

APPENDIX

APPENDIX I

CARGO MOVEMENT

Annex 3.2.9(1) Cargo From other countries to Constanta Trea (tons), 1996

(Ton)

Origin	MODE					Total
	Inland Waterways	Rail	Road	Sea	Unknown/ rest	
EU & WE Countries	13	108	124	2,027	0	2,272
Italy	-	20	34	1,774	-	1,827
Germany & Benelux	11	30	67	109	-	217
United Kingdom	0	0	0	68	-	69
France	1	10	9	45	-	65
Austria	0	26	10	-	-	36
Portugal	-	19	0	0	-	19
Sweden	-	-	0	16	-	16
Ireland	-	-	0	6	-	6
Denmark	-	0	1	4	-	5
Norway	-	-	0	4	-	5
Lithuania	-	1	2	-	-	2
Switzerland	0	0	1	-	-	2
Finland	-	1	0	0	-	1
Latvia	-	-	0	0	-	0
Mediterranean Countries	0	4	11	580	0	595
Greece	-	4	10	512	-	525
Spain	-	-	1	64	-	65
Slovenia	-	0	0	3	-	3
Albania	-	-	-	2	-	2
CEEC	335	222	131	255	2	945
Hungary	322	107	102	-	-	532
Poland	-	-	20	244	1	265
Bulgaria	12	45	4	12	0	73
Slovak Republic	0	29	1	-	-	31
Czech Republic	-	19	4	-	0	23
Yugoslavia	-	17	-	-	-	17
Croatia	-	5	-	-	-	5
Bosnia & Hercegowina	-	-	-	-	1	1
Rest Europe	-	0	-	-	-	0
Mid East & North Africa	0	0	0	5,275	0	5,275
Middle Asia				2,409		2,409
Egypt				1,558		1,558
Turkey				287		287
Morocco				243		243
Israel				127		127
Algeria				107		107
Syria				99		99
Lebanon				27		27
Cyprus				23		23
Tunisia				8		8
Libia				3		3
Rest Africa				384		384
Former CIS countries	0	1554.762	0	7619.696	0	9,174
Russia		823		7,620		8,443
Ukraine		686		-		686
Moldavia		30		-		30
Belarus		14		-		14
Georgia and Armenia		1		-		1
Asian & Oceania Countries	0	0	0	5,325	0	5,325
Australia + New Zealand				2,818		2,818
Japan				9		9
Rest Asia				2,497		2,497
North America	0	0	0	1,619	0	1,619
USA				1,508		1,508
Rest Northern America				111		111
Middle + South America				2,176		2,176
Rest world				107		107
Total	347	1,888	267	24,984	2	27,488

Annex 3.2.9 (2) Cargo destination to Constanta area from other countries (by group of countries) 1996

MODE : Sea

Origin Countries	COMMODITY											Total
	Agricultural Products	Building minerals & material	Chemicals	Crude oil	Fertilizers	Foodstuffs	Machinery & other manufacturing	Metal products	Ores, metal waste	Petroleum products	Solid mineral fuels	
EU & WE Countries	76	19	67	0	0	77	44	49	0	1,694	0	2,027
Italy	1	13	37			15	15	35		1,658	0	1,774
Germany & Benelux	7	2	11			40	7	6		36		109
United Kingdom	36	5	9			1	13	6				68
France	31		3			8	2	1		0		45
Sweden	1	0	5			2	6	1		0		15
Ireland	0		0			6	0					6
Norway	0		0			4	0	0				4
Denmark	1		2			1	0	0				4
Portugal	0					0						0
Latvia	0		0									0
Mediterranean Countries	16	10	57	0	0	7	0	0	371	119	0	580
Greece	15	7	48			5	0	0	317	118		512
Spain	1	3	5			2	0	0	53	0		64
Slovenia	0		3			0			0	0		3
Albania						0			1			2
CEEC	3	8	1	0	0	8	2	0	0	5	228	255
Poland		7	0			7	2				228	244
Bulgaria	3	2	1			1	0	0		5		12
Mid East & North Africa	160	539	79	3,720	1	73	53	11	466	164	9	5,275
Middle Asia	15	0	2	2,239		1	2	1	63	86		2,409
Egypt	62	5	5	1,481		4	1					1,558
Turkey	59	30	60			51	41	5	35	5		287
Morocco		243										243
Israel	4	33	6	1	1	6	5	1		72		127
Algeria		107										107
Syria	1	94	0			4	1					99
Lebanon	6	17	0			2	1	0				27
Cyprus	1	2	3			1	2	5	0	1	9	23
Tunisia		8										8
Libia			3									3
Rest Africa	11	0	0			4	0		368	0		384
Asian & Oceania Countries	151	56	28	0	24	71	115	32	3,555	7,620	1,291	12,944
Russia										7,620		7,620
Australia + New Zealand	0	0					0		1,810	1,007		2,818
Japan	0		1				3	2		4		9
Rest Asia	151	56	27		24	71	112	30	1,745	0	281	2,497
North America	6	2	10	0	0	104	4	6	0	1	1,487	1,619
USA	6	1	9			103	6	6		1	1,381	1,508
Rest Northern America	0	1	0			1	4	0			105	111
Middle + South America	45	0	1			508	2	4	996	475	145	2,176
Rest world	0		1		0	0	102	3				107
Grand Total	456	635	244	3,720	25	848	333	107	5,389	10,077	3,159	24,984

Annex 3.2.10 (1) Cargo From other countries to Romania by Mode (1000 tons), 1996

(Ton)

Origin	Mode					Total
	Inland Waterways	Rail	Road	Sea	Unknown/rest	
EU & WE Countries	29	476	814	2,027	0	3,346
Italy		103	216	1,774		2,093
Germany	20	95	224	2		341
Netherlands	2	17	196	73		287
Austria	0	98	66			164
France	4	39	64	45		152
Portugal		102	1	0		104
United Kingdom	0	2	1	68		71
Belgium & Luxembourg	3	11	21	35		69
Sweden			0	16		16
Lithuania		2	9			11
Switzerland	0	2	9			10
Denmark		0	5	4		10
Ireland			0	6		7
Finland		5	0	0		5
Norway			1	4		5
Latvia			0	0		0
Mediterranean Countries	0	15	74	580	0	670
Greece		13	62	512		587
Spain			10	64		74
Slovenia		2	2	3		8
Albania			0	2		2
CEEC	336	740	401	255	8	1,741
Hungary	322	276	216			814
Poland			123	244	3	370
Bulgaria	14	159	27	12	0	212
Slovak Republic	0	119	9			128
Czech Republic		99	26		0	125
Yugoslavia		68				68
Croatia		18				18
Bosnia & Hercegowina					3	3
FYROM					2	2
Rest Europe		1				1
Mid East & North Africa	0	0	0	5,275	0	5,275
Middle Asia				2,409		2,409
Egypt				1,558		1,558
Turkey				287		287
Morocco				243		243
Israel				127		127
Algeria				107		107
Syria				99		99
Lebanon				27		27
Cyprus				23		23
Tunisia				8		8
Libia				3		3
Rest Africa				384		384
Former CIS countries	0	7,965	0	7,620	0	15,584
Russia		5,383		7,620		13,002
Ukraine		2,343				2,343
Moldavia		172				172
Belarus		65				65
Georgia and Armenia		2				2
Asian & Oceania Countries	0	0	0	5,325	0	5,325
Australia + New Zealand				2,818		2,818
Japan				9		9
Rest Asia				2,497		2,497
North America	0	0	0	1,619	0	1,619
USA				1,508		1,508
Rest Northern America				111		111
Middle + South America				2,176		2,176
Rest world				107		107
Total	366	9,196	1,289	24,984	8	35,842

Annex 3.2.11 (1) Cargo from Constanta Area to other countries (1000 tons), 1996

Destination	MODE				Total
	Inland Waterways	Rail	Road	Sea	
EU & WE Countries	304	152	205	1,302	1,963
Italy		42	58	625	725
Germany & Benelux	302	35	83	228	647
France		25	12	187	224
United Kingdom		2	0	182	184
Austria	2	45	44	1	92
Norway		0		34	34
Sweden			0	17	17
Portugal		0	0	16	16
Denmark		0	5	10	16
Switzerland	0	2	2	1	5
Finland		1			1
Ireland		0	0	1	1
Latvia				1	1
Lithuania		0	0	0	0
Estonia		0	0	0	0
Mediterranean Countries	0	1	12	1,187	1,200
Spain		0	4	750	754
Greece		1	8	281	291
Albania			0	125	125
Slovenia		0	0	31	31
CEEC	717	497	122	125	1,461
Hungary	691	303	109		1,103
Yugoslavia		118			118
Bulgaria	26	28	3	43	100
Poland		0	5	82	88
Slovak Republic		13	2		15
Czech Republic		2	3		5
Croatia		4			4
Bosnia & Hercegowina		0			0
Rest Europe		28			28
Mid East & North Africa	0	0	0	6,554	6,554
Egypt				1,763	1,763
Turkey				1,587	1,587
Middle Asia				686	686
Syria				459	459
Israel				269	269
Tunisia				267	267
Morocco				190	190
Lebanon				185	185
Cyprus				133	133
Algeria				129	129
Libia				39	39
Rest Africa				846	846
Former CIS countries	0	158	0	0	158
Georgia and Armenia		48			48
Moldavia		39			39
Russia		37			37
Ukraine		33			33
Belarus		1			1
Asian & Oceania Countries	0	0	0	2,343	2,343
Japan				72	72
Australia + New Zealand				2	2
Rest Asia				2,269	2,269
North America	0	0	0	133	133
USA				127	127
Rest Northern America				6	6
Middle + South America				741	741
Rest world				36	36
Total	1,021	808	339	12,423	14,591

Annex 3.2.11 (2) Cargo destination from Constantia area to other countries (by group of countries) 1996 MODE : Sea
(Ton)

Destination Countries	COMMODITY											Total
	Agricultural Products	Building minerals & material	Chemicals	Crude oil	Fertilisers	Foodstuffs	Machinery & other manufacturing	Metal products	Ores, metal waste	Petroleum products	Solid mineral fuels	
EU & WE Countries	15	27	117	0	282	28	88	630	10	56	50	1,302
Italy	10	26	70	0	135	9	23	328	2	22		625
Germany & Benelux	0	0	16	0	32	8	14	113	8	7	30	228
France	0	0	10	0	93	0	55	0	0	27		187
United Kingdom	2	0	19	0	22	6	31	82	0		20	182
Norway	0	0	0	0	0	0	9	25	0		34	34
Sweden	2	0	0	0	0	2	10	3	0			17
Portugal	0	0	0	0	0	0	0	15	0			16
Denmark	0	0	0	0	0	2	1	7	0			10
Ireland	0	0	0	0	0	1	1	0	0			1
Switzerland	0	0	0	0	0	1	0	0	0			1
Latvia	0	0	0	0	0	0	0	1	0			1
Austria	0	0	0	0	0	0	0	1	0			1
Lithuania	0	0	0	0	0	0	0	0	0			0
Estonia	0	0	0	0	0	0	0	0	0			0
Mediterranean Countries	133	396	48	0	190	1	7	312	4	90	6	1,187
Spain	3	395	15	0	133	0	0	203	0			750
Greece	21	1	24	0	50	0	7	109	4	65	6	281
Albania	108	0	2	0	7	0	0	0	0			125
Slovenia	0	0	5	0	0	0	0	0	0	25	31	31
CEEC	91	0	13	0	0	17	3	1	0	0	0	125
Poland	60	0	4	0	0	16	2	0	0	0	0	82
Bulgaria	32	0	9	0	0	1	1	1	0	0	0	43
Mid East & North Africa	1,686	1,702	328	0	997	190	335	557	9	710	40	6,554
Egypt	141	1,229	50	0	53	24	109	157	0			1,763
Turkey	334	0	142	0	314	60	40	63	9	585	39	1,587
Middle Asia	334	135	36	0	4	36	45	95	0	0	0	686
Syria	118	1	19	0	187	0	35	54	0	44	0	459
Israel	80	8	7	0	6	38	14	116	0	269	0	267
Tunisia	255	0	4	0	0	5	3	0	0	0	0	190
Morocco	115	0	1	0	52	7	12	4	0	0	0	185
Lebanon	124	1	12	0	15	0	17	16	0	0	0	133
Cyprus	95	0	2	0	24	1	8	3	0	1	0	129
Algeria	32	0	1	0	24	23	8	41	0	0	0	39
Libia	38	0	0	0	0	0	1	1	0	0	0	846
Rest Africa	20	328	53	0	317	1	43	4	0	80	0	2,343
Asian & Oceania Countries	235	4	64	0	645	10	94	626	102	563	0	72
Japan	0	0	1	0	2	2	2	38	7	0	0	2
Australia + New Zealand	0	0	0	0	0	0	0	0	0	0	0	2,269
Rest Asia	235	4	63	0	643	7	90	568	95	563	0	133
North America	1	0	1	0	0	3	10	56	0	62	0	127
USA	1	0	0	0	0	8	8	56	0	62	0	6
Rest Northern America	0	0	0	0	0	3	3	0	0	0	0	741
Middle + South America	53	14	39	0	223	0	20	82	0	310	0	36
Rest world	0	8	7	0	0	19	19	1	0	0	0	12,423
Grand Total	2,215	2,151	618	0	2,337	248	577	2,264	125	1,792	96	12,423

Annex 3.2.12 (1) Cargo from Romania to other Countries (1000tons), 1996

Destination	MODE				(Ton)
	Inland Waterways	Rail	Road	Sea	Total
EU & WE Countries	354	732	1,064	1,302	3,453
Italy		201	304	625	1,131
Germany	234	141	301	47	723
Austria	11	255	236	1	502
France		104	62	187	352
Netherlands	106	5	105	89	305
United Kingdom		7	1	182	190
Belgium & Luxembourg	3	3	21	92	118
Denmark		1	24	10	35
Norway		0		34	34
Switzerland	1	7	10	1	18
Portugal		0	1	16	17
Sweden			0	17	17
Finland		6			6
Ireland		1	0	1	3
Lithuania		1	1	0	1
Latvia				1	1
Estonia		0	0	0	0
Mediterranean Countries	0	18	74	1,187	1,279
Spain		0	19	750	770
Greece		11	43	281	336
Albania			2	125	127
Slovenia		6	9	31	47
CEEC	723	2,145	227	125	3,221
Hungary	691	1,067	166		1,924
Yugoslavia		664			664
Bulgaria	32	153	14	43	242
Poland		3	25	82	110
Slovak Republic		53	8		60
Czech Republic		24	15		38
Croatia		20			20
FYROM		4			4
Bosnia & Hercegowina		2			2
Rest Europe		156			156
Mid East & North Africa	0	0	0	6,554	6,554
Egypt				1,763	1,763
Turkey				1,587	1,587
Middle Asia				686	686
Syria				459	459
Israel				269	269
Tunisia				267	267
Morocco				190	190
Lebanon				185	185
Cyprus				133	133
Algeria				129	129
Libia				39	39
Rest Africa				846	846
Former CIS countries	0	823	0	0	823
Georgia and Armenia		255			255
Moldavia		214			214
Ukraine		176			176
Russia		172			172
Belarus		6			6
Asian & Oceania Countries	0	0	0	2,343	2,343
Japan				72	72
Australia + New Zealand				2	2
Rest Asia				2,269	2,269
North America	0	0	0	133	133
USA				127	127
Rest Northern America				6	6
Middle + South America				741	741
Rest world				36	36
Total	1,077	3,718	1,365	12,416	18,576

APPENDIX IA

IA. 1: TYPES OF EXISTING PIERS IN CONSTANTZA PORT (2001)

**IA. 2: DREDGING FOR ACHIEVEMENT THE DESIGN LEVELS IN
CONSTANTZA PORT**

APPENDIX IA EXISTING PIERS AND DREDGING PLAN

IA. 1: TYPES OF EXISTING PIERS IN CONSTANTZA PORT (2001)

(1) General Description

The construction of the modern Constantza Port started in 1896, by the allocation of some extraordinary credits dedicated to transports development.

During the period 1896 - 1909, there were executed 1,377 m of the North breakwater, 1,497 m of the South breakwater and 7,010 m of piers.

Another stage was the extension of the port by the execution of an oil basin provided with 4 berths having a length of 40 m and a foundation depth of -9.25 m.

Ever since that time, Romanian engineers have chosen the type of vertical bulkhead as a solution for piers execution.

(2) Vertical Bulkheads

Vertical bulkheads are piers whose stability is provided by their specific and dead weights. These weights transfer the loads directly to the foundation ground, which should be resistant and not erodible. At the bottom of the bulkhead, between the foundation plate and the ground, a riprap layer is interposed in order to level and distribute the load.

The first piers were executed using concrete blocks of 40 t/pc. and their foundation depth was -8.28 m. The coping was made of stone masonry. Subsequently, the foundation depths have increased up to -19 m, due to the increase of transport ships capacity. The solutions for piers execution have improved, the piers being made from reinforced concrete rings and caissons.

(3) Classification by Type

In Constantza Port there are 15 types of bulkheads, depending on their composition and foundation depth. The arrangement of pier types in Constantza North and Constantza South ports is as follows:

- *Type 1* - Bulkhead consisting of precast concrete blocks, founded at level -7.00 m and with the coping at level +2.50 m. [BT]

The massive precast concrete blocks are parallelepipedic, with circular holes on their entire height or only on a certain part of it. They are made from plain concrete.

Depending on their position in the pier, the blocks have vertical or inclined faces and a weight of about 100 t.

Such pier type is present at the Military Basin berths, at the Technical Ships berths in Constantza North Port, at the Fluvial and Aggregates Berths (91 - 103) in the Work Port including the river maritime basin, and at berths 107 and 108 in Constantza South Port (Working Port).

The total length of this pier type is 6,508.8 m.

Related quay wall to the proposed Barge Terminal is this type.

- *Type 2* - Bulkhead consisting of precast concrete blocks of 40 t/pc., founded at level -8.28 m and with the coping at level +2.50 m.

Such pier type is present in the old port (Constantza North), at berths 11 - 25.

The blocks of this pier type are parallelepipedic, weighing 40 t/pc. The coping of these piers was recovered by embedding the stone masonry into a reinforced concrete coping, and providing the facility channels. Such piers have been provided with modern pier accessories.

The total length of this pier type is 2,502.30 m.

- *Type 3* - Bulkhead consisting of precast concrete blocks of 100 t/pc., founded at level -9.00 m with the coping at level +2.50 m. [SPI · W]

Such pier type is present at the "S" Basin berths, at Basin 5 of the Shipyard - in Constantza North port, and at berths 86 - 90 of the Connection Canal and the Waiting basin - in Constantza South port.

The total length of this pier type is 2,793.61 m.

This located at west-south wall of South Pier I.

- *Type 4* - Bulkhead consisting of precast concrete blocks of 100 t/pc., founded at level -11.50 m and with the coping at level +2.50 m.

Such pier type is present at berths 0 - 11, 30 - 38, 61 - 65 - in Constantza North port, and at berths 110 - in Constantza South port.

The total length of this pier type is 4,323.5 m.

- *Type 5* - Bulkhead consisting of precast concrete blocks of 100 t/pc., founded at level -13.50 m and with the coping at level +2.50 m. [SPH · W]

Such pier type is present at the berths of the Northern breakwater, the Repair Berths 1 - 2, the Lighters Unloading Berth, berths 39 - 60, 66 - 69 and 70 - 77 - in Constantza North Port, and only at the Ferry-Boat berths (120) - in Constantza South port.

The total length of this pier type is 9,844.7 m.

- *Type 6* - Bulkhead consisting of precast concrete blocks, founded at level -14.50 m and with the coping at level +2.50 m or 3.00 m. [SPI · W, SPI · H, SPH · C, SPH · W, SPH · H, SPIII · C]

This is very typical wall type at the South Port, including Pier I West, Pier I Headwall, Pier II Corner Wall, Pier II West, Pier II Headwall and Pier III Corner Wall.

This pier type is similar to Type 5, with the difference that at the bottom of the pier there is a reinforced plate, 1 m thick, which takes over and distribute evenly the stresses towards the foundation ground.

Such pier type is present at berths 85 - 84 - in Constantza North port, and at berths 111 -114, 118 - 119, 121 - 123 and 131 - in Constantza South port.

The total length of this pier type is 3,053.4 m.

- *Type 7* - Bulkhead consisting of precast concrete blocks of 100 t/pc., founded at level -17.00 m and with the coping at level +2.50 m.

This pier type has a special composition, being provided with two blocks placed behind the pier wall, which take over the riprap prism thrust.

Such pier type is present at berths 129 and 130 in Constantza South port.

The total length of this pier type is 320.93 m.

- *Type 8* - Bulkhead consisting of piles made from precast reinforced concrete rings, founded at level -14.00 m and with the coping at level +3.50 m.

This pier type is present at berth 78 and it was made from independent piles. Between these piles there was executed a pier with the slope protected by stone blocks.

The total length of this pier type is 344 m.

- *Type 9* - Bulkhead consisting of precast reinforced concrete rings, founded at level -16.50 m and with the coping at level +2.50 m. At this type of piers, the coping is made from reinforced concrete.

These reinforced concrete rings have the following features: outside diameter of 10 m, walls thickness of 50 cm and height of 1.95 m. The ring piers have at their bottom a special ring provided with a flat shoe which exceeds the ring sides by one meter perpendicularly on the pier and by 25 cm along the pier.

This pier type is present at berths 83 in Constantza South port.

The total length of this pier type is 283.5 m.

- *Type 10* - Bulkhead consisting of precast reinforced concrete rings of 100 t/pc., founded at level -19.00 m and with reinforced concrete coping at level +2.50 m.

This pier type is present at berths 82 in Constantza South port.

The total length of this pier type is 220 m.

- *Type 11* - Special type of pier consisting of precast reinforced concrete rings, founded at level -19.00 m and with a reinforced concrete coping at level +3.10 m. The pier consists of independent piles.

Such pier type is used at the oil mooring (berth 79) in Constantza South port. The total length of this berth is 249.0 m.

The total length of this pier type is 249 m.

- *Type 12* - Bulkhead consisting of precast reinforced concrete caissons, founded at level -14.50 m and with a reinforced concrete coping at level +2.50 m [SPI · E]

The caissons are gigantic reinforced concrete massifs. The caissons utilized for the piers of Constantza Port are of two distinct types:

- *One type consists of three circular cylinders with an outside diameter of 12.5 m and a wall thickness of 35 cm, secantly jointed and stiffened by a continuous base with 37.5 m length, 12.50 m height and 30 cm thickness.*

- *The other type consists of an oval cylinder stiffened by 6 walls with 27 cm thickness on the entire height of the caisson. The outside walls are 35 cm thick. At the bottom, it is provided with a concrete slab with stiffening ribs for the joint with the vertical walls, with the following features: 37.5 m length, 12.5 m height and 30 cm thickness.*

Generally, the massif compartments are filled with crushed stone.

Such pier type is present at berths 115 - 117 in Constantza South port.

The total length of this pier type is 603.61 m.

This is located at the South Pier I East Wall.

- Type 13 - Bulkhead consisting of precast reinforced concrete caissons, founded at level -16.5 m and with a reinforced concrete coping at level +2.50 m. [SPII · H, SPII · E, SPII · W, SPIII · H, SPIII · E]

Such pier type is present at berths 124 - 1,125, 128 and 134 - 137 (in the partially executed bulkheads of Pier 3).

The total length of this pier type is 1,736.6 m.

- *Type 14* - Bulkhead consisting of precast reinforced concrete caissons, founded at level -19.00 m, with the coping at level +2.50 m.

Such pier type is present at the ore berths, berths 80 - 81. At this pier type, approximately 10 % of the cells height will be filled with B200 cement concrete instead of the crushed stone filling utilised for less deep piers.

The total length of this pier type is 543.75 m.

Together with Type 6, this is a typical wall at the South Port including Pier II Headwall, and Pier II East Wall.

The West Wall, Head wall and East Wall of Pier III are belong to this, however these are not completed yet.

- Type 15 - Bulkhead consisting of precast reinforced concrete caissons, founded at level -17.50 m, transversally arranged at 38.7 m distance between axes. [SPII · E]

The face of these caissons was filled with concrete. A pier with slopes protected with stone blocks was executed between the caissons.

The coping of this pier type has a special shape. It is made from reinforced concrete and its upper level is +4.0 m.

Such pier type is present at berths 126 - 127 in Constantza South Port.

The total length of this pier type is 569.4 m.

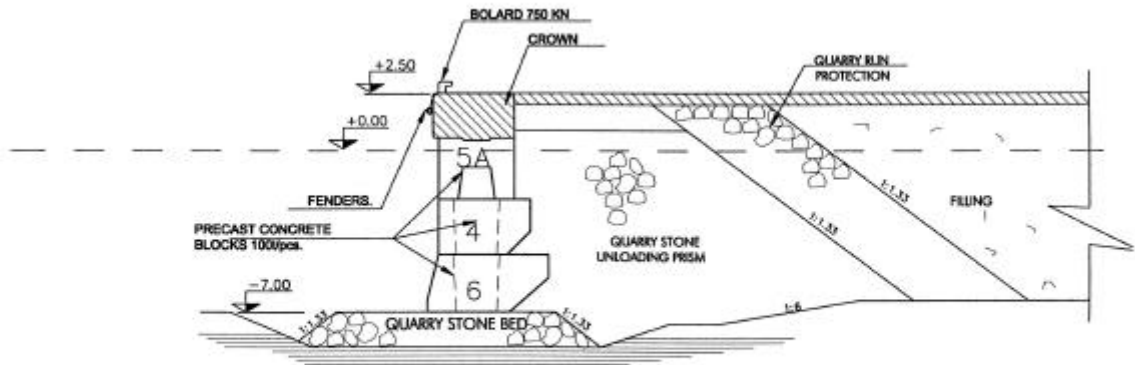
This is located at Pier II East Wall of South Port.


LIST OF PORT CONSTANTZA QUAY WALLS

- * TYPE 1. Quay wall of blocks depth -7.00
 - TYPE 2. Quay wall of blocks depth -8.28
 - * TYPE 3. Quay wall of blocks depth -9.00
 - TYPE 4. Quay wall of blocks depth -11.50
 - * TYPE 5. Quay wall of blocks depth -13.50
 - ** TYPE 6. Quay wall of blocks depth -14.50
 - TYPE 7. Quay wall of blocks depth -16.50
 - TYPE 8. Quay wall of reinforced concrete ring depth -14.00
 - TYPE 9. Quay wall of reinforced concrete ring depth -16.50
 - TYPE 10. Quay wall of reinforced concrete ring depth -19.00
 - TYPE 11. Quay wall of reinforced concrete ring depth -19.00 for oil terminal
 - * TYPE 12. Quay wall of floating caisson depth -14.50
 - ** TYPE 13. Quay wall of floating caisson depth -16.50
 - TYPE 14. Quay wall of floating caisson depth -19.00
 - * TYPE 15. Quay wall of floating caisson depth -17.50
-
- * Pier Type used in the South Port
 - ** Two most widely used Pier Type at the South Port

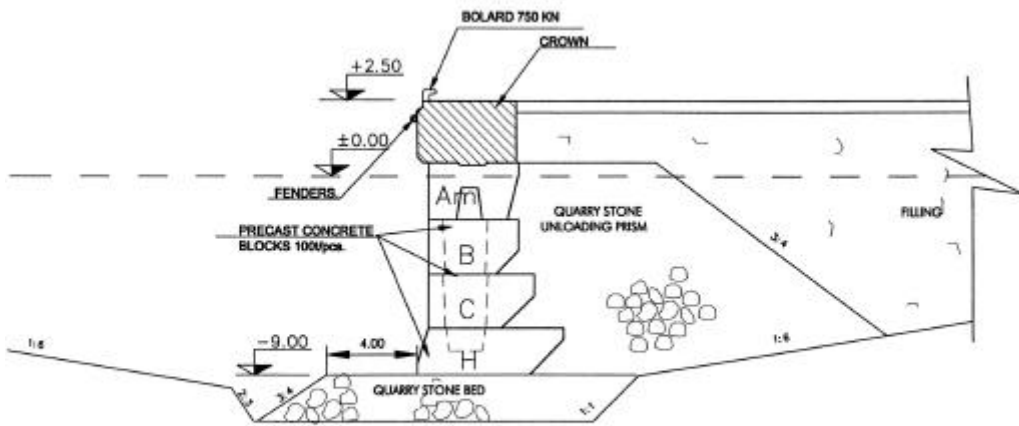
Standard section of all these seven pier are given below.


CROSS SECTION



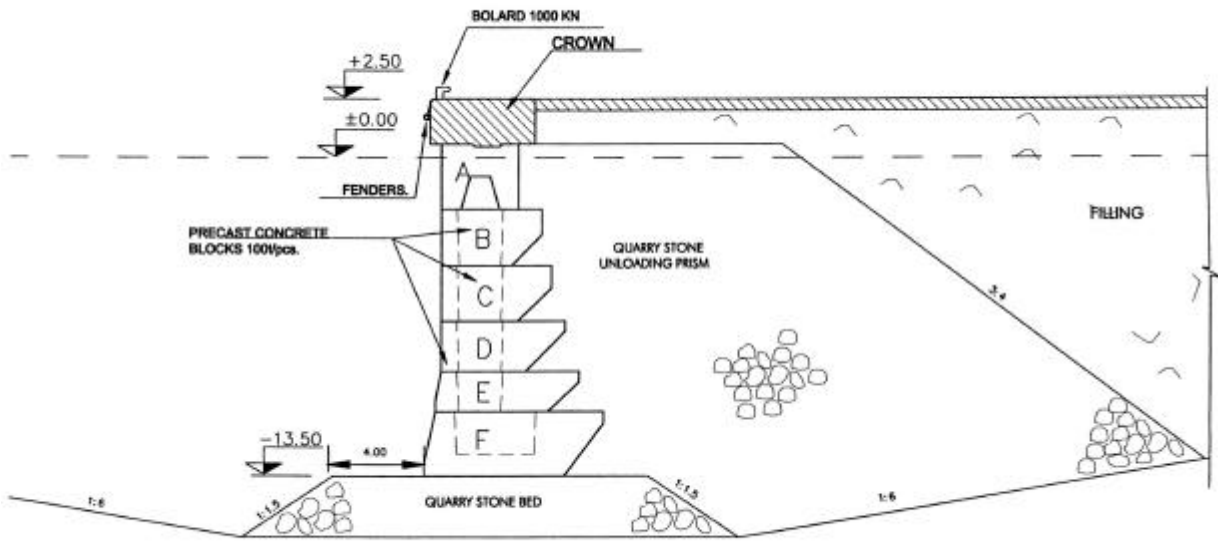

PORT CONSTANZA
QUAY WALLS
HOLLOW CONCRETE BLOCK
TYPE 1

CROSS SECTION



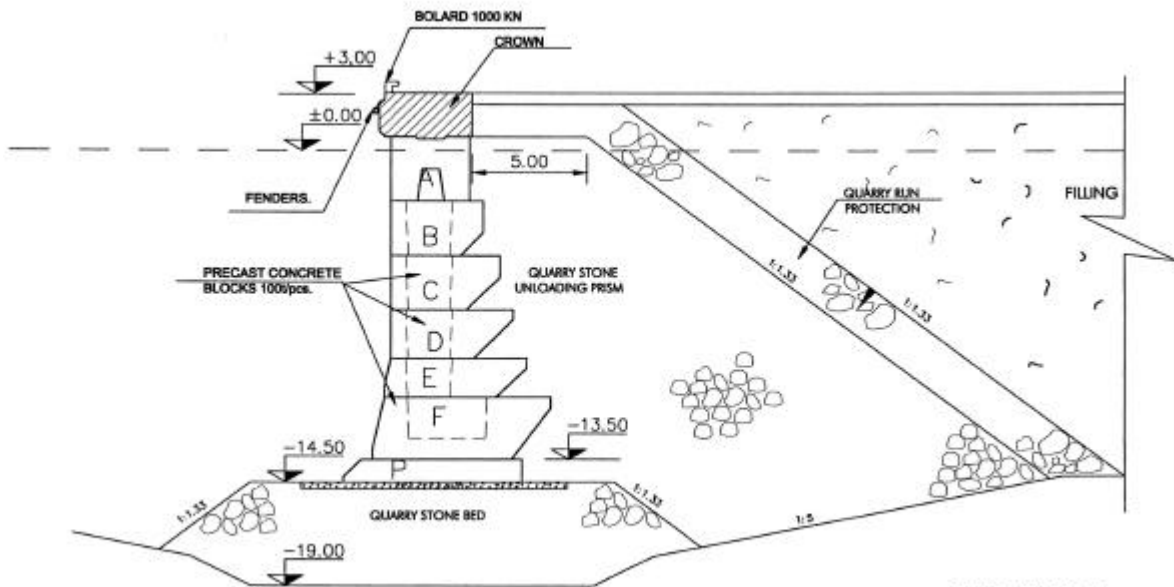

PORT CONSTANZA
QUAY WALLS
HOLLOW CONCRETE BLOCK
TYPE 3

CROSS SECTION



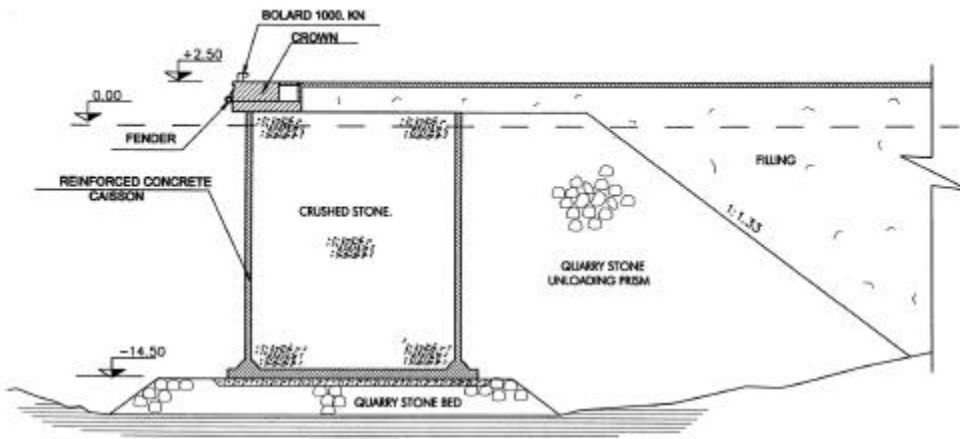
PORT CONSTANTZA QUAY WALLS
HALLOW CONCRETE BLOCK TYPE 5

CROSS SECTION

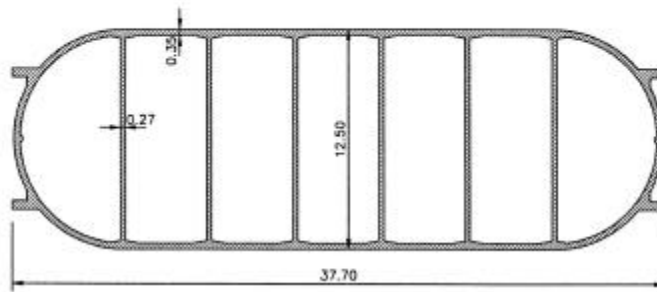


PORT CONSTANTZA QUAY WALLS
HALLOW CONCRETE BLOCK TYPE 6

CROSS SECTION

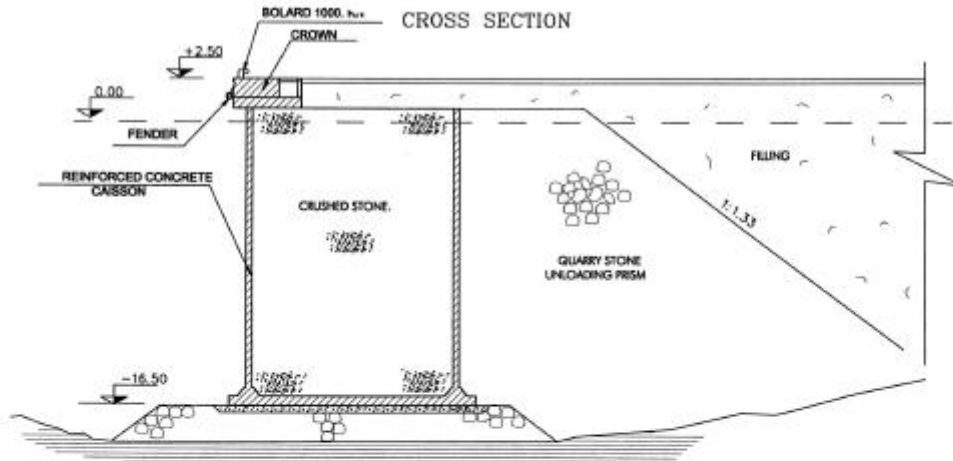


HORIZONTAL CROSS SECTION

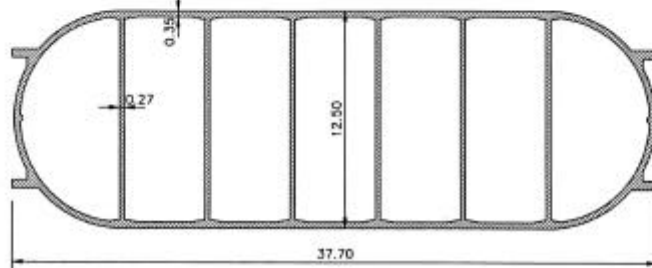


PORT CONSTANTZA
QUAY WALLS
FLOATING CAISSON QUAY WALL
TYPE 12

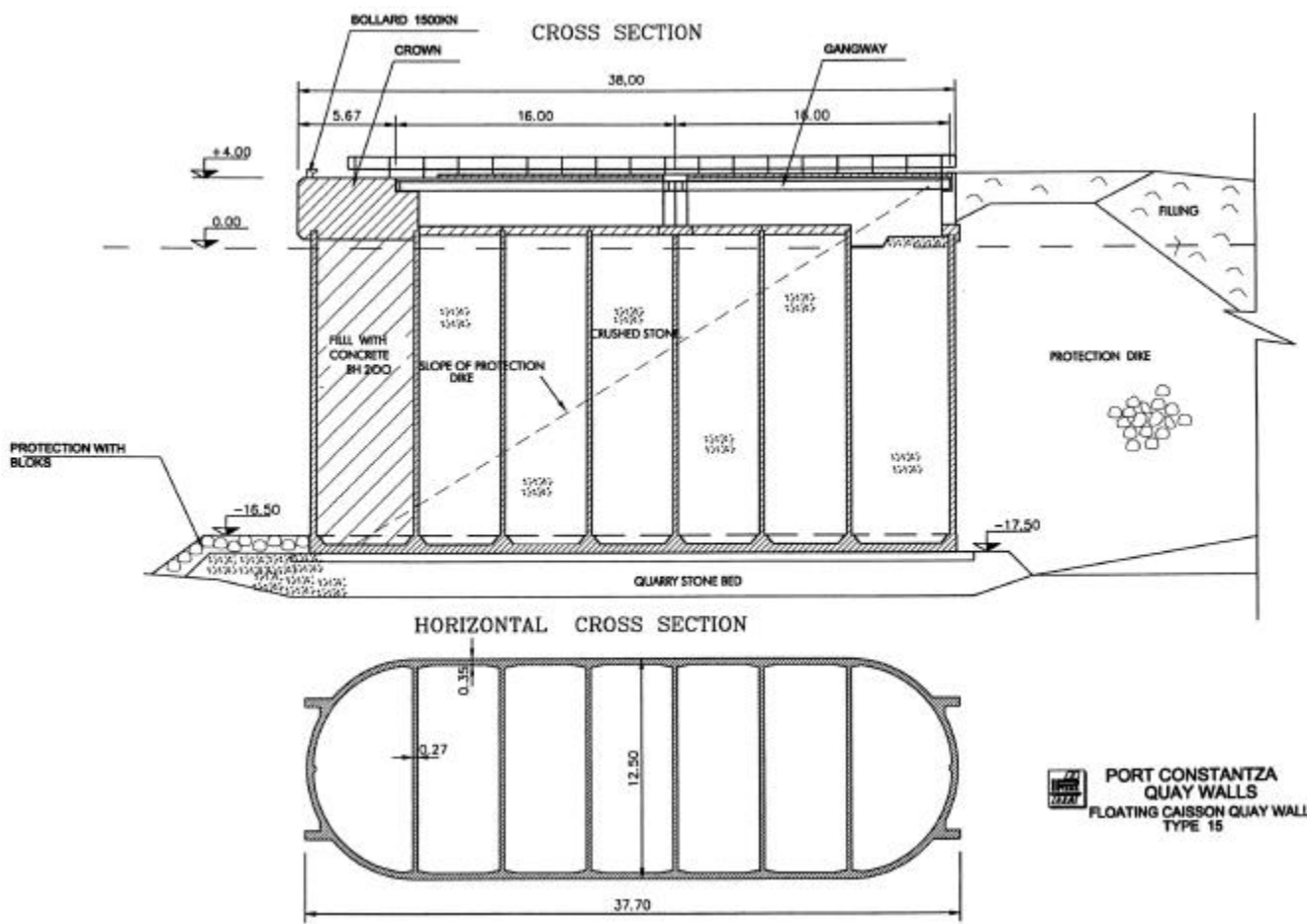
CROSS SECTION



HORIZONTAL CROSS SECTION



PORT CONSTANTZA
QUAY WALLS
FLOATING CAISSON QUAY WALL
TYPE 13



IA. 2: DREDGING FOR ACHIEVEMENT THE DESIGN LEVELS IN CONSTANTZA PORT

(1) General Description

Constantza Port was designed to receive large dead weight ships, correlated with world fleet evolution transport relations. Hereby the biggest port of the traffic it is represented by solid and liquid bulk goods that are efficient transported with big capacity ships. The solid bulk traffic represents 41 - 46 %, and liquid products, especially the oil petroleum, 35 - 40 % of the whole port traffic, resulting an average by approx. 85 % of cargo quantities that could be transported with large ships.

The ships for solid cargoes and liquid oil products have the capacity 55,000 - 165,000 tdw. Consequently, it was provided accosting depth to the berths and basin's depths (Annex 1), as well as berth's technological equipping to ensure a minimal standing duration in port of these ships.

(2) Present Water Depth

Due to the high cost of dredging works, in many port basin areas, where hard soil have been found, the surfaces have not been dredged. Thus, the draught of the ships arriving to berths is reduced. This depth reduction varies in general between 1,0 m and 2,5 m and even more in some areas, which affects the capacity of principal maneuver basins, especially those for solid bulk goods traffic (ore, coal, grain, phosphates, cement, fertilizer etc.) and liquid oil products.

Due to these depths limitation, the port are accepted ships with lower dead weight, thus the berths and afferent installations are not properly used.

Because it's more economic to use larger ships for longer distances, these arrives in port with full cargo, but for unloading are necessary supplementary operations for lighten, using floating cranes and barges, or partial operation to berths that are not meant for that cargo, after which the ship is moved to the specialized berth. The unloaded cargo for the ship's lighter is transported after this to the specialized berth.

All these operations leads to the increase of the time the ships stay in port and to the increase of cargoes tone cost due to supplementary handling operations.

(3) Objective of Dredging

If the design depths are achieved in the port, all the ships will be efficiently operated and there will be no more dead weight restrictions for the access to berths.

By designed basins depths achievement, ships with bigger dead weight than in present, can accost to quays, which will lead to an increase of Port Administration's incomes, improvement of services and traffic increase. The purpose is first of all, to eliminate the ships lightening operations and to reduce the standing duration of ships. By the achievement of the designed depths are the entire basin surface, the navigation safety in port, will increase.

Using bigger ships, the productivity of loading/unloading will increase and the handling equipment is efficiently used.

(4) Seabed and Dredging Materials

The bottom basin's soil is sandy, clayey or calcareous limestone. In this study only the limestone material quantities that is necessary to be dredged according to hydrographic survey it is considered and the maintenance works are not included.

To assure the achievement design depths, a dredging volume of calcareous material of 1,087,000 m³ is necessary according to the following table:

Area	Dredging volume (m ³)
Maneuver basin North	112,000
Basin 7	86,400
Basin 8	260,500
Basin 9	58,000
Basin 10	1,500
Access channel	15,000
Basin 1 South (ore)	20,500
River/maritime basin	392,700
Berth 114	22,000
Berth 118	7,000
Berths 124/125/126	111,400
TOTAL	1,087,000

The cost of these works is estimated to 30 mil. EURO (exclusive V.A.T) by IPTANA

Breakdown of Dredging Volume:

Basin/Zone		Area (m ²)	Design depths (m)	Maximum thickness of hard soil layer to be dredged (m)	Volume to be dredged (m ³)
North manoeuvre basin	A	83.735	-13.50	2.50	112.000
	B	77.313	-13.50	4.00	
	C	44.526	-14.00	2.60	
	D	4.392	-14.00	1.00	
Basin no. 7	E	116.448	-13.50	2.60	86.400
Basin no. 8	F	203.123	-13.50	4.70	260.500
Basin no. 9	G	123.230	-13.50	3.00	58.000
Basin no. 10	H	39.721	-13.50	1.70	1.500
Fairway	I	14.000	-19.00	1.20	15.000
	J	477.800	-19.00	1.10	
Basin 1 South	K	58.144	-14.50	1.00	20.500
River sea basin	L	420.000	-7.00	3.50	392.700
Berth 124/125/126	M	360.620	-16.50	1.00	111.400
Berth 114	N	80.226	-14.50	2.30	22.000
Berth 118	O	48.875	-14.50	1.80	7.000

TOTAL VOLUME = 1.087.000 mc.