Chapter 6 Master Plan of the Port of Constantza

6. 1 Development Scenario of the Port

6. 1. 1 Review of the Previous Master Plan

The previous Master Plan of the Port of Constantza was prepared by Frederic Harris in 1993. According to the demand forecast conducted as part of the investigation for the Plan, the forecast for 2010 was 84.1 million tons. This was approximately a threefold increase on the actual tonnage in 1992 (see Table 6. 1. 1).

If the forecast for 2000, which is a middle point in the Master Plan, is compared with the actual results obtained in the recent three years (1997-1999), we find that the Romanian economy had not grown as smoothly as estimated earlier. In other words, while the Port's total cargo handling tonnage forecast for 2000 ranged from 33.3 to 42.3 million tons, the actual results in the recent three years were 22.9~31.9 million tons.

When the forecast and actual tonnages of individual items of cargo are compared, the difference in the amount of energy import is conspicuous. For example, against the forecast for 2000 of 10.3~12.0 million tons, the actual figure for 1998 was far lower at 6.7 million tons. In the case of containers, the actual figure was 0.4 million tons against the forecast of 0.8~1.3 million tons. In contrast, the actual grain export was 0.7~1.8 million tons against the forecast 0.6~0.9 million tons. The actual iron ore import was 4.9~5.7 million tons against the forecast 1.7~2.1 million tons.

(1) Basic policy for the 1993 Master Plan

The layout plan for the 1993 Master Plan was drawn up using the preconditions for the previous master plan intact. In other words, the construction works which were in progress according to the previous master plan (prepared in the 1980s) such as reclamation for South Port Pier S-1 terminal, reclamation of peripheral areas of Piers S-2 and S-3 and extension (1 km) of East Breakwater were adopted without any modification.

(2) Future area usage outline in the 1993 Master Plan

The outline of the future area usage in the 1993 Master Plan is as shown below.

1) The South Area of the Port: reserved for container terminal expansion, for general cargo or dedicated facilities and for Free Zone distribution and assembly or light

Table 6.1.1 Demand Forecast in the Master Plan (1993) (Million Ton)

				1992	2000 Forecast		2010 Forecast	
					Low	High	Low	High
Bulk Commodities	Crude Oil	I		8.4	10.3	12.0	15.2	24.7
	Oil Products		E	3.1	3.9	4.8	5.5	8.6
	Steam Coal	I		2.9	3.7	4.8	6.9	12.0
	Coking Coal	I						
	Iron Ore	I		1.6	1.7	2.1	2.0	2.6
	Cement		E	2.3	2.7	3.7	2.8	4.8
	Agri-bulk	I	E	1.5	0.9	0.6	0.4	2.4
	Phosphate	I		0.8	1.0	1.3	1.5	2.5
	Others	I		0.1	0.2	0.4	0.4	0.7
	Others		E	0.1	0.2	0.3	0.3	0.6
				20.8	24.6	30.0	35.0	58.9
Non-Bulk Commodities	Domestic Traffic			5.7	7.4	9.4	11.7	17.9
	Free Zone Traffic				0.6	1.6	1.5	4
	Transit/ Transhipment			0.6	0.7	1.3	0.9	3.3
				6.3	8.7	12.3	14.1	25.2
Other (Included in Non-Bulk)	Containers			0.4	0.8	1.3	2.8	4.9
	Frozen/ Ref.			0.1	0.2	0.4	0.4	0.9
	Ro-Ro			0.5	0.7	0.9	1.3	1.7
				1.0	1.7	2.6	4.5	7.5
Total	Bulk Traffic			20.8	24.6	30.0	35.0	58.9
	Non-Bulk Traffic			6.3	8.7	12.3	14.1	25.2
				27.1	33.3	42.3	49.1	84.1

Cargo Throughput from 1997-99 and Forecast for 2010

				1997	1998	1999	2010 Forecast	
							Low	High
Bulk Commodities	Crude Oil	I		7.3	6.7	3.2	9.3	12.3
	Oil Products		E	4.7	3.8	2.2	3.9	3.8
	Steam Coal	I		4.0	3.0	1.8	2.1	2.1
	Coking Coal	I						
	Iron Ore	I		5.2	5.7	4.9	7.8	8.7
	Cement		E	2.0	1.7	1.8	1.4	1.1
	Agri-bulk	I	E	0.7	1.3	1.8	1.0	2.4
	Containers			0.4	0.3	0.4	2.2	3.2
Total				31.9	29.0	22.9	34.4	41.2

manufacturing activities.

2) Central Island: reserved for large, waterfront requiring, industrial users.
3) The sites at the western part of the South Port: reserved for an expansion of barge related handling activities.
4) The land area near the Danube-Black Sea Canal: reserved for industries not requiring waterfront.

(3) Outline of the 1993 Master Plan Layout

Outline of the previous Master Plan for South Area and Central Island Area of the Port is shown in Fig. 6.1.1.

【South Area of the Port】

1) The Pier S-1, S-2, S-3 are maintained as per present Layout.
2) Future development of the eastern part consists of two basins, 250m wide, oriented in north-south direction in accordance with the governing wind direction. The central part of this development accommodates 6 container berths, each 300m long, with an adequate back-up area 500 m behind the berth for container yard and transport operations. The eastern part of the South Area development is reserved for general cargo or other dedicated facilities.
3) Transport corridor for rail and road access is reserved along the South Breakwater.
4) The South area is reserved for 'clean type activities' such as container and other general cargo handling, for warehousing and distribution type of activities and for assembly and manufacturing.

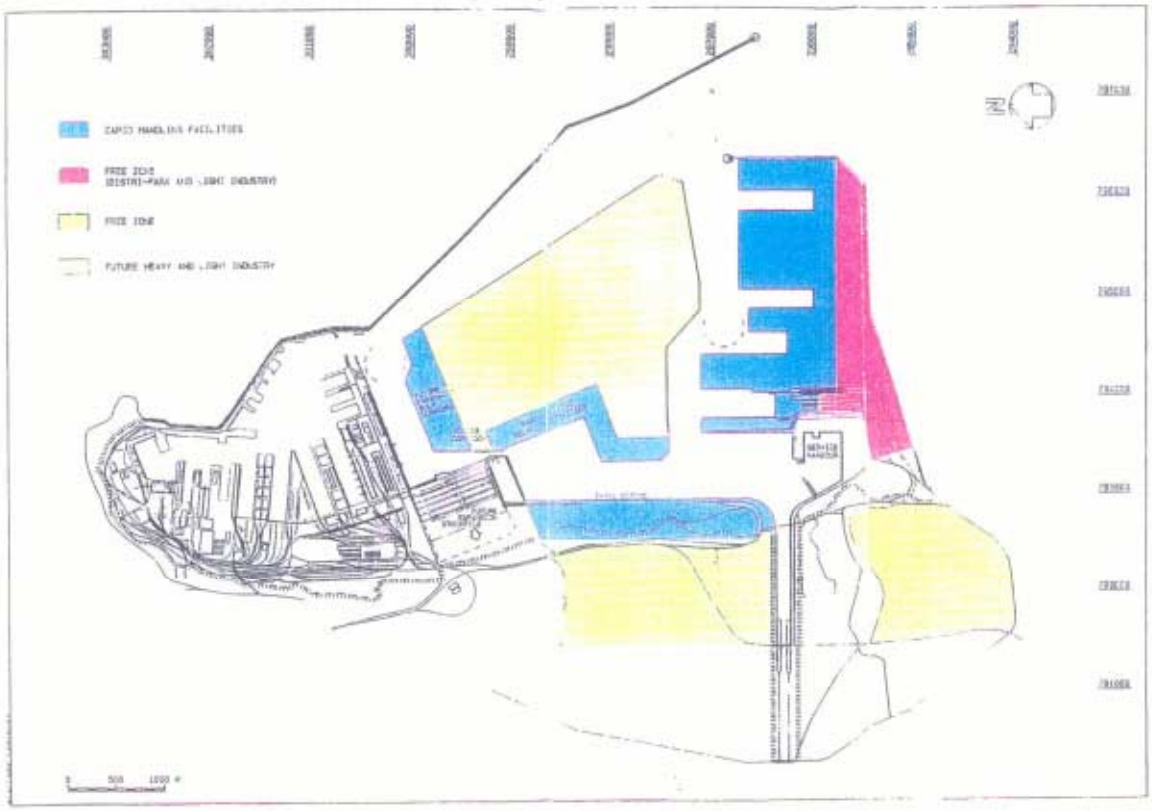
【Central Island Area】

The Central Island Area is preferably to be developed without basins. The available length of water frontage is some 4,000 m along the east side and some 3,500 m along the south side. The total land area is approximately 800 ha. The northern waterfront area is reserved for expansion of the coal/ore bulk terminal activity or other dry bulk activities, such as agricultural bulk export facilities; the western waterfront area is reserved for barge traffic related activities.

【Phasing Plan】

1) The development is to start with the container terminal at Pier S-2, expanding in later phases over the entire area along the South Breakwater.
2) The Central Island development would follow demands for expansion of the bulk facilities and barge operations.

Fig 6.1.1 Layout of the Master Plan (1993)



(4) Evaluation of the 1993 Master Plan

The greatest result of the 1993 Master Plan was the materialization of a new container terminal. However, the reclamation of the sea east of South Port Pier S-2 has not progressed and Central Island remains unutilized. Moreover, work on the 1 km extension of East Breakwater, one of the preconditions for the Master Plan, has yet to be carried out.

Recent actual cargo demand is much smaller than the figure forecast in the Master Plan for the mid-point 2000 due to changes in the Romanian economic structure.

In the Master Plan, the South Port area was supposed to be used in the future as a site to handle clean cargoes, mainly comprising general cargo and containers. However, to enhance the international competitiveness of the Port of Constantza, it is vital that port is able to accommodate larger vessels. From this viewpoint, it is not economical to use the South Port area, which has a depth of 17 m, for the handling of general cargo transported by small ships.

6. 1. 2 Port of Constantza Development Projects after 1993 Master Plan

Since 1993, the following development projects have been underway at the Port of Constantza.

(1) Construction of South Port grain terminal

In 1998, Silotrans constructed a grain terminal with 2 million ton per year handling capacity on Pier S-1 (Berth Nos. 113 and 114). This terminal is equipped with a silo of 100,000 ton storage capacity, two 400 ton/hour pneumatic unloaders and one 800 ton/hour loader.

(2) Materialization of South Port container terminal development project

Using the yen credit extended by Japan, the construction of a container terminal with a capacity of 370,000 TEU per year at South Port S-2 was decided in 1998. Construction is expected to be completed in 2003.

(3) Materialization of Free Trade Zone

Following the enactment of the Law for Free Trade Zone in 1992 (Law No. 84/21.07.1992), a Free Trade Zone was established in the south area of the Port. Currently, 24 ha is plotted as the site for the Free Trade Zone.

6. 1. 3 Viewpoints for the Preparation of the New Master Plan

In drawing up the New Master Plan, the modernization of the Port of Constantza needs to be planned based on the following viewpoints.

(1) Need to meet the advancement of containerization

The demand for containers at the Port of Constantza is expected to increase greatly by such developments as worldwide advancement of containerization, increase of container cargo following the economic development of the Black Sea and East European countries, and the growth in the container ratio as a result of the development of container transport facilities in these regions (see Chapter 7). This increase will sharply surpass the container handling capacity of 370,000 TEU of the currently planned container terminal (Phase-1). Therefore, to meet the expected increase in demand for container terminals, a

new container terminal needs to be proposed in the New Master Plan.

(2) Coping with increasing ship sizes

In 2020, the sizes of grain, container and other types of ships using the Port of Constantza are expected to be much larger. Consequently, the cargoes hauled by these ships need to be handled at berths deeper than the existing ones. In particular, grains and containers, which are handled at present at North Port, need to be aggregated at South Port.

(3) Realization of internationally competitive of the port

To make the port internationally competitive, it is necessary to renew obsolete facilities and realize efficient cargo operation through aggregating the cargo handling which individual operators are undertaking in small lots.

(4) Improvement of linkage with inland transport system

To realize efficient cargo handling, it is necessary to smoothly link port-area railway transport, road transport and inland water transport with waterfront cargo handling, which at present forms a bottleneck.

(5) Realization of port development integral with regional development plan

It is necessary to consider the smooth linkage of port-area roads with highways currently being planned in the hinterland.

(6) Realization of environmental protection measures

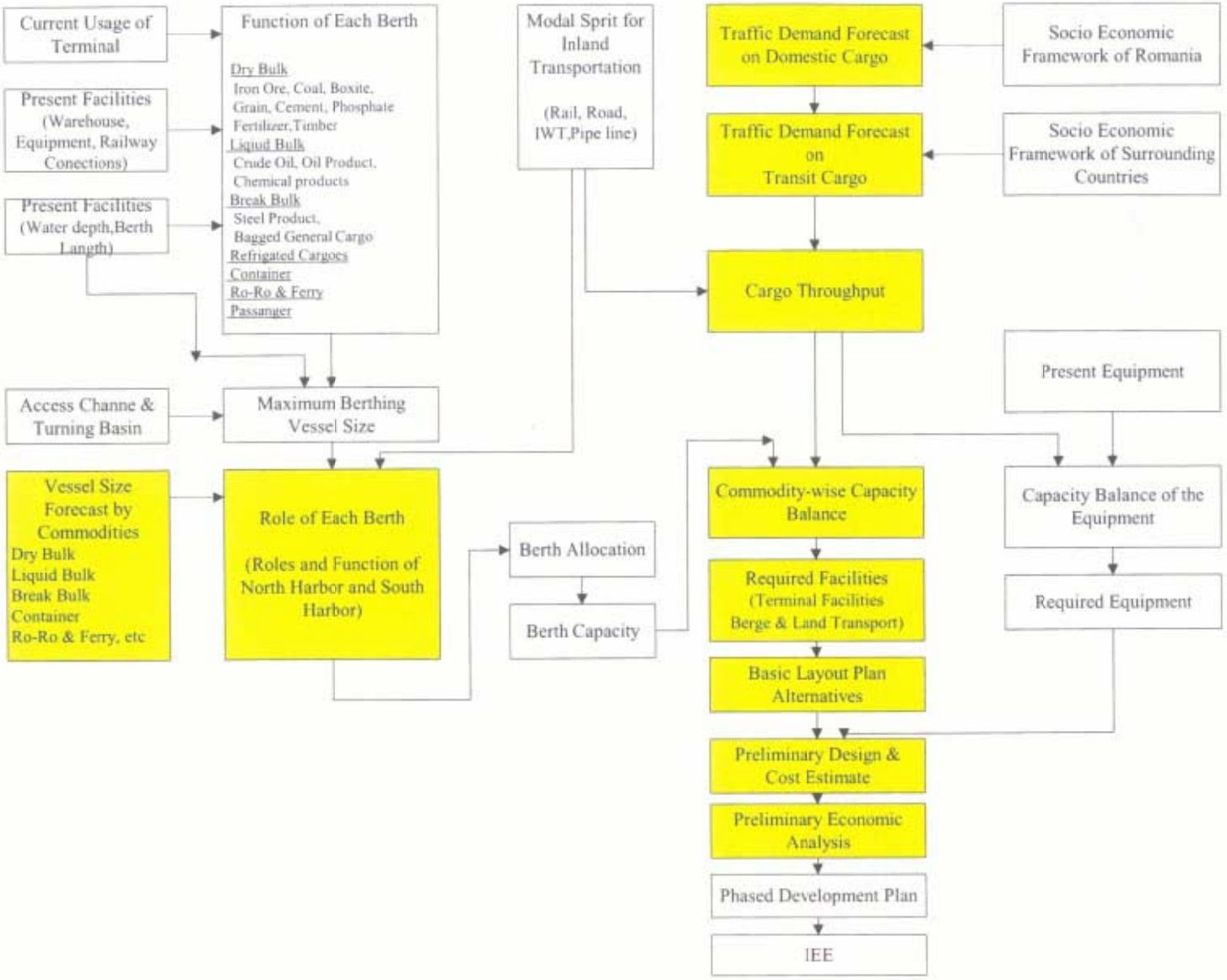
6. 1. 4 Scenario for the Formulation of New Master Plan

According to the CPA's official view, the current cargo handling capacity of the Port of Constantza as a whole is a huge 80 million tons, which appears sufficient to cope with the cargo demand expected in 2020. However, if individual cargo items are taken up, the capacity is not necessarily sufficient, as in the case of the container terminal whose handling capacity is insufficient in the face of rapidly growing cargo traffic and the grain terminal whose existing berths cannot cope with increasing ship sizes. Furthermore, if the realization of efficient cargo handling by the renewal of obsolete port facilities and the replacement of other facilities for smooth railway, road and inland water transport are

taken into consideration, expansion and modernization of facilities by 2020 are unavoidable. A scenario for the investigation of the New Master Plan in consideration of these requirements is shown in the flow chart (Fig. 6. 1. 2). Outline of the Scenario of the Study is listed below.

(1) Clarification of the usages of the existing berths and the accommodable maximum ship sizes in consideration of current berth specifications (water depth and length), dredging plan, waterfront facilities (dedicated loaders and unloaders, warehouses, cargo handling equipment and linkage with railways), access channel, turning basin, etc.
(2) Investigation of standard ship size by cargo type based on trends of marine transport
(3) Clarification of division of work between North Port and South Port and by each berth
(4) Forecast of traffic demand for export/import cargo and transit cargo based on the future socio-economic framework and industrial trends in Romania and neighboring countries
(5) Clarification of modal split for inland transport
(6) Clarification of berth allocation and handling capacity by cargo type
(7) Clarification of required facilities and equipment including terminal facilities and barge and land transport facilities in the port
(8) Drawing basic layout plan alternatives
(9) Preliminary design and cost estimate
(10) Preliminary economic analysis of the master plan projects
(11) Clarification of the phased development plan
(12) Clarification of the Initial Environment Evaluation

Fig. 6.1.2 Flow Chart for Formulating Master Plan targetted year of 2020



6. 1. 5 Acceptable ship size at existing berths

Table 6.1.2 shows the specifications (berth length, design depth, dredging plan and present depth) of each berth and the resulting physical or dimensional limitations which are necessary to determine acceptable ship sizes (max draft and LOA) at each berth. These limitations are determined by berth depth, berth length and turning basin size. Tables 6.1.3, 6.1.3 (1) and (2) also show superstructure and present usage of each berth.

6. 1. 6 Forecast of standard ship size by cargo type

Table 6.1.4 shows the average and maximum sizes of the ships by cargo type which currently use the Port of Constantza, and the sizes of ships which the Port is expected to receive in future, judging from the general trends of ships currently operating in the sea routes and regions served by the ships using the Port of Constantza, namely the standard ship sizes. Of these, special mention is made below regarding the standard ship sizes for major cargoes which will affect the New Master Plan.

(1) Grains

The average and maximum sizes of grain ships currently calling at the Port of Constantza are 9,500 DWT and 18,000 DWT, respectively. However, the sizes of grain ships calling at the regions to which grains are exported from the Port of Constantza, namely, countries in the Near and Middle East, North Africa and the Mediterranean region are mainly handy types ranging from 20,000 to 50,000 tons. Therefore, for 2020, handy type maximums (30,000 -50,000 DWT) are assumed to be the standard grain ship sizes for the Port of Constantza.

(2) Containers

The average and maximum sizes of container ships currently calling at the Port of Constantza are 13,000 DWT and 21,000 DWT (1,200 TEU), respectively. Taking into account the future traffic increase of container cargo at the Port of Constantza, growth of container terminals in countries around the Black Sea reflecting their economic development, and the increasing sizes of container ships, the Panamax types ranging from 40,000 DWT (3,000 TEU) to 50,000 DWT (4,000 TEU) are considered to be the standard size ships which will call at the Port of Constantza.

6. 1. 7 Inland Water Transport Cargoes transshipped at the Port of Constantza

Table 6.1.5 shows the amount of the inland water transport cargo (IWT) hauled by barge to the Port of Constantza from within Romania or third countries and that of IWT from the Port of Constantza to these regions, as well as their ratio to the entire marine transport cargoes. As the Table indicates, the ratio of barge transport to inland is high for bulk cargoes such as grains, iron ore, non-ferrous ores, coal and coke, cement and steel products. Crude oil and petroleum products are transported inland by pipeline.

6. 1. 8 Roles of North and South Ports and Function of Each Berth

Considering aforementioned factors, the roles of North and South Ports and function of each berth are outlined below.

【South Port Area】

(1) Grain terminal

Taking into account the aforementioned grain ship standard size, greater transport ratio from inland by IWT, aggregation effect with Silotrans's grain terminal, etc., it is desirable to locate the grain terminal at South Port Pier S-1 where a maximum draft of 12 m can be accommodated.

(2) Container terminal

Taking into account the aforementioned container ship standard size, aggregation effect with the container terminal currently under development, etc., it is desirable to locate the container terminal at South Port Pier S-2 where a maximum draft of 14 m can be accommodated.

(3) Steel product export terminal

Regarding the steel products which at present are being handled in small lots by operators at their respective berths, it is necessary to realize efficient cargo handling by aggregating handling berths as much as possible and introducing efficient cargo handling systems and machinery. Especially considering that most steel products are hauled by barge from inland to the Port of Constantza, that sufficient yard space is necessary and that the possibility is high that in future 50,000 DWT-class handy max type ships will be used, it is

desirable to locate the steel product export terminal at South Port Pier S-1 or Basin Nos. 8-9 (Berth Nos. 56-60) where a draft of 12 m can be accommodated.

【North Port Area】

(4) Bulk cargo terminal

Regarding the bulk cargo terminal for iron ore, crude oil and petroleum products, cement, fertilizers, etc., it is proposed that the berths which currently handle respective items be continued to be used in consideration of the existing special cargo handling equipment, storage facilities and the linkage with railways.

(5) Terminal for cargoes such as timber which are not containerized

Regarding timber which operators currently handle in small lots at their respective berths, it is necessary to realize efficient cargo handling by aggregating handling berths as much as possible and introducing efficient cargo handling systems and machinery. Especially with regard to timber for export, it is desirable to locate the terminal at North Port Basin Nos. 7-8 (Berth Nos. 46-50) and Basin Nos. 8-9 (Berth Nos. 56-60) where sufficient yard space is available.

(6)General cargo terminal

In the future, the general cargo terminal needs to be able to accommodate 10,000 DWT (8.5 m draft)- to 15,000 DWT (9.5 m draft)-class ships. Most terminals which currently handle general cargo meet this condition. However, the New Master Plan will be drawn up on the assumption that berths of Basin Nos. 1-2 can not be used for cargo handling due to their insufficient depth and extremely limited the back-up area.

Table 6.1.2 Physical Limitation of Berths

Basin No.	Berth	Length (m)	Number of Berth	Design Depth (m)	Dredging Plan (m)	Present Depth (m)	Phyisical Limitation Length (m)	Depth-1 (m)	Depth-2 (m)	Typical Usage	Operator
1	Passenger	296	1	13.5	13.5	12.3	250	12.3	11.2		
	RoRo-5	99	1	13.5	13.5	6.8	80	12.3	6.2	Ro-Ro	
	RoRo-4	364	1	13.5	13.5	8.7	200	12.3	7.9		
	RoRo-3	91	1	13.5	13.5	10.9	80	12.3	9.9		
	RoRo-2	104	1	11.5	9	8.7	90	8.2	7.9		
	1-5	600	5	11.5	11.5	10.0	200	10.5	9.1	General Cargo	Dezrobirea
	6-7	199	2	11.5	11.5	10.0	180	10.5	9.1		Dezrobirea
2	8	130	1	11.5	9	8.1	110	8.2	7.4		Phoenix
	9-10	168	2	11.5	9	6.6	180	8.2	6.0	(Technical Vessels)	
	11-12	279	2	8.3	8.3	7.4	180	7.5	6.7	General Cargo(Refrigerated products)	Dezrobirea
	13-16	488	4	8.3	8.3	7.4	180	7.5	6.7	General Cargo	Dezrobirea
	17-18	224	2	8.3	8.3	6.7	180	7.5	6.1	Cereal	Agroexport
	19	128	1	8.3	8.3	7.0	180	7.5	6.4	Edible Oil & Molasses	Frial/Agroexprt
	20	125	1	8.3	8.3	7.0	180	7.5	6.4	General Cargo	Dezrobirea
	21	125	1	8.3	8.3	7.0	180	7.5	6.4	General Cargo(Edible Oil & Molasses)	Dezrobirea
	22	98	1	8.3	8.3	7.3	90	7.5	6.6	General Cargo	Phoenix
3	23	141	1	8.3	8.3	7.3	200	7.5	6.6	General Cargo(Cement Bag)	Decirom
	24	137	1	8.3	8.3	8.1	200	7.5	7.4	Cereal	Agroexport
3-5										<Shipyard>	SNC
6	30	131	1	11.5	11.5	8.7	120	10.5	7.9	<Shipyard>	SNC
	31-33	674	3	11.5	11.5	10.1	200	10.5	9.2	Cereal	Agroexport
	34	197	1	11.5	11.5	9.7	140	10.5	8.8	(Not for Cargo)	Petromar
	35-37	624	3	11.5	11.5	10.3	200	10.5	9.4	General Cargo	Socep
	38	206	1	11.5	11.5	10.4	200	10.5	9.5	General Cargo(Equipment)	Umex
	39	200	1	13.5	13.5	10.6	180	12.3	9.6	Container	Umex
7	40	205	1	13.5	13.5	10.5	250	12.3	9.5	General Cargo(Equipment)	Umex
	41-43	625	3	13.5	13.5	10.5	250	12.3	9.5	General Cargo	Socep
	44	220	1	13.5	13.5	10.5	160	12.3	9.5	General Cargo(Equipment)	Umex
	45-46	448	2	13.5	13.5	10.5	250	12.3	12.3	General Cargo(Metal products)	Minmetal
	47-48	460	2	13.5	13.5	10.5	250	12.3	9.5	General Cargo (Cement)	Decirom
8	49-50	464	2	13.5	13.5	8.9	250	12.3	8.1		Decirom
	51	235	1	13.5	13.5	10.5	250	12.3	9.5	Container	Socep
	52	241	1	13.5	13.5	10.1	250	12.3	9.2	Container	Socep
	53	220	1	13.5	13.5	8.7	160	12.3	7.9	General Cargo(Refrigerated good)	Frial
	54-57	936	4	13.5	13.5	9.7	250	12.3	8.8	General Cargo(Chemical Products)	Chimpex
	58	181	1	13.5	13.5	9.5	160	12.3	8.6		Chimpex
9	59-60	463	2	13.5	13.5	10.5	250	12.3	9.5		Chimpex
	61-62	468	2	11.5	11.5	9.9	250	10.5	9.0	Bulk(Chemical Products)	Chimpex
	63	220	1	11.5	11.5	9.6	160	10.5	8.7		Chimpex
	64-65	430	2	11.5	11.5	9.0	250	10.5	8.2	Bulk(Ore, coal, coke, bauxite)	Minmetal
	66-67	430	2	13.5	13.5	9.0	250	12.3	8.2		Minmetal
	68	208	1	13.5	13.5	10.6	250	12.3	9.6	Bulk(Cement)	Sicim
10	69	327	1	13.5	13.5	11.6	250	12.3	10.5	Crude oil & oil product	Oil Terminal
	70	327	1	13.5	13.5	10.3	250	12.3	9.4		Oil Terminal
	71		1							(Not Operational)	Oil Terminal
11	72	327	1	13.5	13.5	12.1	250	12.3	11.0	Crude oil & oil product	Oil Terminal
	73	329	1	13.5	13.5	12.1	250	12.3	11.0		Oil Terminal
	74		1							(Not Operational)	Oil Terminal
12	75	326	1	14	14	12.2	250	12.7	11.1	Crude oil & oil product	Oil Terminal
	76	326	1	14	14	12.2	250	12.7	11.1		Oil Terminal
	77		1							(Not Operational)	Oil Terminal
	78	335	1	14	14	12.2	250	12.7	11.1	Bunkerage	Oil Terminal
1-South	79	405	1	19	19	17.8	300	17.3	16.2	Crude oil & oil product	Oil Terminal
	80-81	606	2	19	19	18.2	300	17.3	16.5	Ore, Coal, Coke	Comvex
	82	292	1	16.5	16.5	15.2	300	15.0	13.8		Comvex
	83-84	500	2	14.5	14.5	12.5	300	13.2	11.4		Comvex
	85	356	1	14.5	14.5	10.1	Barge	Barge	Barge	Ore, coal, coke(Berge)	Minmetal
	86-87		2				Barge	Barge	Barge	(Under construction)	
	88-89	380	2	9	9	6	Bargr	Bargr	Bargr	Barge Preparation	(Mast)
	90	191	1	9	7	6	Barge	Barge	Barge	For LPG Terminal	
River Maritime Basin	91-93	600	3	7	7	4.1	Barge	Barge	Barge		
	94-96	714	3	7	7	4.1	Barge	Barge	Barge	Ore, coal, coke (Barge Repair)	Comvex
	97-99	718	3	7	7	3.4	Barge	Barge	Barge		
	100-101	383	2	7	7	4.3	Barge	Barge	Barge	Cereal (Rail->Barge)	(Mast)
	102-103	389	2	7	7	6.3	Barge	Barge	Barge	Private Berth	Sargent
	104	180	1	7	7	4.5	Barge	Barge	Barge		Soya Plus
	105-107	330	3	9	7.2	6.2	300	6.5	5.6		Soya Plus
	108-109	295	2	9	7.2	6.6	300	6.5	6.0		Romtrans
	110-112	586	3	14.5	11.5	10.4	300	10.5	9.5	General cargo(Heavy, Metal)	Romtrans
	113	220	1	14.5	11.5	10.7	300	10.5	9.7	Bulk(Cereals)	Silotrans
	114	201	1	14.5	14.5	12.2	180 (Berge)	13.2	11.1		Silotrans
1S	115-118	904	4	14.5	14.5	12.6	300	13.2	11.5	General cargo (Steel product)	Romtrans
	119	307	1	14.5	14.5	10.7	270	13.2	9.7	Private Berth	FTZ/Mast
	120	227	1	14.5	14.5	11.2	200	13.2	10.2	Ferry-Boat	SNTFM
	121	214	1	14.5	14.5	12.7	300	13.2	11.5	Ro-Ro	MPAC
	122	214	1	14.5	14.5	13.9	300	13.2	12.6	For Container Terminal	Decirom
	123	212	1	14.5	14.5	13.9	300	13.2	12.6		
	124-125	441	2	16.5	16.5	14.0	300	15.0	12.7		Mast
2S,3S	126-130	1070	5	16.5	16.5	126,127=15.1		15.0			Mast(Berth129,130)
	131-137		7	16.5	16.5			15.0		Under construction	

Table 6.1.3 Berths' Superstructures

Basin No.	Berth	Length (m)	Number of Berth	Design Depth (m)	Dredging Plan (m)	Present Depth (m)	Super Structure & Equipment					Operator
							Railway Connection	Special facility	Warehouse	Open Storage	Equipment (Jib Type Crane)	
1	Passenger	296	1	13.5	13.5	12.3						
	RoRo-5	99	1	13.5	13.5	6.8						
	RoRo-4	364	1	13.5	13.5	8.7						
	RoRo-3	91	1	13.5	13.5	10.9						
	RoRo-2	104	1	11.5	9	8.7						
	1-5	600	5	11.5	11.5	10.0	Under Crane	-	-	Nallow	11	Dezrobirea
	6-7	199	2	11.5	11.5	10.0	Under Crane	-	1	Nallow	2	Dezrobirea
2	8	130	1	11.5	9	8.1	-	-	-	Nallow	-	Phoenix
	9-10	168	2	11.5	9	6.6	Under Crane	-	-	Nallow	-	
	11-12	279	2	8.3	8.3	7.4	Under Crane	-	1	Refrigated Warehouse	4	Dezrobirea
	13-16	488	4	8.3	8.3	7.4	Under Crane	-	5	-	6	Dezrobirea
	17-18	224	2	8.3	8.3	6.7	Under Crane	Belt Conveyor	Silo(3)	-	Grain Loader(5)	Agroexport
	19	128	1	8.3	8.3	7.0	Under Crane	Pipe Line	Tank	-	Edible oil loader	Frial/Agroexprt
	20	125	1	8.3	8.3	7.0	Under Crane	-	1	-	2	Dezrobirea
	21	125	1	8.3	8.3	7.0	Under Crane	-	-	-	3	Dezrobirea
	22	98	1	8.3	8.3	7.3	-	-	-	-	-	Phoenix
3	23	141	1	8.3	8.3	7.3	Under Crane	-	-	Nallow	4	Decirom
	24	137	1	8.3	8.3	8.1	Under Crane	Belt Conveyor	-	-	Grain Loader(2)	Agroexport
3-5												SNC
6	30	131	1	11.5	11.5	8.7						SNC
	31-33	674	3	11.5	11.5	10.1	Under Crane	-	-	-	Newmatic U/L(2)+6	Agroexport
	34	197	1	11.5	11.5	9.7						Petromar
	35-37	624	3	11.5	11.5	10.3	Under Crane	-	5	-	12	Socep
	38	206	1	11.5	11.5	10.4	Under Crane	-	-	○	3	Umex
	39	200	1	13.5	13.5	10.6	-	-	-	○	3	Umex
7	40	205	1	13.5	13.5	10.5	Under Crane	-	-	○	3	Umex
	41-43	625	3	13.5	13.5	10.5	Under Crane	-	5	-	12	Socep
	44	220	1	13.5	13.5	10.5	Backword	-	1	○	3	Umex
	45-46	448	2	13.5	13.5	10.5	Under Crane	-	-	○	5	Minmetal
	47-48	460	2	13.5	13.5	10.5	Under Crane	-	-	○	4	Decirom
8	49-50	464	2	13.5	13.5	8.9	Under Crane	-	-	○	11	Decirom
	51	235	1	13.5	13.5	10.5					Gantry Crane(1)	Socep
	52	241	1	13.5	13.5	10.1					Gantry Crane(1)	Socep
	53	220	1	13.5	13.5	8.7	Backword	-	Refrigated Warehouse		3	Frial
	54-57	936	4	13.5	13.5	9.7	Under Crane	-	5	-	14	Chimpex
	58	181	1	13.5	13.5	9.5	-	-	-	Nallow	3	Chimpex
9	59-60	463	2	13.5	13.5	10.5		-	2	-	2	Chimpex
	61-62	468	2	11.5	11.5	9.9	Under Crane	Phosfate Silo	3	-	Phosfate Unloader (3)	Chimpex
	63	220	1	11.5	11.5	9.6	Backword	-	1	-	Bulk Fertilizer Loader(2)	Chimpex
	64-65	430	2	11.5	11.5	9.0	Under Crane	Yard Facilities	-	○	Gantry Type Unloader(3)	Minmetal
	66-67	430	2	13.5	13.5	9.0	Under Crane	Yard Facilities	-	○	Gantry Type Unloader(3)	Minmetal
	68	208	1	13.5	13.5	10.6	Under Crane	Cement Cilo	Cement Warehouse	-	Bulk Cement Loader(3)	Sicim
10	69	327	1	13.5	13.5	11.6						Oil Terminal
	70	327	1	13.5	13.5	10.3						Oil Terminal
	71		1									Oil Terminal
11	72	327	1	13.5	13.5	12.1						Oil Terminal
	73	329	1	13.5	13.5	12.1						Oil Terminal
	74		1									Oil Terminal
12	75	326	1	14	14	12.2						Oil Terminal
	76	326	1	14	14	12.2						Oil Terminal
	77		1									Oil Terminal
	78	335	1	14	14	12.2						Oil Terminal
1-South	79	405	1	19	19	17.8						Oil Terminal
	80-81	606	2	19	19	18.2						Comvex
	82	292	1	16.5	16.5	15.2						Comvex
	83-84	500	2	14.5	14.5	12.5						Comvex
	85	356	1	14.5	14.5	10.1						Minmetal
	86-87		2									
	88-89	380	2	9	9	6						(Mast)
	90	191	1	9	7	6						
River Maritime Basin	91-93	600	3	7	7	4.1						
	94-96	714	3	7	7	4.1						Comvex
	97-99	718	3	7	7	3.4						
	100-101	383	2	7	7	4.3						(Mast)
	102-103	389	2	7	7	6.3						Sargent
	104	180	1	7	7	4.5						Soya Plus
	105-107	330	3	9	7.2	6.2						Soya Plus
	108-109	295	2	9	7.2	6.6	Backword	-	1	-	3	Romtrans
	110-112	586	3	14.5	11.5	10.4	Backword	-	1	-	3	Romtrans
	113	220	1	14.5	11.5	10.7	Backword	Silo	-	-	Pneumatic Barge (1)	Silotrans
	114	201	1	14.5	14.5	12.2	Backword	Silo	-	-	Maritime Ship Loader (1)	Silotrans
1S	115-118	904	4	14.5	14.5	12.6	Backword	-	-	○	6	Romtrans
	119	307	1	14.5	14.5	10.7						FTZ/Mast
	120	227	1	14.5	14.5	11.2						SNTFM
	121	214	1	14.5	14.5	12.7						MPAC
	122	214	1	14.5	14.5	13.9						Decirom
	123	212	1	14.5	14.5	13.9						
	124-125	441	2	16.5	16.5	14.0						Mast
2S,3S	126-130	1070	5	16.5	16.5	126,127=15.1						Mast(Berth129,130)
	131-137		7	16.5	16.5							

Source: CPA, Constantza Port Handbook 2000-2001, etc

Table 6.1.3(1) Commodity-wise Berth Usage

Commodity		Detailed Item	Berth	Length (m)	Number of Berth	Design Depth (m)	Dredgin Plan (m)	Present Depth (m)	DB	BB	BB (Ref)	CO	LB	Export / Impor Export	Import
1	Cereals	Grain (Bulk,Export)	17-18	224	2	8.3	8.3	6.7	x					x	
		Barley (Bulk,Transit)	24	137	1	8.3	8.3	8.1	x					x	
		Rice (Bag, Import)	31-33	674	3	11.5	11.5	10.1		x					x
		Sugar (Bulk, Import)	113	220	1	14.5	11.5	10.7	x						x
			114	201	1	14.5	14.5	12.2							
2	Food, Beverages, Tobacco	Banana	11-12	279	2	8.3	8.3	7.4			x				x
		Onion	53	220	1	13.5	13.5	8.7			x				x
2-1	Edible Oil & Molasses	Urea Formaldehyde (liquid)	19	128	1	8.3	8.3	7.0					x	x	
4	Natural / Chemical Fertilizer	Phosphate (Bulk)	61-62	468	2	11.5	11.5	9.9	x						x
		Urea (Bulk)	63	220	1	11.5	11.5	9.6	x				x	x	
		Ammonium Sulfate (Bulk)							x					x	
		Ammonium Sulfate (Bag)								x				x	
5	Iron Ore	Iron Ore	64-65	430	2	11.5	11.5	9.0	x						x
			66-67	430	2	13.5	13.5	9.0							
6	Non-ferrous Ore	Bauxite	80-81	606	2	19	19	18.2	x						x
		Bentnite	82	292	1	16.5	16.5	15.2	x					x	
7	Solid Fuel (Coal Coke)	Petro Coke	83-84	500	2	14.5	14.5	12.5		x					x
8	Crude Oil	Crude Oil	69	327	1	13.5	13.5	11.6					x		x
9	Oil and Gas Product	Acrylonitorite (chemical)	70	327	1	13.5	13.5	10.3					x	x	
		Caustic Soda (chemical)	72	327	1	13.5	13.5	12.1					x	x	
		Methanol	73	329	1	13.5	13.5	12.1					x	x	
		Perclorate (chemical)	75	326	1	14	14	12.2					x	x	
		Tricloroethylene	76	326	1	14	14	12.2					x	x	
		Diesel Oil	78	335	1	14	14	12.2					x	x	
		Urea Formaldehyde (liquid)	79	405	1	19	19	17.8					x		
		Benzene											x	x	
11	Chalk, Cement, & Construction Materials	Cement (Bulk)	68	208	1	13.5	13.5	10.6	x					x	
		Clinker							x					x	
		Caoline							x						x
		Cement (Bag)	1-5	600	5	11.5	11.5	10.0		x				x	
		Sodium Sulfate(Bag)	6-7	199	2	11.5	11.5	10.0		x					x
		Barium	8	130	1	11.5	9	8.1		x					x
10	Chemical Product	Soda (Bag)	13-16	488	4	8.3	8.3	7.4		x				x	
		Caustic Soda (Bag)	20	125	1	8.3	8.3	7.0		x				x	
		Nitrogenous	21	125	1	8.3	8.3	7.0		x				x	
		Calcium Carbide(Bag)	22	98	1	8.3	8.3	7.3		x				x	
		Chemical Product (Bag)	23	141	1	8.3	8.3	7.3		x				x	
		Caustic Soda (Bag)	35-37	624	3	11.5	11.5	10.3		x				x	
			38	206	1	11.5	11.5	10.4		x				x	
3	Timber, Charcoal	Timber	39	200	1	13.5	13.5	10.6		x				x	
5	Scrap	Scrap	40	205	1	13.5	13.5	10.5		x				x	
12	Ferrous / Non-ferrous Metals	Ferrous Metal	41-43	625	3	13.5	13.5	10.5		x				x	
		Nonferrous Metal	44	220	1	13.5	13.5	10.5		x				x	
		Steel Product (Pipe)	45-46	448	2	13.5	13.5	10.5		x				x	
		Steel Product (Tube)	47-48	460	2	13.5	13.5	10.5		x				x	
		Steel Product (Coil)	49-50	464	2	13.5	13.5	8.9		x				x	
		Steel Product (Plate)	54-57	936	4	13.5	13.5	9.7		x				x	
		Steel Product (Shape)	58	181	1	13.5	13.5	9.5		x				x	
		Steel Billet	59-60	463	2	13.5	13.5	10.5		x				x	
		Aluminum Product	108-109	295	2	9	7.2	6.6		x				x	
		Zinc Ingot	110-112	586	3	14.5	11.5	10.4		x				x	
		Ammonium Ingot	115-118	904	4	14.5	14.5	12.6		x				x	
		Lead Concentrate								x				x	
		Copper								x				x	
		Zinc Concentrate								x				x	
		Manganese								x					x
13	Various Manufactured Products	Tractor								x				x	
14	Other Cargoes	Paper (Roll & Pack)								x				x	
		Melamine								x					x
		Equipment								x				x	
		Tire								x					x
15	Container	Container	51	235	1	13.5	13.5	10.5				x		x	x
			52	241	1	13.5	13.5	10.1							
			122	214	1	14.5	14.5	13.9							
			123	212	1	14.5	14.5	13.9							
16	Railway / Road Ferry		120	227	1	14.5	14.5	11.2							
17	Ro-Ro		RoRo-5	99	1	13.5	13.5	6.8							
			RoRo-4	364	1	13.5	13.5	8.7							
			RoRo-3	91	1	13.5	13.5	10.9							
			RoRo-2	104	1	11.5	9	8.7							
			121	214	1	14.5	14.5	12.7							
18	Passanger		Passenger	296	1	13.5	13.5	12.3							

Table 6.1.3(2) Usage of Berths

Basin No.	Berth	Length (m)	Number of Berth	Typical Usage	Actual Usage (September-October, 2000)	Operator
1	Passenger	296	1			
	RoRo-5	99	1	Ro-Ro		
	RoRo-4	364	1			
	RoRo-3	91	1			
	RoRo-2	104	1			
	1-5	600	5	**General Cargo**	Scrap	Dezrobirea
	6-7	199	2		Banana (D), Timber	Dezrobirea
2	8	130	1		Timber, Paper Roll, Melamine(D)	Phoenix
	9-10	168	2	(Technical Vessels)		
	11-12	279	2	**General Cargo(Refrigerated products)**	PVC	Dezrobirea
	13-16	488	4	**General Cargo**	Timber, Caustic Soda, Soda (Bag)	Dezrobirea
	17-18	224	2	Cereal	Grain, Barley	Agroexport
	19	128	1	Edible Oil & Molasses	Urea Formaldehyde	Frial/Agroexprt
	20	125	1	**General Cargo**		Dezrobirea
	21	125	1	**General Cargo(Edible Oil & Molasses)**	Nitrogenous (Chemical), Timber, Rice (D), Metal prod.	Dezrobirea
	22	98	1	**General Cargo**	Nitrogenous (Chemical), Timber	Phoenix
3	23	141	1	**General Cargo(Cement Bag)**	Timber, Soda (Bag), Paper Roll, Rice(D)	Decirom
	24	137	1	Cereal	Grain, Barley	Agroexport
3-5				<Shipyard>		SNC
6	30	131	1	<Shipyard>		SNC
	31-33	674	3	Cereal	Barley, Sugar (D)	Agroexport
	34	197	1	(Not for Cargo)		Petromar
	35-37	624	3	**General Cargo**	Timber, Scrap, Steel Pipe/Tube/Bar, Zinc Ingot, Aluminum Paper Roll, Suger(D), Urea(Bag), Soda(Bag), Nitrogenous (Chemical), Calcium Carbide, Sunflower Suger, Urea, Soda	Socep
	38	206	1	**General Cargo(Equipment)**	Equipment, Ferros & nonferros Prod. ,Scrap, Tire(D), Timber	Umex
	39	200	1	Container	Container (D/L), Timber	Umex
7	40	205	1	**General Cargo(Equipment)**	Equipment, Scrap, Nonferrous Ore(D), Timber, Rice(D)	Umex
	41-43	625	3	**General Cargo**	Timber, Scrap, Steel Roll, Steel Pipe/Tube/Bar, Tire(D), Petro Coke Paper Roll, Urea (Bag), Soda (Bag), Sodium Sulfate(D) Nitrogenous (Chemical), Calcium Carbide, Urea, Soda	Socep
	44	220	1	**General Cargo(Equipment)**	Equipment, Steel pipe/Bar, Ferros/Nonferros Metal, Barium(D), Rice(D)	Umex
	45-46	448	2	**General Cargo(Metal products)**	Almi Ingot, Timber, Ferros/Nonferros Metal, Steel Pipe, Soda(Bag),	Minmetal
	47-48	460	2	**General Cargo (Cement, building material)**	Timber, Paper Roll, Ferros/Nonferros Metal, Steel Bar, Cement(Bag), Scrap	Decirom
8	49-50	464	2		Timber, Steel pipe, Calcium Carbide, Scrap, Cement(Bag), Paper Roll, Rice(D)	Decirom
	51	235	1	Container	Container(D/L)	Socep
	52	241	1	Container	Container(D/IL)	Socep
	53	220	1	**General Cargo(Refrigerated good)**	Onion(D), Rice(D), Banana(D), Timber, Bentonite,	Frial
	54-57	936	4	**General Cargo(Chemical Products)**	Almi Ingot, Timber, Almina(D), Almina(Bulk) Urea(Bag), Chemical Products, Calcium Carbide, Sodium sulfate, Nitrogenous	Chimpex
	58	181	1		Scrap	Chimpex
9	59-60	463	2		Chemical products, Ferros/Nonferros Products, Ammonium Sulfate(Bulk), Sodium Sulfate	Chimpex
	61-62	468	2	Bulk(Chemical Products)	Phosphate(D)	Chimpex
	63	220	1		Urea(Bulk)	Chimpex
	64-65	430	2	Bulk(Ore, coal, coke, bauxite)	Bauxite(Bulk), Steel Coil, Ferros/Nonferros Products,	Minmetal
	66-67	430	2		Bauxite(Bulk), Steel Coil, Ferros/Nonferros Products,	Minmetal
	68	208	1	Bulk(Cement)	Cement(Bulk), Clinker(Bulk), Cement(Bag)	Sicim
10	69	327	1	Crude oil & oil product	Petro/Gas products, Acrylonitorite, Caustic Soda, Methanol, Urea(Liquid), Perclorate, Tricloethylene	Oil Terminal
	70	327	1		Diesel Oil, Urea(Liquid), Benzene, Methanol	Oil Terminal
	71		1	(Not Operational)		Oil Terminal
11	72	327	1	Crude oil & oil product	Diesel Oil, Urea(Liquid), Benzene, Methanol	Oil Terminal
	73	329	1		Benzene, Diesel oil	Oil Terminal
	74		1	(Not Operational)		Oil Terminal
12	75	326	1	Crude oil & oil product	Benzene	Oil Terminal
	76	326	1		Fuel, Titei(?)	Oil Terminal
	77		1	(Not Operational)		Oil Terminal
	78	335	1	Bunkerage	Bunkerage	Oil Terminal
1-South	79	405	1	Crude oil & oil product	Crude Oil	Oil Terminal
	80-81	606	2	Ore, Coal, Coke	Iron Ore(Bulk)(#80), Bauxite(Bulk)(#81)	Comvex
	82	292	1		Bauxite(Bulk)	Comvex
	83-84	500	2		Bauxite(Bulk)	Comvex
	85	356	1	Ore, coal, coke(Berge)	Barge Loading Berth	Minmetal
	86-87		2	(Under construction)	Barge Loading Berth	
	88-89	380	2	Barge Preparation	Barge Loading Berth	(Mast)
	90	191	1	For LPG Terminal	Garge Loading Berth	
River Maritime Basin	91-93	600	3		Garge Loading Berth	
	94-96	714	3	Ore, coal, coke (Barge Repair)	Barge Loading Berth	Comvex
	97-99	718	3		Barge Loading Berth	
	100-101	383	2	Cereal (Rail->Barge)		(Mast)
	102-103	389	2	Private Berth	Bitumen	Sargent
	104	180	1		Cereals (Import, Processing)	Soya Plus
	105-107	330	3		Cereals (Import, Processing)	Soya Plus
	108-109	295	2	**General cargo(Heavy, Metal)**	Timber, Bentonite, Zinc Ingot, Almina, Phosfate	Romtrans
	110-112	586	3		Timber, Steel pipe, Lead Concentrate, Zinc Ingot, Paper Roll, Ferros/Nonferros Products, Steel Coil/Pipe, Copper, Scrap,	Romtrans
	113	220	1	Bulk(Cereals)	Barley(D), Phosphate, Aluminum Ingot Steel pipe, Equipment	Silotrans
	114	201	1		Barley(D), Grain, Steel Pipe	Silotrans
1S	115-118	904	4	**General cargo (Steel product)**	Almina Timber, Steel Pipe/Coil, Lead/Zinc/Copper Concentrate, Almina(Bulk), Ferros/Nonferros Products, Scrap, Equipment, Tractor	Romtrans
	119	307	1	Private Berth	Fresh Chicken(Chicken Processing)	FTZ/Mast
	120	227	1	Ferry-Boat	Vehicle	SNTFM
	121	214	1	Ro-Ro		MPAC
	122	214	1	For Container Terminal	Building Materials, cement	Decirom
	123	212	1			
	124-125	441	2		Cement(Bulk), Grain, Steel Coil	Mast
2S,3S	126-130	1070	5			Mast(Berth129,130)
	131-137		7	Under construction		

Source: CPA, Constantza Port Handbook 2000-2001, etc

Table 8.1.4 Vessel Size Forecast (Standard Vessel Size to be called on the Port of Constantza)

			Present Calling Vessel Size		Year 2010	Year 2020			
			Average (DWT)	Max (DWT)	Max (DWT)	Max (DWT)			
1	Cereals	B	9,500	18,000	30,000	50,000	Export	1	Cereals
3	Iron Ore	B	160,000	180,000	150,000	150,000	Import	9	Iron Ore (Import)
3	Non Ferrous Ore (Bauxite,Zinc Concentrate,etc.)	B	40,000	75,000	80,000	80,000	Import	10	Nonferrous Ore
4	Solid Fuels (Coa,l Coke,etc)	B			100,000	100,000	Import	13	Solid Fuels
5	Crude Oil	LB	22,000	170,000	150,000	150,000	Import	14	Crude Oil
5	Petroreum Prodduct	LB	13,000	90,000	100,000	100,000	Ex/Im	15	Oil & Gas Products
(14)	Chemical products (Liquid Cargo)	LB	7,500	40,000	50,000	50,000	Export	17	Chemical Products
7	Phosphate	B	11,000	20,000	30,000	30,000	Import	7	Natural & Chemical Fertilizer
8	Chemical Fertilizer	B	5,000	20,000	30,000	30,000	Export	7	Natural & Chemical Fertilizer
9	Cemenrt	DB	18,000	45,000	50,000	50,000	Export	18	Cemenrt, Chark, construction Materials
(9)	Cemenrt	BB	17,000	45,000	15,000	15,000	Export	18	Cemenrt, Chark, construction Materials
10	Scrap	BB	6,000	45,000	15,000	15,000	Export	9	Iron Ore (Export)
11	Steel producs	BB	11,000	45,000	50,000	50,000	Export	20	Ferrous / Non-ferrous Materials
12	Non Ferros Metel Products	BB	5,500	40,000	50,000	50,000	Export	20	Ferrous / Non-ferrous Materials
13	General Cargo(Tinber)	BB	3,500	12,000	15,000	15,000	Export	6	Timber, Charcoal
(3)	Non Ferrous Ore (Bauxite,Zinc Concentrate,etc.)	BB	5,000	15,000	15,000	15,000	Import	10	Nonferrous Ore
14	General Cargo (Chemical products)	BB	5,000	15,000	15,000	15,000	Export	17	Chemical Products
8	Chemical Fertilizer	BB	5,000	9,000	15,000	15,000	Export	7	Natural & Chemical Fertilizer
15	General Cargo (Various Manufactured Products)	BB	5,000	15,000	15,000	15,000	Export	23	Various Manufactured Products
16	General Cargo (Other Cargoes)	BB	5,000	15,000	15,000	15,000	Export	24	Other Cargoes (2,3,5,8,11,12,16,19,21,22)
17	General Cargo (Other Cargoes)	BB	5,000	15,000	15,000	15,000	Ex/Im	4	Food Veverages Tobbaco
18	Container	CO	13,000	21,000 (1,200TEU)	40,000 (3,000TEU)	60,000 (4,000TEU)	Ex/Im	4 23 24	Food Veverages Tobbaco Various Manufactured Products Other Cargoes (2,3,5,8,11,12,16,19,21,22)

Table 6.1.5 Inland Waterway Transportation Volume and Proportion to Maritime Transport

	Cargo Classification	Throughput by Inland Waterway Transport (Ton)					Ratio to Total Maritime Throughput				Ratio of IWT Cargo Volume	
											to Total	to Domestic
		1996	1997	1998	1999	Total	1996	1997	1998	1999	IWT	IWT
1	Cereals	841,125	359,212	1,215,578	665,342	3,081,257	50%	50%	92%	38%	50%	30%
2	Fruits and Vegetables	0	0	0	0	0						
3	Livestock,Sugar cane	0	0	0	0	0						
4	Foods, Beverages,Tobacco,Fodder	87,984	9,031	35,866	70,119	203,000	11%	2%	5%	11%		
5	Seeds, Edible oils, Fats	0	7,645	27,393	116,517	151,555	0%	3%	23%	40%		
6	Timber, fire wood	1,320	2,201	1,750	8,918	14,189	0%	0%	0%	1%		
7	Natural and chemical fertilizers	21,488	147,756	149,802	86,074	405,120	1%	9%	18%	8%		
8	Mineral rough products(quarry)	5,420	45,723	40,619	45,235	136,997						
9	Iron ore, Scrap	4,980,868	4,848,147	5,175,700	3,831,502	18,836,217	98%	94%	91%	79%	90%	75%
10	Non metal ore	841,926	683,942	547,117	706,249	2,779,234	73%	61%	56%	59%	60%	25%
11	Textile, Fablics,Hides, Furs	0	3,000	0	0	3,000						
12	Paste, recycled paper	4,742	492	0	0	5,234						
13	Solid fuel, (coal, coke, etc)	1,991,900	2,800,671	2,415,224	1,688,433	8,896,228	60%	69%	89%	92%	70%	60%
14	Crude Oil	0	14,569	0	54,546	69,115	0%	0%	0%	2%		
15	Gas and Oil Products	0	58,336	43,869	133,250	235,455	0%	1%	1%	6%		
16	Coal and Natural Gas Tars	0	11,063	31,362	4,813	47,238						
17	Chemical Products	49,760	11,759	15,516	550	77,585	6%	1%	2%	0%		
18	Chalk, cement, construction materials	260,000	433,272	549,950	742,748	1,985,970	14%	21%	32%	41%	30%	30%
19	Glass, ceramic products	802	0	6,000	0	6,802	3%	0%	29%	0%		
20	Iron / Non Iron Metals	230,718	571,033	588,336	803,454	2,193,541	19%	28%	35%	55%	30%	30%
21	Metal Fabricated Products	24,608	163,943	136,351	222,179	547,081	15%	137%	91%	168%		
22	Cars, transport materials	702	1,818	4,763	40	7,323	1%	2%	7%	0%		
23	Various Products, fabric	10,006	1,164	1,751	8	12,929	1%	0%	0%	0%		
24	Other Products	25,936	2,005	2,119	71,967	102,027	22%	2%	1%	34%		
25	Totals	9,379,305	10,176,782	10,989,066	9,251,944	39,797,097	27%	32%	38%	40%		

6.2 Optimum Cargo Handling System by Commodities and Requirement for Port Development

6.2.1 Introduction

This section deals with the required cargo handling capacity for each commodity.

Through cargo demand forecast described in previous chapter, Table 6.2.1(a) to Table 6.2.1(d) summarize the demand forecast by commodity and by type of cargoes. Type of cargoes is divided into four types, namely, Dry Bulk, Break Bulk, Liquid Bulk and Container. Each type of cargoes include following commodities.

Dry Bulk;	Cereals
	Ore/Coal/Cokes
	Phosphate/Fertilizer
	Cement (Bulk)
Break Bulk	Bag (Non-ferrous ore, Chemical products, Chemical fertilizer, Cement)
	Scrap
	Metal products
	Timber
	Foods, Beverages, Tobaccos
	Other general cargo
Liquid Bulk	Crude oil
	Petroleum products
	Chemical products (Liquid)
Container	

From these tables we can say that;

1) Constantza Port has a function as an industrial port which imports raw materials such as crude oil, iron ore, cokes and coal, and this is not expected to change rapidly.

2) Container cargo volume will steadily increase, reaching 790,000 TEUs in 2020 in demand forecast Case 1, and 580,000 TEUs in demand forecast Case 2.

3) Major differences between demand forecasts Case-1 and Case-2 come from Container, Cereal, Crude Oil and Petroleum Products and Ores.

Table 6.2.1(a) Summary of Demand Forecast (2020 Case-1)

Type	Commodity			2020 case-1						
				Loading			Unloading			**Total**
				Export	Transit	**Total**	Import	Transit	**Total**	
				(Million tons or 1000 TEUs)						
	(Dry Bulk)									
1	**Cereals**	**B**		**2.640**	**3.840**	**6.480**	**0.100**	**0.100**	**0.200**	**6.680**
2	Iron Ore	B					9.300		**9.300**	**9.300**
3	Non-ferros ore (Bulk)	B					0.808	0.128	**0.936**	**0.936**
4	Solid Fuels (Coal, Coke etc)	B					2.550		**2.550**	**2.550**
2-4	**Ore/Coal (Sub Total)**	**B**					**12.658**		**12.786**	**12.786**
5	Phosphate	B					0.496		**0.496**	**0.496**
6	Chemical Fertilizer (Bulk)	B		0.133		**0.133**	0.744		**0.744**	**0.877**
5-6	**Phosphate/Fertilizer(Sub Total)**	**B**		**0.133**		**0.133**	**1.240**		**1.240**	**1.373**
7	**Cement (Bulk)**	**B**		**0.448**		**0.448**				**0.448**
1-7	**Dry Bulk Total**	**B**		**3.221**	**3.840**	**7.061**	**13.998**	**0.100**	**14.226**	**21.287**
	(Break Bulk)									
8	Non-ferros ore (Bag)	BB					0.188	0.032	**0.220**	**0.220**
9	Chemical Products (Bag)	BB		0.180		**0.180**				**0.180**
10	Chemical Fertilizer (Bag)	BB		0.057		**0.057**				**0.057**
11	Cement (Bag)	BB		0.192		**0.192**				**0.192**
8-11	**Bag (Sub Total)**	**BB**		**0.429**		**0.429**	**0.188**	**0.032**	**0.220**	**0.649**
12	**Scrap**	**BB**		**0.340**		**0.340**				**0.340**
13	Steel Products	BB		1.800		**1.800**				**1.800**
14	Non Ferros Metal Products	BB		0.200		**0.200**				**0.200**
13-14	**Metal Products (Sub Total)**	**BB**		**2.000**		**2.000**				**2.000**
15	**Timber**	**BB**		**0.680**		**0.680**				**0.680**
16	**General Cargo (Foods, Beverages, Tobaccos)**	**BB**		**0.050**		**0.050**	**0.167**		**0.167**	**0.217**
17	**General Cargo (other)**	**BB**		**0.349**		**0.349**	**0.159**		**0.159**	**0.508**
8-17	**Break Bulk Total**	**BB**		**3.848**		**3.848**	**0.514**	**0.032**	**0.546**	**4.394**
	(Liquid Bulk)									
18	Crude Oil	LB					16.400	0.460	**16.860**	**16.860**
19	Petroleum Products	LB		1.570		**1.570**	2.470		**2.470**	**4.040**
20	Chemical Products (Liquid)	LB		0.180		**0.180**				**0.180**
18-20	**Liquid Bulk Total**	**LB**		**1.750**		**1.750**	**18.870**	**0.460**	**19.330**	**21.080**
1-20	**Bulk Total (Million tons)**			**8.819**	**3.840**	**12.659**	**33.382**	**0.592**	**34.102**	**46.761**
	(Container)									
21	General Cargo (Food products, Beverage, Tobacc	CO		0.360	0.090	**0.450**	1.273	0.230	**1.503**	**1.953**
22	General Cargo (other)	CO		2.628	0.513	**3.141**	1.211	0.220	**1.431**	**4.572**
21-22	**Container Total (Million tons)**	**CO**		**2.988**	**0.603**	**3.591**	**2.484**	**0.450**	**2.934**	**6.525**
	Laden Container (1000 TEUs)	CO		**299**	**60**	**359**	**248**	**45**	**293**	**653**
	Empty Container (1000 TEUs)	CO		**30**	**6**	**36**	**81**	**21**	**102**	**138**
	Container Total (1000 TEUs)	**CO**		**329**	**66**	**395**	**329**	**66**	**395**	**790**
1-22	**Grand Total (Million tons)**			**11.807**	**4.443**	**16.250**	**35.866**	**1.042**	**37.036**	**53.286**

Table 6.2.1(b) Summary of Demand Forecast (2020 Case-2)

Type	Commodity			2020 case-2						
				Loading			Unloading			Total
				Export	Transit	Total	Import	Transit	Total	
				(Million tons or 1000 TEUs)						
	(Dry Bulk)									
1	Cereals	B		1.500	0.500	2.000	0.380	0.130	0.510	2.510
2	Iron Ore	B					7.850		7.850	7.850
3	Non-ferros ore (Bulk)	B					0.672	0.104	0.776	0.776
4	Solid Fuels (Coal, Coke etc)	B					2.100		2.100	2.100
2-4	Ore/Coal (Sub Total)	B					10.622		10.726	10.726
5	Phosphate	B					0.324		0.324	0.324
6	Chemical Fertilizer (Bulk)	B		0.210		0.210	0.486		0.486	0.696
5-6	Phosphate/Fertilizer(Sub Total)	B		0.210		0.210	0.810		0.810	1.020
7	Cement (Bulk)	B		0.658		0.658				0.658
1-7	Dry Bulk Total	B		2.368	0.500	2.868	11.812	0.130	12.046	14.914
	(Break Bulk)									
8	Non-ferros ore (Bag)	BB					0.168	0.026	0.194	0.194
9	Chemical Products (Bag)	BB		0.260		0.260				0.260
10	Chemical Fertilizer (Bag)	BB		0.090		0.090				0.090
11	Cement (Bag)	BB		0.282		0.282				0.282
8-11	Bag (Sub Total)	BB		0.632		0.632	0.168	0.026	0.194	0.826
12	Scrap	BB		0.340		0.340				0.340
13	Steel Products	BB		1.800		1.800				1.800
14	Non Ferros Metal Products	BB		0.200		0.200				0.200
13+14	Metal Products (Sub Total)	BB		2.000		2.000				2.000
15	Timber	BB		0.680		0.680				0.680
16	General Cargo (Foods, Beverages, Tobaccos)	BB		0.037		0.037	0.122		0.122	0.159
17	General Cargo (other)	BB		0.256		0.256	0.117		0.117	0.373
8-17	Break Bulk Total	BB		3.945		3.945	0.407	0.026	0.433	4.378
	(Liquid Bulk)									
18	Crude Oil	LB					10.640	0.460	11.100	11.100
19	Petroleum Products	LB		2.020		2.020	1.680		1.680	3.700
20	Chemical Products (Liquid)	LB		0.260		0.260				0.260
18-20	Liquid Bulk Total	LB		2.280		2.280	12.320	0.460	12.780	15.060
	Bulk Total (Million tons)			8.593	0.500	9.093	24.539	0.616	25.259	34.352
	(Container)									
21	General Cargo (Food products, Beverage, Tobacc	CO		0.261	0.072	0.333	0.864	0.234	1.098	1.431
22	General Cargo (other)	CO		1.612	0.692	2.304	0.819	0.234	1.053	3.357
21-22	Container Total (Million tons)	CO		1.873	0.764	2.637	1.683	0.468	2.151	4.788
	Laden Container (1000 TEUs)	CO		187	76	264	168	47	215	479
	Empty Container (1000 TEUs)	CO		19	8	26	38	37	75	101
	Container Total (1000 TEUs)	CO		206	84	290	206	84	290	580
	Grand Total (Million tons)			10.466	1.264	11.730	26.222	1.084	27.410	39.140

Table 6.2.1(c) Summary of Demand Forecast (2010 Case-1)

Type	Commodity			2010 case-1						
				Loading			Unloading			Total
				Export	Transit	Total	Import	Transit	Total	
				(Million tons or 1000 TEUs)						
	(Dry Bulk)									
1	Cereals	B		1.800	2.610	4.410	0.100	0.100	0.200	4.610
2	Iron Ore	B					7.730		7.730	7.730
3	Non-ferros ore (Bulk)	B					1.344	0.216	1.560	1.560
4	Solid Fuels (Coal, Coke etc)	B					2.110		2.110	2.110
2-4	Ore/Coal (Sub Total)	B					11.184	0.216	11.400	11.400
5	Phosphate	B					0.144		0.144	0.144
6	Chemical Fertilizer (Bulk)	B		0.483		0.483	0.216		0.216	0.699
5-6	Phosphate/Fertilizer(Sub Total)	B		0.483		0.483	0.360		0.360	0.843
7	Cement (Bulk)	B		0.750		0.750				0.750
1-7	Dry Bulk Total	B		3.033	2.610	5.643	11.644	0.316	11.960	17.603
	(Break Bulk)									
8	Non-ferros ore (Bag)	BB					0.336	0.054	0.390	0.390
9	Chemical Products (Bag)	BB		0.340		0.340				0.340
10	Chemical Fertilizer (Bag)	BB		0.207		0.207				0.207
11	Cement (Bag)	BB		0.320		0.320				0.320
8-11	Bag (Sub Total)	BB		0.867		0.867	0.336	0.054	0.390	1.257
12	Scrap	BB		0.960		0.960				0.960
13	Steel Products	BB		1.800		1.800				1.800
14	Non Ferros Metal Products	BB		0.200		0.200				0.200
13+14	Metal Products (Sub Total)	BB		2.000		2.000				2.000
15	Timber	BB		1.130		1.130				1.130
16	General Cargo (Foods, Beverages, Tobaccos)	BB		0.054		0.054	0.182		0.182	0.236
17	General Cargo (other)	BB		0.382		0.382	0.176		0.176	0.558
8-17	Break Bulk Total	BB		5.393		5.393	0.694	0.054	0.748	6.141
	(Liquid Bulk)									
18	Crude Oil	LB					11.920	0.390	12.310	12.310
19	Petroleum Products	LB		2.390		2.390	1.440		1.440	3.830
20	Chemical Products (Liquid)	LB		0.340		0.340				0.340
18-20	Liquid Bulk Total	LB		2.730		2.730	13.360	0.390	13.750	16.480
	Bulk Total (Million tons)			11.156	2.610	13.766	25.698	0.760	26.458	40.224
	(Container)									
21	General Cargo (Food products, Beverage, Tobacc	CO		0.194	0.022	0.216	0.655	0.073	0.728	0.944
22	General Cargo (other)	CO		1.375	0.153	1.528	0.634	0.070	0.704	2.232
21-22	Container Total (Million tons)	CO		1.570	0.174	1.744	1.289	0.143	1.432	3.176
	Laden Container (1000 TEUs)	CO		157	17	174	129	14	143	318
	Empty Container (1000 TEUs)	CO		16	2	17	44	5	49	66
	Container Total (1000 TEUs)	CO		173	19	192	173	19	192	384
	Grand Total (Million tons)			12.726	2.784	15.510	26.987	0.903	27.890	43.400

Table 6.2.1(d) Summary of Demand Forecast (2010 Case-2)

Type	Commodity			2010 case-2						
				Loading			Unloading			Total
				Export	Transit	Total	Import	Transit	Total	
				(Million tons or 1000 TEUs)						
	(Dry Bulk)									
1	Cereals	B		1.500	0.500	2.000	0.380	0.130	0.510	2.510
2	Iron Ore	B					7.730		7.730	7.730
3	Non-ferros ore (Bulk)	B					1.112	0.176	1.288	1.288
4	Solid Fuels (Coal, Coke etc)	B					2.100		2.100	2.100
2-4	Ore/Coal (Sub Total)	B					10.942	0.176	11.118	11.118
5	Phosphate	B					0.208		0.208	0.208
6	Chemical Fertilizer (Bulk)	B		0.336		0.336	0.312		0.312	0.648
5-6	Phosphate/Fertilizer(Sub Total)	B		0.336		0.336	0.520		0.520	0.856
7	Cement (Bulk)	B		0.950		0.950				0.950
1-7	Dry Bulk Total	B		2.786	0.500	3.286	11.842	0.306	12.148	15.434
	(Break Bulk)									
8	Non-ferros ore (Bag)	BB					0.278	0.044	0.322	0.322
9	Chemical Products (Bag)	BB		0.350		0.350				0.350
10	Chemical Fertilizer (Bag)	BB		0.144		0.144				0.144
11	Cement (Bag)	BB		0.410		0.410				0.410
8-11	Bag (Sub Total)	BB		0.904		0.904	0.278	0.044	0.322	1.226
12	Scrap	BB		0.960		0.960				0.960
13	Steel Products	BB		1.800		1.800				1.800
14	Non Ferros Metal Products	BB		0.200		0.200				0.200
13+14	Metal Products (Sub Total)	BB		2.000		2.000				2.000
15	Timber	BB		1.130		1.130				1.130
16	General Cargo (Foods, Beverages, Tobaccos)	BB		0.044		0.044	0.146		0.146	0.190
17	General Cargo (other)	BB		0.306		0.306	0.142		0.142	0.448
8-17	Break Bulk Total	BB		5.344		5.344	0.566	0.044	0.610	5.954
	(Liquid Bulk)									
18	Crude Oil	LB					9.330	0.390	9.720	9.720
19	Petroleum Products	LB		2.820		2.820	1.130		1.130	3.950
20	Chemical Products (Liquid)	LB		0.350		0.350				0.350
18-20	Liquid Bulk Total	LB		3.170		3.170	10.460	0.390	10.850	14.020
	Bulk Total (Million tons)			11.300	0.500	11.800	22.868	0.740	23.608	35.408
	(Container)									
21	General Cargo (Food products, Beverage, Tobacc	CO		0.158	0.018	0.176	0.526	0.058	0.584	0.760
22	General Cargo (other)	CO		1.102	0.122	1.224	0.511	0.057	0.568	1.792
21-22	Container Total (Million tons)	CO		1.260	0.140	1.400	1.037	0.115	1.152	2.552
	Laden Container (1000 TEUs)	CO		126	14	140	104	12	115	255
	Empty Container (1000 TEUs)	CO		13	1	14	35	4	39	53
	Container Total (1000 TEUs)	CO		139	15	154	139	15	154	308
	Grand Total (Million tons)			12.560	0.640	13.200	23.905	0.855	24.760	37.960

6.2.2 Balance Between the Port Capacity and Future Traffic

Table 6.2.2 shows balance between the existing cargos handling capacity vs. forecasted cargo demand by commodity.

Existing cargo handling capacities of the Port are presented by commodity. These capacities are based on data provided by IPTANA using Quay Crane Theory, and on interviewing some operators by the Study team.

Relocating Capacity means the capacity of existing berth that will not be utilized for the future due to various reasons such as insufficient berth depth, aged equipment, etc. As for handling general cargo, for example, it is assumed that a lot of berths in Old North Port will not be utilized for cargo handling in future (see Table 6.2.3).

Following observation can be made from Table 6.2.2.

1) As for container cargo, besides the ongoing Phase I of the new container terminal construction project at S-2, additional terminal capacity would be necessary. The required additional capacity in 2020 for Case-1 is 415,000 TEUs and Case-2 is 205,000 TEUs.

2) As for grains, in consideration of annual fluctuation of grain export, shortage of handling capacity for grains will be occur and an additional facilities will be necessary.

3) As for crude oil, petroleum products and ores, the existing capacities are enough to handle these commodities.

Table 6.2.2 Balance between the Existing Cargo Handling Capacity and Demand Forecast (1000 Tons or 1000 TEUs)

	Handling Capacity			Case-1 2020		Case-1 2010		Case-2 2020		Case-2 2010	
Commodity	Existing	*2) Relocating	Balance	Demand	Balance	Demand	Balance	Demand	Balance	Demand	Balance
	A	B	C=A-B	D	E=C-D	D	E=C-D	D	E=C-D	D	E=C-D
(Dry Bulk)				*3)							
Grain	3,750	0	3,750	8,500	**-4,750**	6,400	**-2,650**	4,500	**-750**	4,500	**-750**
Coal/Ore/Cokes	24,000	0	24,000	12,800	11,200	11,400	12,600	10,700	13,300	11,100	12,900
Phosphate/Fertilizer	1,500	0	1,500	1,400	100	840	660	1,020	480	860	640
Cement	2,500	0	2,500	450	2,050	750	1,750	650	1,850	950	1,550
(Break Bulk)											
General Cargo	7,500	1,500	6,000	4,400	1,600	6,100	**-100**	4,400	1,600	6,000	0
(Liquid Bulk)											
Crude Oil/Oil Products	36,000	0	36,000	21,100	14,900	16,500	19,500	15,100	20,900	14,000	22,000
(Container)	*1)										
Container (1000TEUs)	465	90	375	790	**-415**	384	**-9**	580	**-205**	308	67

1) Existing Capacity for container includes capacity of S2 New Container Terminal (375,000 TEUs.)
2) Relocating Capacity : Capacity which will not be utilized in future due to various reasons such as insufficient berth depth, aged equipment or narrow apron width.
3) Demand for grain includes net volume plus annual fluctuation of 2 million tons.

Table 6.2.3 Cargo Handling Capacity and Relocating Capacity

No.	Operator	Berth No.	Handling Commodities	Handling Operation	Cargo Handling Capacity (x 1,000 tons)								
					Break Bulk	Container	Dry Bulk				Liquid Bulk		Total
					General Cargo	Container	Grain	Coal/Ore	Phosphate Fertilizer	Cement	Crude Oil Oil Products	Edible Oil	
01	ROTRAC	Berth RR4	General Cargoes (timber, etc.)	Loading, Unloading									
02	DEZROBIREA	Berth 0 - 5	General Cargoes (steel scrap, timber, etc.)	Loading, Unloading	634								634
		Berth 6,7	General Cargoes (fruits, etc.)	Loading, Unloading	101								101
		Berth 11,12	General Cargoes (timber, etc.)	Loading, Unloading	171								171
		Berth 13-16	General Cargoes (kaolin, soda, timber, etc.)	Loading, Unloading	257								257
		Berth 20	General Cargoes (timber, etc.)	Loading, Unloading	101								101
03	AGROEXPORT	Berth 17,18 & 24	Bulk Cargoes (grains)	Loading			700						700
		Berth 31-33	Bulk Cargoes (grains)	Unloading			300						300
04	FRIAL	Berth 19	Edible Oil	Loading, Unloading								550	550
		Berth 21	General Cargoes (rice, etc.)	Loading, Unloading	93								93
		Berth 53	General Cargoes & Refrigerated Food	Loading, Unloading	152								152
05	DECIROM	Berth 23	General Cargoes (timber, rice, etc.)	Loading, Unloading	203								203
		Berth 47-50	General Cargoes (timber, Steel scrap, cement, etc.)	Loading, Unloading	771								771
06	PHOENIX	Berth 8	General Cargoes (timber)	Loading, Unloading									
		Berth 22	General Cargoes (timber, rice, etc.)	Loading, Unloading									
07	SOCEP	Berth 35-37 & 41-43	General Cargoes (bulk soda, steel scrap, timber, etc.)	Loading, Unloading	977		250						1,227
		Berth 51,52	Containerized Cargoes	Loading, Unloading		810							810
08	UMEX	Berth RR4	General Cargoes (timber etc.)	Loading, Unloading	264								264
		Berth 38-40	General Cargoes (timber, steel scrap, cement, etc.)	Loading, Unloading	610								610
		Berth 44	General & Containerized Cargoes	Loading, Unloading	152								152
09	MINMETAL	Berth 45,46	General Cargoes (steel products, timber,)	Loading, Unloading	582								582
		Berth 64-66	Bulk Cargoes (coals, ores)	Unloading				12,000					12,000
		Berth 85	Bulk Cargoes (coals, ores)	Loading									
10	CHIMPEX	Berth 54-60	General Cargoes (timber, etc.)	Loading, Unloading	1,750								1,750
		Berth 61	Bulk Cargoes (grains)	Loading			500						500
		Berth 62	Bulk Cargoes (phosphate ores)	Unloading					743				743
		Berth 63	Bulk Cargoes (fertilizers)	Loading					743				743
11	SICIM	Berth 67	General Cargoes	Loading, Unloading									
		Berth 68	Bulk Cargoes (cement)	Loading						2,501			2,501
12	OIL TERMINAL	Berth 69-79	Liquid Bulk (crude oil, metanol, chemical liquids, etc	Loading, Unloading							36,000		36,000
13	COMVEX	Berth 80-84	Bulk Cargoes (coals, ores)	Loading, Unloading				12,000					12,000
14	ROMTRANS	Berth 107-112 & 115-118	General Cargoes (timber, ferrous/non-ferrous metal, e	Loading, Unloading	652								652
15	SILOTRANS	Berth 113 & 114	Bulk Cargoes (grains)	Loading, Unloading			2,000						2,000
16	FREE ZONE ADMIN.	Berth 119A-119B	General Cargoes (meat, etc.)	Loading, Unloading									
17	SNTFM	Berth 120	General Cargoes	Loading, Unloading									
18	CPA RO-RO TERMINA	Berth 120	General Cargoes	Loading, Unloading									
19	MAST	Berth 124-125	Bulk Cargoes (cement, ores,etc.)	Loading, Unloading									
A	Total Cargo Handling Capacity		-	-	7,470	810	3,750	24,000	1,486	2,501	36,000	550	76,567
B	Relocating Terminal Capacity		-	-	1,528	810	0	0	0	0	0	550	2,888
C	Balance(A-B)		-	-	5,942	0	3,750	24,000	1,486	2,501	36,000	0	73,679

6.2.3 Present Cargo Handling Productivity

Table 6.2.4 shows the average cargo handling productivity data by commodity. Average cargo handling productivity was obtained from total cargo handled for each vessel divided by berth time (hour). Necessary data was obtained from actual records in September and October in 2000.

Table 6.2.4 Present Commodity-wise Cargo Handling Productivity

	Commodity	Type	Average Productivity (tons/hour/vessel)
1	Grain (Total)	Bulk	59
1'	Grain (Bulk) at Silotrans (Berth No.113 & 114)	Bulk	172
2	Iron Ore	Bulk	2,217
3	Non-ferrous Ore (Bauxite)	Bulk	403
4	Non-ferrous Ore	Bag	45
5	Solid Fuels (Coal, Coke)	Bulk	N/A
6	Crude Oil	Liquid Bulk	867
7	Petroleum Products	Liquid Bulk	265
8	Chemical Products	Liquid Bulk	92
9	Chemical Products	Bag	35
10	Phosphates	Bulk	94
11	Chemical Fertilizer	Bulk	126
12	Chemical Fertilizer	Bag	36
13	Cement	Bulk	156
14	Cement	Bag	35
15	Scrap	Bulk	39
16	Steel Products	BB	50
17	Non-ferrous Metal Products	BB	35
18	Timber	BB	16
19	General Cargo	BB	20

Source: CPA

From Table 6.2.4, it is observed that productivities of "Steel products", "Non-ferrous products" and "Timber" are particularly low compared to the performance at other ports. For example in Japan, steel products can be handled at about 100 tons/hour/vessel or timber can be handled at about 75 tons/hour/vessel.

One reason for this low productivity is the direct loading from railway wagon to vessel. Another factor is the scattered or dispersed use of berths.

In order to improve productivity, it is advisable to handle the same type of commodity collectively at a spatial and dedicated terminal, as well as discontinue direct transfer from the rail wagons to vessel.

6.3 Required Port Facilities

6.3.1 Introduction

This section deals with the required port facilities that should be included in the Master Plan.

Table 6.3.1 outlines development projects related to the Master Plan. There are three categories in the table, namely (1) New Master Plan Projects, (2) Existing Projects and (3) Future Expansion Area.

(1) New Master Plan Projects
"New Master Plan Projects" are the set of projects that are recommended by the Study Team to be included in the Master Plan for Constantza Port and they will be explained in the next section.

(2) Existing Projects
"Existing Projects" are projects that are already ongoing or will be implemented mainly by the private sector, thus in the Master Plan they are treated as given projects.

(3) Future Expansion Area
"Future Expansion Area" is a study team proposal for the future expansion area beyond the year 2020.

6.3.2 Outline of the Master Plan Project

Projects of the New Master Plan can be divided into three groups according to their purposes.

(1) Projects to meet future cargo demand

The objective of the first group projects is to meet the increasing traffic demand of the port in the future. One of the projects of this group is the development of new container terminal and the other is construction of grain terminal.

As for the container terminal, both demand forecast Case-1 and Case-2 are adopted to determine the size of the new terminal.

As for the grain terminal, demand forecast Case-1 and annual fluctuation of grain export demand are adopted to determined the size of the terminal.

(2) Projects to improve port operation

The second group projects are to improve the present port operation. Cargoes are currently handled by each operator in small scale on scattered terminals in the Port of Constantza. Some cargoes are to be integrated in one or two places in a specialized and aggregated manner, thereby raising the cargo handling efficiency and adapting it to the future maritime transport trends such as increase in ship size.

Regarding bulk cargoes such as ores, coals and oil, these cargoes are handled with the existing specialized terminals which have sufficient cargo handling capacity. General cargo will be gradually containerized, so that remaining break bulk cargoes and large lot cargoes will be steel products and timber.

So the Study Team proposes several projects such as Steel Product Terminal, Timber Terminal and relocation of General Cargo Terminals in the Master Plan.

(3) Projects to improve port transportation system

In this group, projects are to improve accessibility of the port terminal in the port to the inland transportation network. The Port of Constantza has inland transportation system such as inland waterways, railway and road. Three projects are proposed to secure smooth and efficient intermodal transportation in the port.

One is to develop barge related facilities in the port for promoting the inland waterways transport using the Black Sea-Danube Canal. The second is to improve railways in the port and the third is to improve road alignment in the port.

Table 6.3.1 Outline of Master Plan Project and Related Projects of the Port of Constantza

		Project		Purpose of the project	Location	Relationship to the Master Plan	Schedule		
							2010	2020	2020-
New Master Plan Projects	1	Container Terminal	Forecast Case-1	To meet cargo demand in the future	S2(122,123,128-130)	Master Plan Proposal	Phase 1	Phase 2&3	
	1		Forecast Case-2		S2(122,123)		Phase 1	Phase 2	
	2A	Grain Terminal	Location Plan-A		S1(Berth115,112) or S3		●		
	2B		Location Plan-B		Berth 31-33		▲		
	3A	Steel Product Terminal (Multi Purpose Terminal)	Location Plan-A	To improve port operation	S1(Berth116-118,110,111)			●	
	3B		Location Plan-B		Berth 45-52 or 56-60			▲	
	4	Timber Terminal (Multi Purpose Terminal)			Berth 45-50			●	
	5	Relocation of GC Terminals			Old North port, North Port			●	
	6	Barge Basin		To improve port transportation system	Central Island and River Basin		●		
	7	Railway Improvement			Old North Port	Concept		▲	●
	8	Road Alignment Improvement			Between Gate 5 & 6 and others	Master Plan Proposal	●	▲	
Exising Projects (considered to be given Project	9	LPG Terminal		Expansion of Energy Resource	Berth 91-93 & Central Island	Private Sector promoting Project			
	10	Passenger Terminal		Commersialization	Passenger Terminal	Private Secrtor and CPA Jointly Promoting Project			
	11	Business Center		Commersialization	Old North Port				
	12	Breakwater Rehabilitation & Extension		Safety Improvement		EU Techninal & Financial Supporting Projects			
	13	Ecologization Project		Environmental Improvement	Oilterminal & Near Gate 6				
	14	Port Management & Information System		Improvement of Effective Port Management & Operation		CPA Project			
	15	Dredging Project		Safty and Efficency Improvement	Channel and Basin	CPA Project			
Future Expansion Area	16	Future Expansion Area		Indicate Appropriate Expansion Area	South Port & Central Island	Study Team Proposal			●

6.3.3 Container Terminal

At present a container terminal at South Port S-2 is under processing to tender. This project has been financed by the Romanian Government and JBIC (Japan Bank for International Cooperation) and is as the stage of the Phase I, which will provide terminal capacity of about 375,000 TEUs.

Currently, two operators in Constantza, namely SOCEP at the Berth No.52 and UMEX at the berth No.39 handle containers. However, both berths can only provide the draft –13.5 and area of backyards cannot be expanded.

In order to realize combined scale merit of container handling, it is advisable to develop a new container terminal at the same S-2 Pier as Phase II and III of on-going Phase I terminal development.

Table 6.3.2 shows the required facilities for container handling.

Table 6.3.2 Required Facilities for Container Handling

	Cargo Forecast (million TEUs)	Required Berth	Berth Length (m)	Required Gantry Crane
Case-1 2010	384	2	625	4
Case-1 2020	790	2+1 *)	625+500	6+2 *)
Case-2 2010	308	2	625	3
Case-2 2020	580	2	625	6

*) "+1" means construction of additional berth at the other (east) side of S2 Pier.

**) Required numbers of gantry cranes are based on SAPROF study.

Additional Phase II and III development plan which include additional one berth (500m) with three Gantry Cranes and 23.5ha of yard space will be required.

It is advisable to widen the slip width in front of proposed Phase III Container Berth from 250m to 400 m by removing revetment of S-3.

The works will consist of the civil works and provision of cargo handling equipment. The former will cover the pavement work, railway laying, supplemental quay strengthening, and others. The latter will include the quayside cranes and yard transfer cranes.

6.3.4 Grain Terminal

From Table 6.2.2, an additional grain silo, capacity of 2,000,000 tons is required for the year 2020. The forecasted vessel size which is explained in Section 6.1 is from 30,000 to 50,000 DWT, thus existing facilities except S-1 Silotrans terminal cannot serve these vessels. In consideration of accommodating larger vessels and accessibility for barge transport which is major inland transport mode of grains, it is recommended to construct an additional silo in South Port.

Scale of required facilities can be calculated as follows:

(1) Number of required berths for grain vessels

N = Ct / Uf
- N: Required number of berths
- Ct: Future cargo throughput per year (ton) : 2,000,000 ton
- Uf: Cargo handling efficiency per year and berth (ton)

Uf = BOR x WD x H

BOR: Berth Occupancy Ratio	0.5
WD: Working days per annum	355 (days)
HR: Working hours per day	22 (hour)
Cargo handling rate per hour	800 (ton / hour)

N = 0.64 → 1 Berth

(2) Number of required berths for grain barges

N = Ct / Uf
- N: Required number of berths
- Ct: Future cargo throughput per year (ton) : 1,100,000 ton
- Uf: Cargo handling efficiency per year and berth (ton)

Uf = BOR x WD x H

BOR: Berth Occupancy Ratio	0.6
WD: Working days per annum	355 (days)
HR: Working hours per day	22 (hour)
Cargo handling rate per hour	150 (ton / hour)

N = 1.56 → 2 Berth

Using computer simulation method, one berth for seagoing vessel and two for barge are

required.

(3) Required storage capacity of silo

V = (N x C) / (R x a)
= (2,000,000 x 1.3) / (40 x 0.7) = 93,000 → 100,000 ton

Where,
V: Required storage capacity (ton)
N: Annual handling volume of cargo
C: Peak Ratio (1.3)
R: Turnover ratio (40)
a: Utilization ratio (0.7)

This is the same size of existing Silotrans storage capacity.

Details are described in PART III Short Term Development Plan.

6.3.5 Steel Product Terminal

Currently many general cargo berths are handling steel products and non-ferrous metal product.
According to the cargo volume forecast for 2020, steel demand will rise to 1.8 million tons. One of planning concepts of the steel products terminal is to integrate physically at one location for easy maintenance and economic operation.

Scale of facilities of the steel products terminal is determined as follows;

(1) Number of required berths

N = Ct / Uf
N: Required number of berths
Ct: Future cargo throughput per year (ton) : 1,800,000 ton (in 2020)
Uf: Cargo handling efficiency per year and berth (ton)

Uf = BOR x WD x H

BOR: Berth Occupancy Ratio	0.6
WD: Working days per annum	355 (days)
HR: Working hours per day	22 (hour)
Cargo handling rate per hour	70 (ton / hour)

N = 5.49 → 6 Berth

(2) Required storage area

$A = Ct / (R \times k \times w \times a)$

A: Required open storage area (sq.m)
Ct: Future cargo throughput per year (ton) : 1,800,000 ton (in 2020)
R: Cargo rotation per year 24
w: Stored cargo volume per unit area 3 (ton / sq.m)
k: occupancy rate 0.7
a: coefficient to calculate gross area 0.6

$A = 59528 \rightarrow 60000$ (sq.m)

(3) Location and development

The required works will mainly consist of the civil works and minor provision of cargo handling equipment. The former will cover the pavement works and overlay works on the existing quay crane foundations. If necessary, supplemental civil works in rehabilitation will be added. The latter will include only minor repair works on the existing equipment as needed.

There are several location alternatives. One is to locate the Steel Terminal at South Port (pier S1:berth 116-118 and 110-111), the other is to locate the Steel Terminal at North Port, (pier 3:berth 45-52 or pier 4:berth 56-60).

Fig. 6.3.1 shows conceptual layout of the steel product terminal in case of location at South Port.

Table 6.3.3 shows the areas required for facilities at the steel product terminal in 2020 based on the export steel product volumes (1.8 million tons) and interviews with cargo handling operators. Preconditions of the estimation are as follows: ①the number of berths: 9, ②the number of users: 3, ③ the ratio of cargo volume and the number of berths for each terminal operator (user) are estimated from the shares of steel product cargo handling volumes by top three operators during the past three years (1998, 1999 and 2000).

There is another option to locate the steel product terminal at North Port pier 3, where a sufficient yard space will be available.

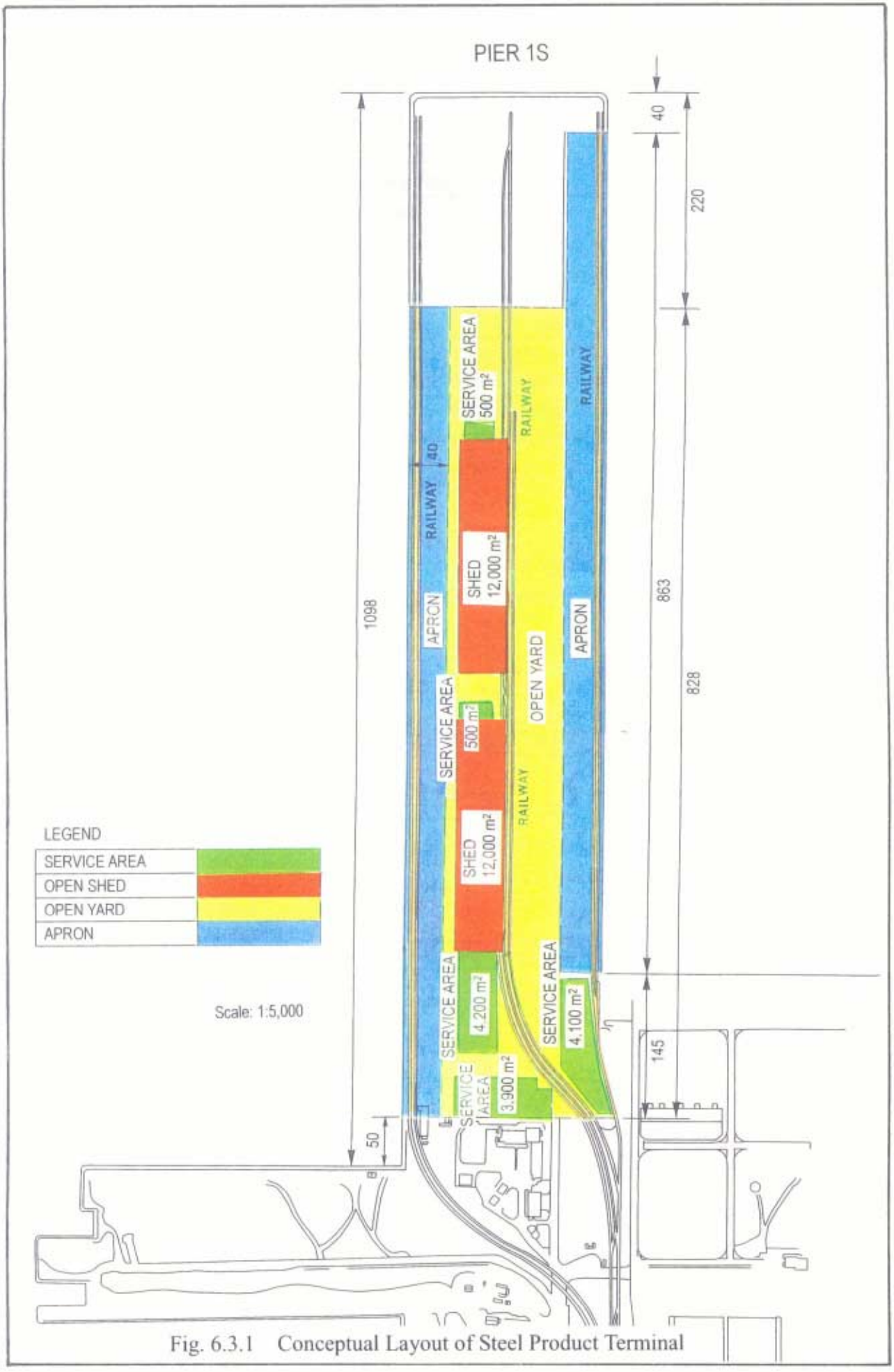


Fig. 6.3.1 Conceptual Layout of Steel Product Terminal

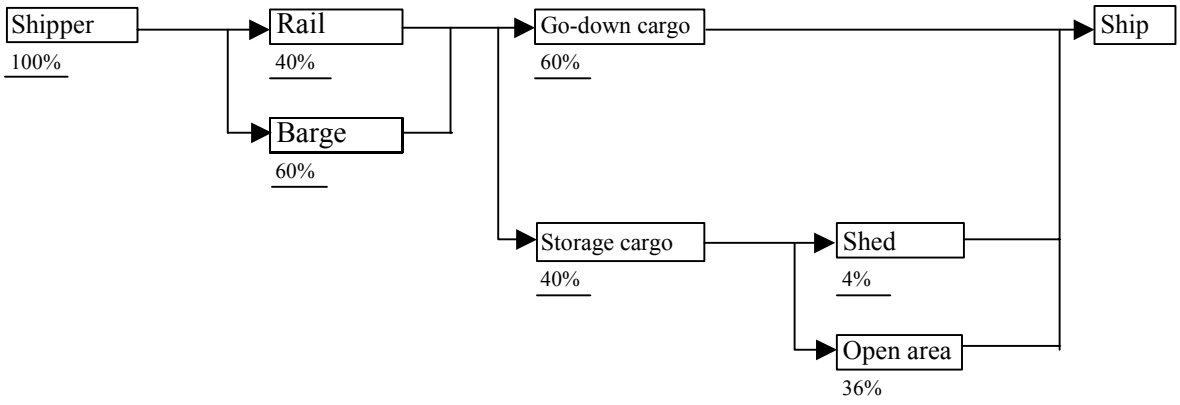
Table 6.3.3 Land Use of Steel Products Terminal

Area	Area(m^2)	Note
Apron of quay	68,000	
Railway	26,000	
Service area	13,000	
Shed	19,000	
Open storage yard and Others	61,000	

Service area: Area of Office and Guared office, Parking space for cargo handling equipment and Repair shop.
Others: Main roads, dead space and etc.
Railway: Some part of area of railway and apron of quay are overlapping. (17,000m^2)

According to interviews with cargo handling operators, the flow of export steel products inside the port area in general is shown Fig. 6.3.2.

Figure 6.3.2 Cargo Flow of Export Steel Products



6.3.6 Timber Terminal

Currently general cargo berths at the North Port area are handling timber products. Since a high demand in timber trade has been observed and it is comparatively easy handling work, all the general cargo berths at the North Port area are capable to handle timber by operators providing related services. Existing handling of timber is carried out through berths no. 45 to 52 of Minmetal, Decirom, and Socep. Handling capacity of these berths is estimated as of 0.5 million tons .

According to cargo volume forecast for 2010, timber demand will rise to 1.13 million tons and the estimated volume for 2020 will be 0.68 million tons. One of planning concepts of timber berths should be physical integration at one location for easy maintenance and economic operation.

Scale of the timber terminal is calculated as follows;

(1) Number of required berths

N = Ct / Uf

N: Required number of berths

Ct: Future cargo throughput per year (ton) : 1,130,000 (in 2010)

Uf: Cargo handling efficiency per year and berth (ton)

Uf = BOR x WD x H

BOR: Berth Occupancy Ratio	0.6
WD: Working days per annum	355 (days)
HR: Working hours per day	22 (hour)
Cargo Handling rate per hour	30 (ton / hour)

N = 8.0 → 8 Berth

(2) Required storage area

A = Ct / (R x k x w x a)

A: Required open storage area (sq.m)

Ct: Future cargo throughput per year (ton) : 1,130,000 ton (in 2010)

R: Cargo rotation per year	25
w: Stored cargo volume per unit area	1 (ton / sq.m)
k: occupancy rate	0.7
a: coefficient to calculate gross area	0.6

A = 107,619 → 105,000 to 110,000 (sq.m)

(3) Location and development

The work will consist of the civil works and supplemental provision of cargo handling equipment. The former will cover the pavement works and overlay works on the existing quay crane foundations. If necessary, supplemental civil works in rehabilitation will be added. The latter will include only minor repair works on the existing equipment as needed.

It is assumed that one specified area at North Port would be selected for future timber terminal, namely triangular terminal (pier 3:from berth No. 45 to 52).
Fig. 6.3.3 shows conceptual layout of the timber terminal at North Port.

The ratio of storage cargo to the total export timber and the average dwelling time of storage cargo for export timber are approximately 80% and one month respectively according to interviews with cargo handling operators.

Table 6.3.4 shows the areas required for facilities at the timber terminal in 2010 based on above paragraph. Preconditions of the estimation are as follows: ①number of berths: 8, ②Number of users: 3, ③ the ratio of cargo volume and number of berths for each terminal operator (user) are estimated from the shares of timber cargo handling volume by top three each operators during the past three years (1998 to 2000).

Table 6.3.4 Land Use at Timber Terminal

Area	Area(m^2)	Note
Apron of quay	71,000	
Railway	23,000	w:10m, two-line
Service area	12,000	
Open shed (without wall)	40,000	
Open storage yard and Others	105,000	

Service area: area of Office and Guard office, Parking space for cargo handling equipment and Repair shop.
Others: Apron of the railway, main roads, dead space and etc..
Railway: Some part of area of railway and apron of quay are overlapping ($17,500m^2$).

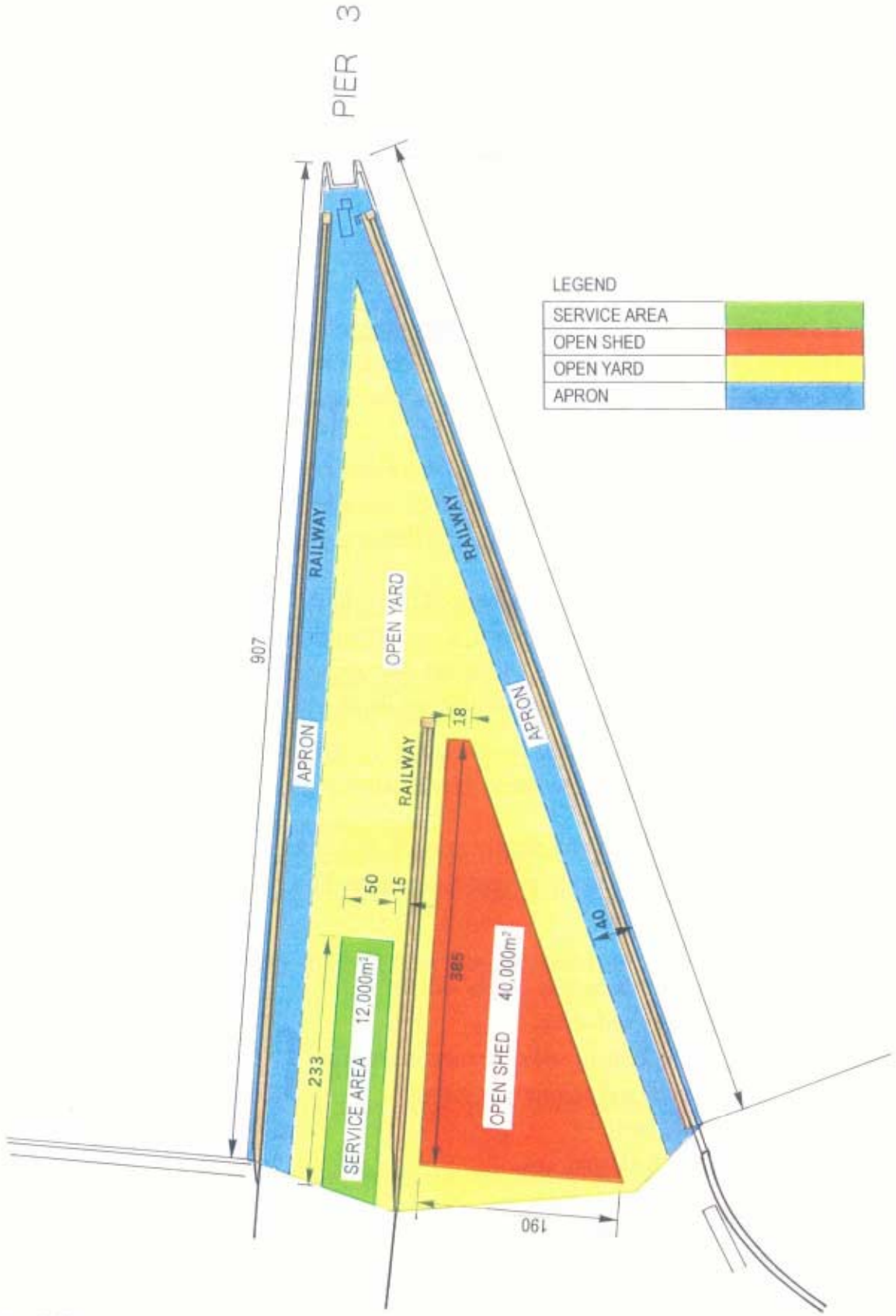
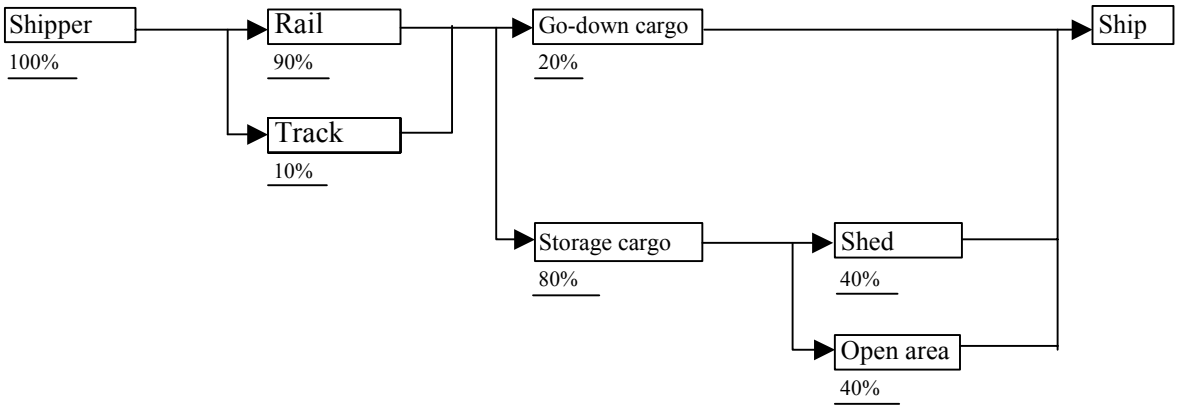


Fig 6.3.3 Conceptual Layout of Timber Terminal

According to interviews with cargo handling operators, the flow of export timber inside the port area in general is shown Fig. 6.3.4.

Figure 6.3.4 Cargo Flow of Timber



6.3.7 Reorganization of General Cargo Terminal

Almost all general cargo will be containerized in the future and timber and steel products will be shifted to the aggregated terminal. Considering these conditions, the New Master Plan recommends the berths in the Old North Port should be tend not to be used in the future for cargo handling, due to their insufficient depth and limited space of back up area.

6.3.8 Barge Basin

It is supposed that this mode will mostly provide port users with collection and delivery services of dry bulk cargoes and a few general cargoes. This mode will predominant in the long haul transport of dry bulk.

Major commodities to be carried by barges will be:

a)	Iron ore and scrap	75% share
b)	Chalk, cement and construction materials	70% share
c)	Ferrous and non-ferrous metals	60% share
d)	Crude oil	50% share
e)	Solid fuel, coal, coke	25% share

The required facilities in the Master Plan are the supporting civil facilities such as mooring quay walls for temporary berthing before loading/unloading cargo on barge and assembling new convoy to next trip. Since it is estimated that the cargoes to be carried by

barges will increase to 20 million tons in 2020, a large wet basin should be reserved for this transport mode. Mooring facilities for pushers and tugs of convoys are also required.

Figure 6.3.1 shows the outline of barge related facilities.
Details are described in Part III Short Term Development Plan.

6.3.9 Railway and Road Improvement

(1) Railway

Railway facilities including the related system occupy a large portion of the port area of Constantza. It is estimated that the railway area is currently twice as large as the road area. Railway system plays a great role for port access.

The Study Team has examined the present railway capacity in the port, reviewing existing railway station facilities and conducting Railway Traffic Survey. So that it is considered that the present capacity will be able to meet the future cargo demand in the Master Plan.

Traffic of railway cargo in the port of Constantza reached a peak in 1989 and decreased recent year.
The railway station capacity for marshalling of wagons in the North Port at Constantza can sufficiently meet the future cargo demand in the New Master plan. However, it will become more important that railway cargoes are marshaled efficiently and smoothly between railway stations and each berth, if each terminal operator is engaged in handling small lots of cargoes such as general cargo.
As for railway in South Port, container terminal project and Free Zone project include railway plans, so it is more important to secure expansion space after 2020.

Details are described in PART III Short Term Development Plan.

(2) Road

In contrast to the railway facilities, it seems that a lower priority has been given to the road system in the port area.
Industrialization will require more integrated and convenient transport services between the port and factories. Present road access has to be examined on the following items:

a) Access to the quay
b) Access to the open storage areas
c) Access road alignment, especially for large trucks and trailers.

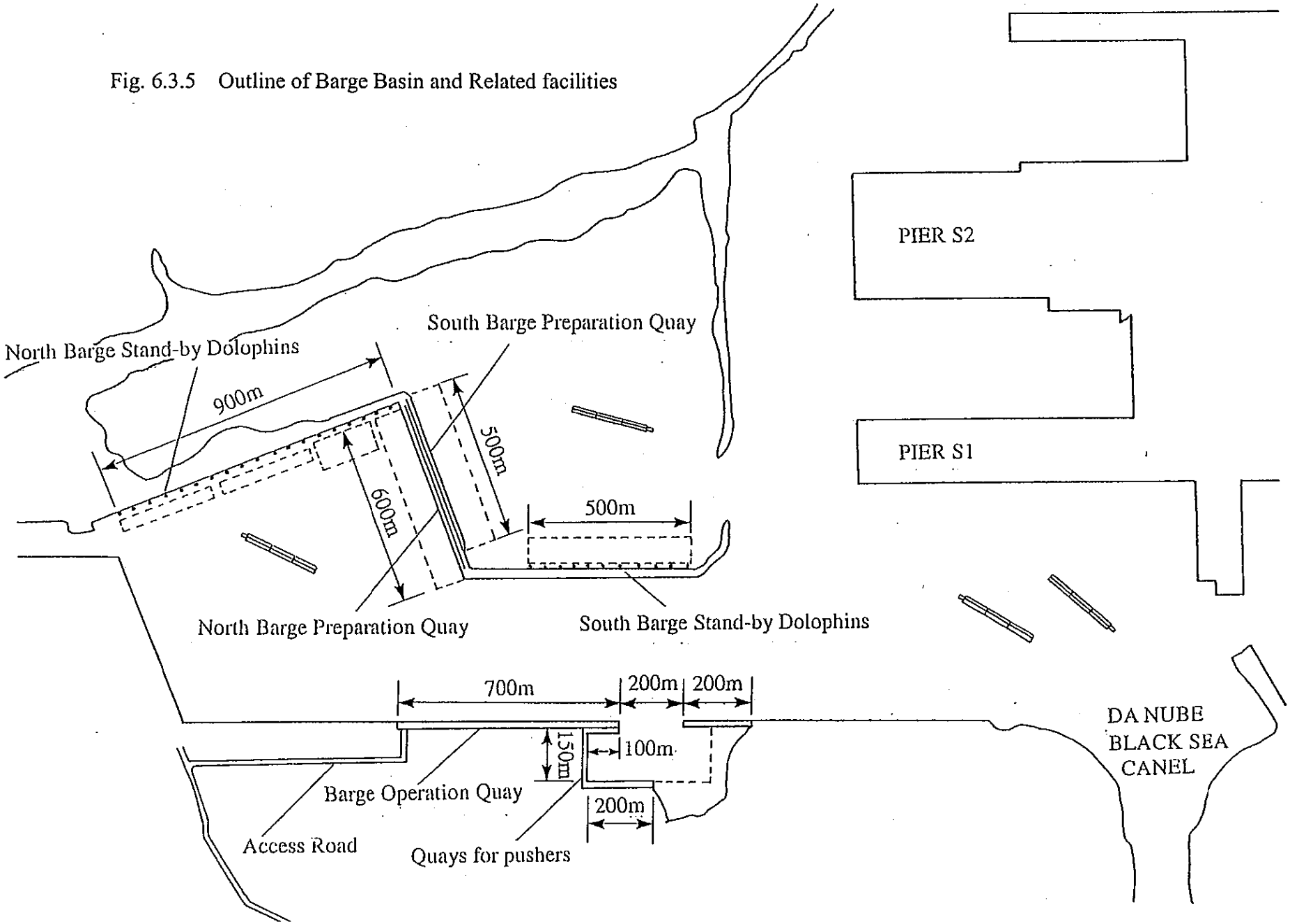
d) Parking areas for car and trucks

The Study Team has examined the present road capacity in the port, reviewing existing road facilities and conducting Road Traffic Survey.

So that the Study Team suggests constructing bypass road of the Gate 5, which is located on the middle of the North Port, in order to avoid traffic jam of the Gate 5 due to steep and narrow road alignment.

In the North Port, repair and maintenance works of roads in several points are also requires.
In the South Port, there is a possibility that the capacity of roads will become insufficient, due to an increase in the cargo traffic, including containers, in the future. Furthermore, the existing roads in the south port have many crossing points with the railway, so it is necessary to construct flyovers and increase the number of traffic lanes. These projects are made part of the Existing Projects in the Master Plan, since CMPA is at present formulating these plans.

Fig. 6.3.5 Outline of Barge Basin and Related facilities



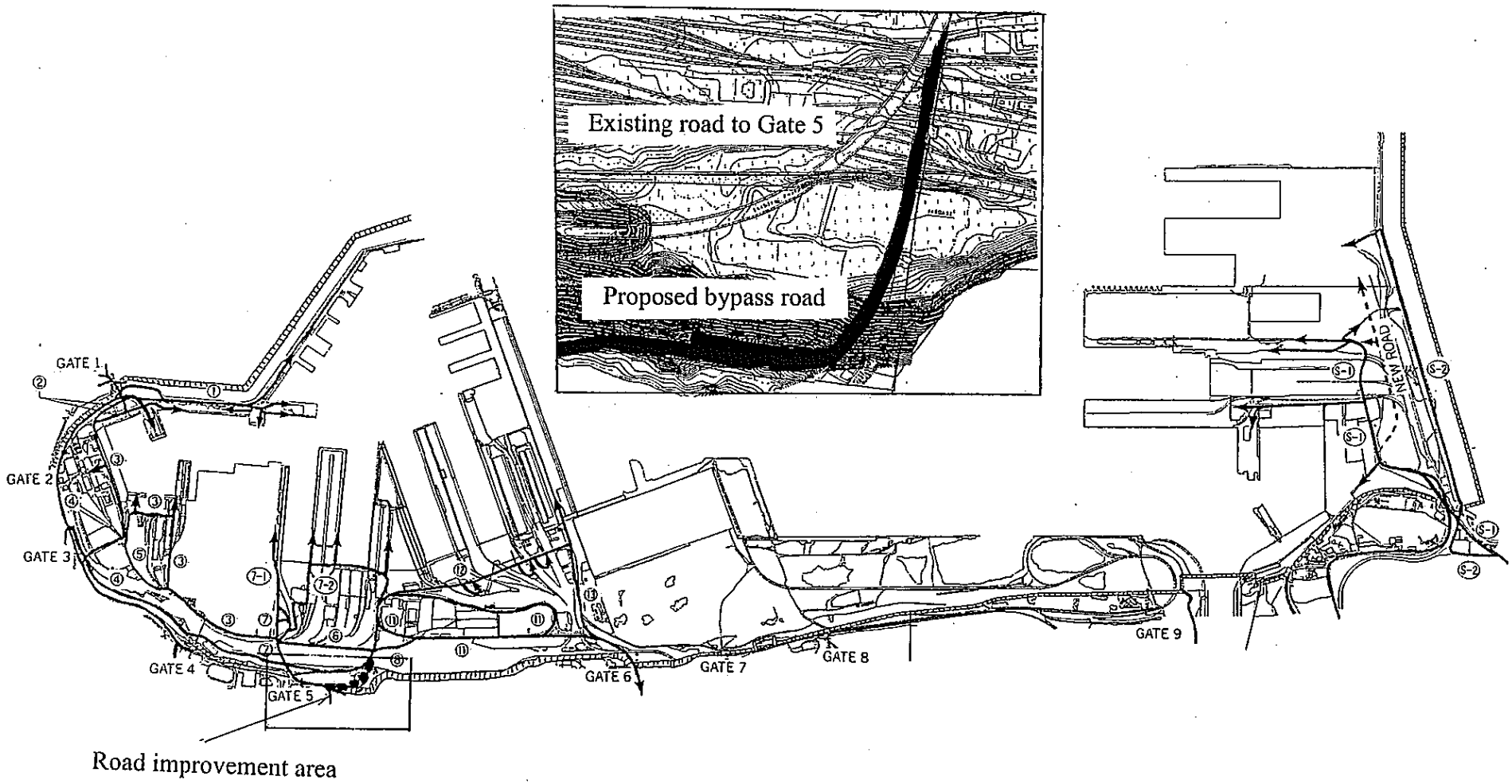


Fig. 6.3.6 Road Network and Road Improvement Area

6.3.10 Existing Projects

Projects that are already on going or will be implemented mainly by private sectors are basically treated as given projects in the Master Plan.

Following projects are considered as given projects:

- Breakwater Rehabilitation
- LPG terminal, Bitumen terminal, Soya Bean terminal
- Grain Terminal in the north port
- International Business Center
- Passenger maritime station
- Waste Management
- Dredging Project

In addition, the projects that are not yet fully justified or identified by traffic demand forecast are considered as the possible projects related to the Master Plan. Following projects are referred:

- Import / export / transit car terminal
- Exotic fruit terminal (citric, bananas etc.)
- Fruit juice and edible oil terminal
- Car and passenger terminal for short sea shipping
- Heavy and oversized cargo terminal.

6.3.11 Future Expansion Area

The Port of Constantza has much potential for development in views of its geographical location, multi-modal transportation infrastructure. So beyond the year 2020, it is important to consider and allocate future expansion area in the Master Plan.