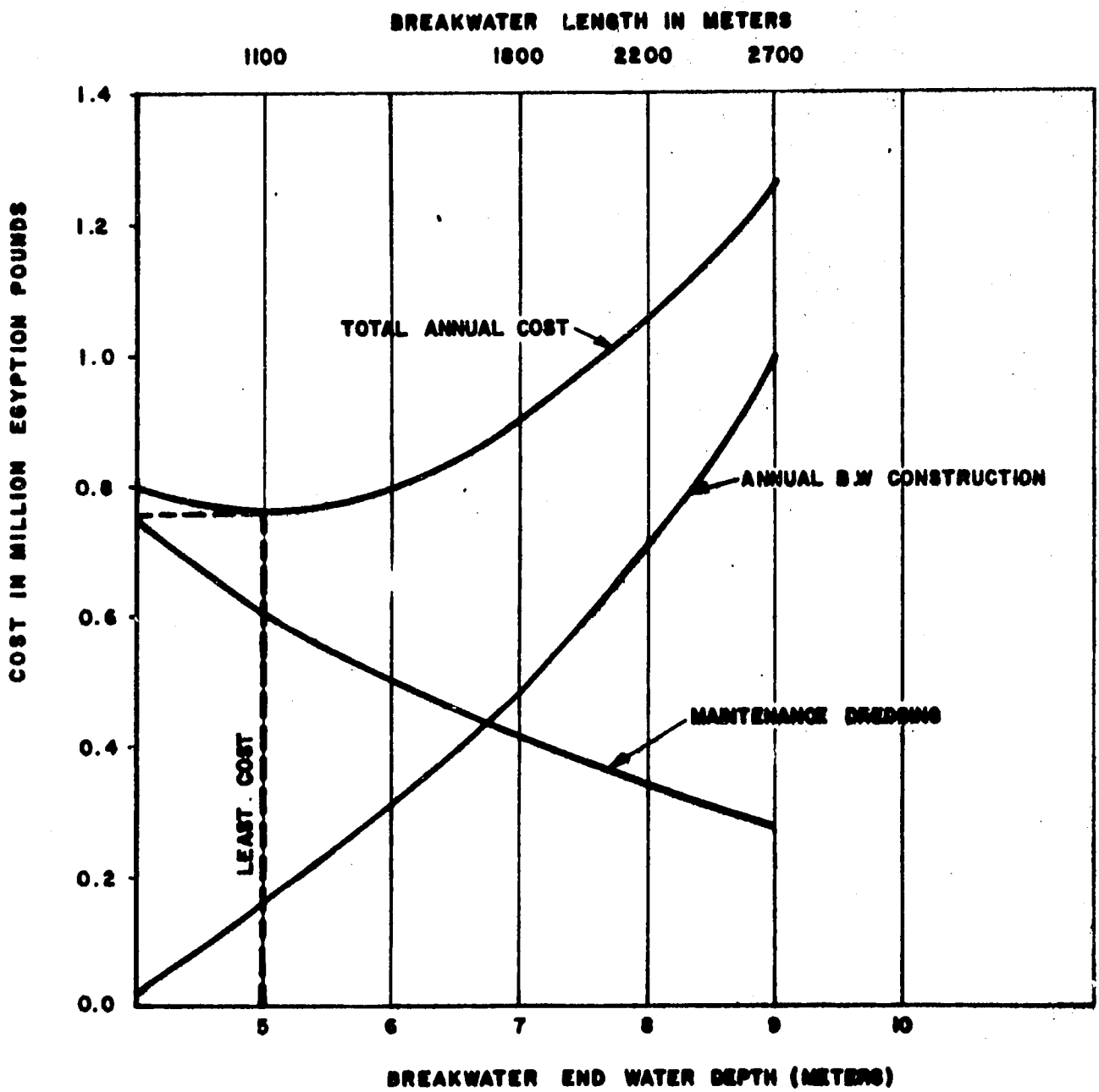


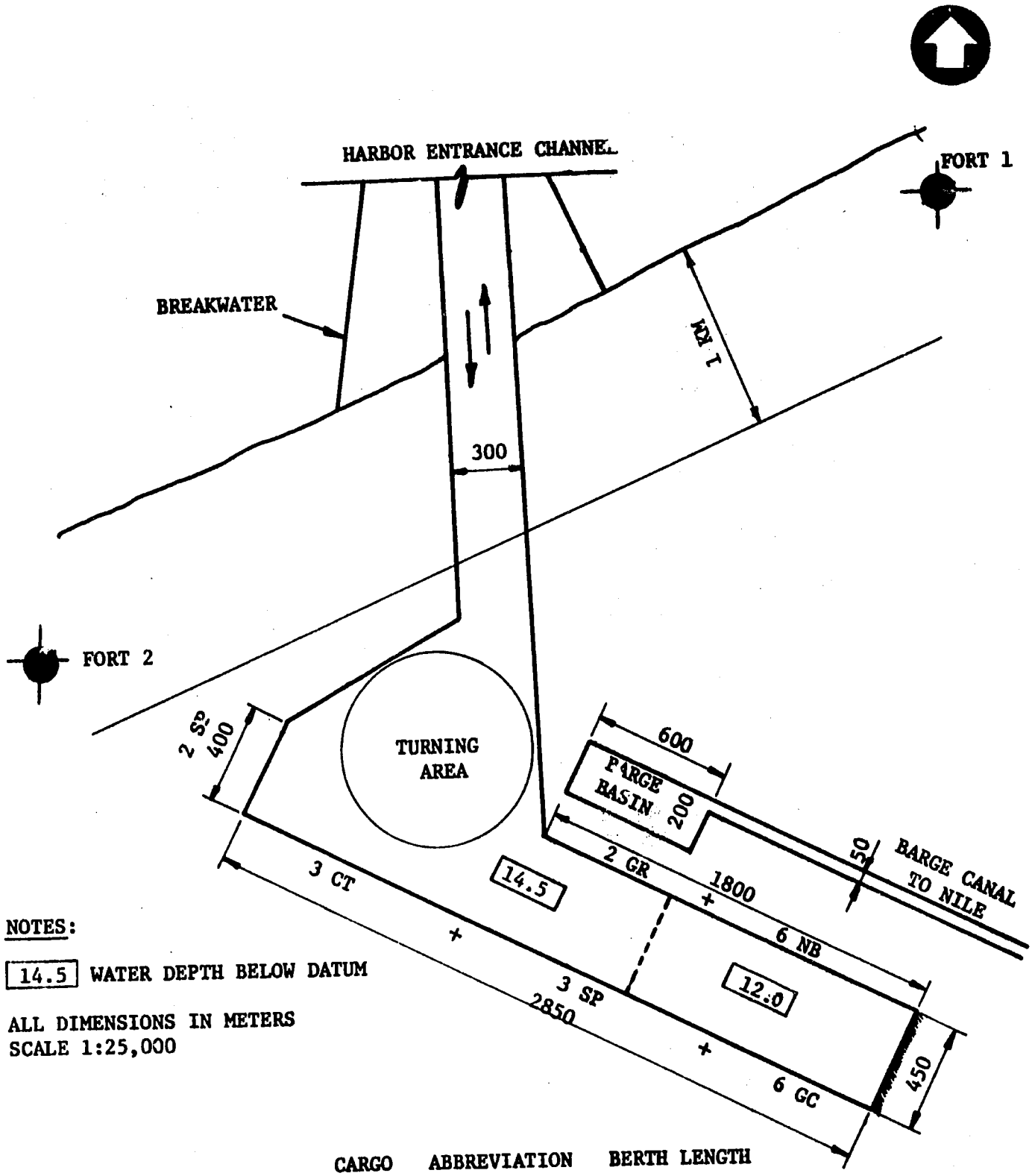
FIGURE 8.2

HARRIS

OPTIMUM BREAKWATER LENGTH AT LOCATION I

9.3 ALTERNATIVE PORT LAYOUTS

Of the many possible port layouts considered, the four offering the greatest potential were evaluated from the standpoint of engineering, operations, construction phasing and ship safety. These four layouts are shown in Figures 9.3 through 9.6. Considered in all four layouts are channel and weather orientation, size of the turning area and required number of berths. The configurations considered varied as to the point of entry of the channel into the harbour shape and geographic direction and location of berths.



NOTES:

[14.5] WATER DEPTH BELOW DATUM

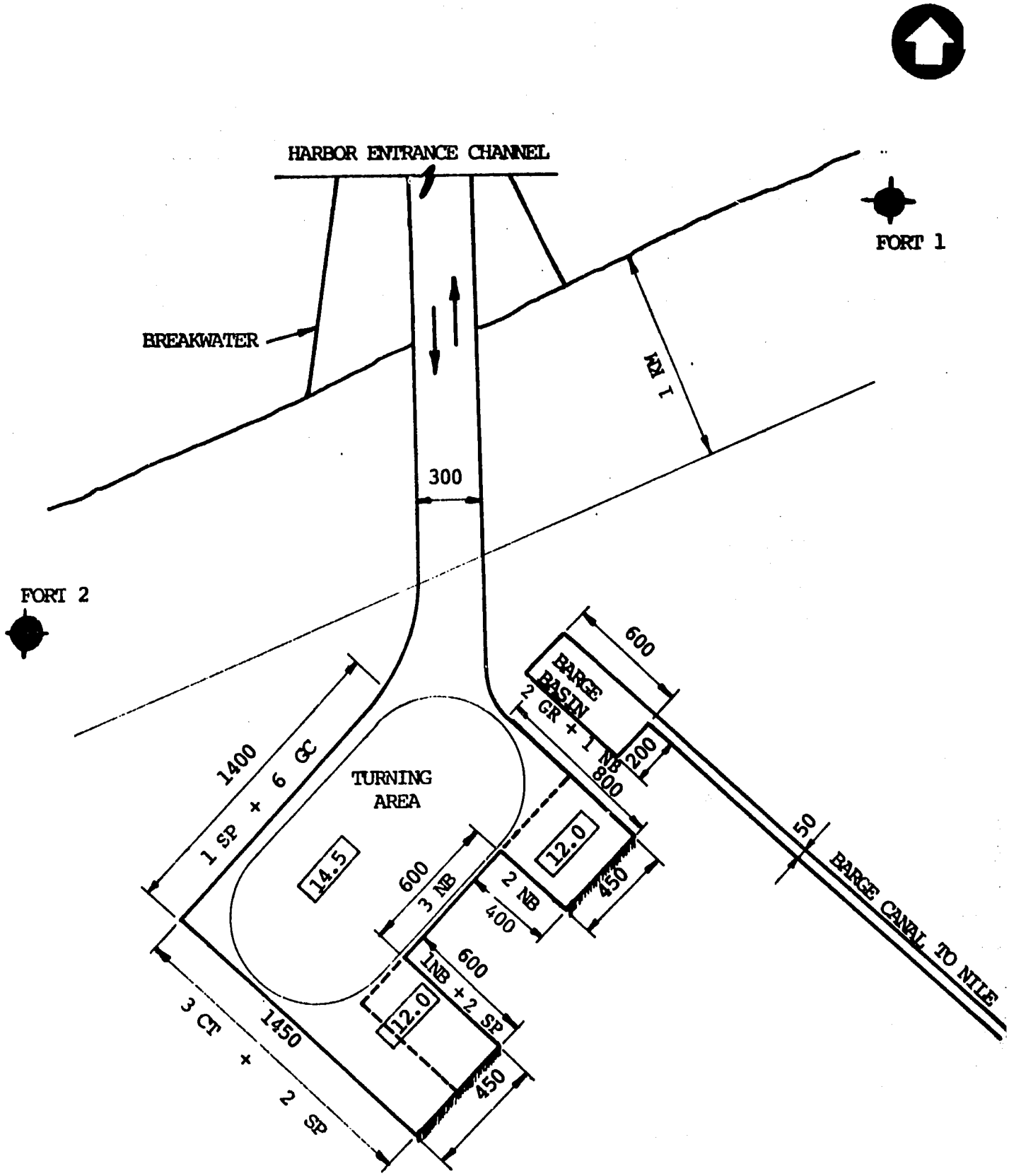
ALL DIMENSIONS IN METERS
SCALE 1:25,000

CARGO	ABBREVIATION	BERTH LENGTH
GRAIN	GR	300M
CONTAINER	CT	350
GENERAL CARGO	GC	200
NET BULK	NB	200
SPECIAL	SP	200

FIGURE 9.3

ALTERNATE PORT LAYOUT NO 1.

HARRIS

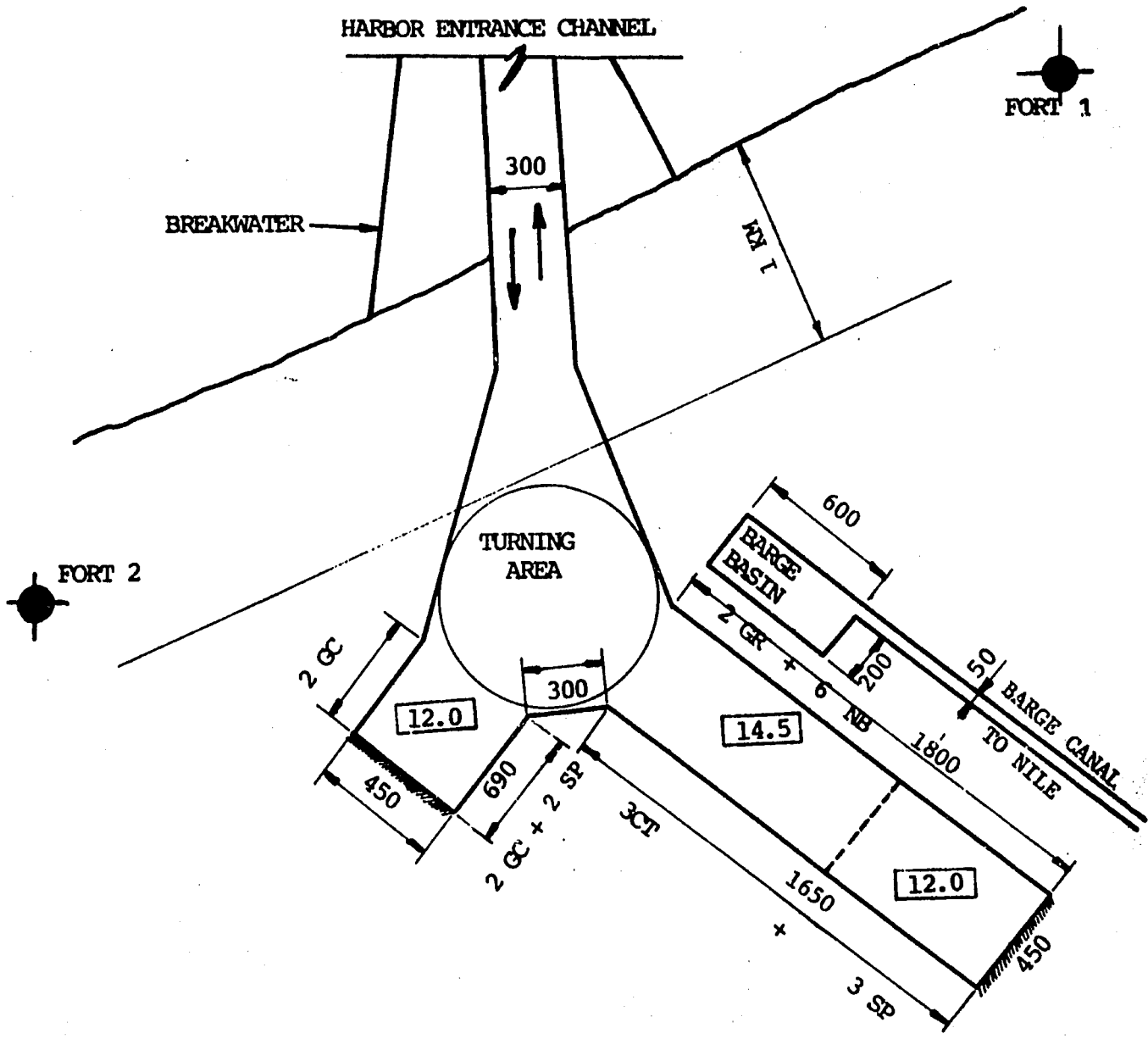


SEE NOTES ALTERNATE 1

FIGURE 9.4

ALTERNATIVE PORT LAYOUT NO 2

HARRIS



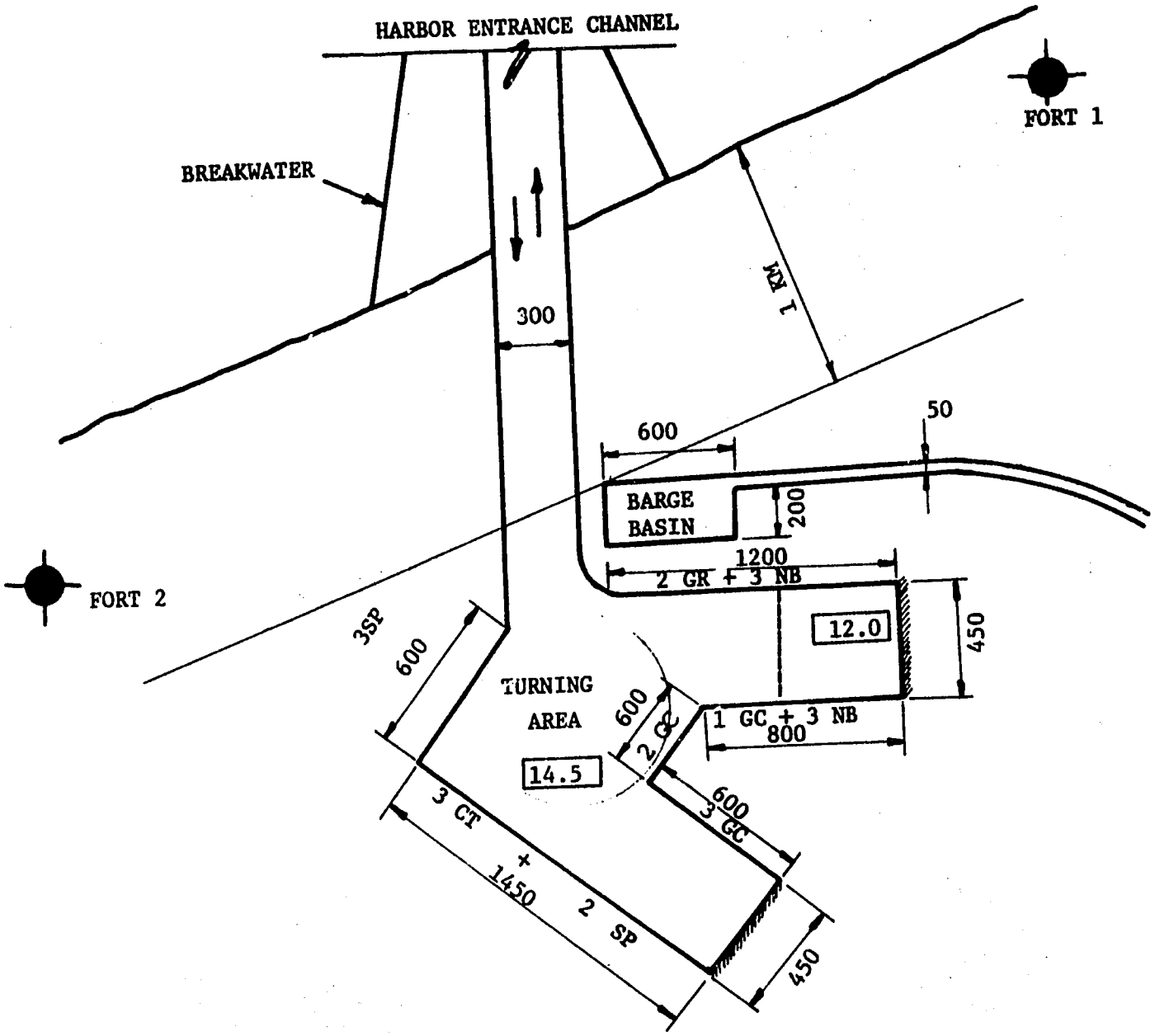
SEE ALTERNATIVE I FOR NOTES

FIGURE 9.5

ALTERNATIVE PORT LAYOUT NO 3

HARRIS

180



SEE ALTERNATIVE 1 FOR NOTES

FIGURE 9.6

ALTERNATIVE PORT LAYOUT NO. 4

HARRIS

9.4 PORT LAYOUT SELECTION

Figure 9.7 presents the factors used in evaluating the 4 alternative layouts. Alternative 4 with the highest score is seen as the most promising layout meeting the requirements imposed for the year 2000. The Master Plan will be developed for this alternative.

The selection factors were given "weights" to better judge the alternatives. For example, ship navigationsl safety is a more important requirement than flushing the port. The construction cost factor is based on the relative quantities of dredging, not construction costs, which were not computed. It was assumed that cost for the berth structures and uplands were the same for each layout.

FIGURE 9.7

PORT LAYOUT SELECTION MATRIX

SELECTION FACTORS	WEIGHT	ALTERNATIVE							
		1	2	3	4	1	2	3	4
		SCORE				WEIGHTED SCORE			
NAVIGATIONAL									
• ENTRANCE AND ACCESS TO TURNING AREAS	3	2	3	1	2	6	9	3	6
• NAVIGATIONAL SAFETY	3	2	3	2	2	6	9	6	6
• CONGESTION	3	1	3	1	2	3	9	3	6
• FLUSHING	1	3	1	2	1	3	1	2	1
CONSTRUCTION									
• FOUNDATION SUITABILITY	1	3	3	3	3	3	3	3	3
• DREDGING QUANTITIES	2	1	1	2	3	2	2	4	6
• FLEXIBILITY FOR FUTURE EXPANSION	1	1	3	1	3	1	3	1	3
• AVAILABILITY OF SHALLOW DRAFT (12.0) AREAS	1	1	3	1	3	1	3	1	3
• RELATIVE CONSTRUCTION COST	2	1	1	2	3	2	2	4	6
• INITIAL PHASED DEVELOPMENT	3	2	1	2	3	6	3	6	9
OPERATIONS									
• CRITICAL BERTHS ALIGNED TO PREVAILING WINDS	3	3	1	2	3	9	3	6	9
• OPERATIONAL EFFICIENCY	3	1	3	2	3	3	9	6	9
• COMPACTNESS	2	1	2	1	3	2	4	2	6
• LAND USE UTILIZATION	2	2	3	2	3	4	6	4	6
• LINKAGES TO PORT TRANSPORTATION	2	1	3	2	3	2	6	4	6
• BARGE CANAL ACCESS	1	3	3	3	3	3	3	3	3
TOTAL WEIGHTED SCORE						56	75	58	88
RELATIVE SURFACE AREA		1.22	1.10	1.30	1.00				

9.5 PORT DEVELOPMENT

A suggested development of the port to meet the throughput demands in the year 2000 is shown in Figure 9.8. The industrial development predicted is accommodated in and around the port area with maximum utilization of port facilities and with minimum conflict of traffic patterns. Expansion in the years following 2000 can be accomplished in an orderly fashion without interfering with the port or industrial activities.

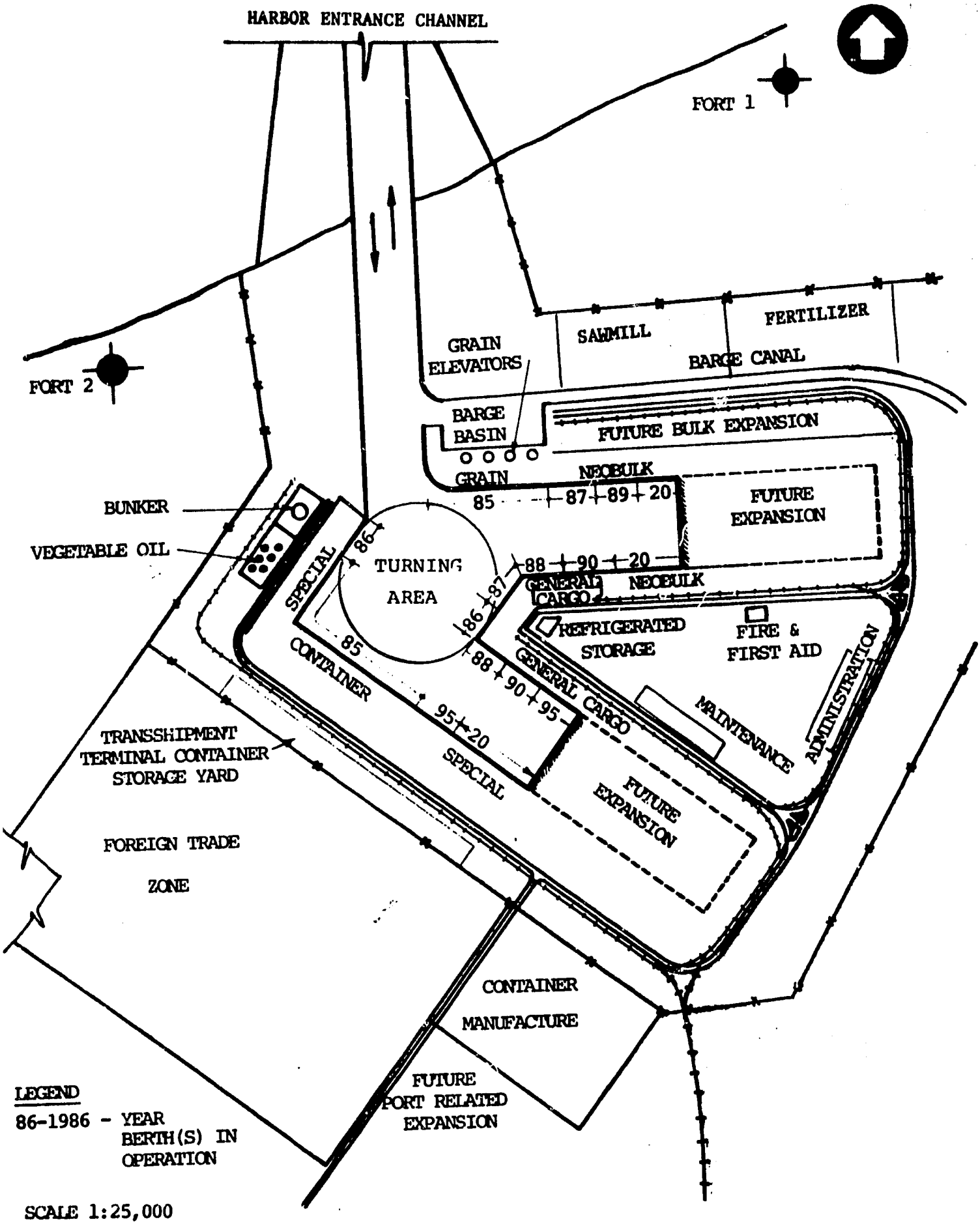


FIGURE 9.8

RECOMMENDED PORT LAYOUT AND PHASED DEVELOPMENT

9.6 PHASED CONSTRUCTION

It is possible to open the Port of Damietta in 1985. As shown in Figure 9.9, the thruput capacity of the port is increased each year until approximately 1990 when the capacity exceeds the projected thruput demand. After 1990, timely construction will maintain economic surplus capacity.

The chart is based on starting major construction in 1980, particularly the breakwaters and dredging. A later start will certainly delay opening of the port. Figure 9.6 illustrates the years during which the berths become operational.

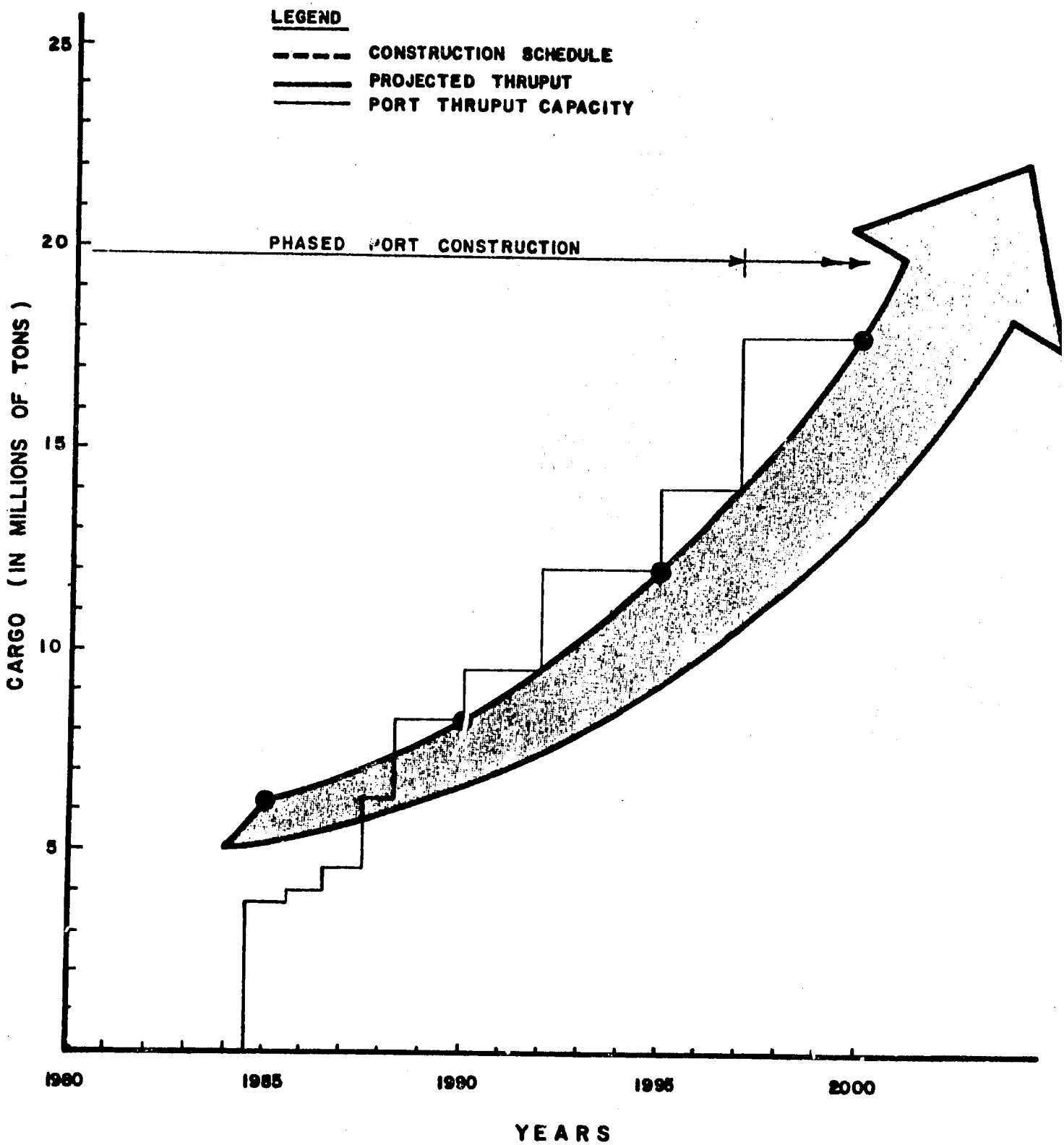


FIGURE 9.9

HARRIS

CONSTRUCTION SCHEDULE REQUIRED TO PROVIDE CAPACITY FOR PROJECTED CARGO

10.0

REGIONAL DEVELOPMENT GUIDELINES

10.0
REGIONAL DEVELOPMENT GUIDELINES

10.1 PURPOSE AND METHOD

The purpose of this section is to synthesize in spatial terms all elements of the regional program.

a. Port;
b. Industrial Complex;
c. Foreign Trade Zone;
d. Transportation Linkages;
   -Highway
   -Railway
   -Waterway
e. Baseline growth of the region; and
f. New urban development requirements.

The analytical method described in this section passes the programs for the above elements through a spatial "squeeze-out" analysis consisting of the constraints and potentials of existing and future baseline development The product of this analysis is a set of alternative regional development configurations. Each configuration represents a generic type and each satisfies to some extent the constraints and potentials test. Alternative configurations are next evaluated and ranked in terms of the extent to which they meet a matrix of objectives. That configuration which ranked highest is presented as the recommended regional guideline plan. It should be kept in mind that this is an interim report and that the plan is subject to change.

10.2 CONSTRAINTS AND POTENTIALS FOR REGIONAL DEVELOPMENT

Figure 10.1 illustrates the major constraints and potentials to the development of the Damietta Region. The figure is self-explanatory.

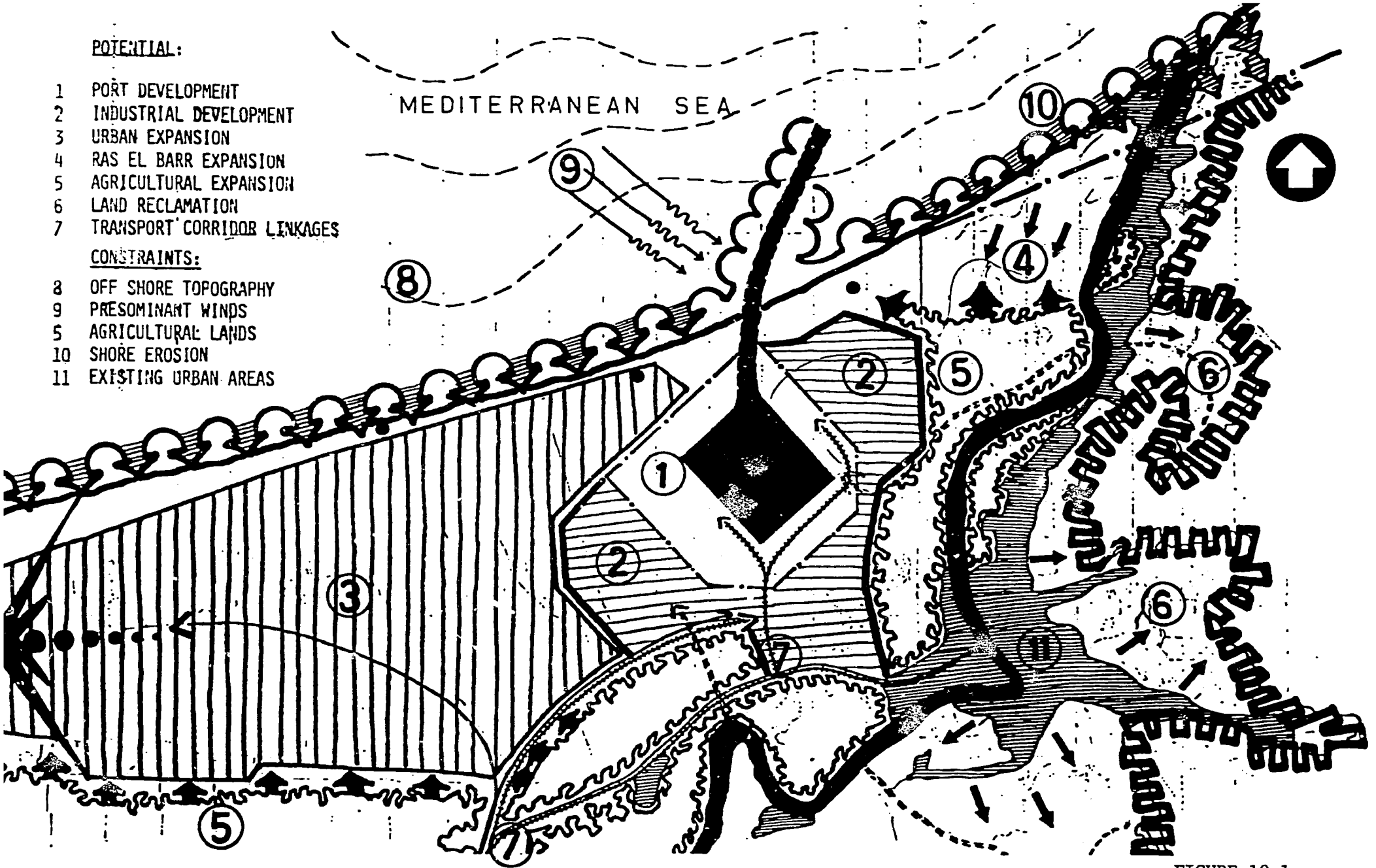


FIGURE 10.1

CONSTRAINTS & POTENTIALS FOR DAMIETTA REGION DEVELOPMENT

HARRIS

10.3 REGIONAL DEVELOPMENT CONFIGURATIONS

Among the myriad of alternative schemes analyzed, three generic configurations have been deduced. Figures 10.2 through 10.4 illustrate each configuration.

Alternative 1: Ocean Corridor

This alternative places the new urban development along a corridor facing the ocean to the west of the port location.

Alternative 2: Radial Corridor

This alternative links the new urban area to existing Damietta by means of development extending around the inland base of the port. It also calls for limited growth along the ocean front, west of the port.

Alternative 3: Strong Core Center

This alternative limits urban growth to the vicinity of existing Damietta. New urban expansions is seen along both sides of the Nile up to and encompassing Ras El Barr.

10.4 EVALUATION OF ALTERNATIVES

The process of evaluation has followed the goal lineage method of systemic planning. First, relevant national and regional goals have been identified. Next, goals have been translated into objectives which are to be met by each alternative and finally, objectives have been reduced to criteria subject to quantification.. That alternative which possesses the highest criteria "score" is considered to be "best", i.e., best satisfying the goals of the planning process.

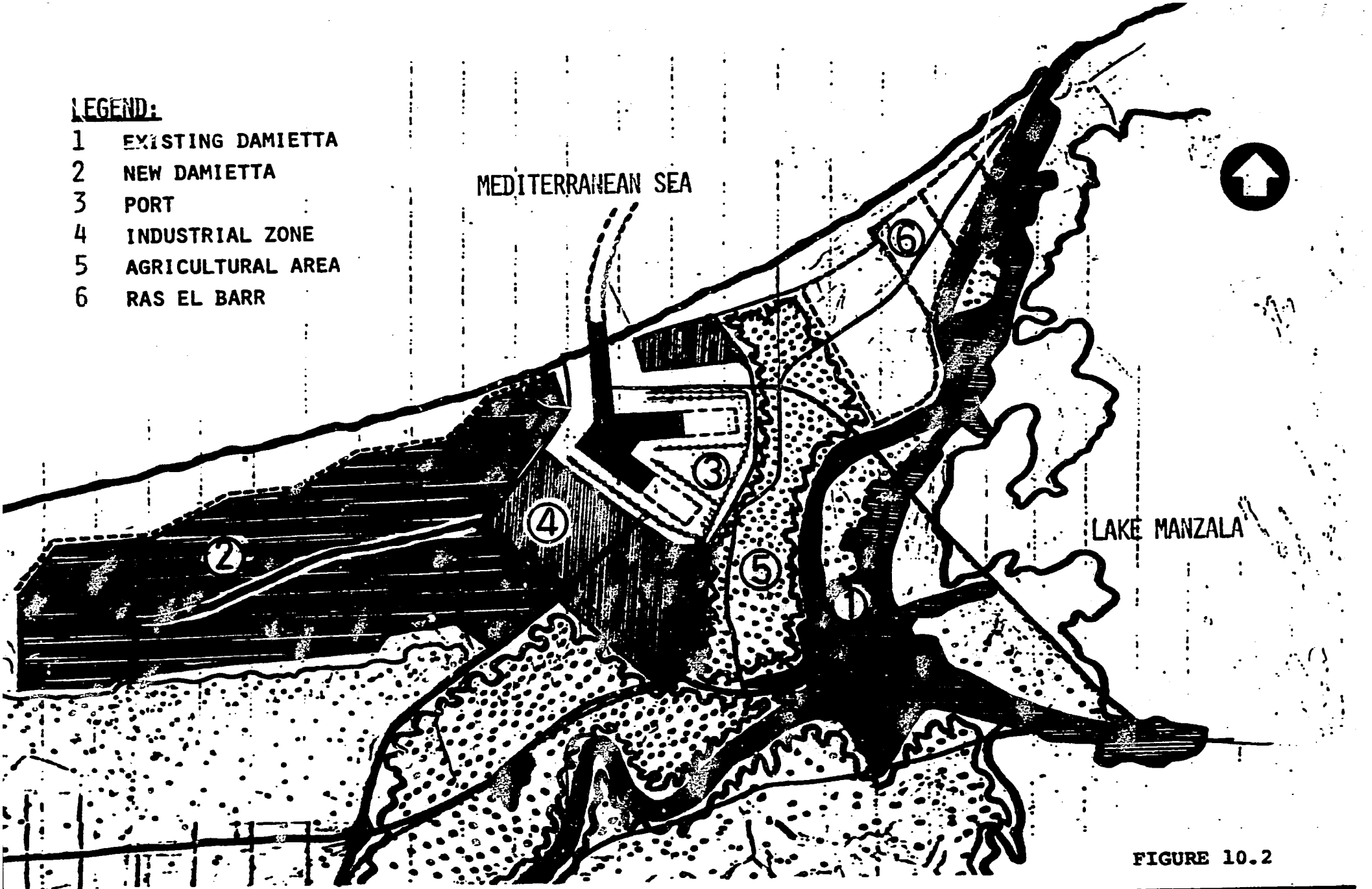


FIGURE 10.2

GREATER DAMIETTA DEVELOPMENT
ALTERNATIVE 1-OCEAN CORRIDOR

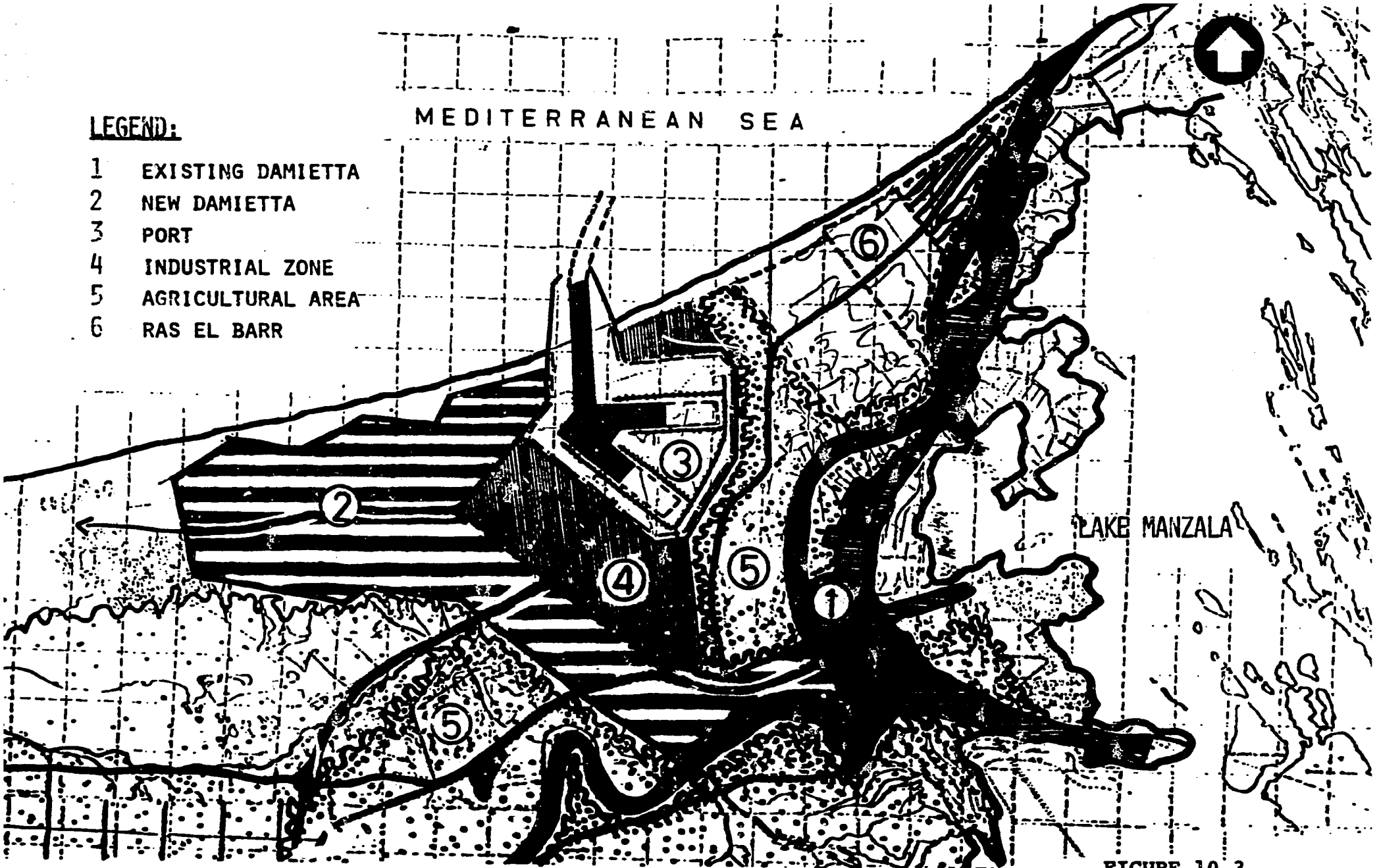


FIGURE 10.3

GREATER DAMIETTA DEVELOPMENT
ALTERNATIVE 2-RADIAL CORRIDOR

HARRIS

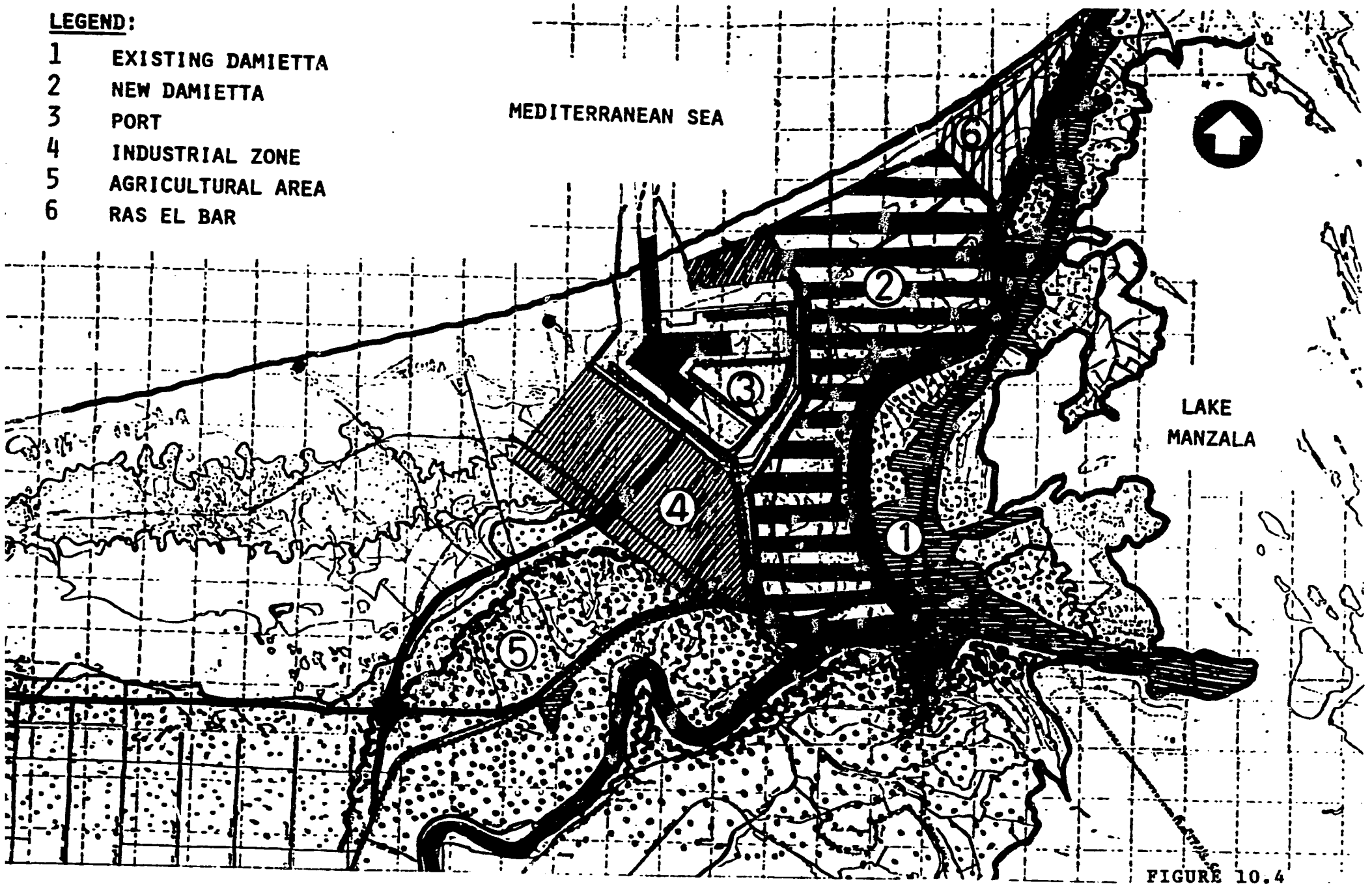


FIGURE 10.4

GREATER DAMIETTA DEVELOPMENT
ALTERNATIVE 3
STRONG CORE DEVELOPMENT

10.5 NATIONAL AND REGIONAL GOALS

The national and regional goals adopted are as follows:

- The spread out urban development from major urban centers into adjacent non-urban and non-agricultural land.
- To identify area to be reclaimed for urban expansion through various redevelopment efforts;
- To limit the uneven and excess extension of the existing exhausted settlements, and to allow the development of the suitable urban centers;
- To develop totally new communtties in non-agricultural land; and
- To develop regional infrastructure system maximizing the multiplier effect of investment projects.

10.6 OBJECTIVES

Objectives relating to the above goals have been categorized in terms of 1) land use objectives; 2) economic objectives; 3) social objectives, and 4) environmental and urban planning objectives.

Land Use Objectives

- Protection of natural resources and encouragement of their appropriate development;
- An orderly conversion of under-developed land to urban use;
- Capability to meet the needs of different people and different new activites; and
- Capability to deal with the induced metropolitan and local problems in Damietta Governorate.

Economic Objectives

- Minimum economic conflicts with the different metropolitan activities.
- To minimize the construction costs of the port and related activities.

- To limit the construction time span of the port and related activities.
- To control and to rationalize the development of land values to minimize and land costs of development.
- To minimize the loss of the agricultural land.
- To minimize transportation costs (trip kilometers).

Social Objectives

- To enhance the positive social traditions, and project them into future social relationship.
- To clarify hierarchial communities with specific social entities, which form a dynamic metropolitan mosaic.
- Solidification of the existing and new communities to form one, distinguished, metropolitan - oriented greater community.

Environmental and Urban Planning Objectives

- Recognition of the constraints and maximizing the utilization of the potentials.
- Consideration of the climatological parameters in orienting the major activities and land uses.
- To minimize pollution by special composition of activities and buffer areas.
- To ensure accessability and connections between the existing communities, new communities working place, and other elements of the metropolitan area.
- To provide identity and individuality of each planning area.
- To clarify the unity of the total metropolitan area.
- To ensure the appropriate facilities for domestic tourism and tourism activities in the area.

- To encourage international tourism activities in the area.
- To provide valuable visual compositions and promote the aesthetic values of the environment.

10.7 CRITERIA FOR SELECTION OF RECOMMENDED GUIDELINE PLAN

Figure 10.5 lists the criteria used to evaluate alternatives and select the recommended guideline plan. The figure also lists the corresponding "score" of each alternative defined in Section 10.3.

CRITERIA FOR SELECTION OF GUIDELINE REGIONAL PLAN

	CRITERIA	ALTERNATIVE 1	2	3
A. LAND USE	Protection of Natural Resources	3	1.7	.7
	Orderly Conversion to Urban Areas	3	1.7	1.7
	Fullfilment of Needs	3	3	2.3
	Deals with Problems	3	2.5	2
	Amenable to Effective Control Measures	2	2.2	2.7
	SUBTOTAL	14	11.1	9.4
B. ECONOMIC	Effective Use of Land	3.7	2.8	1.3
	Minimization of Conflicts	3.3	2.3	2.7
	Minimization of Construction Costs	3.3	3	3.7
	Limiting Construction Time Span	2	1.7	2
	Rationalization of Land Values	4	2.7	2
	Saving Agricultural Land	4	2.3	1
	SUBTOTAL	20.3	14.8	12.7
C. SOCIAL	Relieve Overdensity	4	3.7	2
	Enhance Traditions	3	3.3	4
	Equal Opportunity	3	3	3
	SUBTOTAL	10	10	9
D. TRANSPORTATION	Potential Modal Separation	6	4	4.3
	Minimum Trip Kilometers Required	4	4.3	5
	Transportation Flexibility	4.7	4.7	4.3
	SUBTOTAL	14.7	13	13.6
E. ENVIRONMENTAL & PLANNING	Constraints and Potentials	2	1	.7
	Climatogolical Aspects	1.8	1.2	1.3
	Pollution	2	1.2	.7
	Accessibility	1.5	1.8	1.3
	Identity & Individuality	1.7	1.2	1
	Unity	1.2	1.7	2
	Open Space & Recreation	2	1.3	.7
	Domestic Tourism	2	1.7	1.2
	Visual Authentics	2	1.5	1
	SUBTOTAL	16.2	12.6	9.9
F. FUTURE EXPANSION	Port	2	2	1.7
	Industrial Zone	1.3	1.3	2
	Urban Area	2	1.7	1
	Commercial Zone	1.7	1.7	1.7
	Agricultural Area	1.7	1.2	1.3
	SUBTOTAL	8.7	7.9	8.1
	TOTAL	83.9	69.4	62.7

FIGURE 10.5

10.8 RECOMMENDED GUIDELINE PLAN

As indicated in Section 10.7, Alternative 1 appears to best satisfice the selected criteria. Figure 10.6 graphically presents this alternative.

Basic features of the plan are as follows:

1. Establishment of a "Greater Damietta Metropolitan Area consisting of a new urban zone to be developed on arid land to the west of the port;
2. The plan actually extends the area of potential agricultural activity;
3. Suitable to the parallel and interdependent development of the new urban zone and rehabilitation of old Damietta;
4. Places all new urban development out of the pollution zone of the port and industrial complex;
5. Minimizes the opportunity for conflicting uses and transportation impacts south of the port and industrial complex;
6. Places new development on area of lowest land value (most of which is under Government control);
7. Places new development along environmentally, recreationally, and visually advantageous ocean front.
8. Allows maximum expansion of Ras El Barr tourist community.
9. Provides an internal system of open spaces.
10. Maximizes expansion potential of industrial and foreign trade zone areas.

LEGEND

1. EXISTING DAMIETTA, TO BE REHABILITATED
2. NEW DAMIETTA URBAN EXPANSION
3. RAS EL BARR, EXPANSION OF TOURISM
4. INDUSTRIAL ZONE
5. GREEN SPACE - AGRICULTURE
6. AGRICULTURE
7. PORT OF DAMIETTA
8. URBAN OPEN SPACE - BEACH FRONT

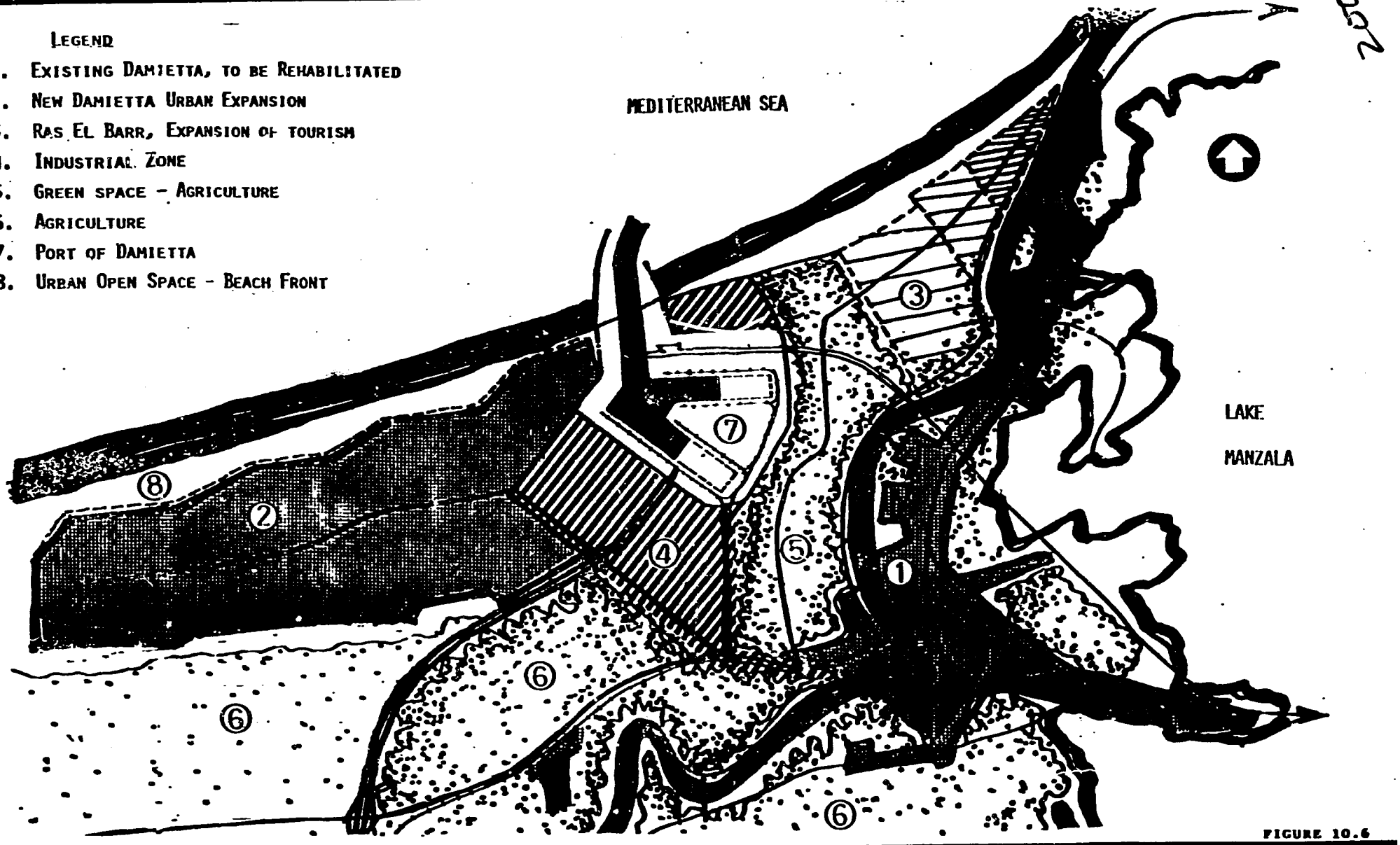


FIGURE 10.6

GREATER DAMIETTA GUIDELINE PLAN

11.0

SUMMARY AND CONCLUSIONS

11.0
SUMMARY AND CONCLUSIONS

Section 1.0 THE ROLE OF THE PORT OF DAMIETTA

The new port located at Damietta is an integral component of Egypt's plans for economic and social progress, with repercussions spanning a broad range of areas - international trade, inland transport, industrial development, urban renewal and the creation of new communities.

Section 2.0 PORT DEVELOPMENT PROGRAM

Careful analysis of the commodity flows in terms of projected volumes, vessel capacities and seasonal variation has resulted in a plan for staged construction of port capacity with initial operation in 1985.

Initial Finding:

- PORT REQUIREMENTS:
  - 1985: CARGO THROUGHPUT 5.6 MILLION TONS, 14 BERTHS
  - 2000: CARGO THROUGHPUT 16.5 MILLION TONS, 22 BERTHS

Section 3.0 INDUSTRIAL DEVELOPMENT PROGRAM

The building of the port provides the opportunity to locate an agro-industrial complex growing from the existing industries in the Damietta Region, as well as the attraction of the international linkages of the port itself.

1985 INDUSTRIAL EMPLOYMENT + 13,199

2000 INDUSTRIAL EMPLOYMENT + 29,216

Section 4.0 REGIONAL TRANSPORT

In locating the port at Damietta, the Consultant has analyzed multimodal linkages to internal points for the purpose of maximizing port activity benefits for the national economy.

TRANSPORTATION IMPROVEMENTS:

RAILWAY	1985:	NO EXPANSION REQUIRED
	2000:	MODERNIZATION OF DAMIETTA-TALKHA AND TANTA-BENHA REQUIRED
HIGHWAY	1985:	WIDENING DAMIETTA TO TALKHA
	2000:	WIDENING MANSOURA-ZAGAZIG AND SONBILAWIN-ABU KABIR
WATERWAY:		NEW FRASKOUR BARRAGE AND BARGE LOCK

Section 5.0 REGIONAL EMPLOYMENT AND POPULATION PROGRAM

The Damietta port complex will create a center of growth that will attract migration from the region and adjacent area, and will require careful planning to adequately integrate the projected population to the regional structure.

TOTAL INDUCED EMPLOYMENT:	1985 - 40,000
	2000 - 85,000
TOTAL INDUCED POPULATION:	1985 -150,000
	2000 -310,000

Section 6.0 COMMUNITY DEVELOPMENT PROGRAM

The new port provides the opportunity and imposes the responsibility for the improvement of the social conditions

in the region, through adequate provision of housing and public services both within the planned new communities and the existing settlements.

NEW COMMUNITY POPULATION 1985: 150,000
2000: 568,000

INCREASE OF 37,000/YEAR 1985 TO 2000

Section 7.0 REGIONAL LAND USE AND VALUES - 1979

The consultant conducted a thorough study of existing land use and values for the Damietta area.

- SUFFICIENT NON-AGRICULTURAL LAND AVAILABLE FOR ALL REQUIREMENTS
- CURRENT LAND VALUES ARE CONDUCIVE TO DEVELOPMENT

Section 8.0 ENGINEERING CRITERIA

Preliminary investigations of port area water levels, offshore topography, erosion trends, wind and wave action, and sub-surface conditions have been completed, and taken into account in the location and layout of facilities.

- OFF-SHORE TOPOGRAPHY INCREASED CONSTRUCTION COST AS PORT LOCATION IS MOVED WEST
- PREDOMINANT WIND/BERTH ORIENTATION: N TO NW
- SEDIMENTATION: LONG TERM EROSION OF SHORE-LINE PREDICTED
- SOIL CONDITIONS: FAVORABLE

Section 9.0 PORT LOCATION AND LAYOUT

Consideration of the alternative port locations has yielded a recommendation for final location which will provide a maximum efficiency of operations for the project cost.

- PORT TO BE LOCATED BETWEEN FORT 1 AND FORT 2, 8.5 KM WEST OF DAMIETTA BRANCH OF THE NILE
- HARBOR TO BE DEVELOPED 1 KM INLAND
- RECOMMENDED PORT LAYOUT OPTIMIZES NAVIGATIONAL, CONSTRUCTION AND OPERATION CRITERIA.

Section 10.0 REGIONAL DEVELOPMENT GUIDELINES

Detailed analysis of alternative developmental configurations in light of national objectives concerning land use, economic development, social programs, and environmental and urban planning has produced a preliminary configuration optimizing the range of objectives attained.

- RECOMMENDED REGIONAL GUIDELINE PLAN FORESEES DEVELOPMENT OF GREATER DAMIETTA METROPOLITAN AREA WITH NEW URBAN DEVELOPMENT WEST OF PORT ALONG MEDITERRANEAN COAST.

- PARALLEL DEVELOPMENT OF NEW URBAN AREAS AND REHABILITATION OF EXISTING IS RECOMMENDED.

APPENDIX A

CARGO ALLOCATIONS TO PORTS OF EGYPT

CARGO ALLOCATIONS TO THE PORTS OF EGYPT
(NON-CONSTRAINED)

CATEGORY (A) CONTAINERIZABLE

YEAR: 1985

COMMODITY TYPE	MARSA MATRUH		ALEXANDRIA		DAMIETTA		PORT SAID		ISMAILIA		SUEZ		SAFAGA		TOTAL FOR EGYPT	
	IMPORT	EXPORT	IMPORT	EXPORT	IMPORT	EXPORT	IMPORT	EXPORT	IMPORT	EXPORT	IMPORT	EXPORT	IMPORT	EXPORT	IMPORT	EXPORT
MEAT	600		14300		24900		2510				390		9300		52000	
FISH			2200	18610	500	4000	2000	17400					1300	11990	6000	52000
VEGETABLES	900	200	31000	221300	99700	43400	6500	10800				19500	28700		166800	295000
BEVERAGES & OTHERS			110800	28690	75100	31110	4900	1100			58800	400	49500	85000	299100	146500
CHEMICALS			266000		328000		95000						141000		830000	
ELECTRIC MACHINE			30700		24410		800				9290		2800		68000	
COTTON TEXTILE				90800		101590						3027		4584		200000
FRUITS & NUTS				243510		41500		38890				54100				378000
TOTAL TONS	1500	200	455000	602910	552610	221600	111710	68190			68480	77030	232600	101570	1421900	1071500

NOTE : IN METRIC TONS

FIGURE A1

CARGO ALLOCATIONS TO THE PORTS OF EGYPT
(NON-CONSTRAINED)

CATEGORY (B) NEOBULK

Year 1985

COMMODITY TYPE	MARSA MATRUH		ALEXANDRIA		DAMIETTA		PORT SAID		ISMAILIA		SUEZ		SAFAGA		TOTAL FOR EGYPT	
	IMPORT	EXPORT	IMPORT	EXPORT	IMPORT	EXPORT	IMPORT	EXPORT	IMPORT	EXPORT	IMPORT	EXPORT	IMPORT	EXPORT	IMPORT	EXPORT
RAW COTTON			21930	43590	620	41340	2790	1670			25570	2800		10600	50000	100000
PAPER			140400				113310				52290				306000	
FLOUR	1900		232500		106700		203850				58850		31200		635000	
CEMENT	51500		301200	4390	311600		226080	54710			49530	7440	117100		1057000	134000
RICE				117100		344600		11180				5130				478000
SUGAR			2900	12900							11100			169200	14000	182000
OIL CAKE		36690				26910		1900				2400		6100		74000
TOBACCO			14300		14810						7390		500		37000	
FATS & OILS			330000		259000		24000						94000		707000	
ONION				162200		28700								153100		344000
TOTAL TONS	53400	36690	1042330	340580	692730	441550	570030	69460			204730	84730	248800	339000	2806000	1312000

NOTE : IN METRIC TONS

FIGURE A2

CARGO ALLOCATIONS TO THE PORTS OF EGYPT
(NON-CONSTRAINED)

CATEGORY (C) SPECIAL HANDLING

Year 1985

COMMODITY TYPE	MARSA MATRUH		ALEXANDRIA		DAMIETTA		PORT SAID		ISMAILIA		SUEZ		SAFAGA		TOTAL FOR EGYPT	
	IMPORT	EXPORT	IMPORT	EXPORT	IMPORT	EXPORT	IMPORT	EXPORT	IMPORT	EXPORT	IMPORT	EXPORT	IMPORT	EXPORT	IMPORT	EXPORT
WOOD	5600		202400		628200		32150				23350		34200		926000	
MACHINERY	400		87600		123610		10670				8830		19900		251000	
IRON & STEEL			41000	428000	807810	67400	9390				141800	4600			1000000	500000
ALUMINUM PRODUCT				40000										40000		80000
TOTAL TONS	6000		331000	468000	1559620	67400	52310				173980	4600	54100	40000	2177000	580000

NOTE : IN METRIC TONS

FIGURE A3

CARGO ALLOCATIONS TO THE PORTS OF EGYPT
(NON-CONSTRAINED)

CATEGORY (D) DRY BULK

YEAR: 1985

COMMODITY TYPE	MARSA MATRUH		ALEXANDRIA		DAMIETTA		PORT SAID		ISMAILIA		SUEZ		SAFAGA		TOTAL FOR EGYPT	
	IMPORT	EXPORT	IMPORT	EXPORT	IMPORT	EXPORT	IMPORT	EXPORT	IMPORT	EXPORT	IMPORT	EXPORT	IMPORT	EXPORT	IMPORT	EXPORT
WH[illegible]			1386900		1744000		553700				833200		657200		5175000	
[illegible]			138110		22400		2000				12390		7100		182000	
IRO[illegible]			3448800		49400						1800				3500000	
CORN & MAIZE	5100		275300		160500		5900						65200		512000	
COAL & COKE			1908010								91990				2000000	
CALCIUM PHOSPHATES				45000				48640				5370		84000		183000
FERTILIZERS				4741410		80000								1481590		6303000
ALUMINUM			17,000										170000		340000	
TOTAL TONS	5100		7327120	4786410	1976300	80000	561600	48640			939380	5370	899500	1565590	11709000	6486000

NOTE : IN METRIC TONS

FIGURE A4

CARGO ALLOCATIONS TO THE PORTS OF EGYPT
(NON-CONSTRAINED)

CATEGORY (A) CONTAINERIZABLE

Year 2000

COMMODITY TYPE	MARSA MATRUH		ALEXANDRIA		DAMIETTA		PORT SAID		ISMAILIA		SUEZ		SAFAGA		TOTAL FOR EGYPT	
	IMPORT	EXPORT	IMPORT	EXPORT	IMPORT	EXPORT	IMPORT	EXPORT	IMPORT	EXPORT	IMPORT	EXPORT	IMPORT	EXPORT	IMPORT	EXPORT
MEAT	1800		39300		69700		6300						26900		144000	
VEGETABLES		59700	37700	4170500	213800	1473800	4[illegible]300	215700				562900	64200	1400	360000	6484000
DEVERAGES & OTHERS	1900	3400	230100	58690	155800	64110	10200	2300			122100	700	102900	15800	623000	145000
CHEMICALS			550000		684000		199000						294000		1[illegible]27000	
ELECTRIC MACHINES			64000		51110		1600				19390		5900		142000	
FISH		1300		41200		8600		38400						54300		144000
FRUITS & NUTS				1487410		458700		275290				370600				2592000
COTTON WASTE																
COTTON TEXT				95930		116300		780				29710		7281		250000
TOTAL TONS	3700	64400	921100	5853730	1174410	2121710	261400	532470			141490	963910	493900	78780	2996000	9615000

NOTE: IN METRIC TONS

FIGURE A5

CARGO ALLOCATIONS TO THE PORTS OF EGYPT
(NON-CONSTRAINED)

CATEGORY (B) NEOBULK

Year 2000

COMMODITY TYPE	MARSA MATRUH		ALEXANDRIA		DAMIETTA		PORT SAID		ISMAILIA		SUEZ		SAFAGA		TOTAL FOR EGYPT	
	IMPORT	EXPORT	IMPORT	EXPORT	IMPORT	EXPORT	IMPORT	EXPORT	IMPORT	EXPORT	IMPORT	EXPORT	IMPORT	EXPORT	IMPORT	EXPORT
RICE				940000		1989400		367880				206720				3504000
SUGAR				117000										1221000		1338000
OIL CAKE				42590		31110		2090				3010		7200		86000
RAW COTTON																
PAPER			292400				233455				111150				637000	
TOBACCO			30300		29310						15390		1000		76000	
FATS & OILS			1063000		834000		78000						303000		2278000	
ONION				660900		192600								549500		1403000
TOTAL TONS			1385700	1760490	863310	2213110	311460	366970			126540	209730	304000	1777700	2991000	6331000

NOTE : IN METRIC TONS

FIGURE A6

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CARGO ALLOCATIONS TO THE PORTS OF EGYPT
(NON-CONSTRAINED)

CATEGORY (C) SPECIAL HANDLING

Year 2000

COMMODITY TYPE	MARSA MATRUH		ALEXANDRIA		DAMIETTA		PORT SAID		ISMAILIA		SUEZ		SAFAGA		TOTAL FOR EGYPT	
	IMPORT	EXPORT	IMPORT	EXPORT	IMPORT	EXPORT	IMPORT	EXPORT	IMPORT	EXPORT	IMPORT	EXPORT	IMPORT	EXPORT	IMPORT	EXPORT
WOOD			845300		2624400		133800				98300				3701800	
MACHINERY			181600		260410		19410				17780				479200	
IRON & STEEL			41000	1700000	819810	247100	9300				129890	52900			1000000	2000000
ALUMINUM PRODUCTS				75000										75000		150000
TOTAL TONS			1067900	1775000	3704620	247100	162510				245970	52900		75000	5181000	2150000

NOTE : IN METRIC TONS

FIGURE A7

CARGO ALLOCATIONS TO THE PORTS OF EGYPT
(NON-CONSTRAINED)

CATEGORY (D) DRYBULK

Year 2000

COMMODITY TYPE	MARSA MATRUH		ALEXANDRIA		DAMIETTA		PORT SAID		ISMAILIA		SUEZ		SAFAGA		TOTAL FOR EGYPT	
	IMPORT	EXPORT	IMPORT	EXPORT	IMPORT	EXPORT	IMPORT	EXPORT	IMPORT	EXPORT	IMPORT	EXPORT	IMPORT	EXPORT	IMPORT	EXPORT
WHEAT			2559400		3218400		1021700				1537600		1212900		9550000	
SALT & SULPHUR			561800		91700		8300				29600		66600		758000	
COAL & COKE			6908010								91990				7000000	
IRON & PYRITE			10000000												10000000	
CORN & MAIZE				169700		974200						2458400		189700		3783000
CALCIUM PHOSPHATE				81000				218910				9090		170000		379000
FERTILIZER				2677000		83600						71400		3441000		6273000
CEMENT				4763700		1768200		37100				2307200		2981800		11858000
BAUXITE			340000										340000		680000	
TOTAL TONS			20369210	7682400	3310100	2826000	1030000	156010			1659190	4846090	1619500	6782500	27988000	22293000

NOTE : IN METRIC TONS

FIGURE A8

APPENDIX B

COMMODITY THROUGH PORT OF DAMIETTA AND THEIR DOMESTIC DESTINATIONS

COMMODITY THROUGH PORT OF DAMIETTA

AND THEIR DOMESTIC DESTINATIONS

(IMPORT)

CARGO HANDLING CATEGORY: (A): CONTAINERIZABLE YEAR: 1985

COMMODITY / DESTINATION	MEAT	FISH	VEGETABLES	CONSUMER GOODS	CHEMICALS	ELECTRIC MACHINES
CAIRO	24,600		95,000		190,000	7,810
BENHA	300			6,100	38,000	3,400
ZAGAZIG				17,400		300
ABU KEBIR				7,200		100
EL MANSOURA			4,700	15,600		700
DAMIETTA		500		4,500		300
SHEBIN EL KOM						800
TANTA				12,900	69,000	7,600
MAHALLA EL KUBRA				5,700	31,000	3,300
BAYALA				5,700		100
KAFR EL SHEIKH						
TOTAL	24,900	500	99,700	75,100	328,000	24,410

NOTE: IN METRIC TONS

FIGURE B1

COMMODITY THROUGH PORT OF DAMIETTA

AND THEIR DOMESTIC DESTINATIONS

(EXPORT)

CARGO HANDLING CATEGORY: (A) CONTAINERIZABLE

YEAR: 1985

COMMODITY / DESTINATION	FISH	VEGETABLES	CONSUMER GOODS	COTTON & TEXTILES	FRUITS & NUTS	
CAIRO			9,910			
BENHA		13,700	1,810	52,390	28,600	
ZAGAZIG		14,500	4,200	1,060	2,900	
ABU KEBIR		7,700	1,700		4,300	
EL MANSOURA			3,600			
DAMIETTA	4,000	3,400	1,100	37,870		
SHEBIN EL KOM			3,200			
TANTA		2,700	3,000	3,010		
MAHALLA EL KUBRA		1,200	1,300	7,260		
BAYALA		200	1,300		1,400	
KAFR EL SHEIKH					4,300	
TOTAL	4,000	43,400	31,120	101,590	41,500	

NOTE: IN METRIC TONS

FIGURE B2

COMMODITY THROUGH PORT OF DAMIETTA

AND THEIR DOMESTIC DESTINATIONS

(IMPORT)

CARGO HANDLING CATEGORY: (B) NEOBULK YEAR:1985

COMMODITY / DESTINATION	RAW COTTON	FLOUR	CEMENT	FATS & OIL	TOBACCO	
CAIRO				170,000	11,610	
BENHA			2,000	12,000		
ZAGAZIG		24,800	47,400	8,000		
ABU KEBIR		13,300	28,000	4,000		
EL MANSOURA		22,900	89,000	33,000	100	
DAMIETTA	610	10,200	35,000	4,000		
SHEBIN EL KOM				6,000	2,800	
TANTA		7,600	61,200	11,000	200	
MAHALLA EL KUBRA		11,400	26,200	5,000	100	
BAYALA		7,600	22,800	6,000		
KAFR EL SHEIKH		8,900				
TOTAL	610	106,700	311,600	259,000	14,810	

NOTE: IN METRIC TONS

FIGURE B3

COMMODITY THROUGH PORT OF DAMIETTA

AND THEIR DOMESTIC DESTINATIONS

(EXPORT)

CARGO HANDLING CATEGORY : (B) NEOBULK YEAR: 1985

COMMODITY / DESTINATION	RAW COTTON	RICE	OIL CAKE	ONION		
CAIRO						
BENHA						
ZAGAZIG	1,840	43,900	5,600	3,200		
ABU KEBIR		22,300	2,800	700		
EL MANSOURA	23,800	121,000	7,410	11,100		
DAMIETTA		33,800	1,000			
SHEBIN EL KOM						
TANTA		300	2,600	6,500		
MAHALLA EL KUBRA			2,400	6,500		
BAYALA	7,300	58,000	2,400	700		
KAFR EL SHEIKH	8,400	65,300	2,700			
TOTAL	41,340	344,600	26,910	28,700		

NOTE: IN METRIC TONS

FIGURE B4

COMMODITY THROUGH PORT OF DAMIETTA

AND THEIR DOMESTIC DESTINATIONS

(IMPORT)

CARGO HANDLING CATEGORY: (C) SPECIAL HANDLING YEAR: 1985

COMMODITY / DESTINATION	WOOD	MACHINERY	IRON & STEEL			
CAIRO	438,200	52,410	727,810			
BENHA	12,500	9,400	80,000			
ZAGAZIG	43,100	7,900				
ABU KEBIR	22,700	3,300				
EL MANSOURA	38,400	7,800				
DAMIETTA	23,200	2,500				
SHEBIN EL KOM	13,900	7,400				
TANTA	16,200	19,500				
MAHALLA EL KUBRA	7,000	8,600				
BAYALA	8,800	2,700				
KAFR EL SHEIKH	4,200	2,100				
TOTAL	628,200	123,610	807,810			

NOTE: IN METRIC TONS

FIGURE B5

COMMODITY THROUGH PORT OF DAMIETTA

AND THEIR DOMESTIC DESTINATIONS

(EXPORT)

CARGO HANDLING CATEGORY : (C) SPECIAL HANDLING YEAR:1985

COMMODITY / DESTINATION	IRON & STEEL					
CAIRO	61,400					
BENHA	6,000					
ZAGAZIG						
ABU KEBIR						
EL MANSOURA						
DAMIETTA						
SHEBIN EL KOM						
TANTA						
MAHALLA EL KUBRA						
BAYALA						
KAFR EL SHEIKH						
TOTAL	67,400					

NOTE: IN METRIC TONS

FIGURE B6

COMMODITY THROUGH PORT OF DAMIETTA

AND THEIR DOMESTIC DESTINATIONS

(IMPORT)

CARGO HANDLING CATEGORY: (D) DRY BULK YEAR: 1985

COMMODITY / DESTINATION	WHEAT	SALT & SULFUR	IRON & PYRITES	CORN & MAIZE		
CAIRO	354,800		36,400	8,800		
BENHA	141,600		13,000	19,700		
ZAGAZIG	184,500	900		17,900		
ABU KEBIR	94,800	400		7,700		
EL MANSOURA	290,900	1,800		63,200		
DAMIETTA	78,500	900		20,600		
SHEBIN EL KOM	184,300			5,100		
TANTA	192,000	9,100				
MAHALLA EL KUBRA	84,000	8,900				
BAYALA	79,100	400		17,500		
KAFR EL SHEIKH	59,500					
TOTAL	1,744,000	22,400	49,400	160,500		

NOTE: IN METRIC TONS

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FIGURE B7

COMMODITY THROUGH PORT OF DAMIETTA

AND THEIR DOMESTIC DESTINATIONS

(EXPORT)

CARGO HANDLING CATEGORY : (D) DRY BULK YEAR: 1985

COMMODITY / DESTINATION	FERTILIZER					
CAIRO						
BENHA						
ZAGAZIG						
ABU KEBIR						
EL MANSOURA	80,000					
DAMIETTA						
SHEBIN EL KOM						
TANTA						
MAHALLA EL KUBRA						
BAYALA						
KAFR EL SHEIKH						
TOTAL	80,000					

NOTE: IN METRIC TONS

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FIGURE B8

COMMODITY THROUGH PORT OF DAMIETTA

AND THEIR DOMESTIC DESTINATIONS

(IMPORT)

CARGO HANDLING CATEGORY: (A) CONTAINERIZABLE YEAR:2000

COMMODITY / DESTINATION	MEAT	VEGETABLES	CONSUMER GOODS	CHEMICALS	ELECTRIC MACHINES	
CAIRO	67,900	213,800		396,000	16,000	
BENHA	1,800			81,000	7,100	
ZAGAZIG			36,100		700	
ABU KEBIR			15,000		300	
EL MANSOURA			32,400		1,400	
DAMIETTA			9,400		700	
SHEBIN EL KOM			12,500		1,700	
TANTA			26,800	143,000	15,900	
MAHALLA EL KUBRA			11,800	64,000	7,000	
BAYALA			11,800		300	
KAFR EL SHEIKH						
TOTAL	69,700	213,800	155,800	684,000	51,100	

NOTE: IN METRIC TONS

FIGURE B9

COMMODITY THROUGH PORT OF DAMIETTA

AND THEIR DOMESTIC DESTINATIONS

(EXPORT)

CARGO HANDLING CATEGORY: (A) CONTAINERIZABLE YEAR: 2000

COMMODITY / DESTINATION	FISH	VEGETABLES	CONSUMER GOODS	COTTON & TEXTILES	FRUITS & NUTS	
CAIRO			20,310			
BENHA		199,100	3,600	22,200	177,500	
ZAGAZIG		416,300	8,400	2,600	74,500	
ABU KEBIR		219,300	3,500	1,400	51,900	
EL MANSOURA		131,700	7,500		72,900	
DAMIETTA	8,800	112,200	2,200	54,300		
SHEBIN EL KOM			6,800		36,800	
TANTA		219,300	6,200	24,800	7,500	
MAHALLA EL KUBRA		96,300	2,800	11,000	3,800	
BAYALA		79,600	2,800		33,800	
KAFR EL SHEIKH						
TOTAL	8,800	1,473,800	64,110	116,300	458,700	

NOTE: IN METRIC TONS

FIGURE B10

COMMODITY THROUGH PORT OF DAMIETTA

AND THEIR DOMESTIC DESTINATIONS

(IMPORT)

CARGO HANDLING CATEGORY: (B) NEOBULK YEAR:2000

COMMODITY / DESTINATION	FATS & OILS	TOBACCO				
CAIRO	545,000	22,110				
BENHA	39,000					
ZAGAZIG	27,000					
ABU KEBIR	14,000					
EL MANSOURA	105,000	300				
DAMIETTA	11,000					
SHEBIN EL KOM	20,000					
TANTA	36,000	500				
MAHALLA EL KUBRA	16,000	500				
BAYALA	21,000					
KAFR EL SHEIKH						
TOTAL	834,000	29,310				

NOTE: IN METRIC TONS

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FIGURE B11

COMMODITY THROUGH PORT OF DAMIETTA

AND THEIR DOMESTIC DESTINATIONS

(EXPORT)

CARGO HANDLING CATEGORY : (B) NEOBULK YEAR: 2000

COMMODITY / DESTINATION	RICE	OIL CAKE	ONION			
CAIRO						
BENHA						
ZAGAZIG	324,400	6,500	33,600			
ABU KEBIR	184,000	3,300	15,000			
EL MANSOURA	841,000	10,000	68,900			
DAMIETTA	218,000	1,100				
SHEBIN EL KOM						
TANTA		3,000	32,700			
MAHALLA EL KUBRA	43,000	2,800	31,800			
BAYALA	379,000	2,800	10,600			
KAFR EL SHEIKH		1,610				
TOTAL	1,989,400	31,110	192,600			

NOTE: IN METRIC TONS

FIGURE B12

COMMODITY THROUGH PORT OF DAMIETTA

AND THEIR DOMESTIC DESTINATIONS

(IMPORT)

CARGO HANDLING CATEGORY : (C) SPECIAL HANDLING YEAR: 2000

COMMODITY / DESTINATION	WOOD	MACHINERY	IRON & STEEL			
CAIRO	1,344,800	109,250	739,810			
BENHA	52,200		80,000			
ZAGAZIG	179,800	16,400				
ABU KEBIR	94,700	6,700				
EL MANSOURA	160,500	16,100				
DAMIETTA	96,700	5,200				
SHEBIN EL KOM	58,000	15,300				
TANTA	67,700	40,300				
MAHALLA EL KUBRA	29,000	1,760				
BAYALA	367,000	5,400				
KAFR EL SHEIKH	174,000	44,000				
TOTAL	2,624,400	260,410	819,810			

NOTE: IN METRIC TONS

FIGURE B13

COMMODITY THROUGH PORT OF DAMIETTA

AND THEIR DOMESTIC DESTINATIONS

(EXPORT)

CARGO HANDLING CATEGORY : (C) SPECIAL HANDLING YEAR: 2000

COMMODITY / DESTINATION	IRON & STEEL					
CAIRO	223,100					
BENHA	24,000					
ZAGAZIG						
ABU KEBIR						
EL MANSOURA						
DAMIETTA						
SHEBIN EL KOM						
TANTA						
MAHALLA EL KUBRA						
BAYALA						
KAFR EL SHEIKH						
TOTAL	247,100					

NOTE: IN METRIC TONS

FIGURE B14

COMMODITY THROUGH PORT OF DAMIETTA

AND THEIR DOMESTIC DESTINATIONS

(IMPORT)

CARGO HANDLING CATEGORY: (D) DRY BULK YEAR: 2000

COMMODITY / DESTINATION	WHEAT	SALT & SULFUR				
CAIRO	697,500					
BENHA	255,200					
ZAGAZIG	374,400	3,800				
ABU KEBIR		1,500				
EL MANSOURA	566,900	7,600				
DAMIETTA	141,900	3,800				
SHEBIN EL KOM	369,100					
TANTA	369,400	36,400				
MAHALLA EL KUBRA	162,200	37,100				
BAYALA	158,000	1,500				
KAFR EL SHEIKH	123,800					
TOTAL	3,218,400	91,700				

NOTE: IN METRIC TONS

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FIGURE B15

COMMODITY THROUGH PORT OF DAMIETTA

AND THEIR DOMESTIC DESTINATIONS

(EXPORT)

CARGO HANDLING CATEGORY: (D) DRY BULK. YEAR: 2000

COMMODITY / DESTINATION	CORN & MAIZE	FERTILIZER	CEMENT			
CAIRO		68,500				
BENHA						
ZAGAZIG						
ABU KEBIR	34,800					
EL MANSOURA		15,100				
DAMIETTA			710,100			
SHEBIN EL KOM						
TANTA						
MAHALLA EL KUBRA	939,400		1,058,100			
BAYALA						
KAFR EL SHEIKH						
TOTAL	974,200	83,600	1,768,200			

NOTE: IN METRIC TONS

FIGURE B16

APPENDIX C

OPTIMUM CARGO ALLOCATION

TO DAMIETTA

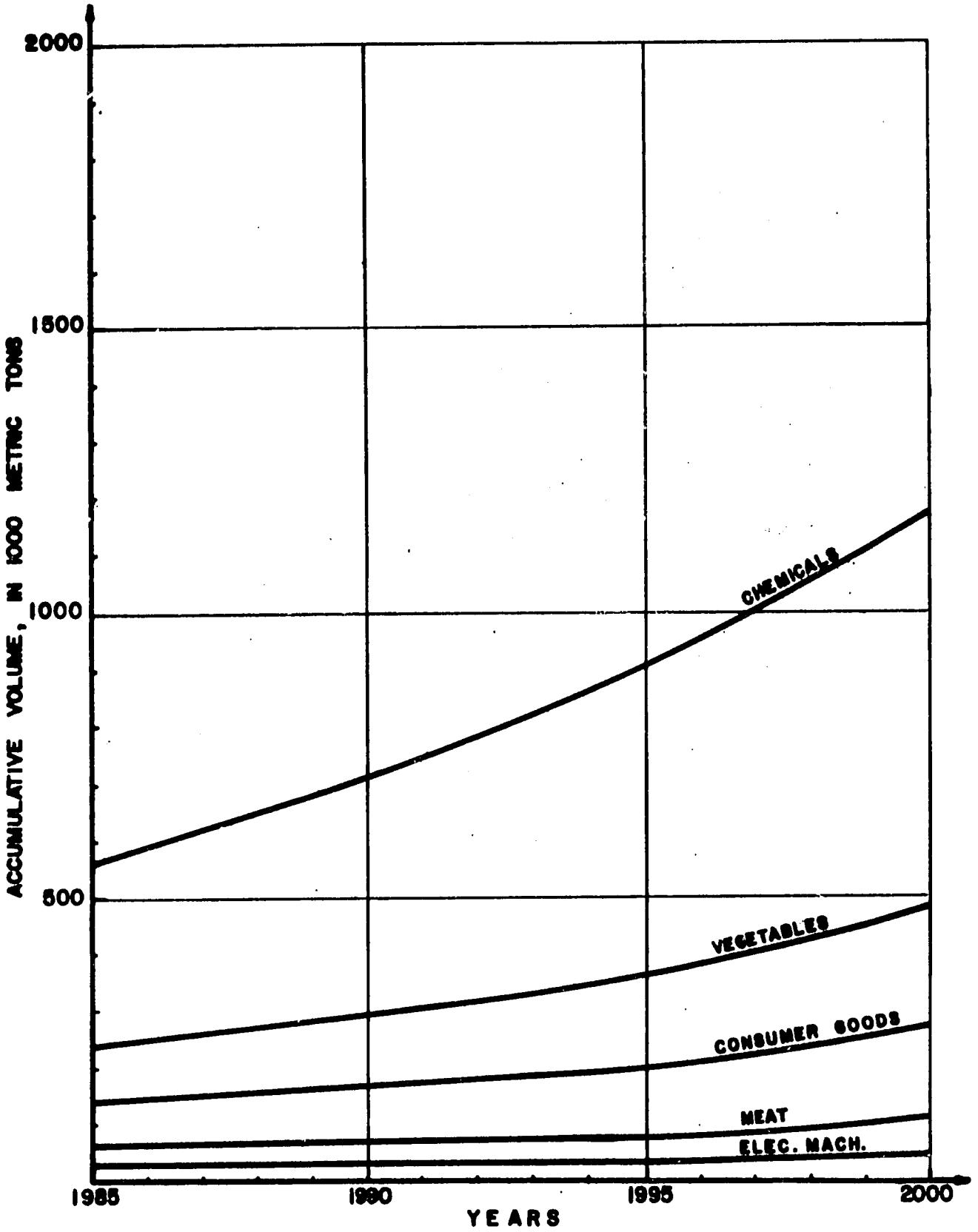

FIGURE C1

HARRIS

OPTIMUM CARGO ALLOCATION

TO DAMETTA (TYPE-A, IMPORTS)

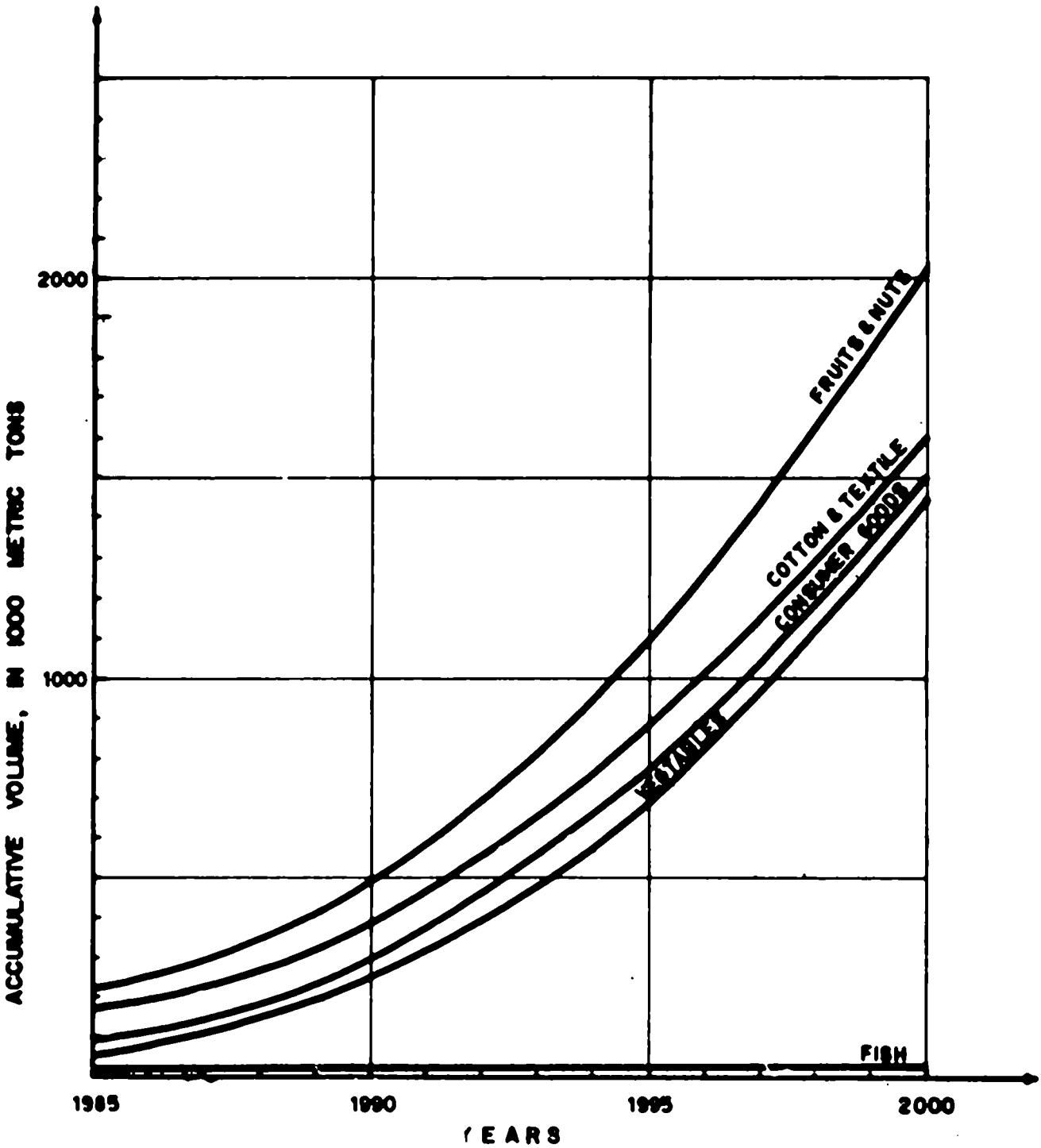

FIGURE C2

HARRIS

OPTIMUM CARGO ALLOCATION

TO DAMIETTA (TYPE-A, EXPORTS)

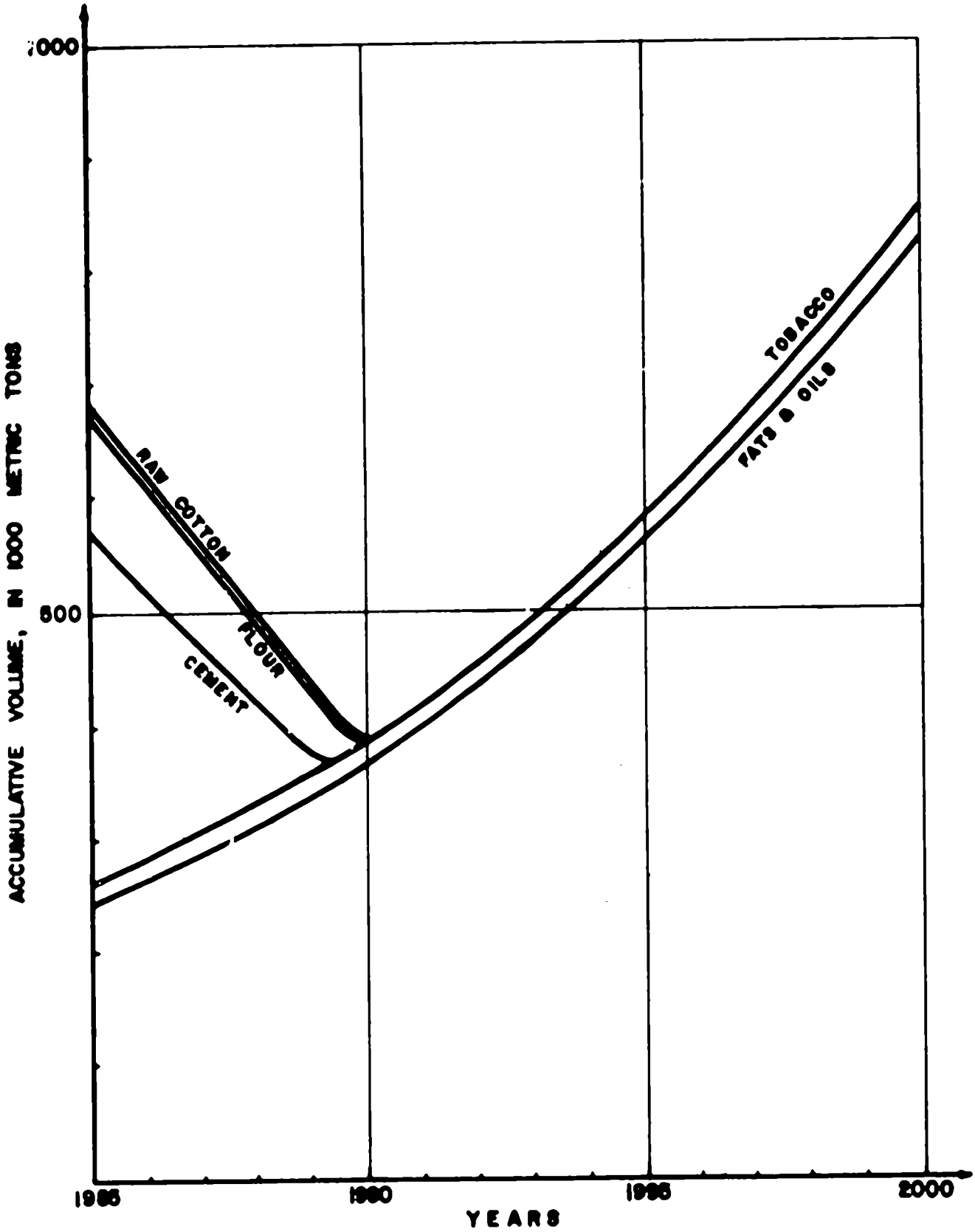

FIGURE C3

OPTIMUM CARGO ALLOCATION
TO DAMETTA (TYPE-B, IMPORTS)

HARRIS

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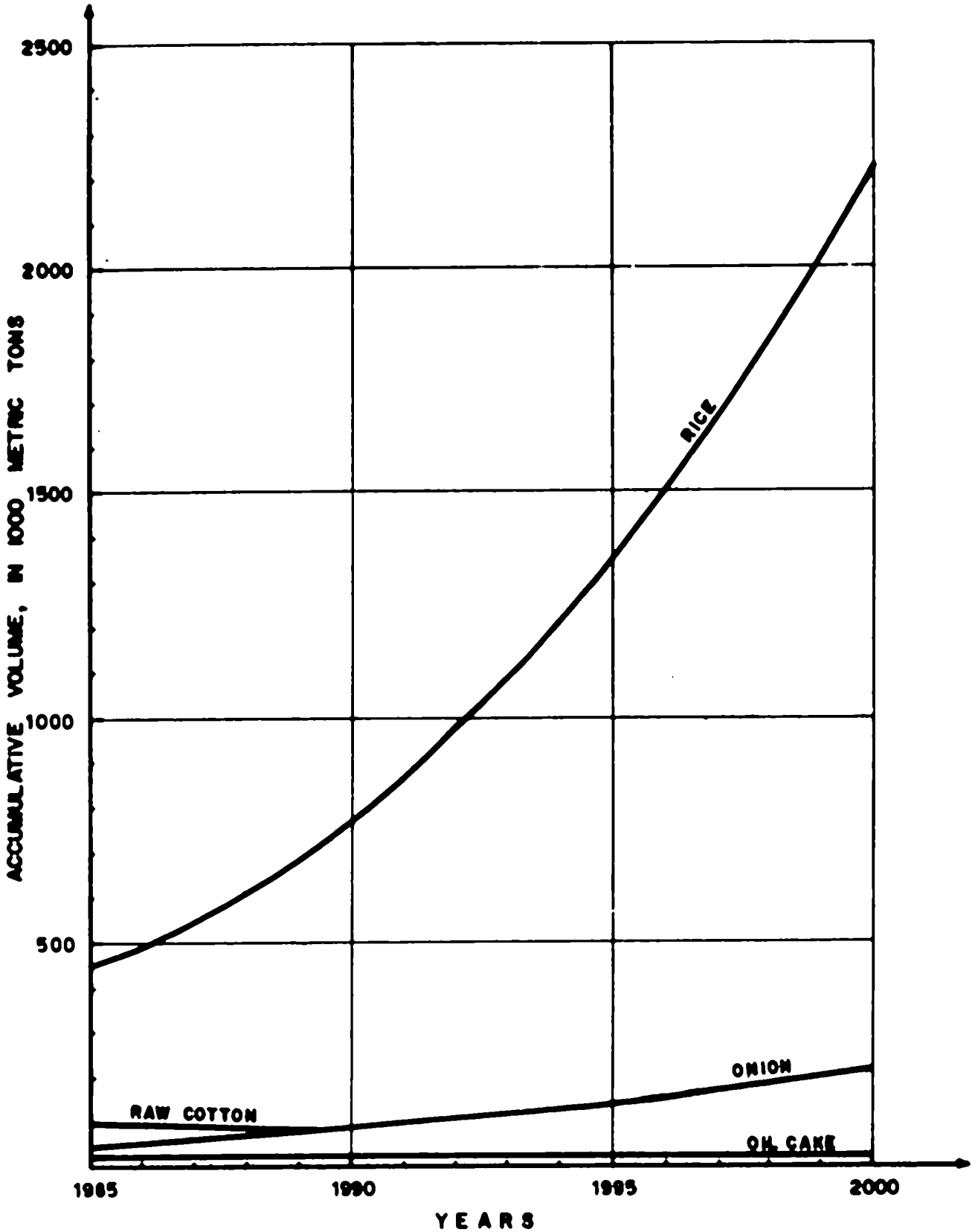


FIGURE C4

OPTIMUM CARGO ALLOCATION
TO DAMETTA (TYPE-B, EXPORTS)

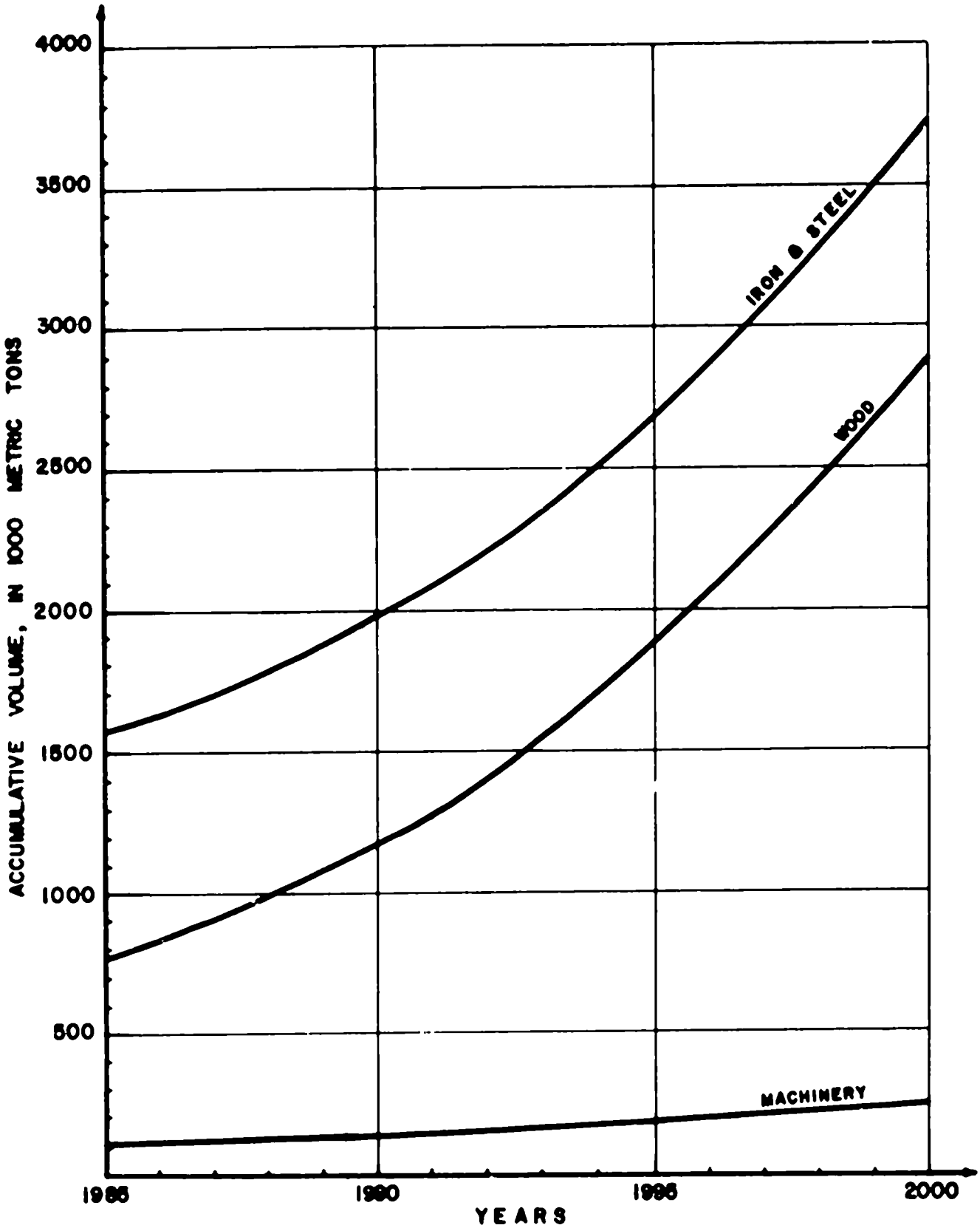


FIGURE C5

OPTIMUM CARGO ALLOCATION

TO DAMIETTA (TYPE-C, IMPORTS)

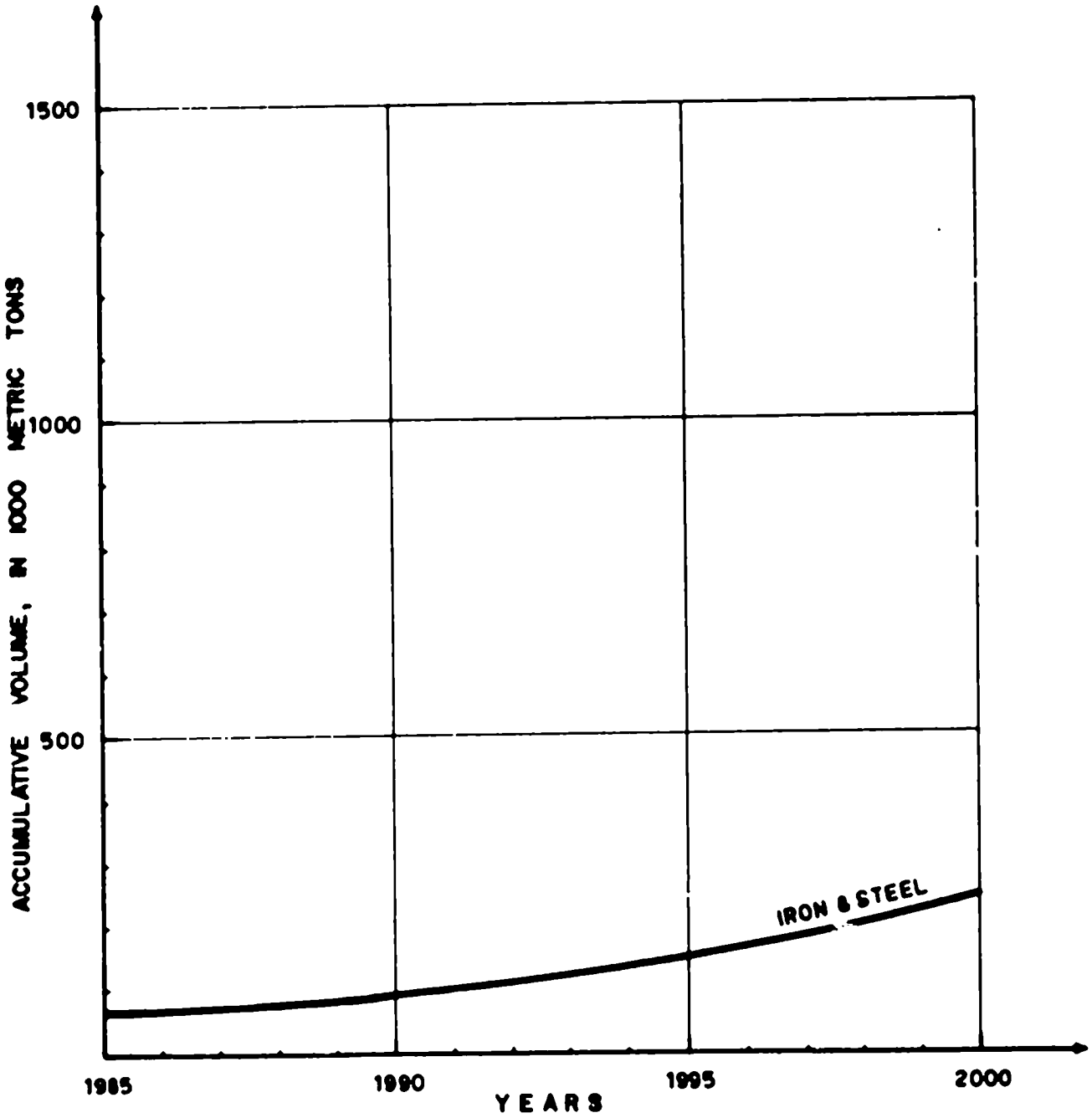


FIGURE C6

HARRIS

OPTIMUM CARGO ALLOCATION

TO DAMIETTA (TYPE-C, EXPORTS)

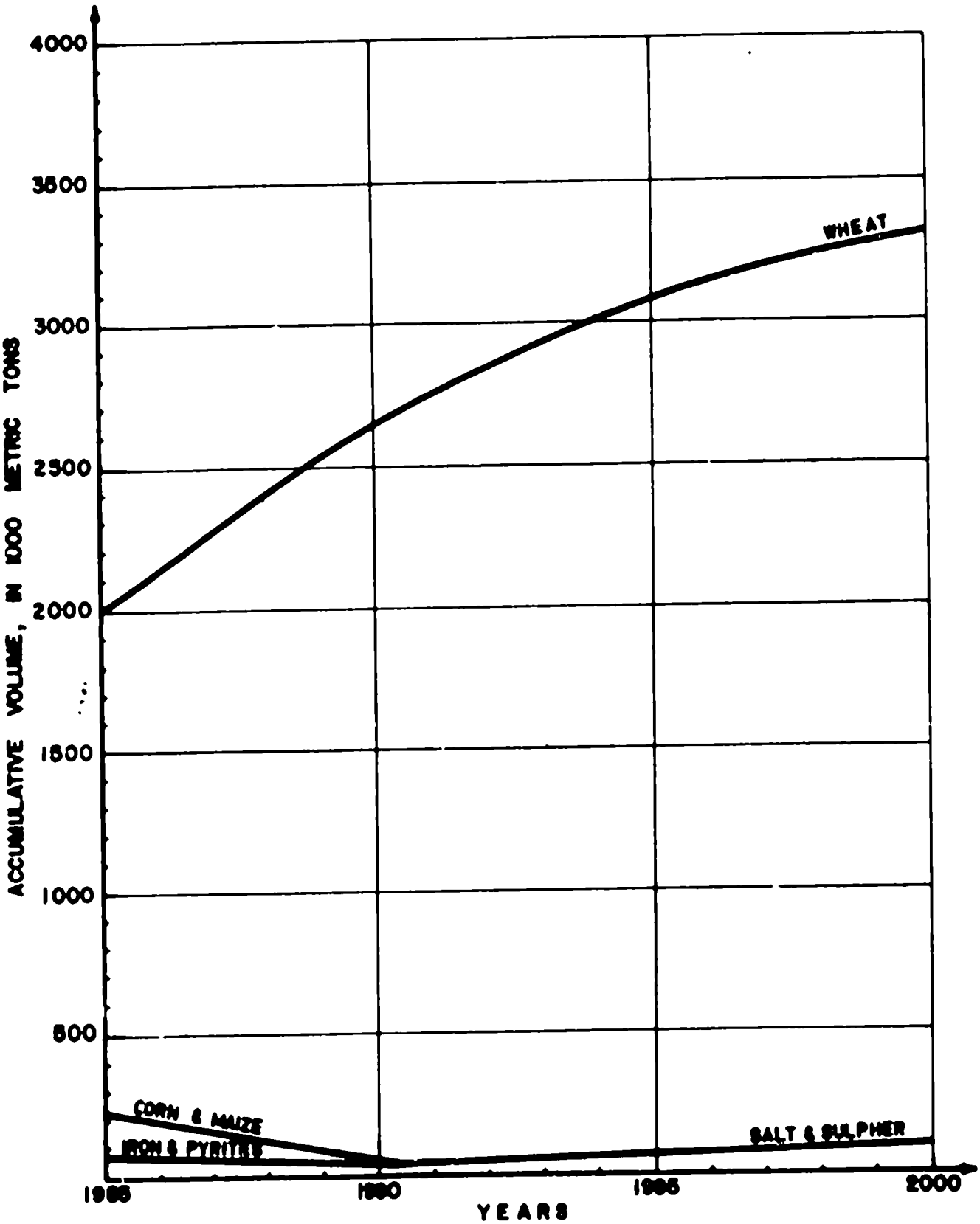


FIGURE C7

OPTIMUM CARGO ALLOCATION
TO DAMIETTA (TYPE-D, IMPORTS)

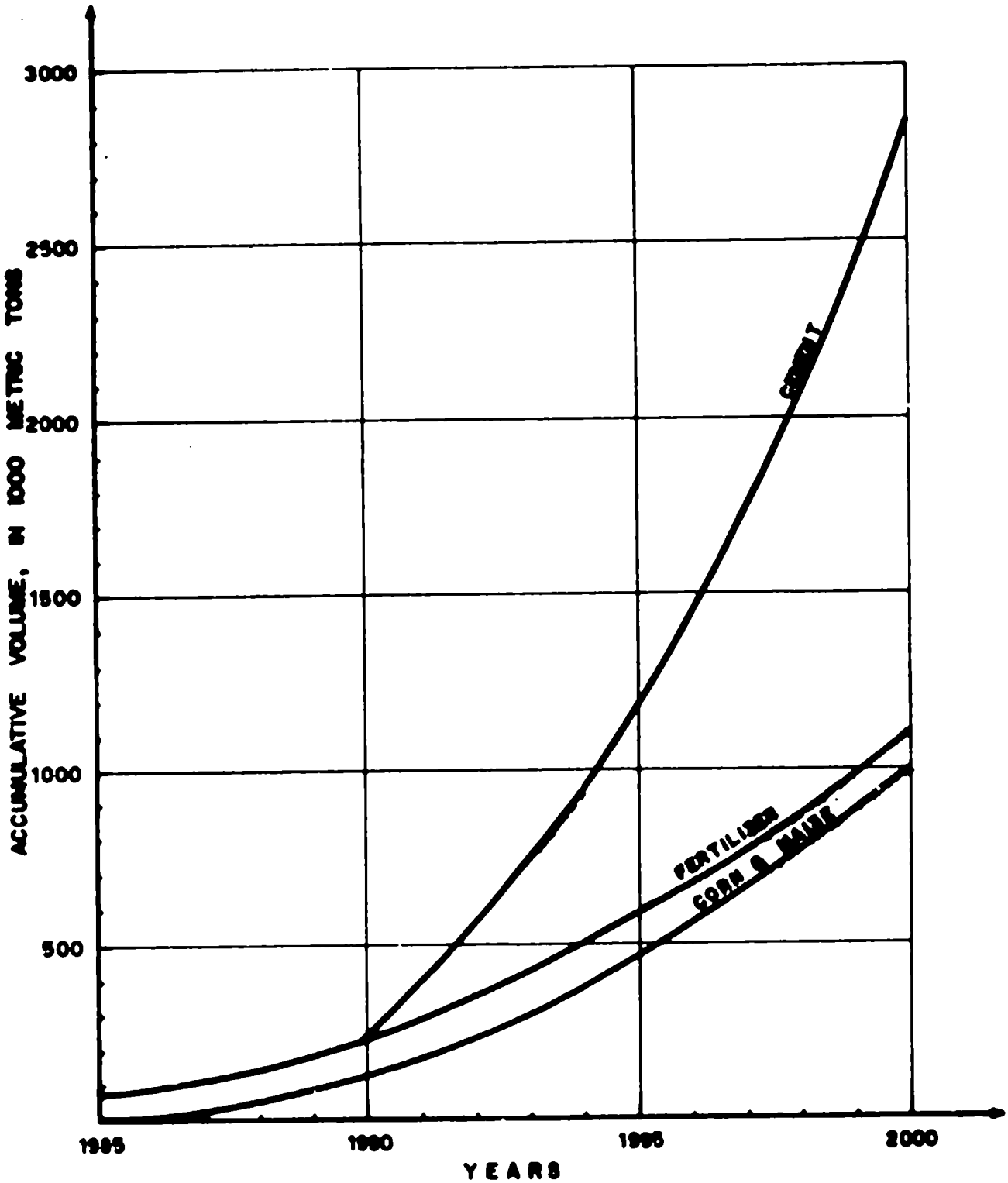
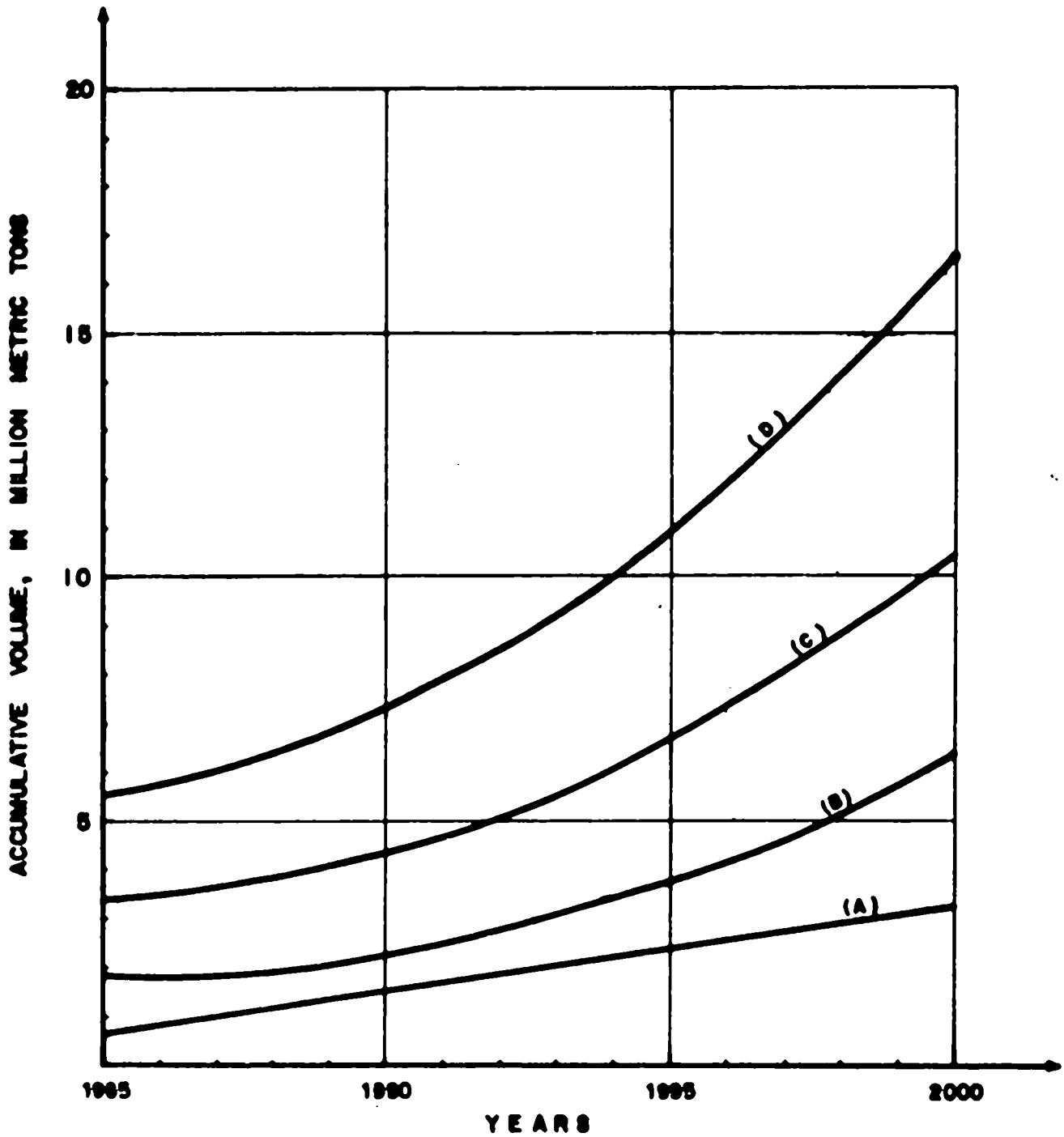


FIGURE C8

OPTIMUM CARGO ALLOCATION
TO DAMIETTA (TYPE-D, EXPORTS)



NOTE:
(A),(B),(C),(D) INDICATES CARGO HANDLING TYPE

FIGURE C9

HARRIS

OPTIMUM THRUPUT ALLOCATION TO DAMIETTA

APPENDIX D

PORT OF DAMIETTA-INLAND PORT SYSTEM

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Background

Traditionally, a seaport has been a complete operating complex where all operations involved in the transfer of cargoes between land and water transport has taken place. Cargoes for export have been delivered from various inland points of origin to receiving stations at the port in size units which are convenient for inland transport. At the port, shipments were repacked and consolidated into larger units appropriate for stowage aboard ship according to destination and the shipping services to be used. All documentation for shipment and all government functions have also been concentrated at the port or in the city surrounding it.

In the same manner, imports have been unloaded from the ship, all customs and governmental clearance functions have been performed, and shipping agencies have received and taken possession of the cargo. Shipments were then broken down into smaller units according to consignee and destination and were loaded onto land transport for movement to inland destinations.

This system for handling foreign commerce has resulted in the development of major cities around the seaport to provide the services and labor required for the operation of the port. But is has also meant that cargoes are handled and rehandled a number of times before they are received by the ultimate consignee. And, because each handling involves labor and delays in time, costs are added but no value is added to the product. Thus the cost to the ultimate consumer is increased- and hence to the overall economy - but there is no compensating increase in the value of the goods.

Inevitably, such a system has increased traffic congestion at the port city, sometimes to the point that the capacity of the port has been reduced because of the inability to move cargoes expeditiously to and from inland points.

The foregoing is not intended as a criticism of the ports or of those who have planned and operated them. Such a system was the only one possible where ocean transport was by way of breakbulk ships - and each individual port was required to develop its handling systems and services to meet the needs of the shipping lines which serves it. Egypt has been, and currently still is, in such a position - and its ports and inland distribution system are controlled by the types of shipping services available.

THE POTENTIAL OF CONTAINERIZATION:

The development of containerized shipping - the "container revolution" as it has come to be known, has made possible the creation of a different type of port, and a different and more efficient distribution system to and from inland cities within a country. Cargoes are now packed into large boxes (containers) of standardized modular sizes - (8' X 8' X 10', 8' X 8' X 20', 8' X 8' X 40') for efficient stowage aboard ships. They are loaded and unloaded by special cranes. The ships are specially designed, and are much more costly to build and operate than the smaller breakbulk ships which they replace. As a consequence, shipping lines operating them require much higher utilization - days at sea actually transporting cargo rather than non-revenue producing days loading and unloading in port. This has resulted in fewer ports-of-call for each ship, with the requirement for interchange of large volumes of cargo to justify a call. At the same time it has also resulted in greatly increased speed of transport with the result that distant destinations can often now be served in a shorter time than nearby areas.

When the containers are off-loaded from the ship at the port they are moved as soon as possible to an inland transport vehicle (truck or rail car) and are carried as complete units "in bond" to the inland city of the consignee. Upon arrival at this point, the container is unstuffed (unloaded), customs and governmental clearance activities are performed, and the cargo then becomes available to the consignee. Thus the unpacking at the port is eliminated, the consignee has received his cargo with no delay, and the inland tranport mode has moved only one rather than many units.

In similar fashion, goods for export can be "stuffed" (packed) in containers at the point of production and be made ready for ocean transport in the large container units. Thus inland transport to the seaport again is carried in the largest possible unit, and is protected from damage or spoilage enroute. No rehandling of the cargo is required at the port, the container simply being stacked and held for dispatch on the ocean carrier. Traffic congestion into the port city is held to the absolute minimum.

In addition to the elimination of the rehandling of cargoes, and the gain in efficiencies resulting from the movement of larger units on the inland transport mode, there are significant advantages to the containers.

- Damage to goods is reduced because the original packaging is undisturbed. Damage potential from unpacking, regrouping, and repacking is eliminated.

- Possibility of loss or pilferage is eliminated because the container remains sealed until it reaches its ultimate destination.

- Spoilage of perishable cargoes can be kept to a minimum because environmental conditions required for optimum protection can be maintained in the container until the contents are delivered to their final destination. This is of utmost significance to Egypt where the bulk of the exports are perishable. By reducing losses from spoilage and at the same time maintaining maximum quality until the containers are unloaded at destination, the actual quantity of exports for which payment is received can be significantly increased. These increases in the quantities of salable produce actually mean more usable production per feddan - and therefore have the same effect as does the reclamation of additional acreage for agriculture. In this instance however, there are no additional costs for land reclamation, and no increases in the demand for water for irrigation.

Containerization and the Inland Port Concept for Damietta

Systems involving the use of containers to develop inland ports are now operating in a few areas in the United States and some of the other highly developed countries. Most were developed for the more efficient distribution of imports; none to our knowledge has been planned for the handling of export cargoes.

Because the port of Damietta will be a completely new port with no existing installations or systems to interfere, the opportunity exists to make it the most modern that existing technology can conceive. Most other ports have had to compromise; Damietta will not.

The port of Damietta can, therefore, become a showplace for the world where all of the most advanced technologies in transport and materials handling have been incorporated into a unified design and operating system to serve the inland areas of Egypt.

In order to create such a port it will be necessary to plan the total system in much more specific detail than would be required for a traditional port. As just a few examples; plans will have to be formulated for cooperative planning to match container availability, packing capability, and ship connections with export production. Communications and control procedures will have to be devised to manage the movements of the fleet of containers between the seaport and the inland ports. Origin and destination studies of cargo movements will have to be studied to determine where inland ports can most expeditiously be located, as well as to determine which ones are to be principally for export or import, or both. Inland transport modal requirements will then need to be established in order to set priorities for improvements which must be made to make the system work. And, of course, the design requirements of the physical facilities will have to be established to insure security and compliance with governmental regulations and procedures as well as to satisfy the operating requirements of the port.

The study program which follows includes the elements necessary to define the inland port system to serve Egypt from the port of Damietta. It will also indicate the areas in which additional detailed planning will subsequently be required as a concurrent activity in the design for the port of Damietta.

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