MINISTRY OF DEVELOPMENT AND NEW COMMUNITIES

ARAB REPUBLIC OF EGYPT

MASTER PLANNING AND INFRASTRUCTURE DEVELOPMENT FOR THE PORT OF DAMIETTA

EXECUTIVE SUMMARY
FINAL REPORT
VOLUME 1

JULY 1979

FREDERIC R. HARRIS, INC.,
CONSULTING ENGINEERS NEW YORK · CAIRO, EGYPT

associated with :
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CONSULTANTS CAIRO, EGYPT
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HARRIS

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Serial Letter No. 241
Job No. 02-816-04
July 31, 1979

Engineer Soliman Abd El Hai, Chairman
Advisory Committee for Reconstruction
Ministry of Development and New Communities
1 Ismail Abaza Street
Cairo, A.R.E.

Subject: Damietta Master Planning and Infrastructure Development Guidelines - Submission of Final Report: Master Planning and Infrastructure Development for the Port of Damietta

Dear Engineer Hai:

In accordance with Amendment No. 3, dated 25 December, 1978, of the contract between the Ministry of Development and New Communities, Government of the Arab Republic of Egypt, and Frederic R. Harris, Inc., for Consulting Engineering Services for Development of Port Facilities at Port Said, dated 3 April, 1977, we are pleased to submit fifty (50) copies of the above mentioned final report.

This report is submitted in five (5) volumes:

Volume 1 - Executive Summary
Volume 2 - Master Plan
Volume 3 - Infrastructure Development Guidelines
Volume 4 - Appendices
Volume 5 - Geotechnical Report

It has been our privilege to complete for the Ministry this most interesting, challenging and important project.

Very truly yours,

FREDERIC R. HARRIS, INC.

Joseph J. Bonasia
Project Manager

JJB/mcg

cc: TAMS

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We are also thankful to the following organizations and to the many individuals in these organizations who have been of considerable assistance:

- The Governorate of Damietta
- High Port Technical Committee of Egypt
- Ministry of Economics
- Ministry of Housing
- Ministry of the Interior, Port Security Department
- Ministry of Irrigation
- Ministry of Land Reclamation
- Ministry of Local Government, Cairo
- Ministry of Planning
- Ministry of Supply, G.A.S.C.
- The Egyptian General Petroleum Corporation
- The Egyptian Navy
- Port Said Customs
- U.S.A.I.D.
- TAMS
- Raymond International, Inc.

SECTION 1.0 - SUMMARY AND CONCLUSIONS

MAJOR ELEMENTS OF THE MASTER PLAN

- ENTRANCE CHANNELS, BREAKWATERS AND TURNING AREA
- FUTURE HARBOR EXPANSION
- BARGE BASIN AND BARGE AND FISHING BOAT CANAL
- BERTHS:

  4 CONTAINER, RO/RO BERTHS
  7 GENERAL CARGO
  7 NEOBULK
  6 SPECIAL HANDLING
  2 GRAIN
  1 CEMENT

- BUILDINGS:

  CONSOLIDATION SHED
  REFRIGERATED WAREHOUSES
  OPERATIONS
  ADMINISTRATION
  CUSTOMS AND HEALTH
  TRANSIT SHEDS
  WAREHOUSES
  MECHANICAL MAINTENANCE

- SILOS:

  GRAIN
  CEMENT

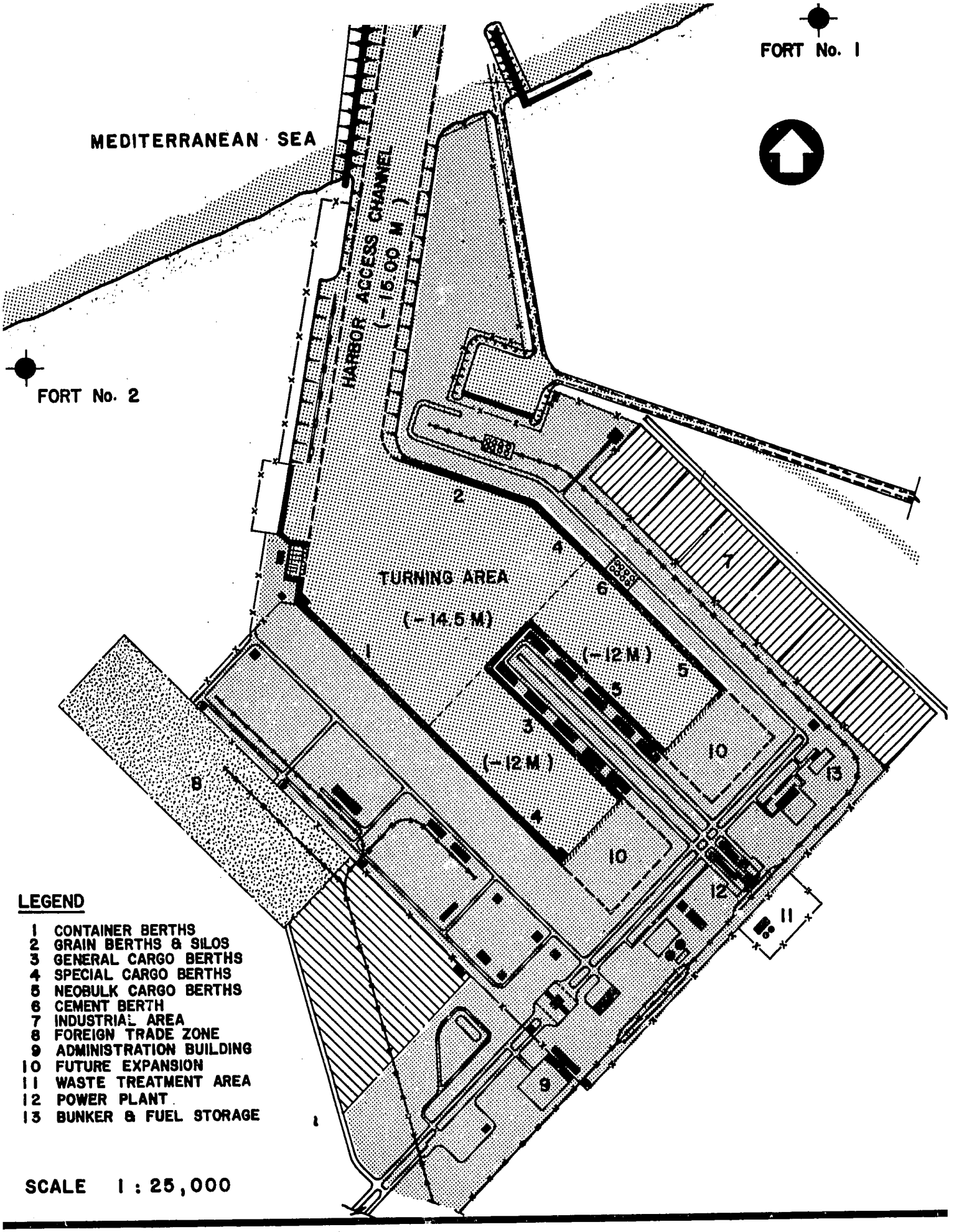
- POWER & UTILITIES:

  DESALINIZATION
  WATER TREATMENT PLANT, WATER TANKS AND PUMP STATION
  BUNKER AND FUEL STORAGE

- SUPPORT FACILITIES:

  FIRE PUMP STATION
  FIRST AID
  SECURITY
  PORT ENTRY/EXIT PLAZA
  HARBOR MASTER
  MARINE REPAIR

- EMPLOYEE PORT ENTRANCE
  CARGO TRANSFER CORRIDOR
  RAILRAOD YARD



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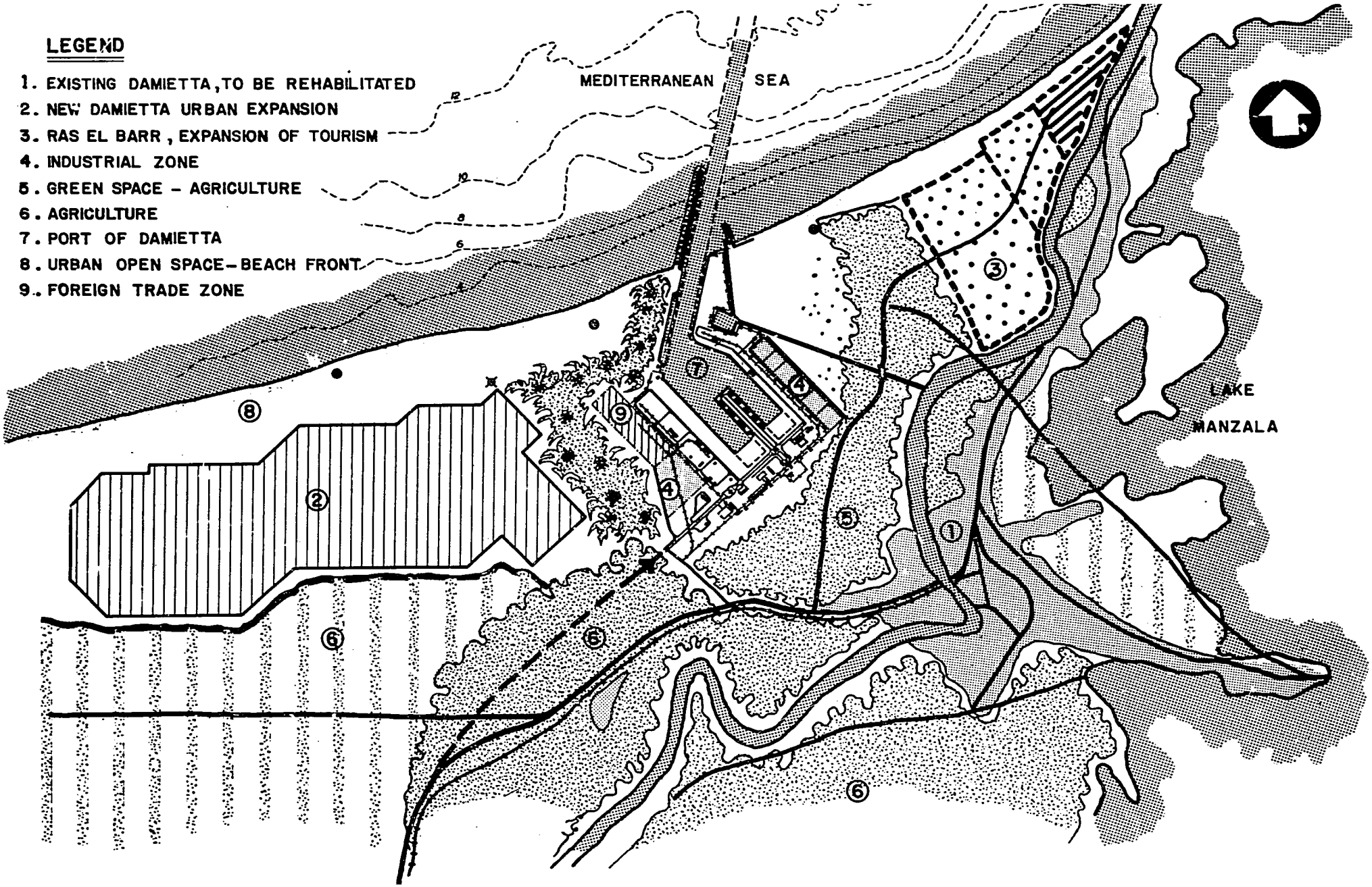
PORT OF DAMIETTA MASTER PLAN
FOR THE YEAR 2000

MAJOR ELEMENTS OF GREATER DAMIETTA GUIDELINE PLAN

- GREATER DAMIETTA METROPOLITAN AREA
  - NEW DAMIETTA URBAN ZONE
  - REHABILITATED DAMIETTA
- PORT OF DAMIETTA
- INDUSTRIAL AREA
- FOREIGN TRADE ZONE
- RAS EL BARR EXPANSION
- AGRICULTURE
- GREEN BELT
- URBAN BEACH FRONT DEVELOPMENT



HARRIS

GREATER DAMIETTA GUIDELINE PLAN
FOR THE YEAR 2000

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

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.

- Port Requirements
  - 1985: Cargo Throughput 5.6 million tons
  - 2000: Cargo Throughput 16.5 million tons
  - 2010: Cargo Throughput 22.9 million tons
- Port to be located between Fort 1 and Fort 2, 8.5 km west of Damietta Branch of the Nile

[1] Included within the Master Plan.

- Sufficient non-agricultural land available for all requirements

- Current land values are conducive to development

- Soil conditions uniform throughout site

- Long term erosion of shoreline predicted

- Major harbor structures to be developed a minimum of 1 km inland

- Recommended Port layout optimized navigational, construction and operational criteria

- Container Transshipment Terminal is operationally and economically viable

- "Inland Port" feasible concept for the exporting of fresh vegetables and fruits

- Transportation Improvements:
  - Railway 1985: No expansion required
    2000: Modernization of Damietta-Talkha and Tanta-Benha links required
  - Highway 1985: Widening Damietta to Talkha link
    2000: Widening Mansoura-Zagazig and Sonbilawin-Abu Kabir link
  - Waterway 1985: New Faraskour barrage and barge lock endorsed.

- Industrial Development

Total employment:	1985 - 14,000
	2000 - 29,000
Total induced employment:	1985 - 40,000
	2000 - 85,000
New community population:	1985 - 150,000
	2000 - 568,000
Total induced population:	1985 - 150,000
	2000 - 310,000

- Recommended regional guideline plan foresees development of greater Damietta metropolitan area with new urban development west of Port along the Mediterranean coast.

- Parallel development of new urban areas and rehabilitation of existing Damietta is recommended.

- If the Master Plan and Infrastructure Guideline Plan are not implemented, there would result:
  - Increased congestion to already congested Egyptian ports
  - Higher freight costs
  - Loss of foreign exchange and revenues
  - Loss of new employment potential
  - Unrealized regional development potential.

2.0 INTRODUCTION

The Alternative 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 than, 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.

This final report consists of 5 volumes:

- Volume 1 - Executive Summary
- Volume 2 - Master Plan
- Volume 3 - Infrastructure Development Guidelines for the Port of Damietta
- Volume 4 - Appendices
- Volume 5 - Geotechnical Report

An Interim Report was issued in April 1979. This submission stimulated comments and suggestions from those concerned with the development of the Port and the Damietta region. A two-day workshop was held June 11 and 12, during which study final conclusions were presented and discussed. A Draft Final Report was issued in June 1979.

This Executive Summary, Volume 1, summarizes the major findings of the study. Section, Figure and Table numbers are the same as those used in the Final Report.

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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)

3.0 PORT DEMAND

The amount of cargo generated by the domestic zones in a port service area, together with the demand or supply from corresponding foreign ports, defines the amount of cargo allocated to the port. Table 2.1 summarizes the cargo tonnages for the ports of Egypt in 1985 and 2000 by cargo handling category. The detailed commodity import and export forecasts are given in Appendix A in the report.

The summary of commodity import and export movements through the Port of Damietta, projected for the years 1985 and 2000, is shown in Table 3.1. Tables detailing movements by cargo handling categories for inland destinations are found in Appendix B in the report. The projections are "unconstrained" that is the port is considered (and designed) to possess facilities required to handle its least cost cargo potential at standard levels of productivity.

Owing to its location near the head of the Suez Canal, the Port of Damietta would provide a facility where steamship lines can interface cargoes bound for destinations other than Egypt. While stopping at the Port of Damietta Transshipment Terminal, steamship lines could also be expected to encourage the containerized shipment of Egyptian imports and exports on board their vessels. Utilizing the concept of an inland port", described in Section 14 of the report, fresh vegetables and fruits could be containerized and delivered with minimum time lapse and spoilage to foreign markets. Estimates of containerized cargo tonnages on the basis of 12 tons per TEU (twenty foot equivalent units) are given in Table 3.2.

The projections presented are for the years 1985-2000. Projections beyond this 15 year time span are subject to error for reasons described in the report. Therefore, projections beyond 2000 to 2010 are by basic handling categories and are given in Table 3.3.

TABLE 2.1

CARGO ALLOCATIONS TO THE PORTS OF EGYPT

(NON-CONSTRAINED)[1]

SUMMARY

CARGO HANDLING CATEGORIES	MARSA MATRUH		ALEXANDRIA[2]		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	6600	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	36830	9155450	6197900	4781250	810560	1295650	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

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

2. INCLUDES THE PROJECTIONS FOR THE PORT OF DEKAILA

TABLE 3.1
SUMMARY OF COMMODITY MOVEMENT THROUGH
THE PORT OF DAMIETTA
1985 - 2000

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.

NOTE: COMMODITY THRUPUT IN METRIC TONS.

TABLE 3.2
PROJECTED TRANSSHIPMENT TONNAGE

1985 - 2000

FORECAST VARIANT	1985	2000	1985	2000
	NO TEU'S	NO TEU's	TONNAGES	
HIGH	275,000	465,000	3,300,000	5,580,000
MEDIUM	150,000	215,000	1,800,000	3,000,000
LOW	87,500	154,000	1,050,000	1,848,000

TABLE 3.3

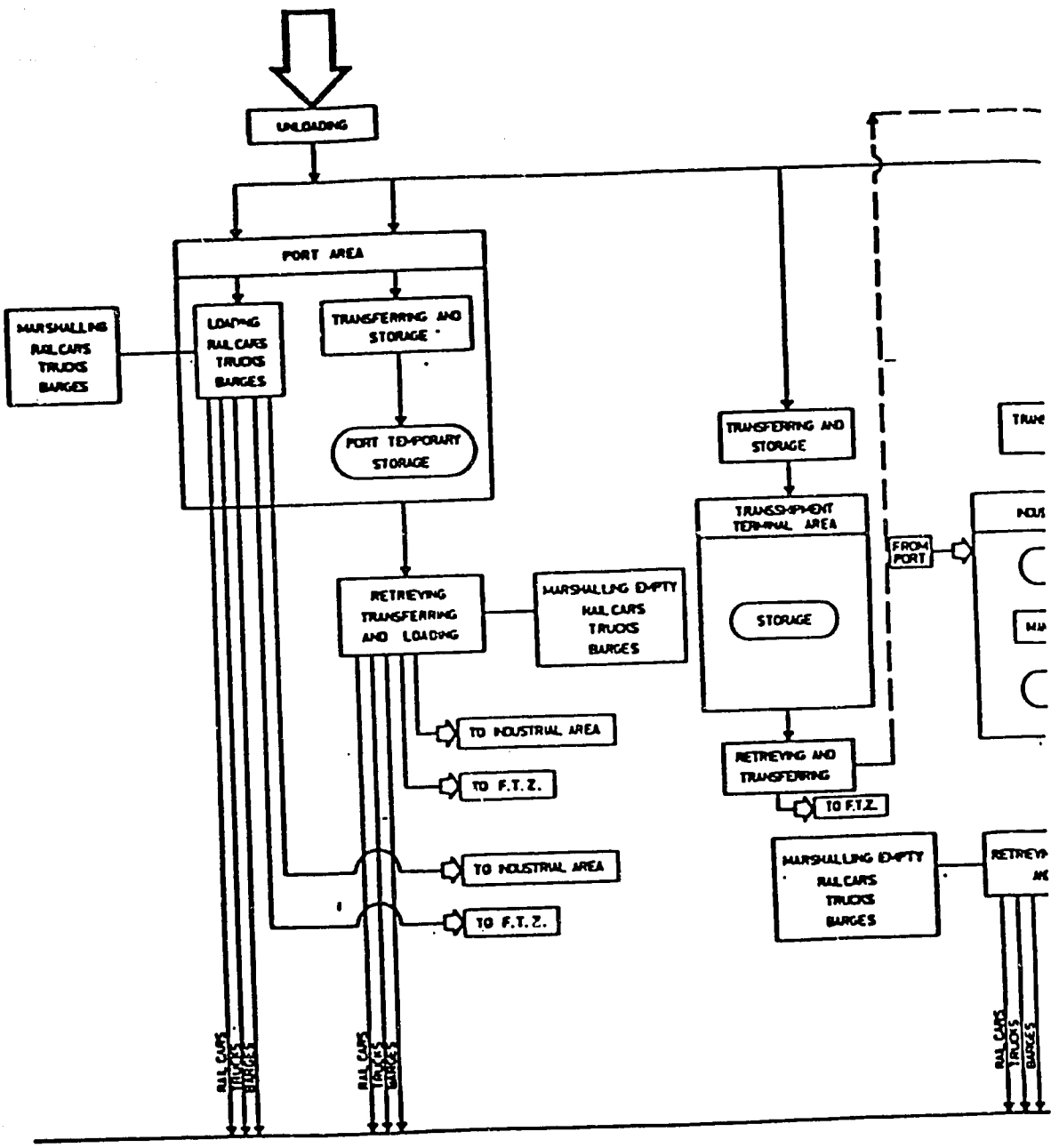
SUMMARY OF COMMODITY MOVEMENT THROUGH THE PORT OF DAMIETTA BY CARGO HANDLING CATEGORIES 2000 - 2010

CARGO HANDLING CATEGORY	YEAR		
	2000	2005	2010
A	3,296	4,170	5,333
B	3,076	3,630	4,284
C	3,952	4,746	5,750
D	6,136	6,775	7,521
TOTAL	16,460	19,321	22,888
TRANSSHIPMENT VOLUME	2,975	3,501	4,120
GRAND TOTAL	19,435	22,826	27,008

NOTE: COMMODITY THRUPUT IN METRIC TONS.

The development of a new port of the size envisaged for Damietta can be expected to be accompanied by the large scale expansion of industrial and urban areas. This study analyzed the industries that can be expected to locate in the vicinity of the Port owing to the commodity flows through the Port and the potential development of a Foreign Trade Zone.

An overview of the Port integrated commodity flows subsystems is shown on Figure 3.4. This diagram outlines the cargo flows for the Port/Industrial Area/Foreign Trade Zone/Transshipment Terminal complex when the port is in full operation and offering all of potential services.


UNLOADING
PORT AREA
MARSHALLING
RAILCARS
TRUCKS
BARGES
LOADING
RAILCARS
TRUCKS
BARGES
TRANSFERRING AND
STORAGE
PORT TEMPORARY
STORAGE
RETREVING
TRANSFERRING
AND LOADING
MARSHALLING EMPTY
RAILCARS
TRUCKS
BARGES
TO INDUSTRIAL AREA
TO F.T.Z.
TO INDUSTRIAL AREA
TO F.T.Z.
RAILCARS
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RAILCARS
TRUCKS
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TRANSFERRING AND
STORAGE
TRANSSHIPMENT
TERMINAL AREA
STORAGE
RETREVING AND
TRANSFERRING
TO F.T.Z.
MARSHALLING EMPTY
RAILCARS
TRUCKS
BARGES
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PORT
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BARGES

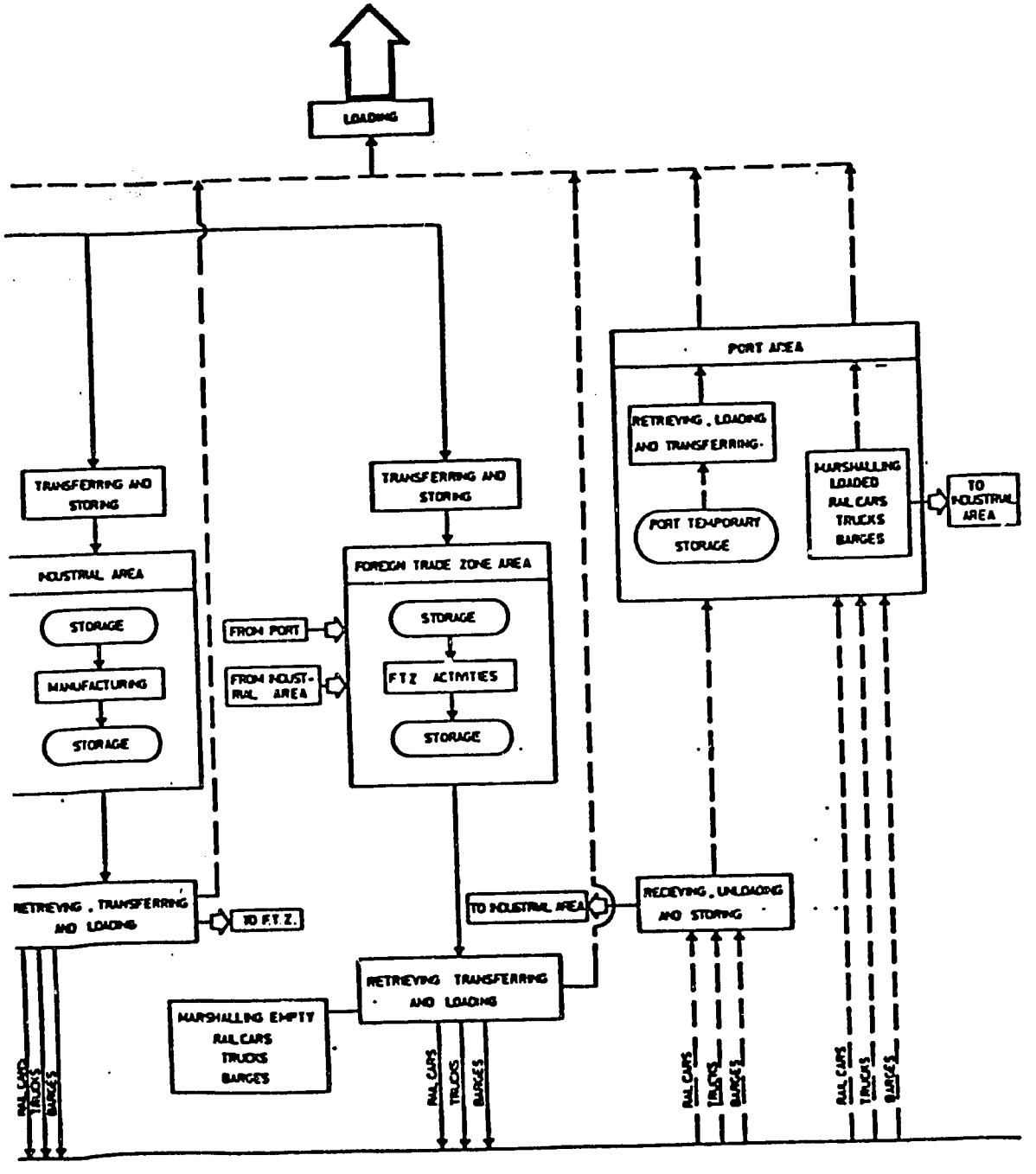

FIGURE 3.4

INTEGRATION COMMODITY FLOW SUBSYSTEMS

4.0 PROGRAMMING THE PORT

The number and type of berths required to accommodate vessels carrying the projected cargoes at acceptable and economic waiting times has been calculated. The number of berths required, by type of berth, average vessel waiting time, berth occupancy percentage, and total berth capacity under indicated conditions are tabulated in Tables 4.2 and 4.3. The proprietary berth capacity model devised by Frederic R. Harris, Inc. is based upon the following cargo handling productivity rates:

Container - (2 cranes)	6750 tons/day
General cargo	600 tons/day
Neobulk	1200 tons/day
Special handling	2000 tons/day
Grain	1000 tons/hour

Final port planning must maximuze interchangeability of facilities between compatible categories. Such interchange can increase utilization of facilities and capacities while improving income to operation cost ratios. It is entirely practical, after determining berth requirements to combine general cargo berths with neobulk berths, and special handling berths with container berths since infrastructural and mechanical support for each pair is similar.

The Port offshore entrance channel requires a width of 300 meters for two way traffic and a water depth of 15 meters. The minimum diameter of the turning area is two times the length of the design vessel. The entrance channel would be located on a tangent to the turning area. An offshore anchorage in 15 meter depth water is required for ships waiting for berthing space.

TABLE 4.2

BERTH REQUIREMENTS

PORT OF DAMIETTA

1985

CARGO TYPE	ANNUAL VOLUME 1985	NUMBER OF BERTHS REQUIRED [1]	AVERAGE VESSEL WAITING TIME (HRS) [2]	BERTH OCCUPANCY PERCENTAGE [2]	NOMINAL BERTH CAPACITY [2]
GENERAL CARGO					
• CONTAINERIZED [3]	2213500	2	4	48%	2400000
• BREAK BULK	387100	4	6	55%	450000
NEOBULK CARGO	1134300	4	12	55%	1400000
SPECIAL CARGO	1627000	4	14	65%	1700000
BULK CARGO					
• GRAIN	1904500	2	15	40%	4000000
• OTHER	150800	0 [4]			
TOTAL	7417010	16 [5]			10550000

NOTE:

1. Excludes Petroleum.
2. As computed by FRH, Inc. Proprietary Berth Capacity Methodology.
3. Includes 1.83 million times of transshipment Cargo. Roll on/ Roll off cargo to be handled at container berths from combination vessels and at available open berths from stern and bow vessels. Container berth capacity assumes two cranes per berth.
4. Miscellaneous Bulk Cargo in small annual volume to be handled at Special or Neobulk berths until sufficient volume to justify facilities.
5. Time of construction constraint is expected to limit berth availability in 1985 to 12 berths. (3 container berths 2 grain berths, 3 special berths and 4 general or neobulk cargo berths.

TABLE 4.3

BERTH REQUIREMENTS

PORT OF DAMIETTA

2000

CARGO TYPE	1) ANNUAL VOLUME 2000	1) NUMBER BERTHS	2) AVERAGE VESSEL WAITING TIME (HRS)	2) BERTH OCCUPANCY PERCENTAGE	2) NOMINAL BERTH CAPACITY
GENERAL CARGO					
• CONTAINERIZED 3)	5446900	4	4	60%	6600000
• BREAK BULK	824000	7	6	60%	880000
NEOBULK CARGO	3076400	7	12	65%	3200000
SPECIAL CARGO	3951700	6	15	68%	4200000
BULK CARGO					
• GRAIN	4192600	2	24	50%	5000000
• CEMENT	1768200	1	45	45%	5000000
• OTHER	175300	0 4)			
TOTAL	19435000	27			20880000

NOTE:

1. Excludes Petroleum.
2. As computed by FRH Inc. Proprietary Berth Capacity methodology.
3. Includes 2.97 million tons of transshipment cargo. Roll on/ Roll off cargo to be handled at container berths from combination vessels and at available open berths from stern and bow vessels. Container berth capacity assumes 2 cranes/berth.
4. Miscellaneous bulk cargo consisting of bulk fertilizer, salt and sulphur to be handled at special cargo berths until sufficient volume develops to justify a berth.

The physical layout, space requirements and equipment used for each berth is determined by the type of cargo expected to be handled and the cargo handling methods. Facility requirements for each type of cargo handling category are summarized in Table 4.4.

TABLE 4.4

FACILITIES REQUIREMENTS

TYPE BERTH	TOTAL AREA (M^2)	APRON WIDTH (M)	BUILDINGS TYPE	OPEN STORAGE (M^2)	TRANSPORT FACILITIES
CONTAINER & ROLL ON-ROLL OFF	100,000	INCLUDED IN TOTAL AREA	STRIPPING & STUFFING 170M X 40 M	INCLUDED IN TOTAL AREA	RAIL,HIGHWAY
GENERAL BREAKBULK	30,000	25M	1 TRANSIT SHED 170 X 60M 1 WAREHOUSE 170 X 60M FOR EVERY 2 TRANSIT SHEDS	18000 M^2 INCLUDED IN TOTAL AREA	HIGHWAY
NEOBULK	30,000	25M	1 TRANSIT SHED 170 X 60M 1 WAREHOUSE 170 X 60M FOR EVERY 3 TRANSIT SHEDS	18000 M^2 INCLUDED IN TOTAL AREA	HIGHWAY
SPECIAL	30,000	INCLUDED IN TOTAL AREA	NOT INDICATED	TOTAL AREA	RAIL,HIGHWAY
DRYBULK	DETERMINED BY VOLUME AND TYPE CARGO HANDLED	NOT CRITICAL	SILOS OR STORAGE YARDS TO HOLD 10% ANNUAL THROUGHPUT	FOR ORE,COAL AND SIMILAR CARGOES	RAIL,HIGHWAY BARGE

5.0 LOCATING THE PORT

The proposed Port would be located approximately 8.5 kilometers west of the River Nile Damietta Branch outlet approximately midway between Forts No. 1 and No. 2. The Port would be located inland 1 kilometer and connected by an access channel to the Mediterranean Sea. It would be situated in the arid sand dune belt with the southern limit of the Port bordering on the northern boundary of agricultural land. See Figure 5.1.

A deep water significant wave height of 6.3 meters with a period of 9 to 10 seconds for a 30 year recurrence was established for the conceptual design. The design water levels, referred to Egyptina Datum, are:

- Highest High Water 0.79 meters
- Mean Water Level 0.24 meters
- Lowest Low Water 0.39 meters

Design currents established are:

Location	Depth	Magnitude	Direction
Offshore deepwater zone	50 m	0.5 m/sec	Easterly
Offshore shallow water	50-2 m	1.0 m/sec	Easterly
Breaker zone	2 m-coast	10 cm/sec	Northeasterly

In order to establish the magnitude of shore erosion or sedimentation at the Port site area, a comparison was made between the British Admiralty bathymetric survey of 1919 and the United States Navy bathymetric survey of 1978. Figure 5.16 shows the offshore bathymetry based on marine surveys conducted by the U.S. Navy Hydrographic Office Ship HARKNESS and the estimated limits of eroding and accreting areas. It

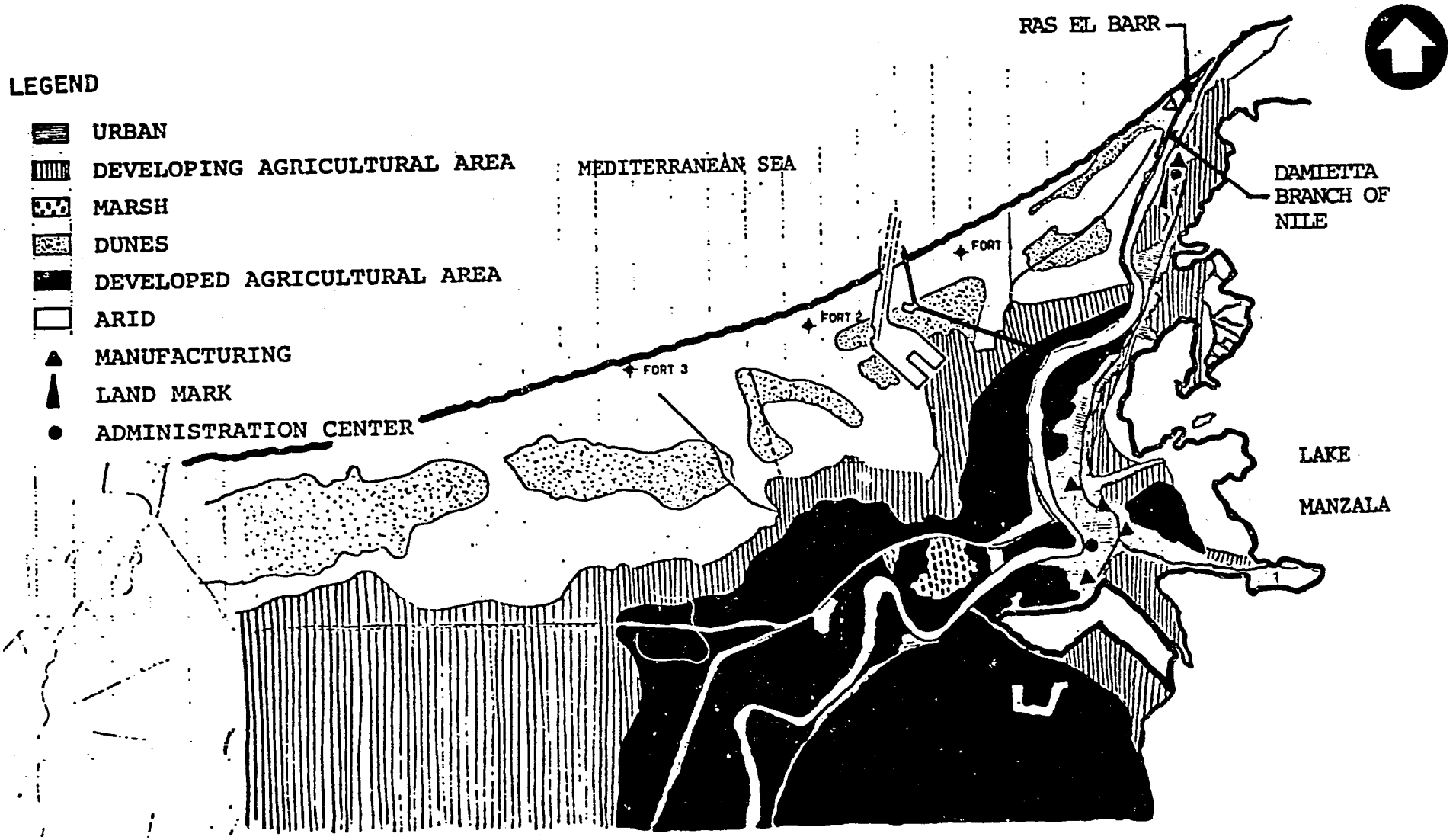

FIGURE 5.1

SITE LOCATION MAP

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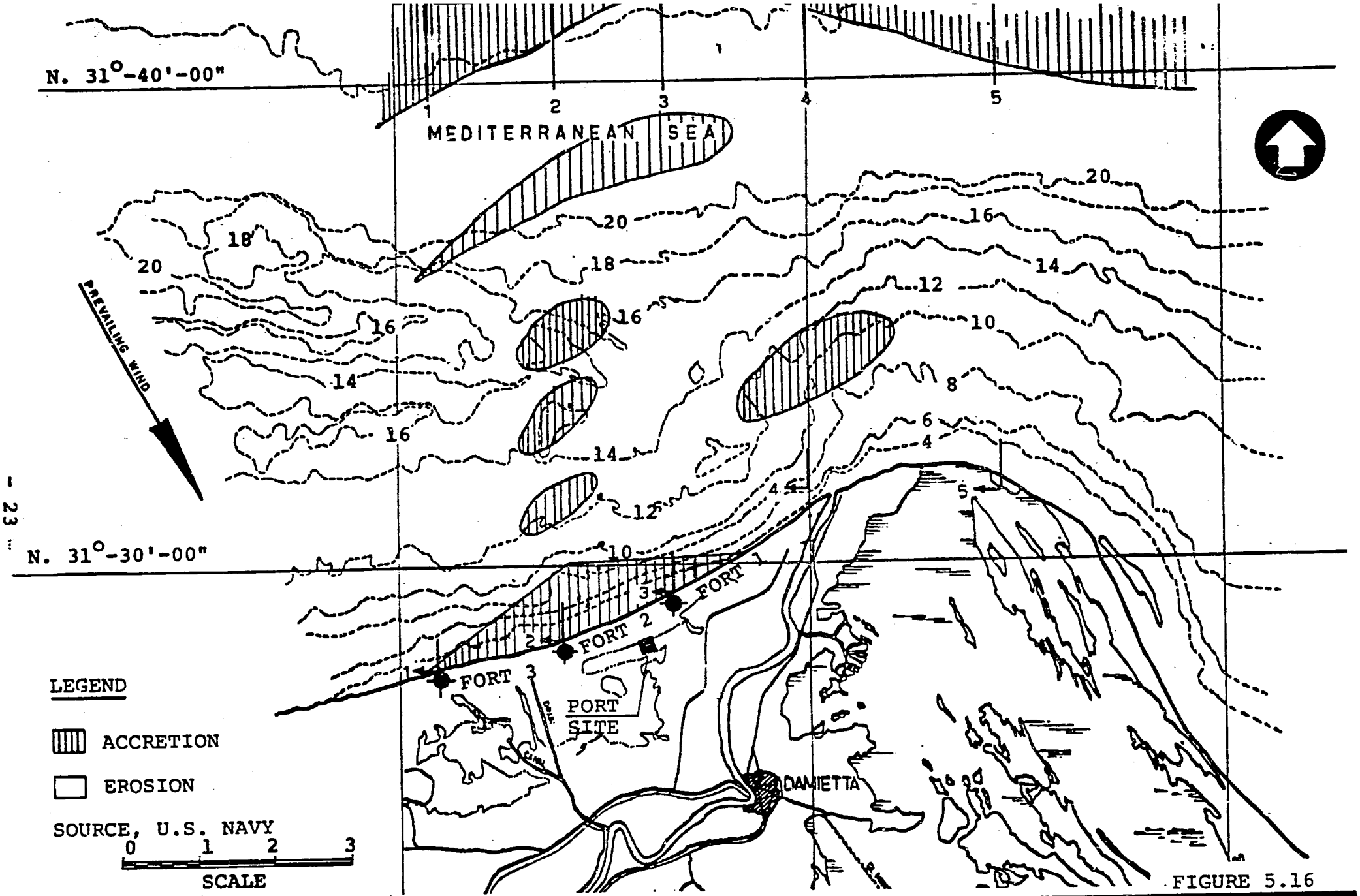

FIGURE 5.16

OFFSHORE BATHYMETRY
ZONES OF EROSION AND ACCRETION
OF BOTTOM SEDIMENTS

HARRIS

was also concluded from the comparison that the coastline west of For No. 1, oscillates annually in a 200 meter wide zone from the existing shoreline, but with a long term accretion trend. Figure 5.22 shows the expected shoreline after 200 years.

A subsurface exploration program was conducted at the site of the proposed Port of Damietta and included the drilling of 21 land and 4 marine borings and laboratory testing of representative soil samples recovered. A detailed description of the laboratory testing program is presented in Volume 5, Geotechnical Report. The generalized soil stratigraphy is shown in Figure 5.26. The results were correlated with a subsurface exploration program conducted in the vicinity of the port site in 1970 which included the drilling of 28 shallow onshore borings and 53 shallow marine borings.

It is recommended that the Port be built west of Fort No. 1 where the area is generally accreting and more stable. Any location east of Fort No. 1 would be subject to considerable erosion and would conflict with Ras El Barr resort expansion. The three alternative port locations and breakwater configurations and approach channel alignment investigated are shown in Figure 5.28. Moving the Port to the west increases breakwater and channel lengths and results in higher construction costs. Location No. 1 is the recommended optimum Port location.

A preliminary cost comparison between a port constructed on the coastline and an inland port, showed the latter to be 10 to 15 percent cheaper. Additionally, it is estimated that an inland port can be constructed faster than an offshore port due to the fact that work can start simultaneously on the breakwaters, the channel and the berths.

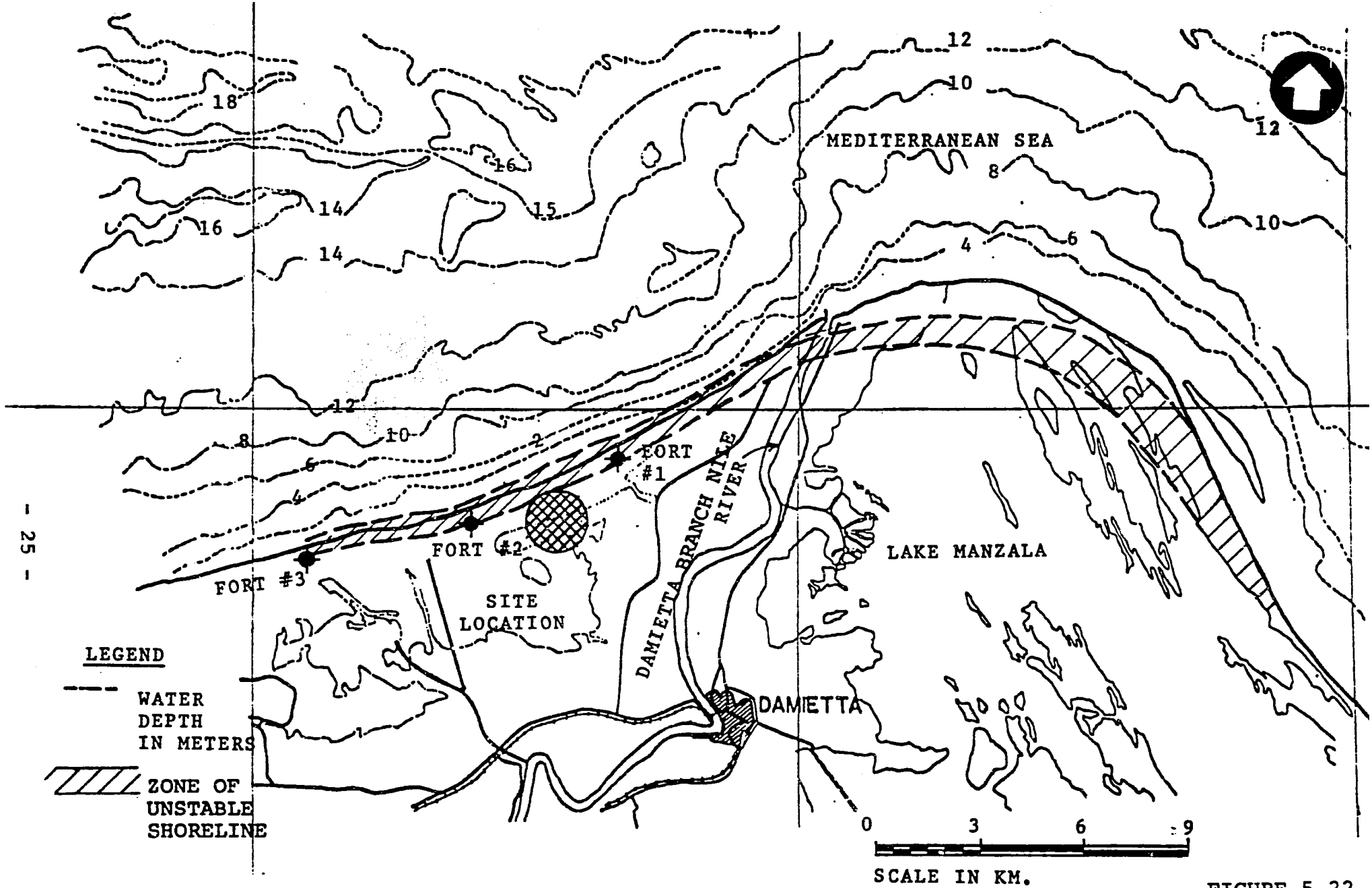

FIGURE 5.22

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DAMIETTA CONCEPTUAL DESIGN
POTENTIAL VARIATION OF
COASTLINE IN 200 YEARS

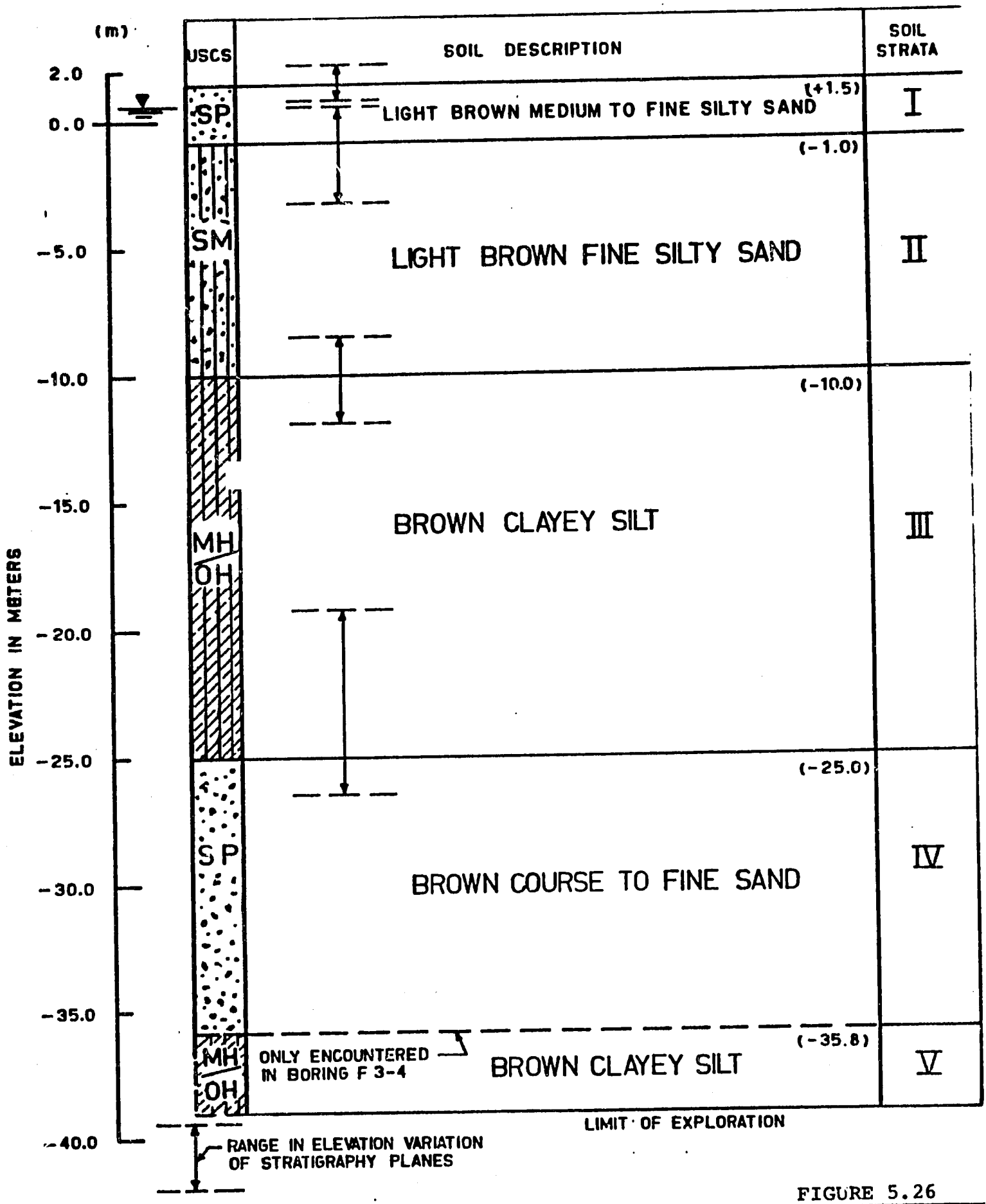

FIGURE 5.26

GENERALIZED SOIL STRATIGRAPHY

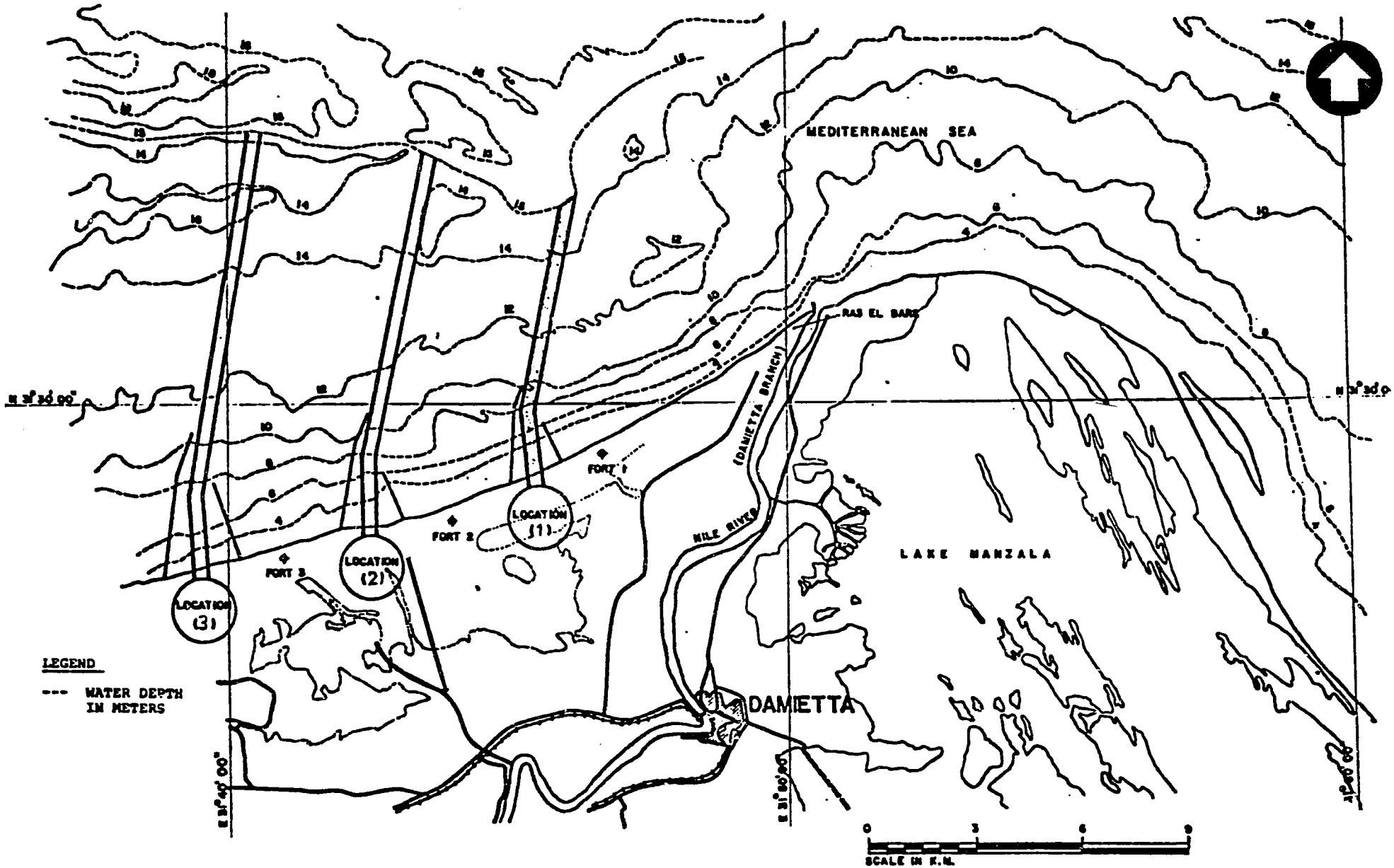

FIGURE 5.28

ALTERNATIVE PORT LOCATIONS

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Due to possibilities of long term changing rates of erosion and accretion, a one kilometer buffer zone between major structures of the port and the coastline was established to insure the integrity of the port.

6.0 MASTER PLANNING THE PORT

Many possible alternative harbor layouts were studied by the Consultant. The four offering the greatest potential from the standpoint of engineering, construction, operations and navigational safety were further developed and evaluated. Subsequently, a fifth layout was added at the suggestion of the High Port Technical Council of Egypt. "Weighted" evaluation factors were developed to objectively select the most desirable layout. The selected harbor configuration for final Master Plan development was then optimized in a series of refined developments, each one improving on the features of the previous one.

In the optimization process, the following objectives were established:

- Minimize harbor area to reduce the required dredging and construction costs.

- Provide sufficient harbor area for a turning basin having a diameter of twice the length of the design vessel.

- Orient as many berths as possible into the prevailing northwesterly wind zone.

- Locate major Port complex structures a minimum of 1 kilometer from the existing shoreline.

- Avoid Port complex encroachment on Ras El Barr and on prime agricultural land

- Phase entire stage construction to minimize disruption of ongoing operations.

- Locate Port related industries to provide rapid movement of material to and from berths, yet location should not interfere with port operations.

- Locate barge canal and basin such that ease of cargo movement may be attained without the barges impacting upon the harbor.

The Master Plan for the year 2000 incorporates the following major features and facilities as illustrated in Figure 6.11:

- Entrance channels, breakwaters and turning area
- Future harbor expansion
- Barge basin and barge and fishing boat canal
- Berths: 4 container, Ro/Ro berths
  7 general cargo
  7 neobulk
  6 special handling
  2 grain
  1 cement
- Buildings: Consolidation shed
  Refrigerated warehouses
  Operations
  Administration
  Customs and Health
  Transit sheds
  Warehouses
  Mechanical maintenance
- Silos: Grain
  Cement
- Power and utilities:
  Power plant and substation
  Desalinization plant
  Water treatment plant, water tanks and pump station
  Bunker and fuel storage
- Support facilities:
  Fire stations
  First aid
  Security
  Port entrance plaza
  Harbor Master
  Marine repair
- Industrial: Foreign Trade Zone
  Industrial area

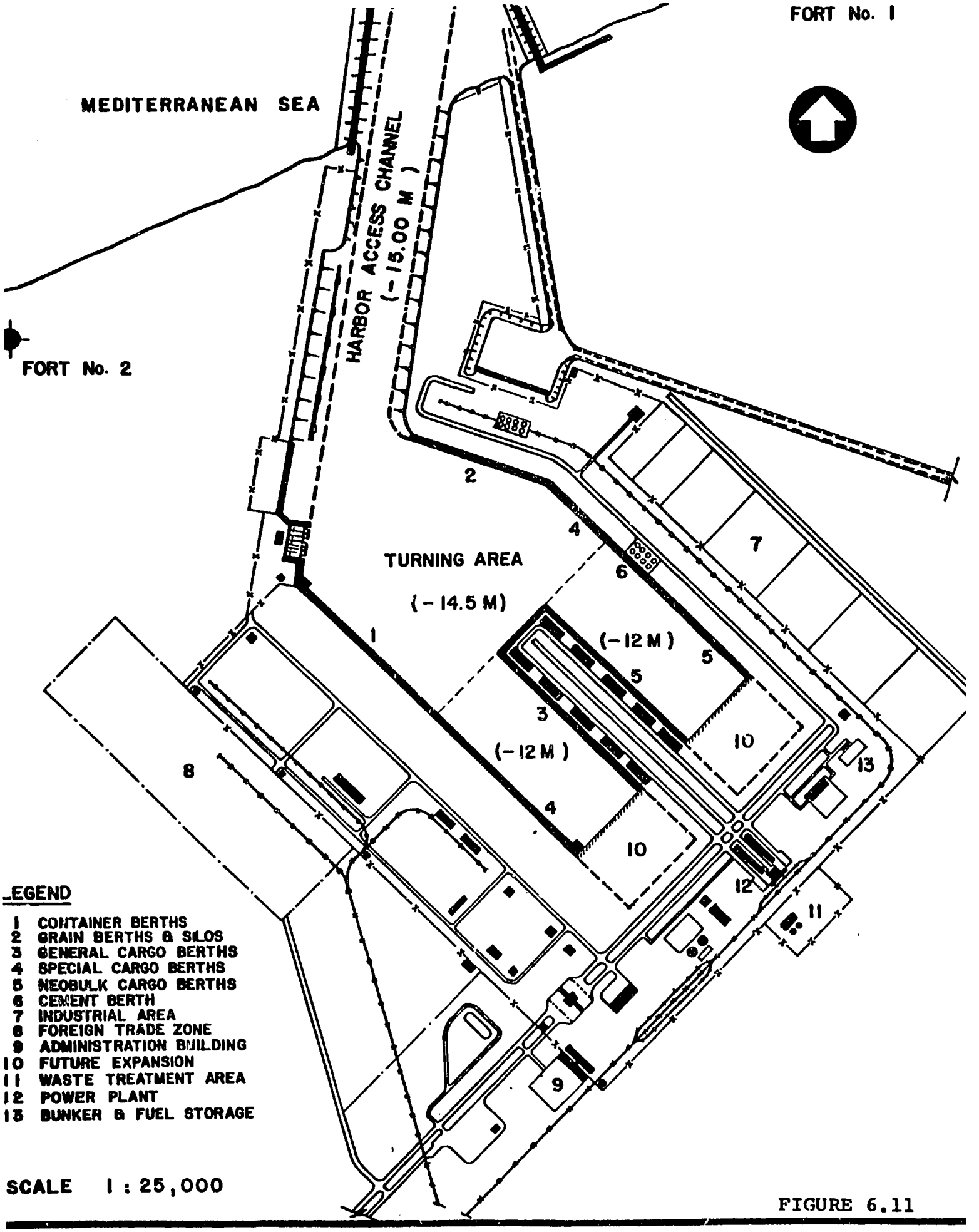

FORT No. 1
MEDITERRANEAN SEA
HARBOR ACCESS CHANNEL
(-15.00 M)
FORT No. 2
TURNING AREA
(-14.5 M)
(-12 M)
(-12 M)
1
2
3
4
5
6
7
8
9
10
11
12
13
LEGEND
1 CONTAINER BERTHS
2 GRAIN BERTHS & SILOS
3 GENERAL CARGO BERTHS
4 SPECIAL CARGO BERTHS
5 NEOBULK CARGO BERTHS
6 CEMENT BERTH
7 INDUSTRIAL AREA
8 FOREIGN TRADE ZONE
9 ADMINISTRATION BUILDING
10 FUTURE EXPANSION
11 WASTE TREATMENT AREA
12 POWER PLANT
13 BUNKER & FUEL STORAGE
SCALE 1 : 25,000

FIGURE 6.11

Special features of the Master Plan are:

- Tug basin has provision for 8 tugs and 10 harbor crafts. Repair facilities provided.

- All Port related industry is placed on the east side of the port to be convenient to the neobulk (raw material) supply berths and the barge canal for potential barge movement of products.

- Container berths and special handling heavy lift berths are adjacent to each other.

- A container and pallet repair facility is placed close to the container area for ease of container repair.

- General administrative functions, i.e. administration, customs, operations, security and first aid are grouped into the southwest corner of the Port complex.

- The Port entrance location keeps transient administrative related traffic out of the cargo handling areas.

- Utility functions, i.e. power generation, water supply, water treatment and oil storage, are grouped near the southern perimeter for ease of utility distribution.

- Mechanical maintenance for Port equipment is located out of the way of cargo movement.

- Grain handling (wheat and corn) are located with direct access to road and rail and to the barge basin.

- A dry bulk berth for loading of cement is located down

wind of the grain facility to prevent contamination of grain from this source.

- General breakbulk cargo and a number of neobulk berths are grouped on the harbor "finger pier" and provided with a mechanized cargo transport corridor that runs the center of the pier.

- Separate rail access has been provided for container movement to minimize railroad - vehicle road crossings within the Port complex.

- The length of the harbor expansion is variable. Additional expansion to that shown on the drawing means the taking of additional agricultural lands.

7.0 ENGINEERING THE PORT

An access channel, approximately 8 kilometers long, would be constructed from the mouth of the Port to the elevation -15 meter offshore contour. The channel would be oriented in a north-northeasterly direction and would intersect the existing shoreline approximately midway between Forts 1 and 2. Breakwaters would provide protection to the navigation channel in the vicinity of the shore.

Alternative breakwater types considered included caisson structures and rubblemound structures armored with concrete cubes, modified cubes, tribars and dolosse. The concrete cube type was found to be most desirable. In order to combat local erosion in the vicinity of the Port, shore protection structures, consisting of interlocking concrete block revetment, were recommended. Additionally, rip-rap slope protection along the periphery of the entrance channels from the coastline into the Port and barge basin would be provided. Harbor resonance does not appear to pose a particular problem for the proposed harbor layout. As a result of poor natural harbor flushing, stringent controls are necessary to preclude dumping or discharge of wastes within the Port.

Several types of berthing structures were studied to assess their inherent merits and feasibility. Conceptual designs were made and relative costs and construction duration factors were estimated for the five alternative structure types found most suitable which included deck-on-piles, heavy sheet pile, concrete block wall, precast concrete caissons and slurry-poured open end concrete caissons. On the basis of a weighted criteriz matrix evaluation, the slurry wall type of construction appears most suitable for the main cargo berths.

Grading of the proposed Port uplands area requires approximately 1.5 meters of fill which would be obtained from the granular material dredged from the access channel and the Port basin area. It is estimated that approximately 21.0 x 10^6 cubic meters of excess material would result.

The Port of Damietta would be served with the following utility systems:

- Fire Protection
- Diesel and Bunker Fuel
- Potable Water
- Sanitary

The Port area would be provided with a fire protection system utilizing salt water drawn from the barge basin. The potable water system would be an independent, self-sustaining system utilizing desalinization units utilizing waste heat from electric power generating gas turbines. The resultant sweet water would be chemically treated to produce a pure potable water.

A self-contained, self-sufficient sanitary system would be designed to collect waste streams generated by the Port and would be treated in a waste treatment plan with digested dewatered effluent sludge utilized as a low grade fertilizer. The treated effluent water would be suitable for irrigation purposes.

The fuel and bunkering systems would provide for power generation requirements, vessel bunker, and oily waste collection systems.

The electric power generating station installed at the Port would utilize as a prime mover either a diesel engine or

a heavy duty industrial type gas turbine. However, the possibility that all electrical power required for the operation of the Port and related activities be drawn from the Egyptian National Electrical Grid should be investigated in the final engineering design. Lighting of large open areas would utilize the high mast system of illumination, using cluster mounting of up to twelve 1000 watt high pressure sodium luminaires atop 30 meter high round tapered steel poles.

Communications between the Port and vessels, and within the Port would utilize VHF radio, VHF or UHF communications system, VHF or UHF personnel radio and a telephone system. An electrical powered fire alarm system would protect all Port facilities.

Aids to navigation would include ocean buoys equipped with radio beacon, radio reflector and lanterns, berth lights and range lights.

8.0 CONSTRUCTING THE PORT

The objective is to make the Port operational as soon as possible. Phased development of the Port and its supporting facilities would be scheduled to meet increasing cargo demand. A proposed engineering design and construction schedule to complete the work is presented in Figure 8.1. It is estimated that if construction starts in 1981, Port capacity would meet cargo throughput demand projections approximately in 1988-1989. Figure 8.3 illustrates phased construction, projected cargo demand and Port capacity for General Cargo to the year 2000.

The Port can be built in three phases:

- Phase I would provide 12 berths for the Port opening in 1985.

- Phase II would provide an additional 9 berths by 1988-1989 at which time Port capacity would have met projected cargo demand.

- Phase III would provide the remaining berths by 1996.

To achieve the planned construction schedule all major work items, dredging, earthfill, breakwater and berth construction would proceed simultaneously. Dredging operations would start in concurrently offshore and inland. An ocean dredger would excavate the offshore access channel and hydraulic and dragline dredges would excavate the inland harbor. The breakwaters would be constructed from land with the stone core placed by barge or land based cranes, followed by placement of secondary and then the primary armor layer by land based equipment.

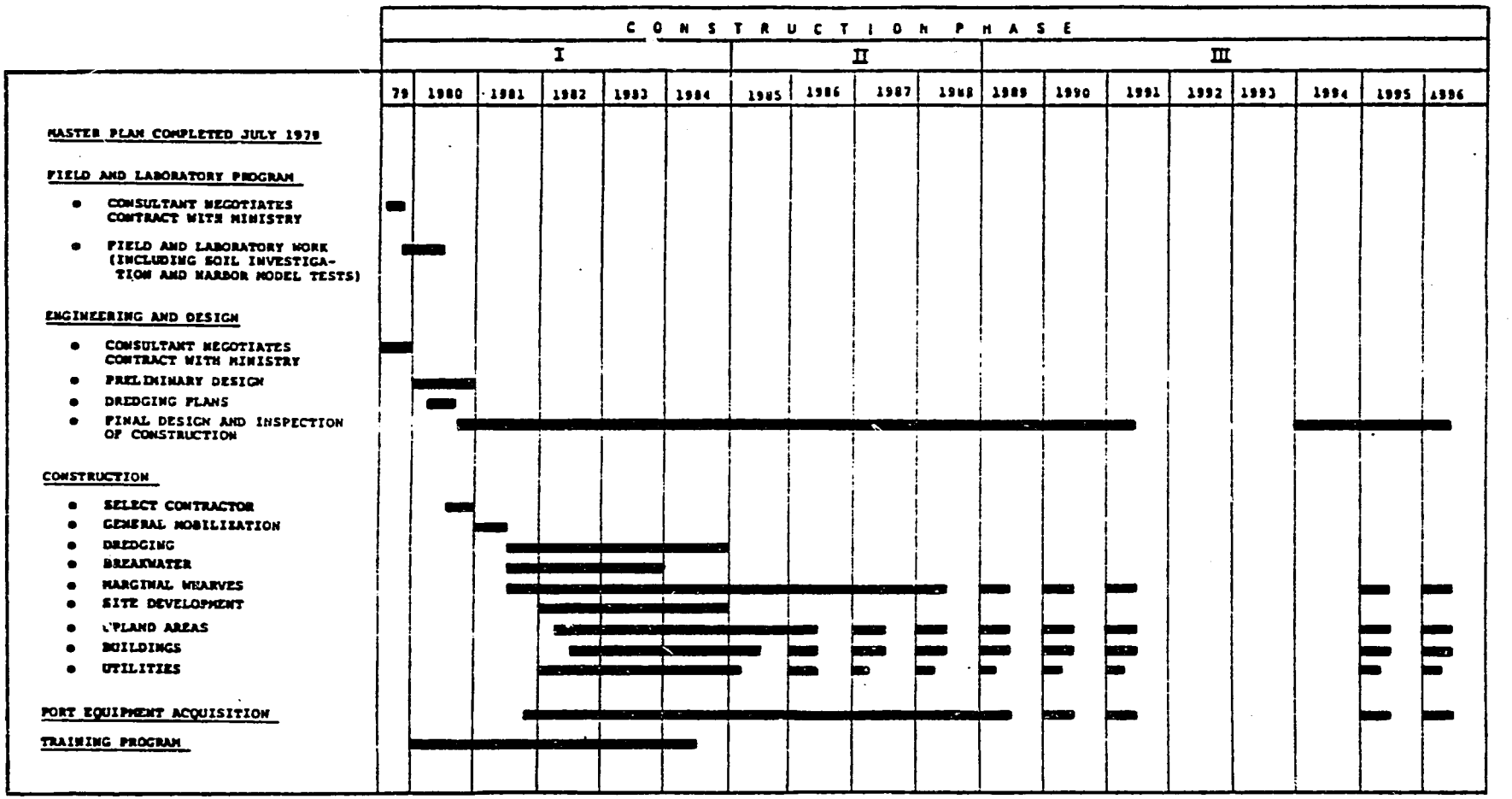


FIGURE 8.1

PORT OF DAMIETTA CONSTRUCTION SCHEDULE

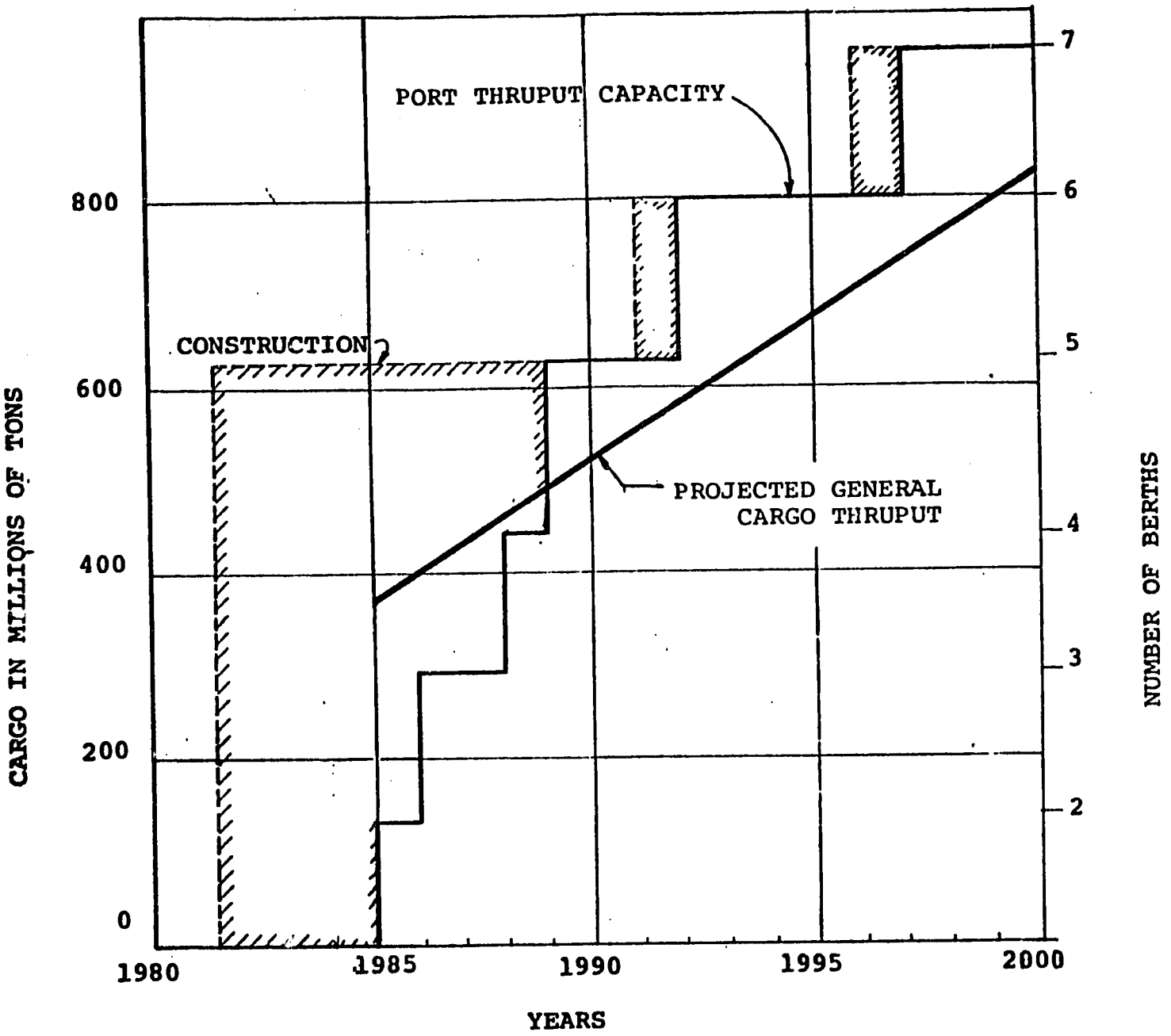


FIGURE 8.3

PHASING OF BERTH REQUIREMENTS
GENERAL CARGO

To take full advantage of the inland harbor location, construction of berthing structure would be accomplished by land based construction methods. Such a method, the slurry poured concrete wall type construction, utilizes a self-contained trenching machine, which travels along rails laid along the length of the foundation wall to be cast, excavates a trench in stages while filling it with bentonite, places a reinforcing steel cage into place and casts wall with tremie concrete. The walls are cast in alternate sections.

A construction material reconnaissance survey indicates that local sources of sand for concrete and fill, gravel, cement, limestone, lumber, gypsum, structural and reinforcing steel are available within distances up to 200 kilometers from the Port site.

The estimated order-of-magnitude 1979 international pricing costs to construct the Port of Damietta is 400 million U.S. Dollars and 83 million L.E. This cost does not include engineering, field surveys, construction management and equipment costs.

9.0 EQUIPPING THE PORT

Port equipment for handling the projected flow of goods is based upon the cargo handling characteristics of the traffic flow over the berths. A schedule of major shoreside and floating equipment and estimated order-of-magnitude costs is provided in the report.

Major land based equipment would include:

- Standard A frame container cranes with 40 tons capacity
- Heavy duty truck mounted cranes of between 150 and 250 tons capacity
- Medium duty truck mounted cranes of 75 tons capacity
- Light duty truck mounted cranes of 20 ton capacity
- Forklift trucks of 10 ton, 5 ton, 3 ton and 2.5 ton capacity
- Stevedore and warehouse pallets
- Heavy duty tractor trailers, flat bed, 20 ton capacity
- Yard tractors and trailers
- Trucks and utility vehicles
- Container handling straddle carriers, side loaders, bridge cranes, forklift toploaders
- Bulk handling bulldozers and front end loaders
- Fire trucks and engines
- Railroad car moving equipment

Major marine floating equipment would include:

- Tugs
- Pilot boats
- Harbor launches

The single most important factor in successful port operation, maintenance of plant and equipment, represents one of the most difficult problems confronting port management. A highly motivated, skilled, well trained and well supervised mechanical force is essential. The ability of the port to meet its required capacities would very largely depend on the performance of the port maintenance force. It is vital that the development and training of a skilled maintenance force be promptly established.

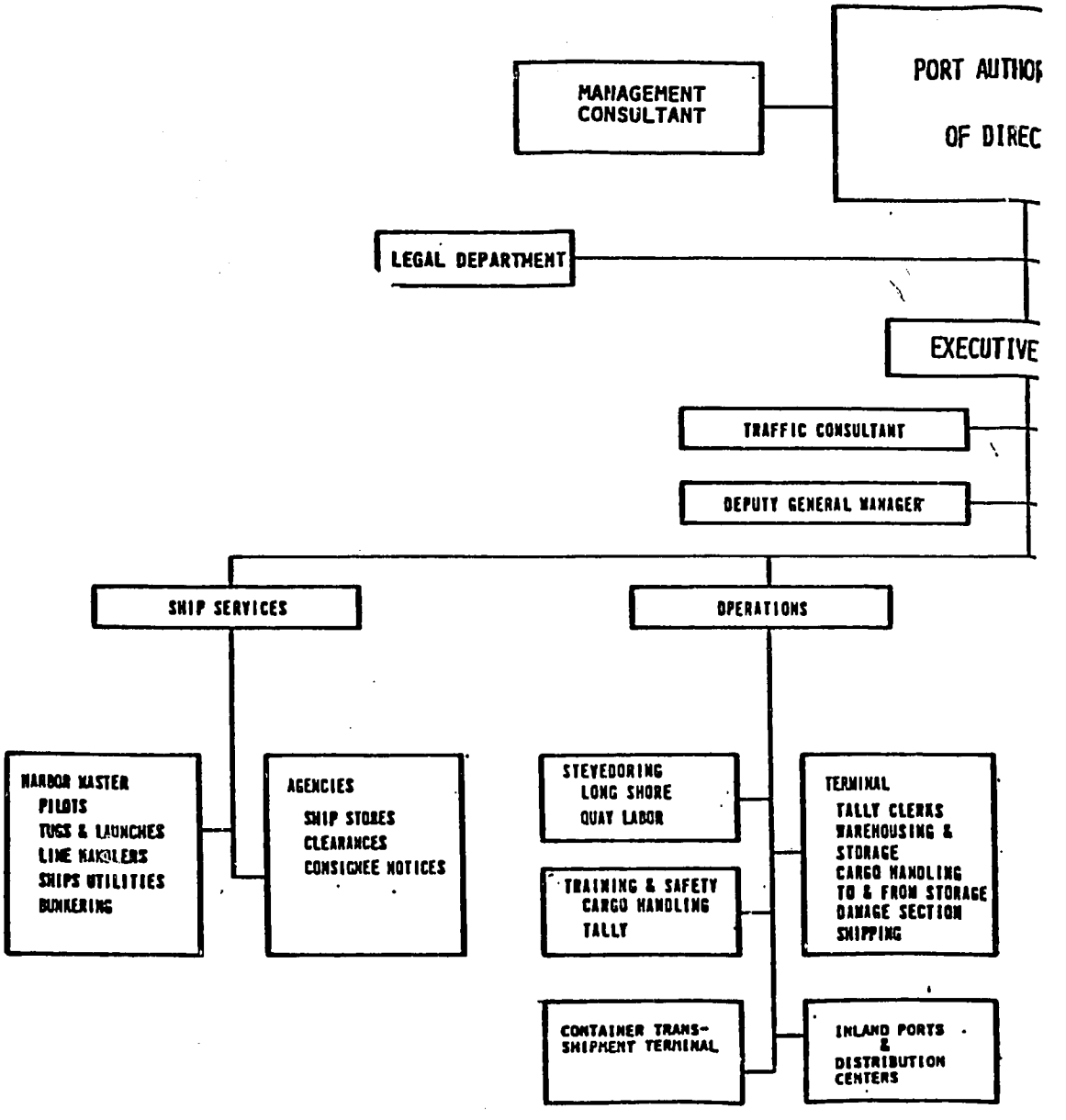
10.0 OPERATING THE PORT

The Master Plan recommends an autonomous Port organization representing a full cross section of National and Governorate interests with a strong management team of experts under the direction of an experienced executive. An administrative organization draft is presented in Figure 10.1.

The Board of Directors would be given broad powers in the matters of Port policy and development of the Port Infrastructure. It would adopt tariff and official regulations of the Port of Damietta and would have available to it such advisors as Consulting Engineers, Management and Development Consultants, Legal Council, Economists and external auditors. The Executive Officer would be directly responsible to the Board and would be charged with administration of the policies adopted by that body.

The Master Plan also recommends the initiation of a computerized Port Traffic Data Collection System to collect and assemble all information about activities within the Port, movements of vessels and their cargoes, and to present this information in such a form that existing operations are benefitted, future planning facilitated and management information provided.

Basic manpower for administration and supervision of the Port is relatively fixed, whereas the number of personnel engaged in the receipt, handling and storage of cargo increases as the throughput volume increases. While many of the skills are available in Egypt, supplementary training is indicated in order to provide a cadre upon which to build the complete organization.


MANAGEMENT CONSULTANT
PORT AUTHO
OF DIREC
LEGAL DEPARTMENT
EXECUTIVE
TRAFFIC CONSULTANT
DEPUTY GENERAL MANAGER
SHIP SERVICES
OPERATIONS
HARBOR MASTER
PILOTS
TUGS & LAUNCHES
LINE HANDLERS
SHIPS UTILITIES
BUNKERING
AGENCIES
SHIP STORES
CLEARANCES
CONSIGNEE NOTICES
STEVEDORING
LONG SHORE
QUAY LABOR
TRAINING & SAFETY
CARGO HANDLING
TALLY
CONTAINER TRANS-
SHIPMENT TERMINAL
TERMINAL
TALLY CLERKS
WAREHOUSING &
STORAGE
CARGO HANDLING
TO & FROM STORAGE
DAMAGE SECTION
SHIPPING
INLAND PORTS
&
DISTRIBUTION
CENTERS

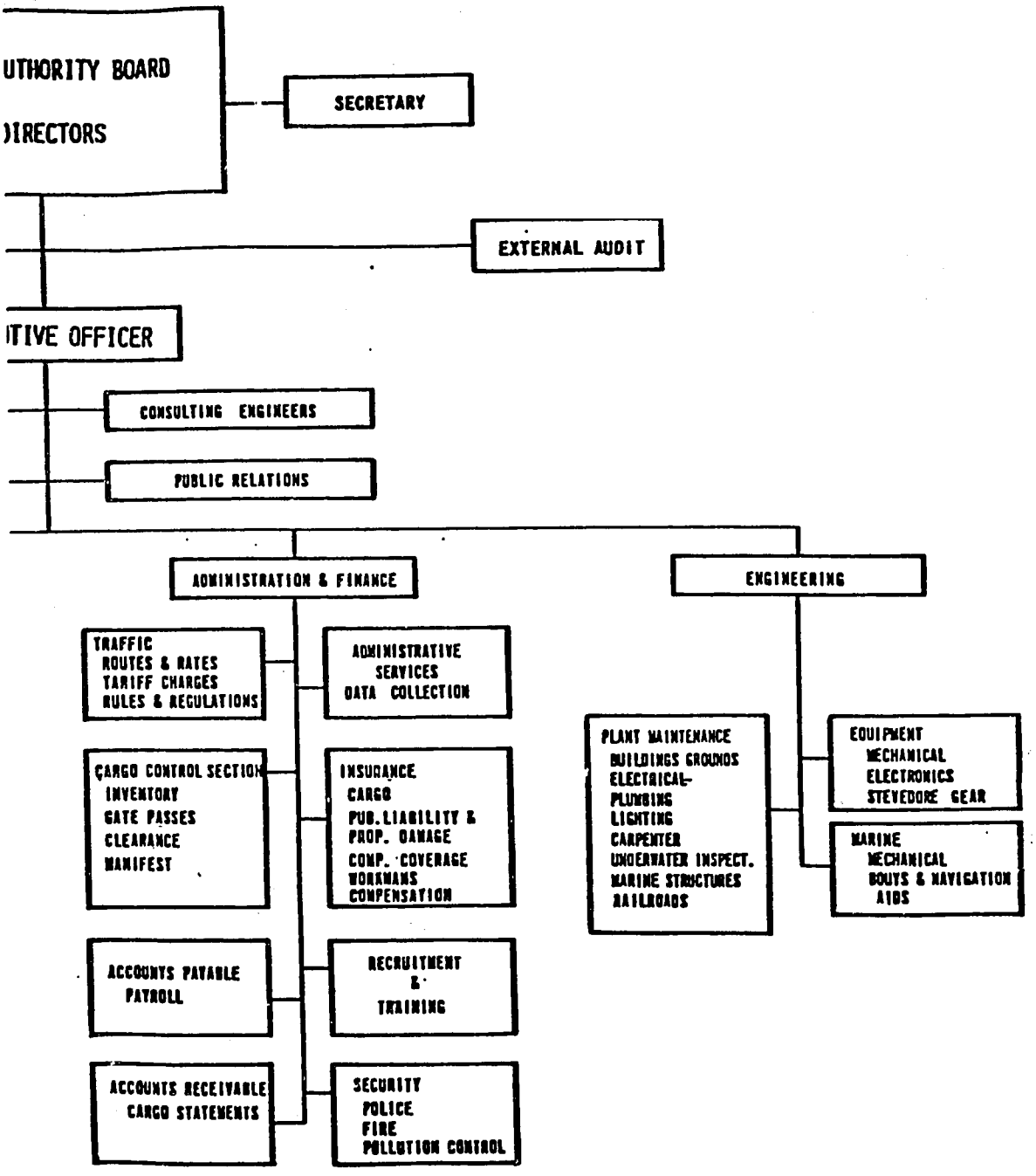


FIGURE 10.1

PROPOSED ORGANIZATION CHART
PORT OF DAMIETTA PORT AUTHORITY

45a

11.0 THE ECONOMICS OF THE PORT

Analysis of the relationship between discounted benefits and costs, of the economic rate of return, as well as of the financial proforma conditions, show the Port of Damietta to be a viable investment in every respect. In arriving to this conclusion the following benefits were examined:

I. Direct Benefits

- Reduced door-to-door transportation costs of Egypt's imports and exports;
- Reduced vessel waiting time in port;
- Reduced holding costs on commodities while waiting;
- Transshipment terminal revenues; and
- Container and running gear maintenance and repair;

II. Selected Developmental Benefits

- Net revenue of the export of fresh vegetables;
- Net revenue of fish cleaning, processing, packaging and freezing;
- Net revenue of container manufacture.

The resulting benefit/cost ratio of the port considering only direct benefit is 2.19 and including developmental benefits is 2.58. The internal rate of return of the port considering direct benefits is 22.97 and with the addition of developmental benefits is 25.52

12.0 INTRODUCTION - INFRASTRUCTURE GUIDELINES

The report analyzes the functional and spatial impact of the Port as it affects the following:

- Expansion of the existing economic activities and the establishment of new Port-related industries
- Development of the regional transportation system
- Development of the Damietta region in terms of employment opportunities and population growth (i.e., demographic redistribution through job-related development)
- Specific regional development guidelines and,
- Selection of a recommended guidelines plan for future regional development with the Port.

13.0 PORT RELATED INDUSTRIAL DEVELOPMENT PROGRAM

The report describes in preliminary terms, the basic characteristics of the industries proposed for the Damietta complex. The industries examined are those identified by research as those existing economic activities which would expand and the new ones that would be established as a direct result of the new center of growth created by a major international seaport located at Damietta. The projected development for each of the different activities of the entire port and industrial complex are detailed in Table 13.13.

The industries that currently occupy an important place in the local economy that can be expected to utilize their existing base to exploit the opportunities to develop new export markets are:

- Vegetables, fruits and related products
- Rice processing
- Timber sawmill, storage and distribution facility
- Fish cleaning, processing, packaging and freezing facility

Siting of the Port at Damietta could attract the following activities:

- Wheat and corn storage and distribution
- Fats and oils, refining, storage and distribution
- Meat imports, sampling, inspection and storage
- Animal feed and fertilizer blending
- Container fabrication

A customs privileged Foreign Trade Zone (FTZ) can take advantage of local labor conditions and infrastructure to

TABLE 13.13

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 2 (M)	ANNUAL CAPACITY (MT)	EMPLOYMENT (NUMBER)	LAND 2 (M)	ANNUAL CAPACITY	EMPLOYMENT (NUMBER)	LAND 2 (M)
1. PORT	6500000	3906	1250000	8500000	5460	12250000	12500000	5675	12250000	16500000	5926	12500000
2. INDUSTRY												
- WHEAT & CORN STORAGE TERMINAL	1904000	472	4800	2592000	457	4800	3388000	502	4800	4192600	548	4800
- FATS & OIL STORAGE TERM.	25000	54	80000	35000	70	80000	60000	125	80000	85000	175	80000
- FISH PROCESSING	10600	87	3600	11600	97	3600	11600	97		11600	97	3600
- MEAT INSPECTION & STORAGE	25000	19	2000	40000	19	2500	55000	28	4100	70000	34	5800
- LUMBER SAWMILL	628200	90	54000	1012000	145	91000	1629000	230	145000	2624400	375	257000
- 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	1371	65000	175000	2153	85000	282000	3460	85000
- CONTAINER MANUFACTURING	*	925	160000	*	2080	250000		3000	360000	*	5900	472000
TOTAL INDUSTRY	2693600	2679	408000	3857100	4651	567700	5395600	6744	772500	7342600	11198	968200
3. FOREIGN TRADE ZONE												
- MANUFACTURING		2000	300000		3275	425000		4550	540000		5470	685000
- TRANSSHIPMENT TERMINAL		1500	81000		2925	114000		5187	144000		5772	185000
TOTAL FTZ	9193600	3500	381000		6200	539000		9737	684000		11242	870000
TOTAL EXPORT BASE	9193600	10085	13039000	12357100	16311	13356700	17895600	22150	13706500	23842600	28366	14338200

* NOT APPLICABLE

transform raw material or intermediate commodities into final consumer goods destined for foreign markets. The promising industrial activities identified, all of which relate to existing or planned activities in the Port area, include furniture, shoes, clothing, leather products, lumber, can fabrication and canning. Another component of the FTZ which offers development potential is a container Transshipment Terminal facility which would include breaking down of containers, packaging or berthing of goods shipped in bulk form and products then reloaded on ships for final destination, without the cost of local customs and taxes being added.

14.0 REGIONAL TRANSPORT

The regional traffic analysis involved the following:

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

- Determination of the future commodity flows between the Port of Damietta and the domestic inland zones followed by modal split and traffic assignment between the different links of the network.

- Determination of the normal traffic growth on the different transportation network links generated by normal social and economic development of the different cities and industrial centers inside the market area of the Port of Damietta.

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

- Determination of the main expansion requirements over periods of time for highways, railways and canals and locks.

- Development of inland ports.

Regional transport linkages are shown in Figure 14.1, main national highway links in Figure 14.7 and main national and waterway links in Figure 14.8.

Comparing required highway capacities with prevailing capacities of the different links, the following expansion requirements were concluded:

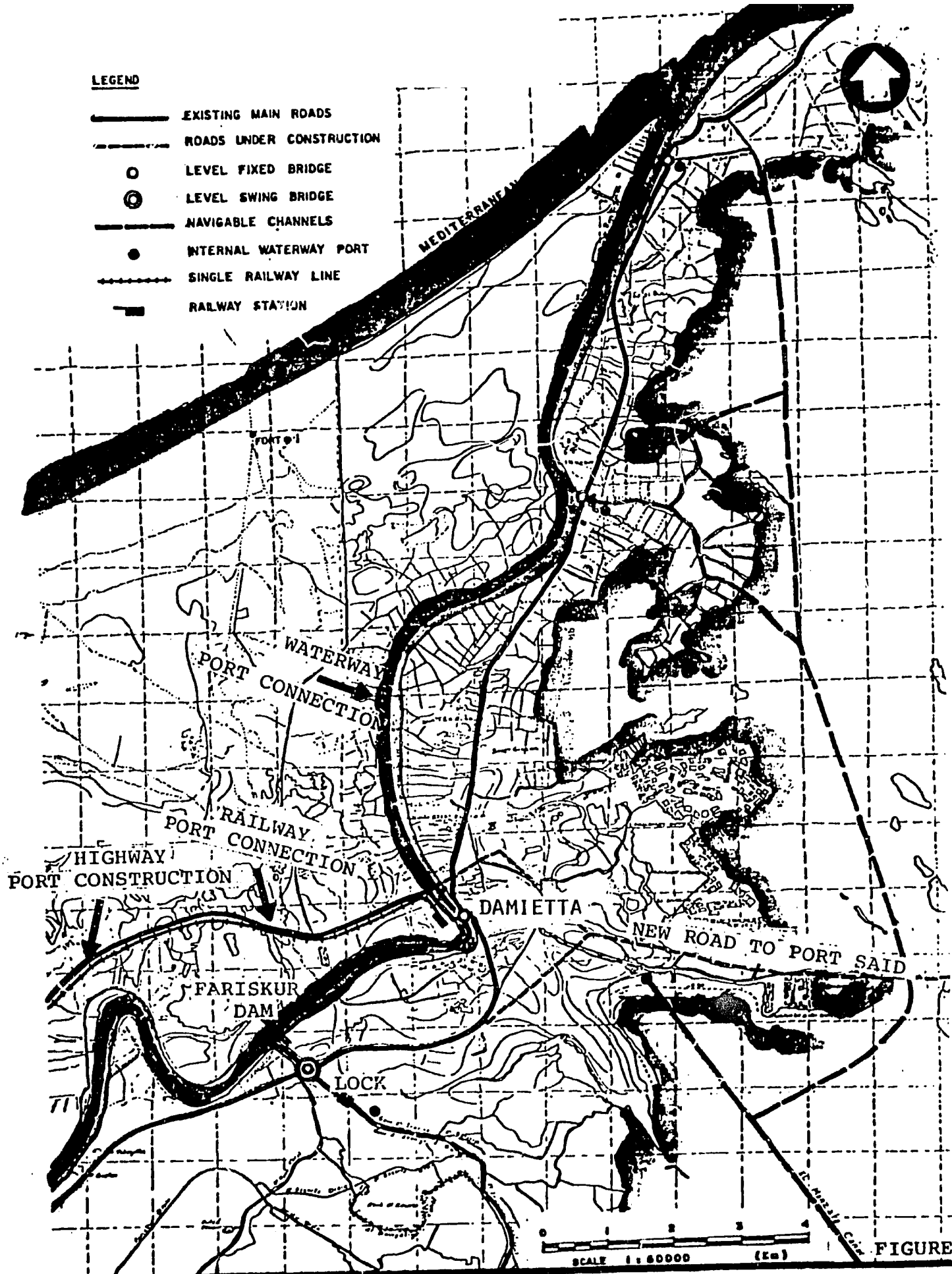


FIGURE 14

REGIONAL TRANSPORT LINKAGES
IN DAMIETTA AREA

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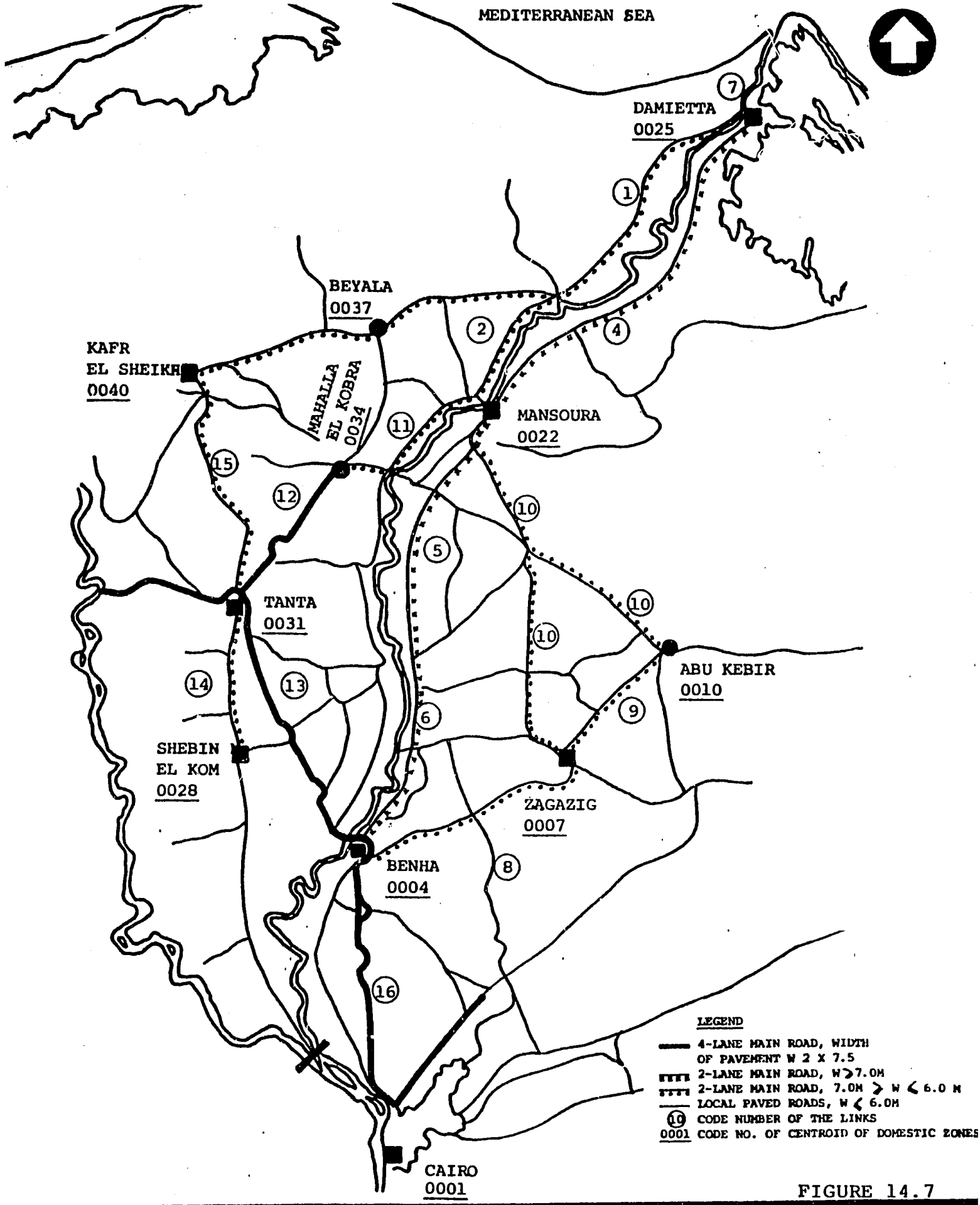

FIGURE 14.7

MAIN NATIONAL HIGHWAY LINKS IN DAMIETTA PORT MARKET AREA

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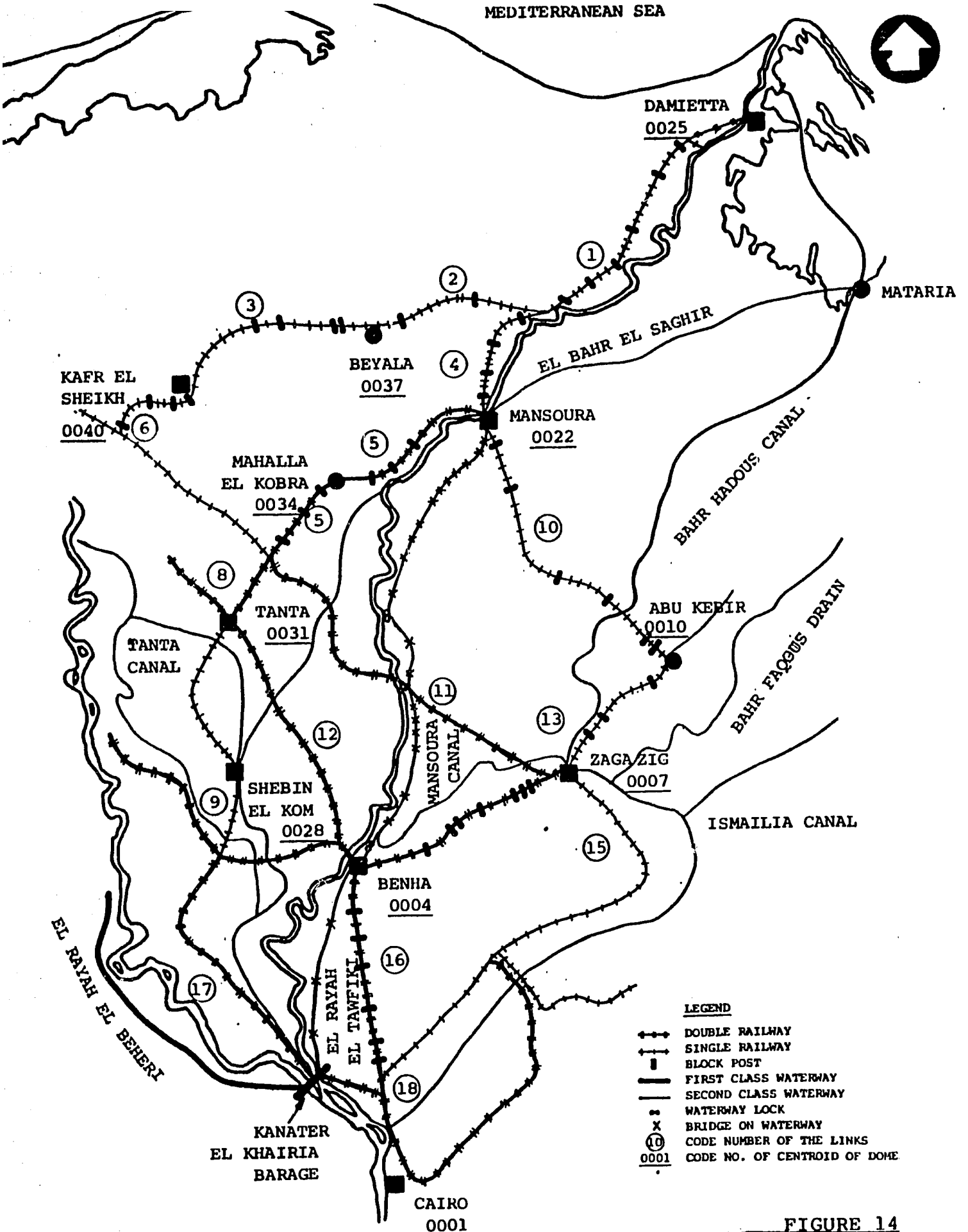

FIGURE 14

MAIN NATIONAL RAILWAY & WATERWAY LINKS IN DAMIETTA PORT MARKET AREA

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For the Year 1985:

- Widen the highway between Damietta and Talkah to a four-lane divided highway

- Widen the highway links, Mansoura-Zefta, Zefta-Benha, Mansoura-Mehalla El Kubra, from two-lane to four-lane divided highways as proposed by the Ministry of Transportation.

- Widen the highway link between Benha and Cairo to a six-lane divided highway by the year 1985 as proposed by the Cairo Entrance Study, carried out by MOHR in 1976.

For the Year 2000:

- Widen the highway links between Mansoura-Zagazig, Sen-billawain-Abu-Kebir from two-lane to four-lane divided highways.

- Widen the highway between Benha and Cairo to a ten-lane corridor as proposed by the Cairo Entrance Study.

The investigation of the total railway line capacity which can be operated on the different lines in the Port of Damietta area results in the following recommendations:

For the year 1985:

No expansion is required for the Damietta-Sherbin-Talkha line. The railway fleet is under capacity and must be increased to cope with the port traffic requirements.

For the Year 2000:

- Increase the capacity of the single railway Damietta-Sherbin-Talkha line by electrifying the signaling system, shortening the block section length to 4.0 kilometers and keeping the lines as single railway lines.

- Increase the Tanta-Benha railway line capacity and electrify the signaling system by a continuation of the existing plans of the Egyptian Railway.

For a more reliable, flexible and economical inland transport system from the Port of Damietta to the domestic zones, especially to the Cairo area and Upper Egypt, the construction of a lock within the plan of the Faraskour new barrage is endorsed.

Regional highway, railway and waterway linkages must be provided to the Port.

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. In order to create an efficient operating container Port, it would be necessary for cooperative planning to match container availability, packing capability, and ship connections with export production. Inland ports would be most expeditiously located so as to satisfy the operating requirements of the port. Figure 14.10 graphically illustrates the concept and potential location of inland ports for the year 2000.

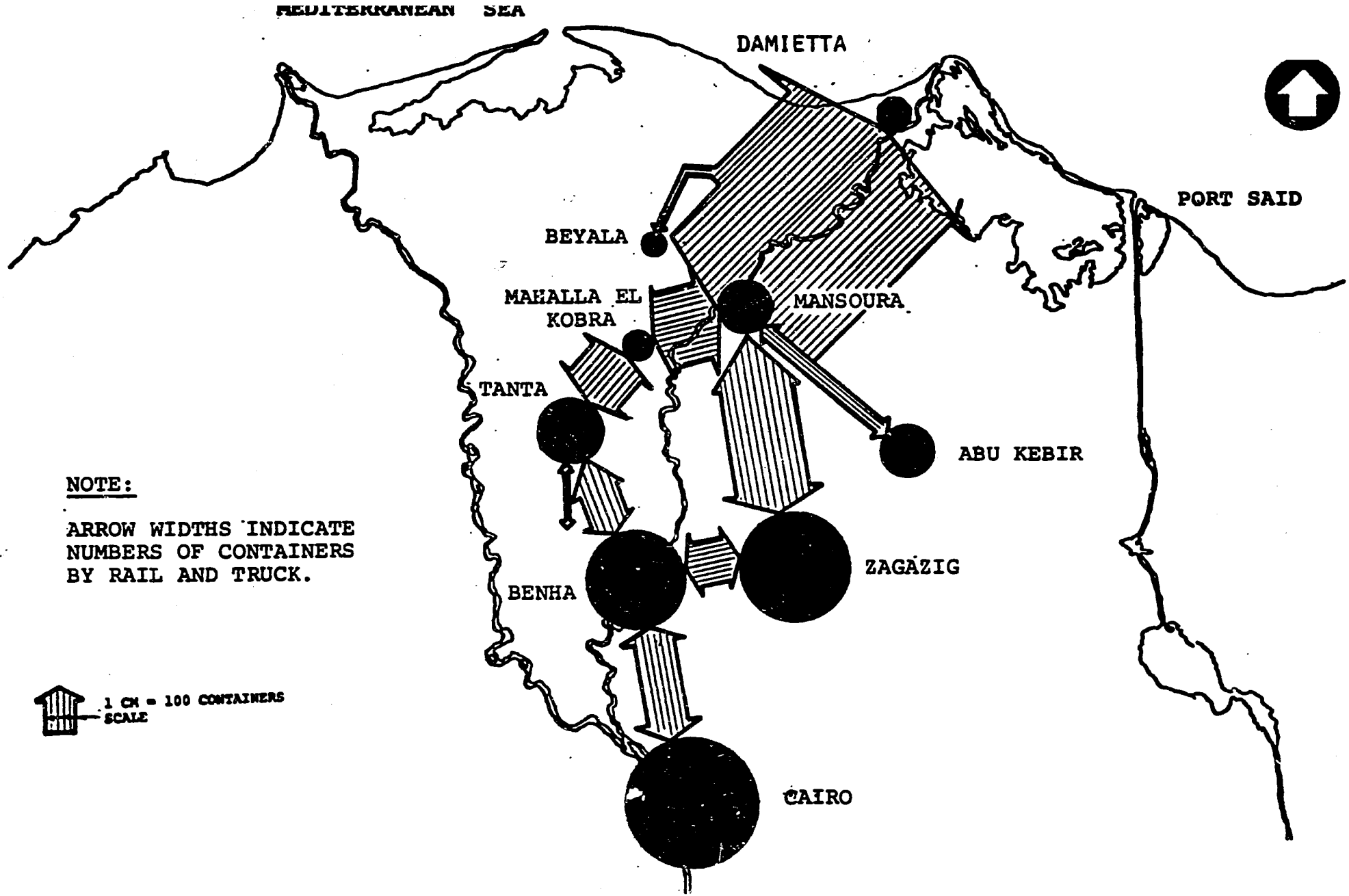

FIGURE 14.10

CONTAINER FLOW(YEAR 2000)
BETWEEN INLAND PORTS

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15.0 REGIONAL EMPLOYMENT AND POPULATION REDISTRIBUTION PROGRAM

A population growth program has been specified for the Damietta Governorate through the year 2000. With development of the Port and related industries, the population of the new urban development would reach 400,000 by year 2000 and the overall population of the Governorate would be around 1,230,000. The results of this population projection analysis are used as the basis for the community development program and the regional development guidelines. A population growth schedule was developed for the Damietta Governorate both with and without the Port through the year 2000. The growth of Damietta's population considered the following elements:

- Baseline population growth that would accrue irrespective of the Port's development.

- Creation of new jobs caused by development of the Port and related industries.

- Migration of population from different governorates attracted by the growing job opportunities.

The migration patterns are graphically illustrated in Figure 15.7. It is expected that starting in 1985 the additional urban population that is induced by the Port and industrial development would be partially or totally absorbed by a new urban area located in the Damietta Governorate. The estimate of excess urban population projections is shown in Table 15.7.

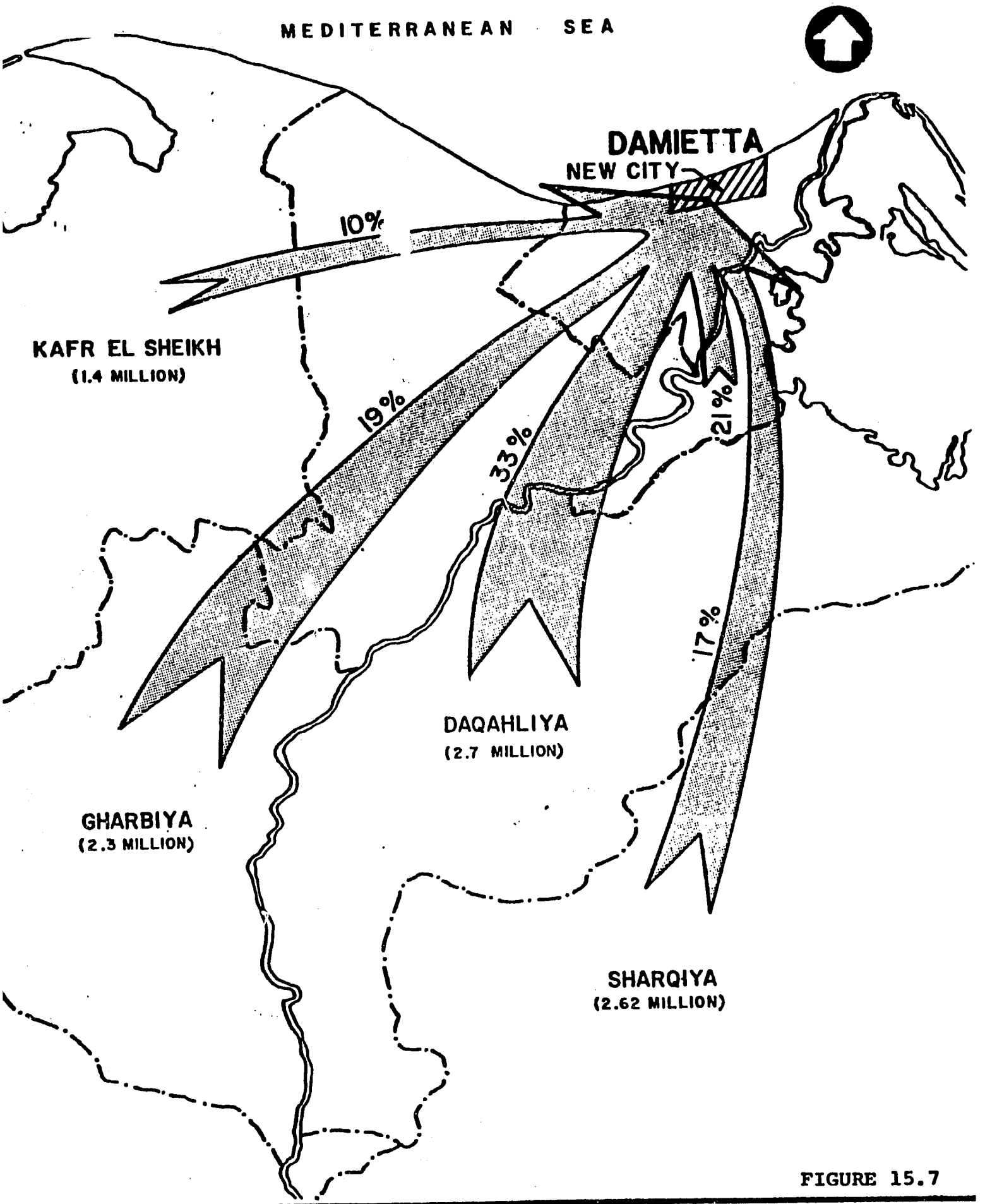

FIGURE 15.7

MIGRATION TRENDS

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TABLE 15.7

TOTAL POPULATION PROJECTION OF
DAMIETTA GOVERNORATE AND NEW DAMIETTA CITY

	1985	1990	1995	2000
INDUCED MANUFACTURING	10,000	16,000	22,000	28,000
TOTAL ACTIVE POPULATION (INDUCED)	25,000	41,000	57,000	74,000
ACTIVITY RATE	40%	35%	32%	32%
INDUCED POPULATION	63,000	118,000	178,000	230,000
EXCESS POPULATION	-	48,000	106,000	213,000
REFINED EXCESS POPULATION		25,000	72,000	169,000
BASELINE POPULATION EST	679,000	752,000	840,000	939,000
TOTAL POPULATION OF NEW DAMIETTA CITY	63,000	143,000	250,000	400,000
TOTAL POPULATION OF DAMIETTA GOVERNORATE WITH DEVELOPMENT	742,000	870,000	982,000	1,230,000

16.0 COMMUNITY DEVELOPMENT PROGRAM

Baseline characteristics and a program for community growth was developed that would accommodate population growth from the evolution of the Port and its related industries. In 1976, the Damietta Governorate contained over 557,000 inhabitants and evidence indicates that the city is attracting migrants from other nearby governorates. Baseline population projections indicate that the population would increase to nearly one million even without development of the Port.

There is an acute shortage of both water supply and electricity in the Governorate, 50 percent supply shortage for water and 40 percent for electricity. Additionally, the one water treatment plant presently serves only 25 percent of the requirements of Damietta City and untreated sewerage is channeled into irrigation canals causing a health hazard. The majority of the population is concentrated in Damietta City, representing 17 percent of the total population and 64 percent of the Governorate. Damietta City cannot expand within its administrative borders because all of the available land has already been developed. Past expansion has consumed fertile agricultural land; if expansion occurs unabated an additional 700 feddans of fertile land would be destroyed by the year 2000.

Construction of the Port would create 25,000 new jobs by 1985 and 74,000 by the year 2000 with a corresponding increase in population of 57,000 and 207,000 respectively. Total urban population of the Damietta Governorate would be approximately 206,000 by 1985 and 740,000 by the year 2000. All future urban development should take place on desert (arid) soil, which is approximately 30 percent of the Governorate's land and much of it on ocean front which is eminently suitable for urban development. The development plan for a new urban

area should also deal with the rehabilitation of the existing city. A "Greater Damietta" plan should be executed which blends the potential of the new with the needs of the old. While the new residential, commercial, manufacturing and transportation areas would be organized around the Port, they must be planned to interface with activities of the existing city to form an integrated metropolitan region. Table 16.6 summarizes the housing, utilities and service requirements for a new Damietta City.

TABLE 16.6

HOUSING, UTILITIES AND SERVICE

REQUIREMENTS FOR NEW DAMIETTA CITY

REQUIREMENTS	1985	1990	1995	2000
POPULATION	63,000	143,000	250,000	399,000
DWELLING UNITS	12,000	27,000	47,000	75,000
WATER SUPPLY (M^3/DAY)	23,000	52,000	90,000	144,000
ELECTRICITY (MW)	10	24	42	66
SEWERAGE (M^3/DAY)	18,000	42,000	72,000	115,000
PRIMARY SCHOOLS	13	28	49	78
PREPARATORY SCHOOLS	7	14	25	39
SECONDARY SCHOOLS	4	8	15	23
HEALTH CENTERS	1	3	5	8
GENERAL HOSPITAL	--	1	2	3
SPECIAL HOSPITAL	1	2	3	5
POLYCLINIC	--	--	1	1

17.0 REGIONAL DEVELOPMENT GUIDELINES

The establishment of a Port at Damietta with an annual throughput capacity of approximately 16.5 million tons in the year 2000, would have an acute and adverse effect on the socio-economic structure of the region unless the spatial distribution of activities is properly planned. The existing elements that would react to the development of the port are:

- Existing regional land uses
- Distribution, size, spacing and hierarchies of urban and rural settlements
- Existing urban spatial patterns and their potential for expansion
- Existing transportation corridors

The induced activities that are expected to exert considerable impact on the Damietta region are the Port, the Industrial Complex, the Foreign Trade Zone, the transportation linkages and the new urban development requirements.

An analysis of potentials and constraints was performed to define in spatial terms the possibilities that exist for development of the Damietta region. Figure 17.1 graphically illustrates these major potentials and constraints.

Among the myriad of possible alternatives for regional development, five configurations were examined in depth. Three of these alternatives are based on the location of the Port between Fort 1 and Fort 2, since the engineering study determined this to be the preferred location and were given further study and evaluation. They are:

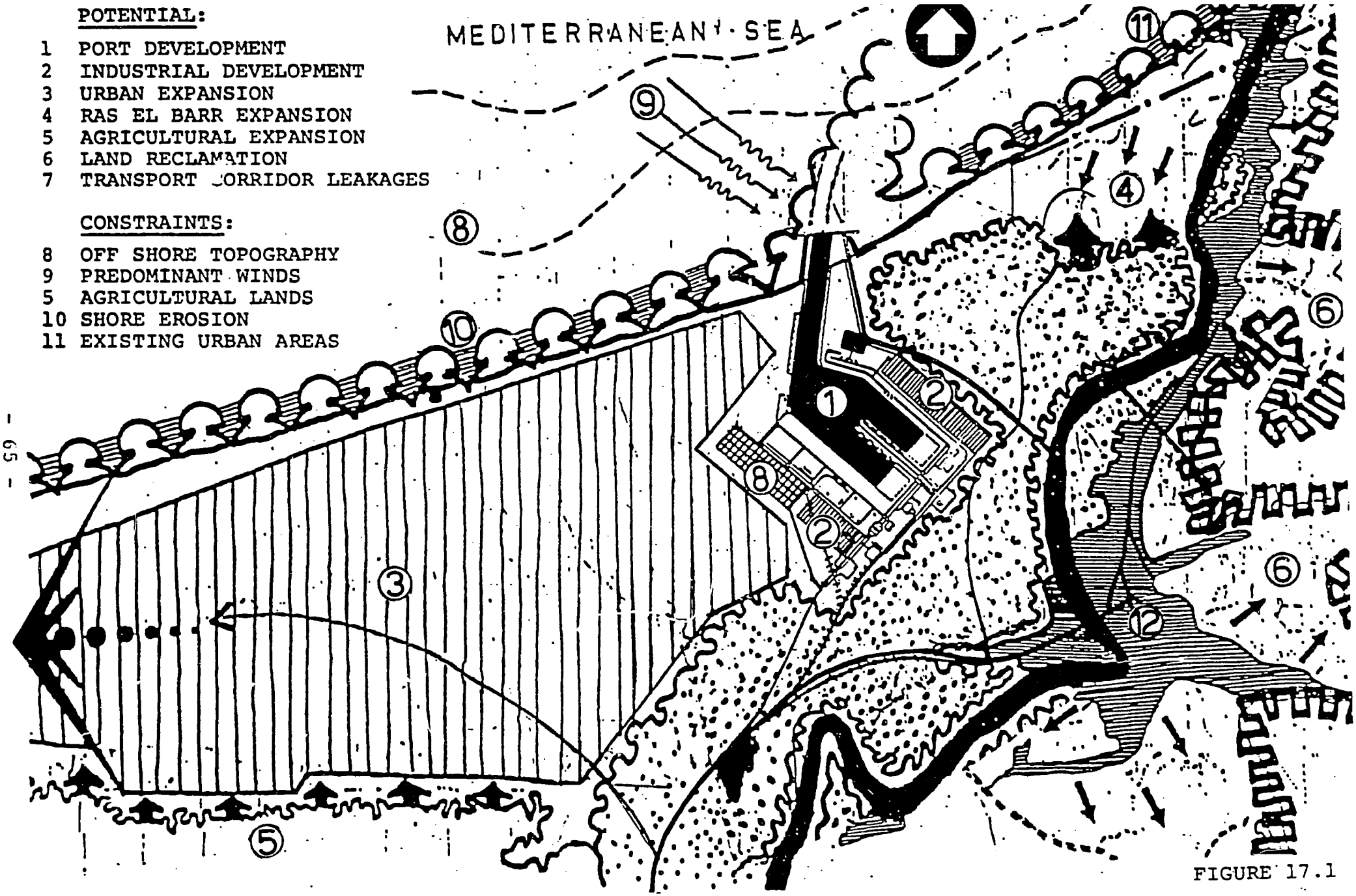


FIGURE 17.1

HARRIS

CONSTRAINTS & POTENTIALS FOR
DAMIETTA REGION DEVELOPMENT

- Sea Corridor: This alternative places the new urban development along a corridor to the west of the Port location and facing the sea.

- Radial Corridor: This alternative links the new urban area to existing Damietta by means of developments extending around the inland base of the Port and calls for limited growth along the sea front, west of the Port.

- Strong Core Center: This alternative limits urban growth to the vicinity of existing Damietta and new urban expansion is along both sides of the Nile up to and encompassing Ras El Barr.

The procedure for evaluating the alternative regional development alternatives involved a two-step process: the establishment of evaluation criteria and the quantitative comparison of the different plans. The evaluation criteria developed:

- Economic criteria to evaluate primarily the monetary aspects.

- Transportation criteria to evaluate potential for separation of different types of traffic, minimization of vehicle trip kilometers generated and the feasibility of the development in terms of its ability to accommodate different transport patterns.

- Environmental and urban planning criteria to evaluate whether the various parts of the development schemes are properly placed in terms of their compatability with surrounding activities.

- Land use criteria to evaluate the effective utilization and functioning of different land uses.

- Social criteria to assess how effectively the alternative plans mitigate against excess density, enhance the positive social traditions of the area and provide equal or balanced opportunities for residents of the development.

- Future expansion criteria to evaluate the ability to accommodate expansion of the Port and all of the new and existing activities surrounding it.

Based on these criteria, evaluation of the three regional development alternatives was carried out and the "sea corridor" alternative best satisfies the selected criteria. Figure 17.5 graphically illustrates this recommended plan.

The most important features of this plan are as follows:

- Establishment of a "Greater Demietta Metropolitan Area" consisting of a new urban zone to be developed on arid land to the west of the Port.

- Extends the area of potential agricultural activity.

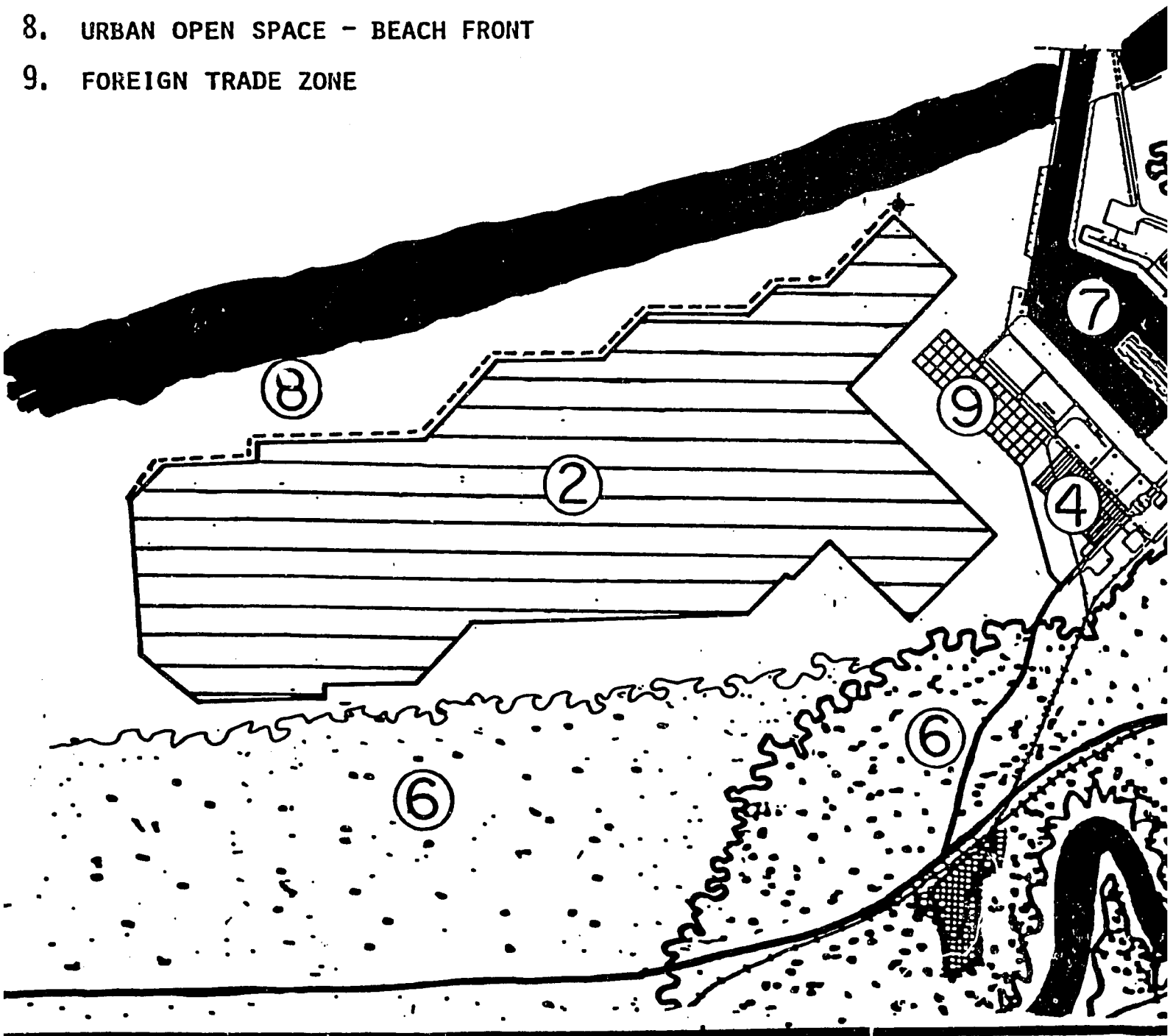
- Accommodates the parallel and interdependent development of the new urban zone to the rehabilitation of old Damietta.

- Places all new urban development out of the pollution zone of the Port and Industrial Complex.

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
9. FOREIGN TRADE ZONE

MEDIT



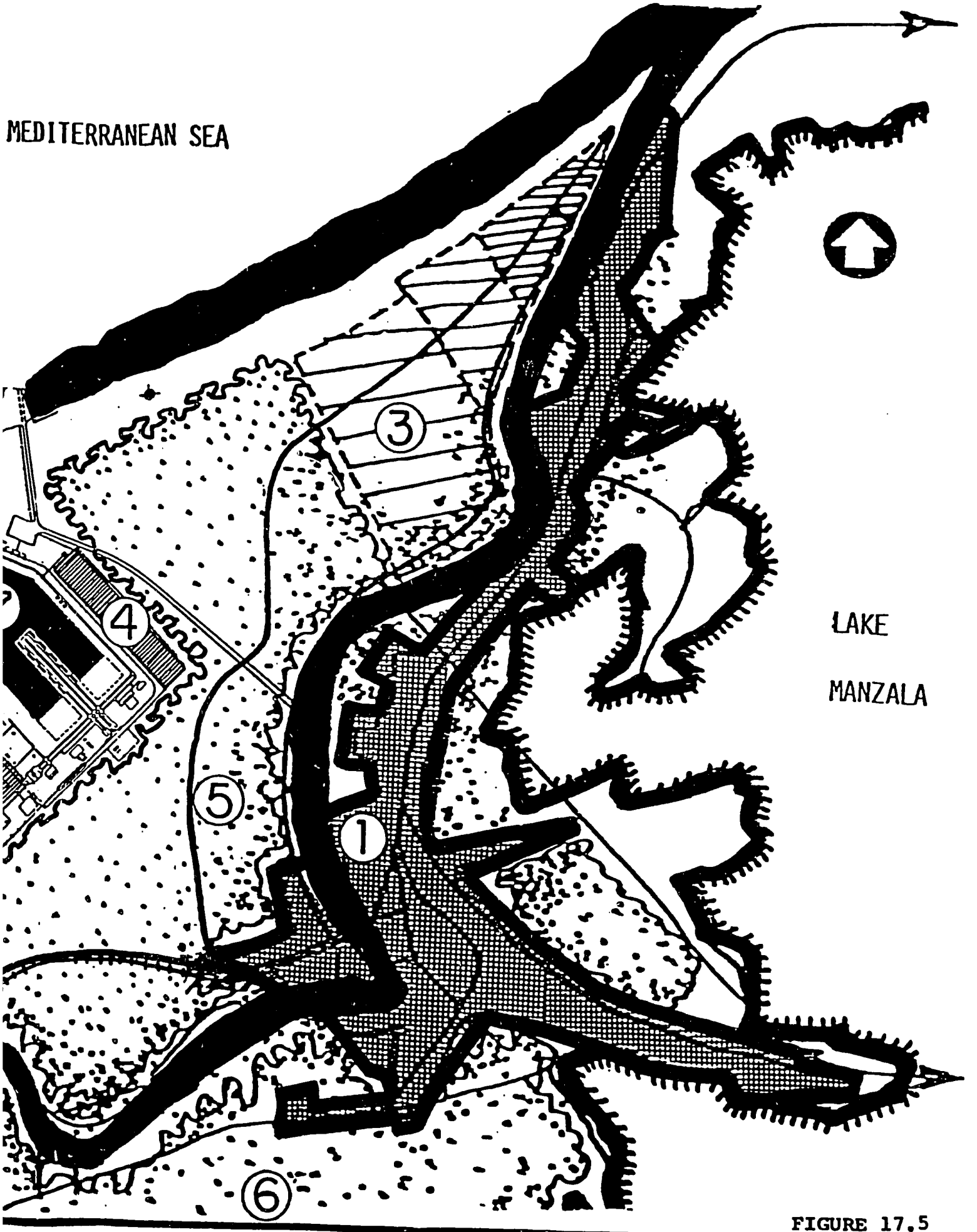


FIGURE 17.5

GREATER DAMIETTA GUIDELINE PLAN

- Minimizes competition among conflicting land uses.
- Places new development on areas of lowest land value, most of which is under government control.
- Places new development along environmentally, recreationally, and aesthetically advantageous sea front.
- Allows maximum expansion of the Ras El Barr summer resort community.
- Provides area for internal open spaces.
- Maximizes expansion potential of Industrial and Foreign Trade Zone area.

D. PRELIMINARY ENVIRONMENTAL ASSESSMEN

The preliminary Envoronmental Assessment is qualitative, appropriate to the level of master planning accomplished, and is oriented toward developing the scope of environmental considerations which should be addressed in subsequent stages of design.

Conclusions:

- Net environmental effects are projected to be positive due to the jobs, income and public revenues which can be generated to support basic waste and environmental management facilities which lack capacity.

- Direct and indirect negative environmental effects would also be produced and include loss of land for alternative uses, slight decreases in air quality southeast of the Port, dust from grain, fertilizer and other bulk cargo handling, disturbance of terrestrial and marine benthic habitat and losses of indeterminate importance of indigenous terrestrial fauna.

- Two types of national plans would, if available, make it easier to evaluate major development projects which have potentially signficant environmental impacts:

  - A general environmental quality control plan;
  - A coastal zone management program.

- The data base for environmental evaluations in the Damietta region is scant. Terrestrial and marine ecology studies are conspicuous by their absence; data on ambient air and water quality, existing biota and historical/cultural conditions are needed.

Offsetting the negative impacts are mitigative measures which are incorporated in the Master Plan.

- Controls on the dredge and fill operations to minimize disturbances to benthic biota and to nourish erosion-prone beaches;

- Containment and control of all dry bulk cargo handling and storage to eliminate dusting and danger of toxic escapes;

- Collection and treatment of all Port and ship-board sanitary wastes, and recycling of treated effluent for agricultural reuse or marine fertilization.

- Collection and treatment of all oily wastes, and recycling of effluent; provision of oil spill containment and cleaning system and an Oil Spill Contingency Plan.

F. DEVELOPMENT AND OPERATION FOR A CONTAINER TRANSSHIPMENT TERMINAL AT THE PORT OF DAMIETTA

The term "transshipment" as it applies to ocean shipping, means 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.

There are two basic transshipment approaches, feeder services and interline arrangements. Feeder systems are the use of smaller vessels (feeder ships) that operate out of a load center port, that deliver and pick up cargo from other ports. The large containerships carry the cargo between load center ports. Interline systems development can be between two or more carriers or within the same steamship company. Containerized cargo is transferred between vessels enroute each serving different world markets.

The benefits derived from transshipment in broad terms are:

- Reduced port-to-port transportation costs.
- Increase capacity of vessel fleet.
- Extend market reach, serve ports not presently served.
- Increase voyage load factor.
- Increase revenue.

Based on the analysis carried out in this study, an integrated transshipment terminal at the Port of Dami ta is operational and economically viable. In 1985, the transshipment terminal would generate between $45 and $53 million in gross revenue to the port.

The report recommends that:

- The Transshipment Terminal be an integrated activity

within the Port of Damietta complex.

- A detail marketing plant and training of a marketing staff for promotion of the concept among intermodal steamship companies that operate on trade routes which pass the port be developed.

- A marketing data base be developed of data elements pertaining to the ocean carrier operators that are potential users of the transshipment service.

- A computer data and communcation system be developed and installed for coordination of vessel and terminal operations and container control.

- Terminal staff, management and labor, be trained with the skills necessary to operate the terminal.

G. PORT OF DAMIETTA WORKSHOP

The Port of Damietta Master Plan and Infrastructure Development Guidelines Study covers complex investment opportunities of critical importance to Egypt. Therefore to ensure the widest possible discussion amongst decision makers and to stimulate the deepest possible construction of dialogue with the Consultant, numerous meetings and presentations were held with government agencies, representatives and officials, a public seminar, held at the submission of the Interim Report April 11, 1979, and a two-day Workshop held on the 11th and 12th of June 1979.

The format of the Workshop was such that the study was broken up into its component parts and was presented in a manner to stimulate discussions. Each part was presented by the Consultant's responsible expert team member. Most certainly, the Port of Damietta Study greatly benefited from the criticisms, advise and direction provided.

The consensus and recommendations arrived at during the Workshop are:

CONSENSUS

- The High Technical Committee agrees with the Consultant on the location of the Port.

- The Governorate of Damietta fully supports the Consultants recommendations on the location of the Port and the city.

- The best location for the new city is to the west of the Port.

RECOMMENDATIONS

- A Damietta Port Authority, with full authority and responsibility to handle all aspects of the Port should be organized.

- A regional Master Plan should be initiated.

- Final design should be initiated immediately if the Port is to be in operation by 1985.