3) Damietta Port

Damietta Port is located 8.5km west of Ras El Bar, Damietta branch of River Nile to the Mediterranean Sea and also 70km west of Port Said Port. Damietta Port started its operation June 26th 1986. Dimension of the entrance channel is 11.3km long, 300m - 250m wide and 15m deep. Two breakwaters protect the entrance channel. The western breakwater is 1,640m long and the eastern breakwater is 738m long.

a) General Information

- Area: 6.2 sq.km (Land area) / 3.1 sq.km (Water area)
- Tide: Two feet above the constant level of the map
- Maximum permissible vessel draft: 12.8m (42feet)

Table 6.4.6 Berth Dimension of Damietta Port

Berth No.	Berth Type	Berth Length	Berth Depth
1-4	Container	4B@250m	14.5m
5-8	General Cargo	4B@200m	12.0m
9-12	General Cargo	4B@225m	12.0m
13-14	Grains	2B@300m	14.5m

Source) "Egyptian Ports Information", March 2000, MOMT & EMDB,

b) Container Terminal

The container terminal is operated by Damietta Container and Cargo Handling Company. There are 4 berths of which total length is 1,050m. Berth depth is maintained at 14.5m while the entrance channel is facing siltation problems.

Potential handling capacity of Damietta Container Terminal is expected to be 0.9 million TEUs, while the terminal throughput decreased to 0.43 million TEUs in 1999 after peaking at 0.61 million TEUs in 1997. Potential capacity is said to be 1.7 million TEUs when converting the existing 4 general cargo berths (No.5-8) into container berths with additional 7 QGCs and 21 RGTs in the future.

c) Grain Terminal

The grain terminal is operated by Damietta General Company for Silos and Strages. There are 2 berths of which length and depth are 300m and 14.5m respectively.

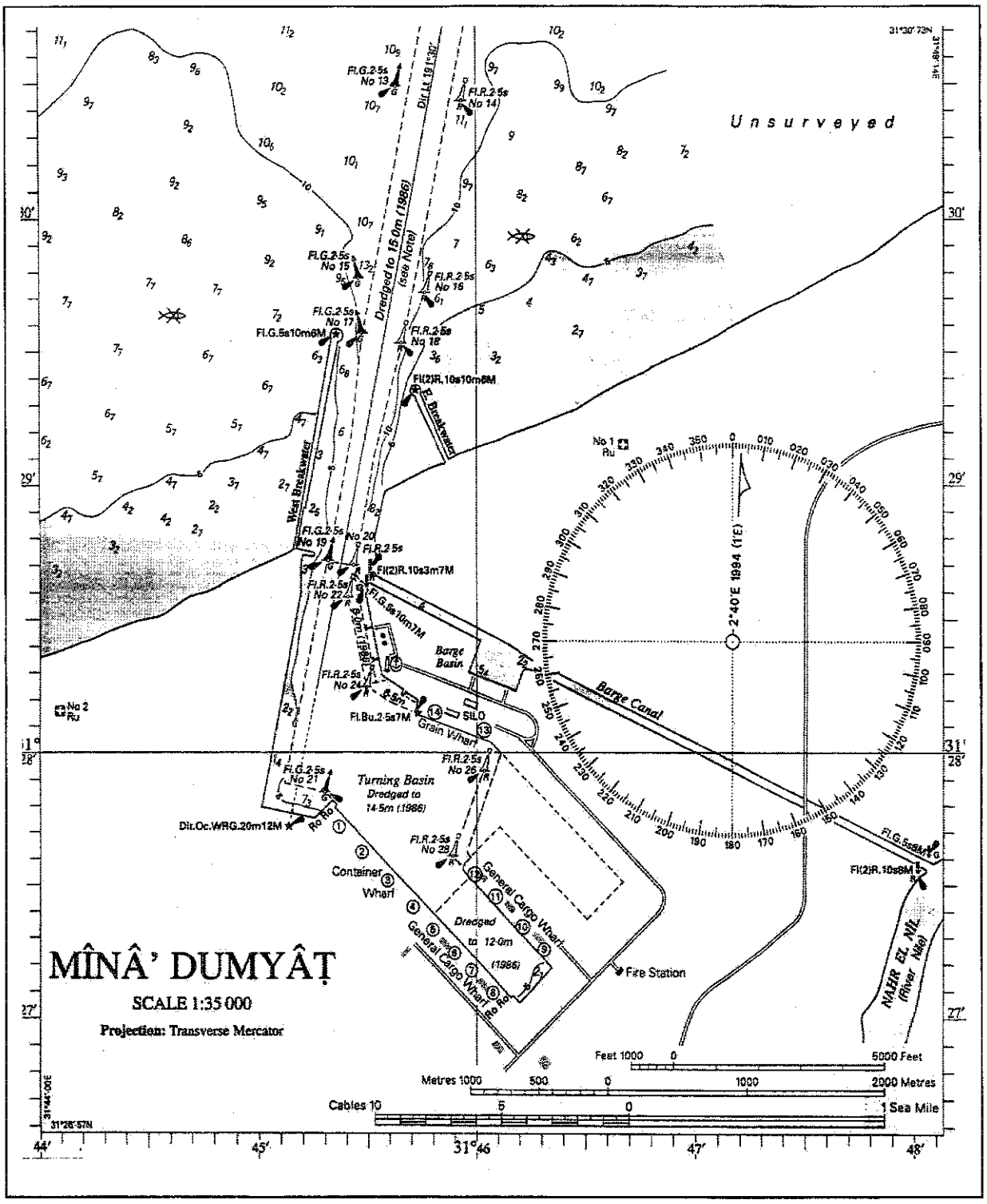


Fig. 6.4.10 General Plan of Damietta Port

Table 6.4.7 Outline of Damietta Port Facilities

1. Container Terminal		
Quay	Berth	4B@(250m length and 14.5m depth)
Terminal	Area	256,000 sq.m (overall: 826,000 sq.m)
	Ground Slot	Approx. 3,400 TEUs
	Reefer Point	96
	QGCs	6 (Outreach:42m, Underspreader:32m, Railspan:15m)
	RTGs	0
	Toplifters	21 (Capacity:40-45 tons for Laden Container) 3 (Capacity:16-25 tons for Empty Container)
	Forklift	4 (Capacity:15 tons for Empty Container)
	Tractors	52 (Capacity: 40-50 tons)
	Trailers	43 (Capacity: 40-55 tons)
2. General Cargo Berth		
Quay	Berth	4B@(200m length and 12.0m depth) 4B@(225m length and 12.0m depth)
Storage	Open Yard	300,000 sq.m
	Shed	5,000 sq.m (5 Sheds)
	Cold Storage	3,000 sq.m (Capacity: 15,000 cb.m, 250,000 tons/year)
3. Grain Terminal		
Quay	Berth	2B@(300m length and 14.5m depth)
Terminal	Unloader	2 Pneumatic (Disch. rate: 700 tons/hour/unloader)
		1 Mechanical (Disch.rate: 1,000 tons/hour/unloader)
	Silo	2 (Capacity: 100,000 tons + 50,000 tons)

Source) Damietta Port Authority

4) Port Said Port

Port Said Port is located at the northern entrance of the Suez Canal. Two breakwaters protect the canal entrance leading to the port. The eastern breakwater is approximately 6.5 km long and the western breakwater is approximately 2.8 km long.

a) General information

- Approach channel: 140m wide, 12.5 to 13.0m deep
- Tide: 70cm
- Maximum permissible vessel draft: 12.8m (42feet)

Table 6.4.8 Berth Dimension of Port Said Port

Berth No.	Berth Type	Berth Length	Berth Depth
15	Petroleum	1B(350m)	3.66m
6, 9, 10	General Cargo	3B(365+295+40m)	8.24m
11	Containers	1B(350m)	12.81m
12-14	Multi-purpose	3B(350+350+250m)	12.81m
7, 8	Grains	2B(530m)	12.81m
1-5, 16, 17	Small Units	7B(1,249mm)	1.83-3.66m

Source) "Egyptian Ports Information", March 2000, MOMT & EMDB, PSPA

b) Container Terminal

The container terminal is operated by Port Said Port Container Handling Company. There are one container berth (No.11) and two multi-purpose berths (No.12 and No.13) mainly used by large mother vessels of which total length and depth are 1,050m and 12.81m respectively. There is also general cargo berth (No.9) of which length and depth are 295m and 8.2m, mainly used by small feeder vessels.

Two additional post-Panamax QGCs have been introduced at the terminal.

Future potential handling capacity with additional new multi-purpose berth of Port Said Container Terminal is expected to be 0.8 million TEUs, while the terminal throughput in 1999 is 0.41 million TEUs.

c) Grain Terminal

The grain terminal is operated by marine shipping companies. There are two grain berths (No.7 and 8) of which total length and depth are 530m and 12.81m respectively.

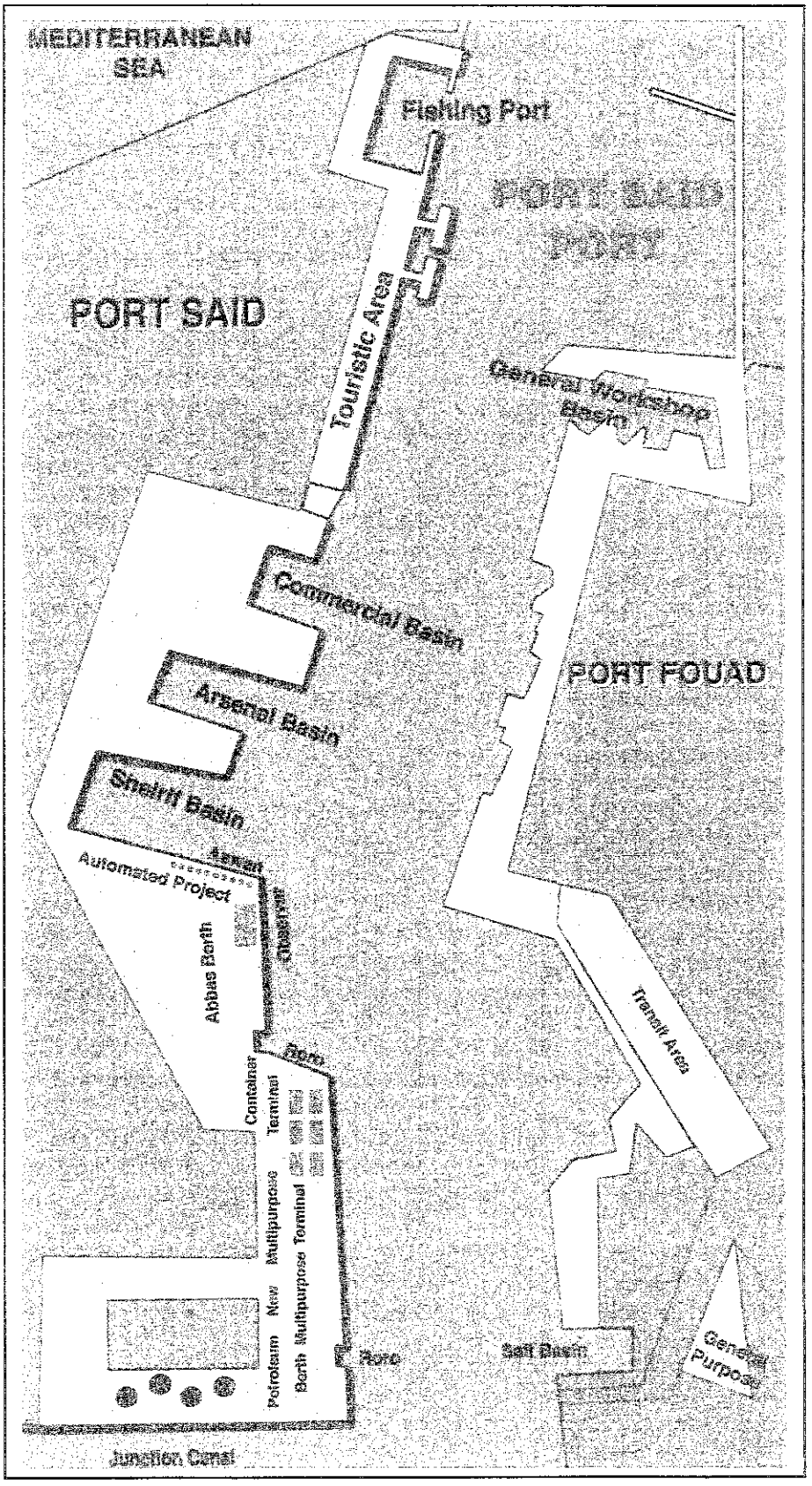


Figure 6.4.11 General Plan of Port Said Port

Table 6.4.9 Outline of Port Said Port Facilities

1. Container Terminal		
Quay	Container	1B(350m length and 12.81m depth)
	Multi-purpose	3B(350+350+250m length and 12.81m depth)
	General	1B(295m length and 8.24m depth)
Terminal	Area	300,000 sq.m (planned to increase up to 450,000 sq.m)
	Ground Slot	Approx.2,300 TEUs
	Reefer Point	100
	QGCs	5 (Panamax:3, Post-Panamax:2)
	Mobile Cranes	2 (Capacity:80-100 tons)
	RTGs	4 (Capacity:32-35 tons)
	Reach Stackers	10 (Capacity:7@42-45 tons + 3@7.5 tons)
	Toplifters	16 (Capacity:12-42 tons)
	Tractors and Semi-Trailers	21
2. Grain Terminal		
Quay	Berth	2B@(265m length and 11.59-12.81m depth)
Terminal	Floating Unloaders	2 (Disch. rate: 16,000 tons/day)
	Silo	2 (Capacity: 43,000 tons)

Source) Port Said Port Authority

5) Suez Port (including Adabeya)

Suez Port is located at the southern end of the Suez Canal.
Adabeya is located at the west coast of Suez Gulf and 10 km southwest of Suez Port.

a) General Information

- Water area: 258km^2 (Suez + Adabeya)
- Land area: 327 thousand m^2 (Suez), 837 thousand m^2 (Adabeya)

Table 6.4.10 Berth Dimension of Suez Port (including Adabeya)

Berth No.	Berth Type	Berth Length	Berth Depth
Suez No.1-4, 6	Passenger	6B(650m)	7.0-7.8m
Suez No. 5, 7-14	General Cargo	9B(1,590m)	5.0-8.0m
AdabeyaNo.1-4,6,8,9	General Cargo	7B(1,370m)	13.0-13.5m
Adabeya No. 10	Cement	1B@100m	10.0m
Adabeya No. 5, 7	Grains	2B(470m)	13.0-13.5m

Source) "Egyptian Ports Information", March 2000, MOMT & EMDB,

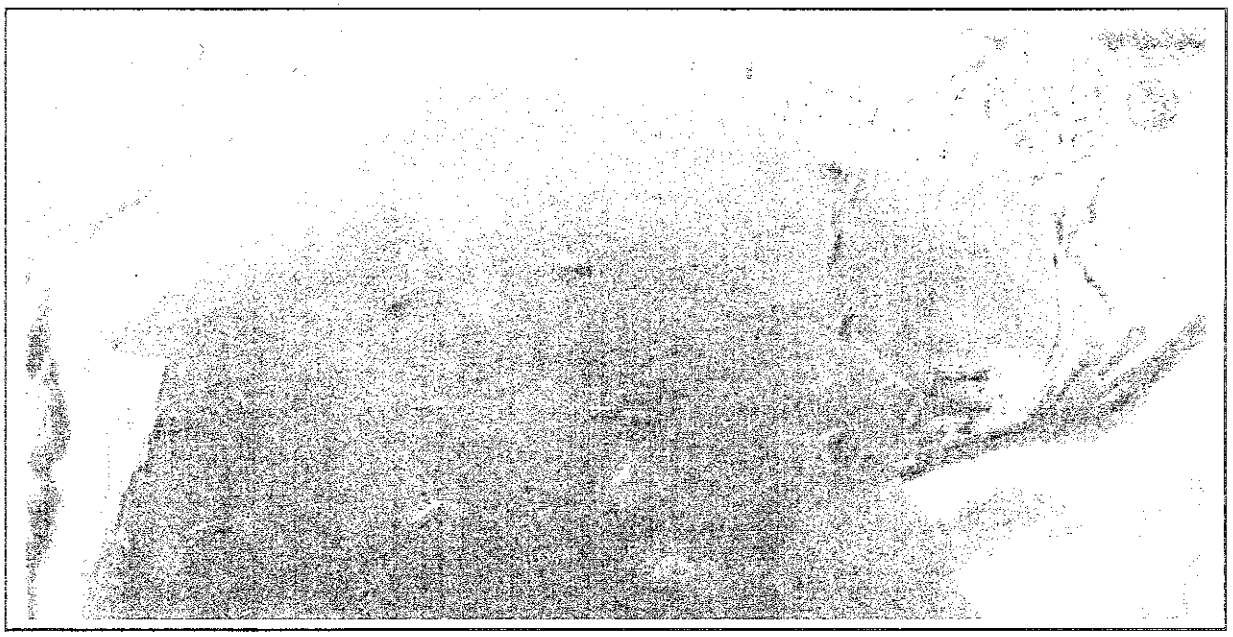


Figure 6.4.12 General Plan of Suez Port

6) Safaga Port

Safaga Port is located at the western coast of the Red Sea and 50 km south of Hurgada. The port is a large inlet (natural gulf) which is sheltered by natural protection from the east and north directions by Safaga Island.

a) General Information

- Land area: 418 thousand m^2

Table 6.4.11 Berth Dimension of Safaga Port

Berth No.	Berth Type	Berth Length	Berth Depth
No.1	Grains	1B(289m)	14m
No.2,3	Passengers	2B(415m)	10m
No.4	Mining	1B(221m)	10m
No. 5	Coal	1B(115m)	8m

Source) "Egyptian Ports Information", March 2000, MOMT & EMDB,

(2) Development Plans of Sea Ports

1) Alexandria Port

The Master Plan and the Short-term Plan for the Greater Alexandria Port were proposed by JICA in 1999 as shown in Table 6.4.12.

Table 6.4.12 Facility Plan of Alexandria Port proposed by JICA

Items of Plans	1st Phase Project (short-term Plan)		Completion (Master Plan)	
Project Period	up to 2007		up to 2017	
Project Cargo Volume of Final Year (thousand tons)	35,722		44,327	
		million LE		million LE
1. Multi-purpose Terminal		443		494
1.1 Infrastructure				
(1) Deep water berth (14m below C.D.)	960m		1,440m	
(2) Open yard	13ha		17ha	
(3) Dedicated access road (700m long) with a fly-over	Development			
1.2 Superstructure				
(1) Warehouses	6,000sq.m		12,000sq.m	
(2) Gate house	Development			
(3) Truck scale	Development			
1.3 Multi-purpose QGC	2 units		2 units	
2. Redevelopment of the existing Grain Terminal at West Zone		118		118
2.1 New berth (14m below C.D.)	270m		270m	
2.2 Grain handling equipment				
(1) Rail-mounted unloader	2 units		2 units	
(2) Belt conveyers	Development			
3. New coal berth at the existing Coal/Coke Terminal	Development	23		23
4. Redevelopment of El-Mahmudia Quay	Development			
5. Deepening of the Inner Harbor Basins	Development			
6. New port road bridge connecting East and Central Zone	Development	10		10
7. Common port facilities	Development	4		4
(1) VTMS	Development			
(2) Waist oil receiving facility	Development			
Grand Total		598		649

Source) "Final Report on Master Plan and Rehabilitation scheme of the Greater Alexandria Port", November 1999, JICA

2) El-Dekheila Port

The major existing development proposals of El-Dekheila Port up to the year 2017 are shown in Table 6.4.13.

Table 6.4.13 Major Existing Development Proposals of El-Dekheila Port

Facilities	Description	Situation
1. General Cargo Berth No.94/3, 94/4	Depth: 12.0m, Length: 500m	Under construction
2. Ro-Ro Berth No.99, 95/1	Depth: 12.0m, Length: 130m+50m	Under construction
3. Timber Berth No.98-2	Depth: 12.0m, Length: 270m	Under construction
4. Marine Service Jetty (No.101)	For tugs, pilot launches and mooring launches with draft of 6.0m	Under construction
5. Extension of existing Mineral Berth No.90-1	Depth: 24.0m, Length: 300m, to accommodate 250,000 DWT-size vessel	Plan
6. Extension of existing Mineral Berth No.90-2	Depth: 20.0m, Length: 600m	Plan
7. Dry Bulk and Chemical Berth (Location unknown)	Depth: 12.0m, Length: 940m for Bulk, Length: 200m for Chemical, Capacity for both berth: 3.6 million tons	Plan
8. Dangerous Cargo Berth (Location unknown)	Depth: 11.0m, Length: 1,400m, Capacity: 1.0 million tons	Plan
9. Road and yard pavement	Roads: 1.0 million sq.m Yard extension: 48,000 sq.m	Plan
10. Breakwater	Additional breakwater, renewing the existing one	Under study

Source) "Egyptian Ports Information", March 2000, MOMT & EMDB,
"Final Report on Master Plan and Rehabilitation scheme of the Greater Alexandria Port", November 1999, JICA

3) Damietta Port

The development plans of Damietta Port up to the year 2017 are shown in Table 6.4.14. New multi-purpose berths of which total length is 550m is under construction.

Table 6.4.14 Suggested Five Year Plan up to 2017 of Damietta Port

(Unit: 1,000 LE)

Item Project & Investment Operation	01/02 from 4th Plan (97-2002)	5th Plan 02/03-06/07	6th Plan 07/08-11/12	7th Plan 12/13-16/17	Total
Replacement & renew 1238 projec t renew infrastructure & services					
Buying lands outside the fence of the port 505 feddans (=212ha) for new oil project	20,000	50,000	-	-	70,000
Support infrastructure network	1,500	7,500	8,000	5,000	22,000
Electric generation station	-	-	14,000	4,000	18,000
Building for administrative	-	-	-	3,000	3,000
Deepening navigation channel and connecting channel	5,000	25,000	25,000	30,000	85,000
Supporting breakwater	-	2,500	2,500	5,000	10,000
Setting up by-pass on navigation channel	-	-	-	10,000	10,000
Setting up gates east side	-	-	-	2,000	2,000
Setting up pollution purifying station	-	-	-	5,000	5,000
Importation lorries	450	2,000	2,000	2,750	7,200
Importation bus & mini-bus	150	850	900	2,000	3,900
Importation technical & fire equipment	100	500	500	3,000	4,100
Importation machines & tools	160	1,000	1,000	2,000	4,160
Furniture	50	300	300	500	1,150
Cost of postponed revenue	-	100	120	-	220
Total of the 1238 project	27,410	89,750	54,320	74,250	245,730
1239 project renew marine & other equipment					
Tugs & launches	-	16,000	17,000	30,000	63,000
Assistant services unit	-	-	-	20,000	20,000
Fire equipment	500	-	1,500	-	2,000
Buses & mini-buses	400	850	900	1,000	3,150
Machines & equipment	100	550	600	750	2,000
Tools & equipment	100	550	600	750	2,000
Furniture for office	100	500	500	750	1,850
Total of the 1239 project	1,200	18,450	21,100	53,250	94,000
Widening & renew 3240 project construction new berth, etc.					
Storages and areas	-	10,000	12,000	14,000	36,000
New berths	42,000	200,000	160,000	300,000	702,000
Construction of new berth length 400m depth 15m for exporting gas	Studies2,000 -	- 80,000	- -	- -	2,000 80,000
Deepening of container berth and grain berth length 1,650m	1,000	-	-	-	1,000
Turning basin 14.5-15.0m	-	20,000	-	-	20,000
Total of the 3240 project	45,000	310,000	172,000	314,000	841,000
Grand total	73,610	418,200	247,420	441,500	1,180,730

Source) Damietta Port Authority

4) Port Said Port

The development plan of Port Said Port is shown in Table 6.4.15.

Table 6.4.15 Suggested Five Year Plan up to 2017 of Port Said Port

(Unit: 1,000 LE)

Item	up to 2007	up to 2012
Development of Arish Port	334	
Development of Tourist Port	20,700	
Deepening basins: Sherif Basin	29,840	
Arsinal Basin	10,250	
Garbage Burner	575	
Administrative and Workshop Bild.	5,103	
Trucks and Winches	2,007	
Different Machines & Tools	7,157	1,655
Furniture	1,754	345
Renewing and Replacing:	5,313	247
Total	83,033	2,247

Source) Port Said Port Authority

5) East Port Said Port

a) Aim of the Project

Aim of the East Port Said Port Project is as follows:

- Serves the Industrial Free Zone under the general policy of the country for the development of Sinai.
- Turning Port Said area into an international center for trade, transit, storage and distribution.
- Integration with the hub ports in the Arabic Area: Jebel Ali - Salalah - Aden - Jeddah
- Strengthening the role of the Suez Canal for the purpose of attracting the international maritime lines so as to transfer container market into a multi-modal transport through the adjacent countries and ports on the Mediterranean Sea.
- Attracting a larger share of the transit containers from the competing ports in the area such as: Jiatauro - Limasol - Malta.

b) Outline of the project

First phase of the project is shown in Table 6.4.16. In the second phase, total length and width of container quay and total area will be 2,400m, 500m and 1.2 million sq.m. respectively. In following phases, total length of container quay wall will be 7,000m, and total length of other quay wall at the northern and southern basins will be 4,800m. Total project investment will amount to 480 million USD.

Table 6.4.16 First Phase of East Port Said Port Project

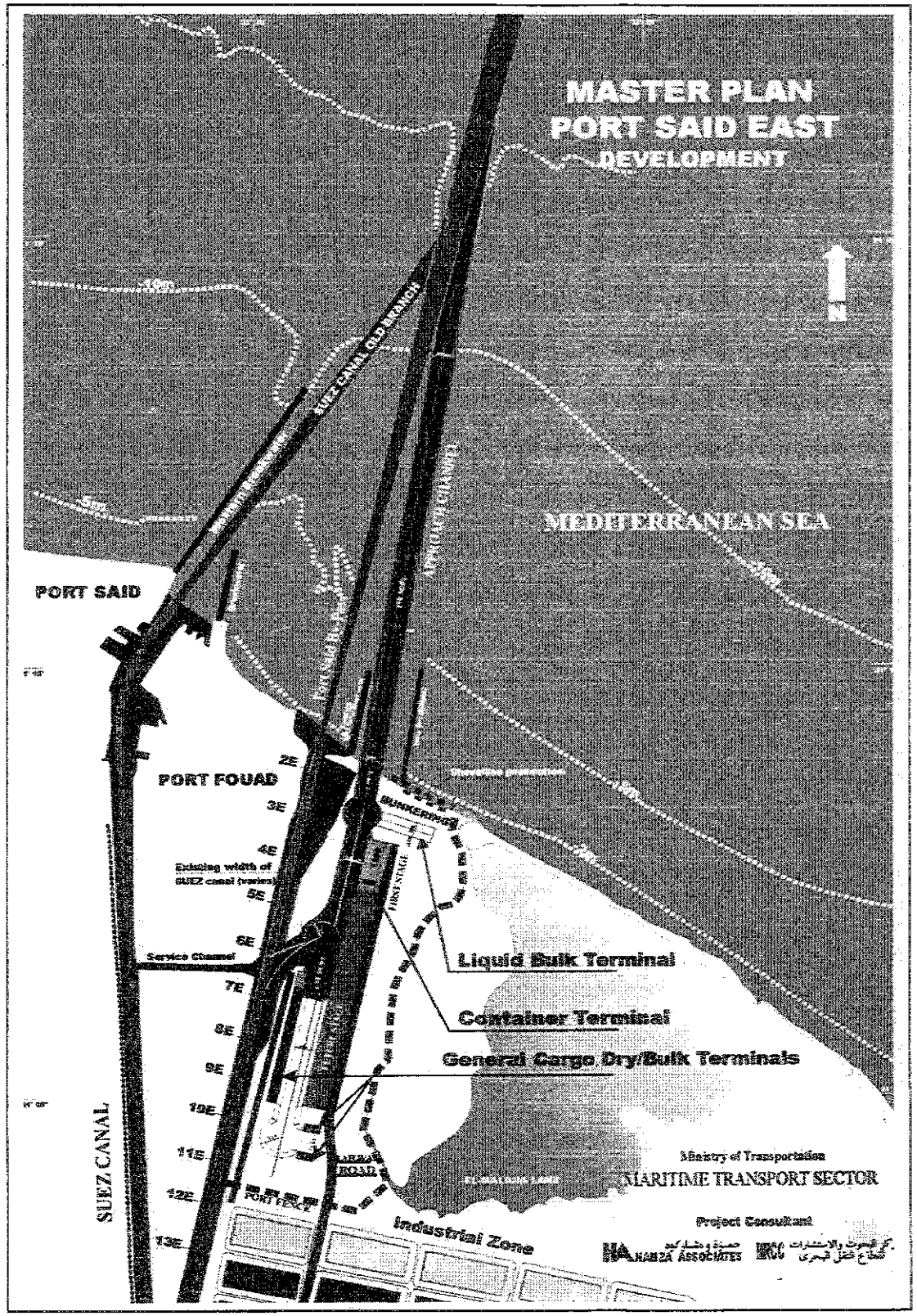
Item	Content
1.Access channel from the sea	Length 13km, depth 18.5m, width 250m at the bottom, slope 15:1 Contractor: Port Said Dredging Contractors, a consortium of Jan De Nul (Belgium), Ballast Nedam (Netherlands), Boskalis (Netherlands) and Hyundai (Korea) Target of dredging works: 97.2 million cub.m (Contractor:85.2, SCA:12) Executed up to 25/3/2000: 56.4 million cub.m. (Average monthly rate: 5 million cub.m)
2.Eastern breakwater	Length of 2,300m, Contractor: Port Said Dredging Contractors
3.Inland access channel	Length 3.8km, depth 16.5m, width 250m at the bottom, slope of 4:1.
4.Channel connecting with the Suez Canal By-pass	
5.Container terminal quay wall	Length 1,200m, depth 16.5m for receiving container ships of length 350m, width 50m and depth 15m, also general cargo ships of length 270m and depth 15m. Of the fifth generation carrying up to 6,000 TEUs and of generations currently under production carrying up to 9,000 TEUs. Contractor: Rodio Company (Italy) with Arabian International Company (Egypt) Executing period: Aug. 1999 - Dec.2000
6.Container terminal yard	Length 1,200m, width 500m, total area 0.6 million sq.m.

Source) Port Said Port Authority

c) Preparing, Operating and Managing of the Container Terminal

Preparing, Operating and Managing of the Container Terminal will be done under a BOT scheme with period of privilege of 30 years. Opening of the terminal is expected with handling rate of 0.6 million TEUs with 5 QGCs. The handling rate will increase to 1.7 million TEUs in 2007. Composition of capital of the BOT company is as follows:

60% Suez Canal Container Co. (a national company)
30% European Container Company ECT (Dutch), 30% Maersk (Danish)
40% Suez Canal Container Handling Co. (a national company)
5% Suez Canal Authority, 5% The National Bank, 30% Private Investors



Source) PSPA

Figure 6.4.13 Master Plan of East Port Said Port

6.5 IWT Cargo Handling at Major River Ports and Sea Ports

6.5.1 Cargo Handling at Major River Ports

(1) Cargoes

The commodities handled at each river port are shown in Table 6.5.1. Inbound commodities are mostly raw materials for the factories such as limestone, phosphate, coal, petroleum and sugar canes. Outbound commodities are raw materials and industrial products of the factories such as petroleum products, aluminum and coke. The handling cargo volume at each river port is shown in Table 6.5.2. The areas where large volumes of cargoes are handled are Deshna, Samallot, El Tebbin, El Hawamdiya and Nekla.

(2) Cargo Handling Methods

As mentioned in Section 6.4.1, the most suitable cargo handling equipment is selected based on the characteristics of each cargo. Pipe and pump systems are used for liquid bulk cargoes. Rail mounted cranes, fixed cranes, loaders and movable cranes are used for bulk and break bulk cargoes. Belt conveyor systems are widely used for bulk cargoes to connect between the quays and stock facilities (See Table 6.4.1(1)). Generally, a company handles its own cargoes with its own handling equipment. Some companies such as a sugar company use their own barges. The cargo handling productivity at each port depends on the system and the efficiency of cranes and pumps.

Table 6.5.1 Commodities at Each River Port

No.	Port Name	Location (km)	Outbound	Inbound
1	El Hadid and El Solb (Iron and Steel)	9	***	Petrol
2	Abu Zaabal	9	***	Phosphate raw
3	Kima	10.5	Fertilizers	Fertilizer material
4	El Nasrr Phosphate (Tanash)	10.5	Aswan loam	Aswan loam
5	El Gizera	12	Clay	***
6	El Shima	13	Clay	***
7	El Nasrab	15	Phosphate raw	Phosphate raw
8	El Akaba	20	Clay	***
9	El Akaba	22	Clay	***
10	El Biyara	41	Molasses	Chemical materials/Sugar cane
11	Edfu Sugar	106	Sugar raw/Molasses	Mazot/Limestone/Solar
12	El Morada	106	Phosphate raw	Phosphate raw
13	Firocilicon Factory	115	Firoclicon products	Coal
14	El Sibaaya	143	Phosphate raw	***
15	Armant Sugar	203	Sugar raw/Molasses/ Sugar cane	Sugar cane/Lime
16	Koss Sugar	257	Sugar raw/Molasses	Production requirements
17	Dishna Sugar	314	Sugar	Sugar
18	Nagaa Hammady Sugar	340	Sugar/Molasses	Mazot/Limestone/Solar/ Sulft/Spare parts
19	River Aluminum	347	Aluminum flags/Flags	Aluminum raw/Coal
20	El Balina	391	Passengers /Cars	Passengers/Cars
21	Gerga Sugar	394	Molasses	Mazot/Stone /Equipments
22	Asyut Calories	553	***	Oil
23	Petrol Port	553	Petrol/Kerosene/Solar/Mazot	***
24	Asyut Cement in Menkbad Petrol	556	***	Petrol
25	Asyut Cement in Menkbad Cement	556	Fertilizer	Petrol
26	Fertilizer Factory in Menkbad	556	Super cement	Phosphate raw/ Sulft
27	El Nil Cotton Ginning Co.	702	Cotton	Cotton
28	Bany Khaled in Samllot	705	Limestone	***
29	Limestone in El Tebbin	925	Iron products	Limestone
30	El Tebbin El Nahree	925	***	***
31	Coke Factory in El Tebbin	927	Coke for export	Lime coal/Coke
32	El Kawmiya Cement	930	Not packed cement	Packed and not packed cement
33	Cement Packing on Nile	935	Packed cement	***
34	Samloot Cement Receive	935	***	Limestone
35	Sugar Factory in El Hawmdiya	940	SugarMolasses/Spare parts	Sugar raw/Molasses/Mazot
36	Equipment Factories	940	Equipments	Materials
37	El Masara	940	Aluminum products	Local aluminum products
38	Tora	945	Cement	***
39	Athar El Nabi	952	***	Sand/ Stones
40	Embaba Tankers	960	Wheat	***
41	Saulft	986	Sulft	***
42	Phosphate (Ismaelia canal)	23	***	Phosphate
43	El Nahda (El Nobaria canal)	102	Sulft	Sulft
44	El Metras (El Nobaria canal)	118	Aluminum products	Production requirements/ equipments

Source) "The Strategy of the Public Authority for the River Transport until 2012 (1999)"

Table 6.5.2 Cargo Volumes at Each Port Area

No.	Location	Inbound		Outbound	
		Ton(Thousands)	Ton km(millions)	Ton(Thousands)	Ton km(millions)
1	Aswan	43	26,649	165	156,948
2	El Akaba	***	***	22	5,738
2	Kom Ombo	6	4,405	***	***
3	Edfo	70	43,711	77	59,082
4	Sbaaiya	***	***	251	197,756
5	Deshna	43	19,709	474	30,437
6	Kos	19	7,393	90	62,294
7	Arment	17	5,703	65	47,755
8	Al Oksor	20	6,637	***	***
9	Kena	91	25,110	1	146
10	Nag Hammadi	52	17,778	152	96,838
11	Grga	8	3,307	29	15,660
12	Sohag	105	12,555	***	***
13	Asyut	1	434	310	78,443
14	Menkabad	67	37,962	***	***
15	El Menya	***	***	22	5,738
16	Abu Korkas	0.2	13	***	***
17	Samallot	***	***	667	142,029
18	El Tebbin	1,016	230,878	106	67,331
19	El Hawamdiya	419	282,287	160	44,609
20	Tora	***	***	20	2,818
21	Athar El Nabi	88	18,824	1	536
22	Helwan	5	1,315	***	***
23	Embaba	0.2	13	***	***
24	Shobra	377	327,679	3	2,189
25	Nekla	505	1,182	***	***
26	Bostan	17	2,504	***	***
27	Dmanhoor	1	84	***	***
28	El Katatba	0.3	295	0.2	13
29	Bolin	3	314	***	***
30	El Nahda	12	752	***	***
31	El Metras	21	41	***	***
32	Alexandria	195	70,122	542	142,665
	Total	2,731	1,147,640	3,159	1,147,645

Source) "The Strategy of the Public Authority for the River Transport until 2012 (1999)"

6.5.2 IWT Cargo Handling at Sea Ports

(1) Transshipment Cargoes between Sea and River Ports

The existing river transport route is connected with only Alexandria Port among several seaports. Dekheila Port, part of the Greater Alexandria Port, is not used for river transport because the existing barges cannot navigate the sea area between Alexandria Port and Dekheila Port. Therefore, only Alexandria Port handles export/import cargoes for IWT. The cargo volume from Alexandria Port to river ports is 398 thousand tons in 1999 (See Table 6.5.3). Main cargoes are coal and sulphur. The cargo volume from river ports to Alexandria Port is 293 thousand tons in 1999 (See Table 6.5.4). Main cargoes are molasses and coke. The total cargo volume between river ports and Alexandria port is 691 thousand tons, or 32% of the total river transport cargo volume of 2.160 million tons. The origin to and the destination from Alexandria Port of each commodity are limited within some river ports, because river transport cargoes are mostly materials and products of the factories along the Nile River and canals.

Table 6.5.3 Cargo Volume from Alexandria Port to River Ports in 1999

Unit: thousand metric tons

Break Bulk		Dry Bulk					Total
General Cargo	Iron & Steel	Clay	Other Minerals	Coal	Sulphur	Aluminum	
5	19	18	6	200	140	9	398

Source) RTA

Table 6.5.4 Cargo Volume from River Ports to Alexandria Port in 1999

Unit: thousand metric tons

Dry Bulk				Liquid Bulk	Total
Clay	Coke	Phosphate	Aluminum	Molasses	
5	94	0.3	6	188	293

Source) RTA

(2) Cargo Handling of Transshipment for IWT at Alexandria Port

Basically there are two cargo handling methods for the transshipment between sea going vessels and river barges. One is the direct transshipment with ship gears or quay cranes. The other one is transshipment via stockyard or tank. Off-shore cargo transshipment between sea going vessels and river barges is carried out at the calm water area protected by breakwaters near the entrance of Nobaria canal. Handling methods of IWT cargoes for each commodity are shown in Table 6.5.5 and 6.5.6.

In order to establish an efficient container river transportation system, cargo transshipment system at

sea ports is important as well as the development of the river container terminal. Therefore, the location of the berths for river barges, scale of backyard area and cargo handling system between sea going vessels and river barges should be considered carefully before starting the container IWT service. The berths for river barges should be prepared in or near the container terminal as far as possible in order to reduce time and cost of land transportation. One option is to use the berths of the container terminal if the berth occupancy rate is not high. Sufficient backyard area also should be prepared with the berths. The most appropriate equipment, such as a movable crane or a gantry crane should be determined from various view-points including cost and efficiency.

Table 6.5.5 Handling Method of IWT Cargoes at Alexandria Port (Outbound)

Commodity	Handling Method					Average load volume per barge
Coal	Sea vessel	3 Rail mounted gantry cranes Berth No.61, 62, 63 150 t/h (1 crane) 180-200 t/h (2 cranes)	Stockyard	3 Rail mounted gantry cranes Berth No.61, 62, 63 150 t/h (1 crane) 180-200 t/h (2 cranes)	River barge	520 t/barge
	Sea vessel	3 Rail mounted gantry cranes Berth No.61, 62, 63 150-200 t/h			River barge	
Clay	Sea vessel	Ship gear Off-shore 60-80 t/h			River barge	528 t/barge
Sulpher	Sea vessel	Ship gear Off-shore 60-80 t/h			River barge	475 t/barge
Raw aluminum	Sea vessel	Ship gear Off-shore 60-80 t/h			River barge	450 t/barge
Minerals	Sea vessel	Ship gear Berth No.— 60-80 t/h	Yard	Movable crane Berth No.— 50-60 t/h	River barge	550 t/barge
	Sea vessel	Ship gear Off-shore 60-80 t/h			River barge	
Iron/steel products	Sea vessel	Ship gear Off-shore 50-60 t/h			River barge	395 t/barge

Source) Alexandria Port Authority

Table 6.5.6 Handling Method of IWT Cargoes at Alexandria Port (Inbound)

Commodity	Handling Method					Average load volume per barge
Molasses	River barge	3 Pumps Berth No.71 150 t/h (1 pump) 200 t/h (2 pumps)	Tank	3 Pumps Berth No.71 150 t/h (1 pump) 200 t/h (2 pumps)	Sea vessel	363 t/barge
Coke	River barge	3 Rail mounted gantry cranes Berth No.61, 62, 63 150 t/h (1 crane) 180-200 t/h (2 cranes)	Stockyard	3 Rail mounted gantry cranes Berth No.61, 62, 63 150 t/h (1 crane) 180-200 t/h (2 cranes)	Sea vessel	365 t/barge
	River barge	3 Rail mounted gantry cranes Berth No.61, 62, 63 150-200 t/h			Sea vessel	
Aluminum products	River barge	Movable crane General cargo berth 5-41 50-70 t/h	Yard	Ship gear General cargo berth 5-41 60-80 t/h	Sea vessel	448 t/barge
Edible oil	River barge	Pump Berth No. 85/1, 85/2 —	Outside tank connected by pipes	Pump Berth No. 85/1, 85/2 —	Sea vessel	—
Phirocilicon	River barge	Ship gear Off-shore 60-80 t/h			Sea vessel	495 t/barge
Phosphate	River barge	Ship gear Off-shore 60-80 t/h			Sea vessel	210 t/barge

Source) Alexandria Port Authority

6.6 Barge System of Inland Water Transport

6.6.1 General Rules & Regulation

Egyptian government has ratified the following main International Conventions with the latest amendments, which are generally applied to international ship trading.

1. International Convention for Safety of Life at Sea (SOLAS) 1974, 1978 Protocol and Amendments
2. International Convention for Prevention of Pollution from Ships. 1973 and 1978 Protocol
3. International Convention on Load Lines 1966
4. International Convention on Tonnage Measurement of Ships 1969
5. Convention on International Regulations for Preventing Collisions at Sea. 1972

The concept of the above International Conventions is incorporated to Egyptian domestic rules, and applied to domestic vessels including inland barges through the Presidential or Ministerial Decrees which are issued when necessary.

Navigation Rules for inland waterway are mainly prescribed in Ministerial Decree No.282/1998, in which RTA is authorized to issue license to owners of barges and to have inspection for hull and machinery etc, even in dry-dock condition when necessary. Validity of license to barge owner is 3-years for cargo transportation barge and 2-years for passenger ship.

At present, maximum dimensions and speed of barges at present are prescribed as follows as per RTA Decree Nr.254 to Ministerial Degree No.282/1998 which requires to obtain RTA approval for dimensions of new-building barges. Other items including safety, stability, load line and numbers of crew and license are also prescribed in this decree.

Length : 50m
Breadth : 7.5m
Draft : 1.5m
Height above water : 3.5m
Max. speed : 13km/hr, 7knots

6.6.2 Existing Barge Fleet

(1) Statistical Data of Barges

Existing barge fleets for inland waterway navigation in Egypt are summarized in the following tables. These fleets of barges are owned by private, public or government sector.

Table 6.6.1 Existing Barge Fleets

Fleet Unit		Propeller Barge	Twin	Push Boat	Total
1. General Nile Company for Water Transportation (Public Sector)					
Number of Units	Nr	70	118	22	210
Average Capacity per Unit	Ton	287	336	0	
Total Capacity	Ton	20,074	39,669	0	59,742
Average Engine Power	Hp	201	434	198	
2. General Nile Company for River Transportation (Public Sector)					
Number of Units	Nr	51	168	21	240
Average Capacity per Unit	Ton	294	351	16	
Total Capacity	Ton	14,978	58,950	340	74,268
Average Engine Power	Hp	215	446	178	
3. General Business Sector					
Number of Units	Nr	68		43	111
Average Capacity per Unit	Ton	126		8	
Total Capacity	Ton	8,588		358	8,946
Average Engine Power	Hp	177		187	
4. Sugar Company					
Number of Units	Nr	157		23	180
Average Capacity per Unit	Ton	362		0	
Total Capacity	Ton	56,912		0	56,912
Average Engine Power	Hp	190		166	
5. Private Sector					
Number of Units	Nr	1,251	2	326	1,579
Average Capacity per Unit	Ton	66	213	4,4	
Total Capacity	Ton	82,511	425	1,436	84,362
Average Engine Power	Hp	62	105	74	
6. Government					
Number of Units	Nr	46		38	84
Average Capacity per Unit	Ton	56		6	
Total Capacity	Ton	2,560		240	2,799
Average Engine Power	Hp	127		184	

Source: RTA

The technical features of the above fleets of barges are summarized by type-wise in the following tables.

Table 6.6.2 Technical Feature of Existing Barge Units

Description		Gov. Sector	Private Sector	Sugar Company	GNWT*	GRWT*	General Business Sector
1. Propeller Barge							
Number of Unit	Nr	46	1251	157	70	51	68
Ave. Length	m	15.7	13.9	44.4	40.9	42.6	22.2
Ave. Breadth	m	4.3	3.03	7.51	7.21	7.02	5.48
Ave. Depth	m	1.93	1	2.22	2.1	2.06	2.07
Ave. Draft	m	1.44	0.66	1.67	1.54	1.53	1.51
Ave. Max. Dead Weight	Ton	55.64	65.9	362.4	286.7	293.6	126.2
Ave. Engine Power	Hp	126.56	61.5	190.4	201.3	215.1	176.7
:Biggest Size of Propeller Barge L x B x D x d = 50m x 7.5m x 2.25m x 1.6m							
2. Twin Unit (Pusher and Barge)							
Number of Unit	Nr		2		118	168	
Ave. Length	m		22.5		47	47.3	
Ave. Breadth	m		3.8		7.4	7.4	
Ave. Depth	m		1.1		2.2	2.2	
Ave. Draft	m		0.9		1.61	1.64	
Ave. Max. Dead Weight	Ton		212.5		336.1	350.8	
Ave. Engine Horse Power	Hp		105		434.4	446.3	
:Biggest Size of Twin Unit : L x B x D x d = 50m x 7.5m x 2.25m x 1.6m							

GNWT*: General Nile Company for Water Transportation

GRWT*: General Nile Company for River Transportation

Source: RTA

(2) Age of Fleet

The range of age of each barge fleet is summarized in the following Table. According to this Table, average age of cargo transport barge fleets is about 15 –35 year.

Table 6.6.3 Number of Existing Barge Fleet Unit by Age

Age of Fleet (Year)	Sugar Company	Water Trans. Company	River Trans. Company	Private Sector	Gen. Business Sector
5	0	0	1	2	0
10	0	1	0	25	8
15	0	3	3	393	11
20	5	46	36	640	27
25	31	26	6	129	16
30	56	60	82	3	15
35	74	76	72	0	3
40	8	22	3	2	0
45	4	0	1	1	0
50	1	0	0	0	0
50-	0	1	2	1	0
Average	**30.0 yrs**	**27.9 yrs**	**28.1 yrs**	**16.7yrs**	**19.7 yrs**

Source: RTA

(3) Crew Onboard

Number of crew onboard cargo transport barge is as follows :

Below 250 tons : Chief 1, Mechanic 1, Sailor 2
Over 250 tons : Superior Chief 1, Mechanic 1, Sailor 2
Pusher : Superior Chief 1, Mechanic Assist. 2, Mechanic 1, Sailor 2

(4) RTA Barges for Works

Total 7 numbers of self-propelled barges as work vessel are owned by RTA and, among them, the main barges are detailed as follows.

1. Name : "Marmer"
   Built : 1986
   L x B x D(m) : 55.0 x 10.0 x 3.0
   Main Engine : 250 Hp x 2
   Location : Aswan
   Purpose : Buoy maintenance
   Special equipment : 7-tons crane

2. Name : "Mubarac"
   Built : 1999
   L x B x D(m) : 45.0 x 9.0 x 2.25
   Main Engine : 200 Hp x 2

Location : Cairo
Purpose : Buoy maintenance
Special Equipment : 3-tons crane, 2-holds

3. Name : "Nile Giant"
   Built : 1986
   L x B x D(m) : 35.0 x 8.0 x 2.3
   Main Engine : 100 Hp x 2
   Location : Cairo
   Purpose : Rescue for sunk unit
   Special Equipment : 2-hooks, 2-pontoons

Other 4 barges are used for such works as barge pushing, depth measuring, and lock basin cleaning.

6.6.3 Previous Studies on Coastal Going Barges

(1) Coastal-Going Barge between Dikheila and Alexandria

Twin units designed for inland waterway transport normally consist of a self-propelled pusher barge and a pushed dumb barge, which are connected together by straight wires.

At present, cargoes have been transported from the port of Alexandria to Cairo via Nobaria and Beheiry Canals. But, in connection with new port of Dikheila for inland transport by barge, barges have to pass an open sea area of about 2-miles between two ports and this coastal connection can not be realized so far.

Since inland vessels has a small freeboard, coastal sailing of inland vessel in wave conditions will cause serious problems such as sea water flow into barge holds, breaking of connecting wires for twin unit barge, etc. The most important and serious matter on coastal sailing will be excessive bending moment caused by waves in longitudinal hull structure members, of which strength is normally designed insufficient especially in case of inland sailing barge.

Netherlands Consultant carried out a feasibility study on introduction of coastal going barge for coal carrier in 1989. This study has adopted the following base data on wave climate at offshore of Alexandria port.

Table 6.6.4 Wave Height at Alexandria Port

Wave Direction	Deep Water Wave	Shallow Water Wave : Hs		
	Ho	To=4.0	To=5.5	To=7.5
(deg.)	(m)	(m)	(m)	(m)
285-315	0.75	0.74	0.7	0.65
	1.75	1.45	1.57	1.45
	2.75	-	2.08	2.01
315-345	0.75	0.74	0.7	0.66
	1.75	1.43	1.58	1.46
	2.75	-	2.08	2.01
345-015	0.75	0.74	0.69	0.63
	1.75	1.43	1.56	1.4
	2.75	-	2.11	2.01
015-045	0.75	0.74	0.63	0.5
	1.75	1.44	1.43	1.12
	2.75	-	2.16	1.69

Source: Transit of Inland Waterway Barges from El Dikheila to Alexandria, Delft Hydraulic, May 1989

The above shallow water wave data were hydraulically omputed from the statistical wave height data on deep-sea water as presented in Table 3.4.2 of Sub-Chapter 3.4.

The above study for possible development of coastal going coal barges has summarized allowable significant wave heights as follows.

Table 6.6.5 Permissible Wave Height for Coastal Sailing by Previous Study

		Propeller Barge	Twin Unit
Loaded Draft(m)	m	1.5	1.5
Significant Wave Height (without modification)	m	0.45	0.31
Significant Wave Height (with modification)	m	0.6 *1	0.39 *2

*1 To increase the bulwark height

*2 To strengthen the barge connecting wire

Source: as described above

(2) Container Barges

Almost all containers handling through seaports are recently transported by inland road traffic. In order to transport containers from Dikheila port through inland waterway via Alexandria port, special considerations must be taken to the capability of coastal navigation by container barges. In

this respect, conceptual design on two types of container barges navigable on the above route of was carried out by the previous study, which shows the result that two tiers loading on barge could not be possible due to its excessive draft. Other particular problems on coastal going container barge is sufficiency of freeboard strength and how to keep forward visibility disturbed by containers stack on deck as the height of wheel house is quite limited by the required air clearance for passing under bridges. Anyhow, Nekla bridge should be opened by lifting bridge deck in order to allow passing of 2-tiers container vessels.

Inland Container Transport Company "Egytrans" has recently developed new project for inland container transportation using existing waterway of Beheiry and Nobaria canals to connect Alexandria or Dikheila Port with Cairo city. This project has proposed an advanced design concept of self-propelled coastal going container pusher barge, which is capable of 62 TEU containers (4-rows, 2-tiers and 8-bays). The special feature of the design concept is application of liftable wheel house system using hydraulic power to keep forward visibility within air draft restriction for passing under existing bridges. This self-propeller pusher barge with twin engines is tied together with a pushed dumb barge having loading capacity of 44 TEU (4-rows, 2-tiers and 6-bays) and, therefore, the total 106 TEU container units can be loadable on this twin unit barge system as follows.

Table 6.6.6 Dimensions of New Barge by Egytrans

		Pusher	Dumb Barge
Length Overall	(m)	63.0	48.0
Breadth	(m)	11.8	11.8
Depth	(m)	3.2	2.7
Draft	(m)	1.6	1.6

The above propeller barge is so designed in dimensioning the length overall of 63 m and the breadth of 11.8 m to use longer End lock at Alexandria (Big Lock) and other locks or to pass under existing bridges along canal waterways without any special modification.

But, pusher barge for coastal sailing is classed by Lloyd Register of Shipping (British Classification Society) and there still remain the following subjects for further investigation.

1) Water Depth on Navigation Route
2) Night Navigation (Lock Operation by RTA)
3) Waiting Time at Locks
4) Air Clearance when Empty Containers are loaded

6.7 Navigational Conditions of Inland Water Transport

The study team reviewed the past studies concerned with the captioned subject to recognize the actual situation of the canal navigation.
The references are entitled:

- Navigation and Infrastructure for RTA (GEM Consultants, 1995)
- Noubaria/Beheiry Canal and Nile (GEM Consultants, 1995)
- Navigation in the Nile Delta (Damen Shipyards, Giesberger Underwater Technology & Services, Holland Institute of Traffic Technology, Kabel Service Center, Port & Maritime Consultants, Rabbani Trading and Consulting, Royal Haskoning, 2001)

Summary of referred information is described hereinafter.

6.7.1 Waiting time & Passing time at Locks

G.E.M. Consultants B.V., The Netherlands, carried out the study in 1993-94 to clarify the existing problems regarding the canal navigation and operation of the locks. The study concentrates on the Nobaria canal with RTA and the two representative shipping agents concerned.
The general objectives of the study are:

- To reduce damage to the canals and to the barges;
- To improve the efficiency of canal transport by reducing passage/waiting hours;
- To improve the traffic control by introducing a better communication method between barges and shore.

1) Findings

●Locks in Beheiry and Nobaria canal are listed in Table-6.7.1.

Table-6.7.1 Summary of locks **(Unit:minute)**

No.Lock	Km	W	L	Crew	Power	Head (m)	Time for Fill/Sink		Time for Up/Dn		Communi-cation
1 Kanater	0	16	116	6	Electric. &Manual	2.0-1.4	10	10	20	20	Telephone Nearby
2 Khatatba	42.25	16	116	10	Electric. &Manual	1.5-0.2	20	15	30	25	Wireless
3 Bolin	0	16	116	10	Electric. &Manual	1.1-0.4	15	12	25	22	Wireless
4 Bustan	28.5	16	116	13	Manual	0.4-0.2	10	10	20	20	Wireless
5 J Klees	61	16	116	6	Electric. &Manual	1.1-0.2	12	10	22	20	Wireless
6 Nahada	100	16	116	9	Electric. &Manual	6.5-4.9	45	35	55	45	Wireless
7 End lock	119.5	16 16	116 80	10	Electric & Manual	2.5-2.5	15	15	25	25	Wireless Telephone

Remarks:

No.1-2 locks are in the Beheira and No.3-7 locks are in Noubaria

Average lock passage time includes:

- Entering of units into the lock (assumed 6 min.),

- Closing of doors, leveling, opening the doors,
- Leaving of units from the lock (assumed 4 min.),
- The customs and police at the End lock close officially at 14:00 hrs at the latest. However, the water transport companies usually negotiate with them to extend the working time, if necessary.

2) Lock capacity of the units' passage

According to the above table, it is clear that the Nahada forms the bottleneck of all locks because it requires roughly the double passing time of others. Assuming that the above mentioned passage time and 10 hours of lock operating time per day (08:00-18:00), the maximum number of units which can negotiate the Nahada are:

- Up-going: 12 twin barge units per day (6 lock filling); and
- Down going: 12 twin barge units per day (6 lock filling).

In March 1993, which is just after the winter closure* of the year, the Nahada was operating at full capacity, however since then the actual passage number has been slightly less than half the total capacity.

*Winter closure: For the period of about one month from Jan. to Feb., the water level of the Nile sinks due to control the flow by the Ministry of Irrigation; consequently, inland water transport is forced to close in the lower reaches.

The calculated maximum number of units which can pass the End Lock is (600/(25+25) x 3 =) 36 units per day in both directions. However, the actual number of units at that time was far below the calculated value.

3) Queuing at locks

Queuing occurs, in most cases, when units of barges arrive after 18:00 at a closed lock and wait until operation resumes the next morning.

Actual conditions of the queue at the Nahada were investigated for about one month in 1993, and the findings are shown in Table 6.7.2

Table 6.7.2 Arrival/departure time of units at Nahada lock

(18-06-93 to 24-07-1993)

Sailing direction		Arrival date (After 18:00)	Departure date	Departure time
Up	Down			
	*	17-06	18-06	09:15
	*	17-06	18-06	09:15
*		17-06	18-06	10:40
	*	18-06	19-06	10:00
	*	20-06	21-06	09:45
	*	20-06	21-06	09:45
	*	20-06	21-06	11:45
	*	20-06	21-06	11:45
	*	21-06	22-06	09:30
	*	21-06	22-06	09:30
	*	22-06	23-06	09:20
	*	22-06	23-06	09:20
	*	22-06	23-06	11:15
	*	22-06	23-06	11:15
	*	23-06	24-06	09:15
	*	23-06	24-06	09:15
	*	23-06	24-06	12:00
	*	24-06	25-06	09:00
	*	27-06	28-06	09:15
	*	27-06	28-06	09:15
	*	27-06	28-06	11:30
	*	29-06	30-06	10:30
*		29-06	30-06	09:45
	*	30-06	01-07	09:20
	*	30-06	01-07	09:20
	*	01-07	02-07	09:20
*		01-07	02-07	10:45
*		01-07	02-07	10:45
	*	03-07	04-07	09:15
	*	03-07	04-07	09:15
	*	(07-07)	08-07	09:25
	*	(07-07)	08-07	09:25
	*	(07-07)	08-07	09:25
*		(07-07)	08-07	09:25
*		07-07	08-07	12:30
	*	08-07	09-07	08:45
	*	08-07	09-07	08:45
	*	08-07	09-07	09:45
	*	08-07	09-07	09:45
	*	11-07	12-07	09:15
	*	12-07	13-07	09:30
*		12-07	13-07	10:20
*		13-07	14-07	10:20
*		13-07	14-07	09:30
*		13-07	14-07	09:30
*		13-07	14-07	09:30
	*	15-07	16-07	11:00
*		20-07	21-07	10:30
*		21-07	22-07	10:45
*		23-07	24-07	10:30

Remark: Units in parenthesis of the 3rd column are small single units

The report pointed out that the times of leaving of units are unexpectedly late, e.g. among 50 queuing units, 18 units (36%) left the lock after 10:00 a.m. and seven units (14%) left after 11:00 a.m., This was usually due to the poor condition of the lock.

4) Guiding of vessels at locks

There were different opinions between RTA and the river transport companies on the necessity of dolphins for the purpose of guiding units to a lock. Both sides concluded finally that a high quay with a suitable shape is a good alternative for guidance of the units.

5) Time required for a round trip (Alex-Cairo)

The calculated value for a round trip is 13.4 days including five days for waiting, loading and unloading. However, survey of seven units during the period of April to November 1992 revealed that the actual value was 25.3 days.

The big difference between the calculation and the result is mainly caused by the gap of the time for waiting, loading, unloading and customs inspection. The actual time required for the matter was 13.4 days instead of 5 days. The major part of the time consists of waiting and loading in Alexandria (11.7 days). These figures are confirmed by the data of 72 units of RTC during a period of 13 months. In addition, total number of trips per year was 10.7 while the estimated value was 18.6.

Calculated values and actual results are shown in Table-6.7.3.

Table 6.7.3 Theoretical and actual transit times/trips

Time	Sailing/ Locks pass	Canal Problem (Shallow)		Waiting/ Loading	Customs	Waiting/ Unloading		Accidents/ Repairing	Company Problem & Inspection		Time required Per trip	Number of trips per year
Item	1	2	1+2	3	4	5	3+4+5	6	7	6+7	Σ (1to7)	
Actual												
a) Nahri V.	7.04	1.18	8.28	9.60	0.37	3.55	13.52	0.66	0.48	1.14	22.88	10.68
b) Salam V	6.66	0.83	7.50	13.81	0.46	4.91	19.18	0.50	0.21	0.71	27.39	10.75
c) Average	6.85	1.01	7.86	11.70	0.42	4.23	16.35	0.58	0.34	0.92	25.13	10.72
Calculated	8.4(5.6+2.8)	-	8.4	3 (2+1)	-	-	5	-	-	-	13.4	18.6

Remark

Company problem: recruit crew, licenses, etc.

Technical inspection at start & end of the trip

6.7.2 Obstacles on Navigation

According to the Survey be G.E.M. Consultants B.V., The Netherlands in 1993-94,

Navigational obstacles in Nobaria canal

A joint working group of RTA/RTC/WTC made field surveys twice between 1993 and 1994 during winter closures, and confirmed existing navigational obstacles as follows:

- Sunken units 12
- Unused water sources 4
- Various other obstacles 13

The group classified the above obstacles A, B and C according to the degree of jeopardy for units traffic, and recommended countermeasures ranging from immediate removal or remove as soon as possible to not urgent.

In addition, following problems were found:

-High-speed sailing is difficult at many stretches of the canal because of the obstacles and the shoals;

-Many damaged and collapsed bank protections were observed at various locations at the canal. Since high-speed sailing and using anchor into the bank are not common practices, the most likely cause seems to be poor quality of the bank protection works.

The report gives the details of existing obstacles (1994) such as locations and types in Appendix 11-4.

According to the Survey during Apr.'93 – Apr. '95 by GEM Consultants team:

-Identification and removal of obstacles and high bottom levels in the Nobaria/Beheiry Canal;

-Maintaining the navigability of the Nobaria/Beheiry canal by means of planning and execution of surveying and dredging;

-Maintaining the navigability of the Nile by means of planning, surveying, marking with buoys and dredging.

A summary of the status of maintaining the navigability of the Nouaria/Beheiry canal and the Nile as per 1995 is presented in this report.

At the beginning of this report, it mentions the division of responsibility for canal administration between MPWWR and RTA that the former is responsible for water supply and irrigation, thus, maintenance of waterway also, while the latter is responsible for maintaining the navigability of the waterway.

Notable facts are found in its detailed descriptions:

1) Between Bolin (km 0) and Busstan (km 28.5)
   - Past dredging: Sectional dredging was carried out for km 0 to 28.5 in 1991, for km20-22.5 in

1986 and km 28.5(Busstan lock basin) in 1993, respectively.

- Survey in this stretch was carried out recently, and resulted in a plan to dredge between km 3 and km 26.8, in addition, identified shoals which seriously affect the navigability in between km 27.5 and 28.4.
- Present status of dredging: Only km 10-24 is in progress, others are being planned or are in the preparatory work stage.

2) Between Busstan (km 28.5) and Gianaclis (km 61)

Recently, no complaints were received on navigability in this stretch.

- Past dredging: The last dredging was carried out in 1993 in some sections; but other sections were last dredged in 1991 or even 1986.
- Although no complaints were received, confirming survey should be carried out.

3) Between Gianaclis (km 61) and Nahada lock (km 100)

During the last couple of years shipping companies frequently complained about the shoals in this stretch, which seriously affect the navigability.

- Past dredging: During the last nine years, sectional dredging was carried out for km 72.5-75 in 1989, for km 76.5-80 in 1986 to 89, and for km 80-101 in 1986 to 89, respectively.
- Surveying: In 1994, a longitudinal survey was carried out along the centerline of the canal about 10 m width both sides through the stretch, and a number of serious shoals were identified. Consequently, RTA drew up detailed cross sections at selected locations.
- Dredging: Based on the cross section survey, the maintenance dredging will be prioritized, and the tendering of dredging is to start as soon as possible.

4) Between Nahada lock (km 100) and the End lock (km 119.5)

It is known that there are navigational problems of high bottom in between km100 and km 103, and around the double road bridge at km 112.5, which is probably caused by soil disposed from a collapsed bank.

- Past dredging: This stretch has never been dredged.
- Surveying: As a result of the survey in Oct.-Nov. 1994 some shoals are found in Km 100-103m, and also at two points around the new double road bridge.
- Dredging: In 1994, dredging contract in between km 112.5-113,3 was concluded, but actual works were never carried out due to problems with disposal of mud.

The other stretches are in the stage of tendering and or planning.

5) Progress in removal of obstacles

During the last two years frequent attention was paid by RTA and the interested parties to identify all obstacles and shoals affecting navigation in Noubaria and Beheiry canal.

The status of obstacles is almost the same as mentioned earlier. An obstacle at Genesa (remains of

the civil structures under water of the old bridge; km 6.4) was removed in 1994. However, the other obstacles in the canal have not been removed so far. Installation of km-markings alongside the canal to identify obstacles was completed in the end of 1994.

6.7.3 Other Navigational Conditions (such as communication tools navigation charts, etc.)

1) Bathymetric and navigation charts

There are no recent bathymetric charts of the Nile Delta available except for some surveys specifically carried out for bank protection, bridges, dams and reported shallows in the river. However, detailed bathymetric survey for Damietta will be produced under this project.

There is an available chart issued by RTA providing the general alignment of waterways and the locations of locks in the Delta.

2) Signal and mark system

There are no navigational aids or any positioning marks for sailing units between Cairo and Alexandria. Some kilometer marks exist along the banks of the Beheiry and Noubaria canals but they are rather badly maintained.

Floating marks have been exhibiting only proximate to dredging areas to mark underwater obstacles and anchors.

Although a preliminary design of the navigational aids system have been carried out, the Consortium has been invited by RTA to review and comment on the proposed system.

3) Radio communication

The locks are equipped with medium wave transmitter/receiver for RTA use only. Barges do not have any communication facilities on board. It would be difficult to install such communication equipment due to the lack of power supply on board.