2.8. Conclusions and Recommendations

2.8.1 Types of Industry Likely to be Located

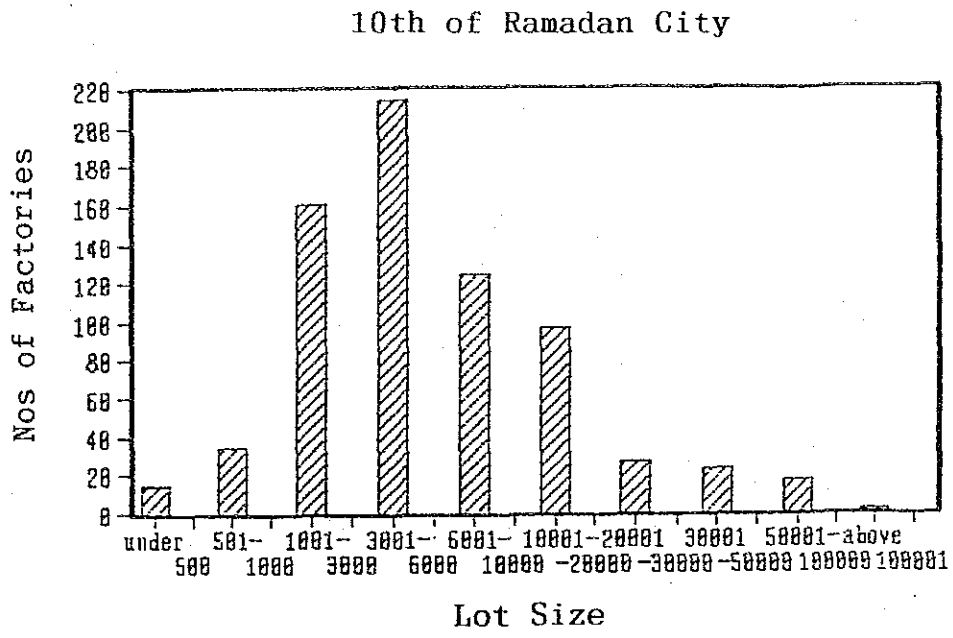
In addition to the statement made on the subject, in the Project Report this report deals with a zoning plan by type of industrial activities identified in the above study. The zoning plan will provide a guideline to the infrastructural planners and engineers as well as to the project management organizations for selection of investors and assignment of factory lot within the project areas. For evaluation of respective activities, nine (9 factors were considered.

As a recommended zoning plan, it was concluded that the consumer related industries are assigned to the coastal zone and the zone along the Suez-Ain Sukhuna road, the basic material industries are to the zone in the north western Part of Ataqa West along the arterial road situated in the south western part of the Ataqa West. The same principles are applied to a zoning plan of Adabiya Industrial Free Zone. Figure 2-7-2 shows a recommended zoning plan.

2.8.2 Recommended Land Use Plan

The land use plan submitted in the Progress Report has been modified in accordance with the results of coordination with the concerned agencies. Major modifications are creation of a buffer green zone along the boundary between the US-AID STP and Ataqa Industrial Estate West section, readjustment of road network plan, relocation of the proposed STP to Adabiya and siting of the water treatment plant and power substation in the green area. The recommended plan is shown in Figure 2.6-7.

It is understood that the disposal of industrial solid waste will be handled by private contractors who have experiences in this field. Therefore no disposal area is planned within the zone and estates. It is customarily disposed in the remote desert as land fill after open incineration for inflammable materials. The green buffer zone will diinitely help reduce odors, dusts and noise by the STP of the US-AID.



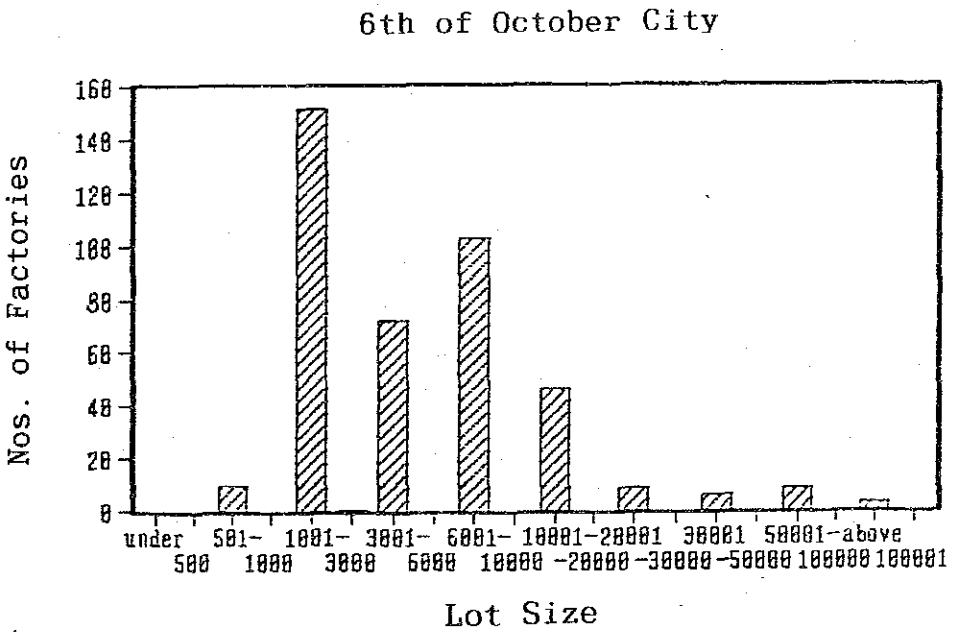


Figure 2.7.1 An Analysis of the Factory Lot Size

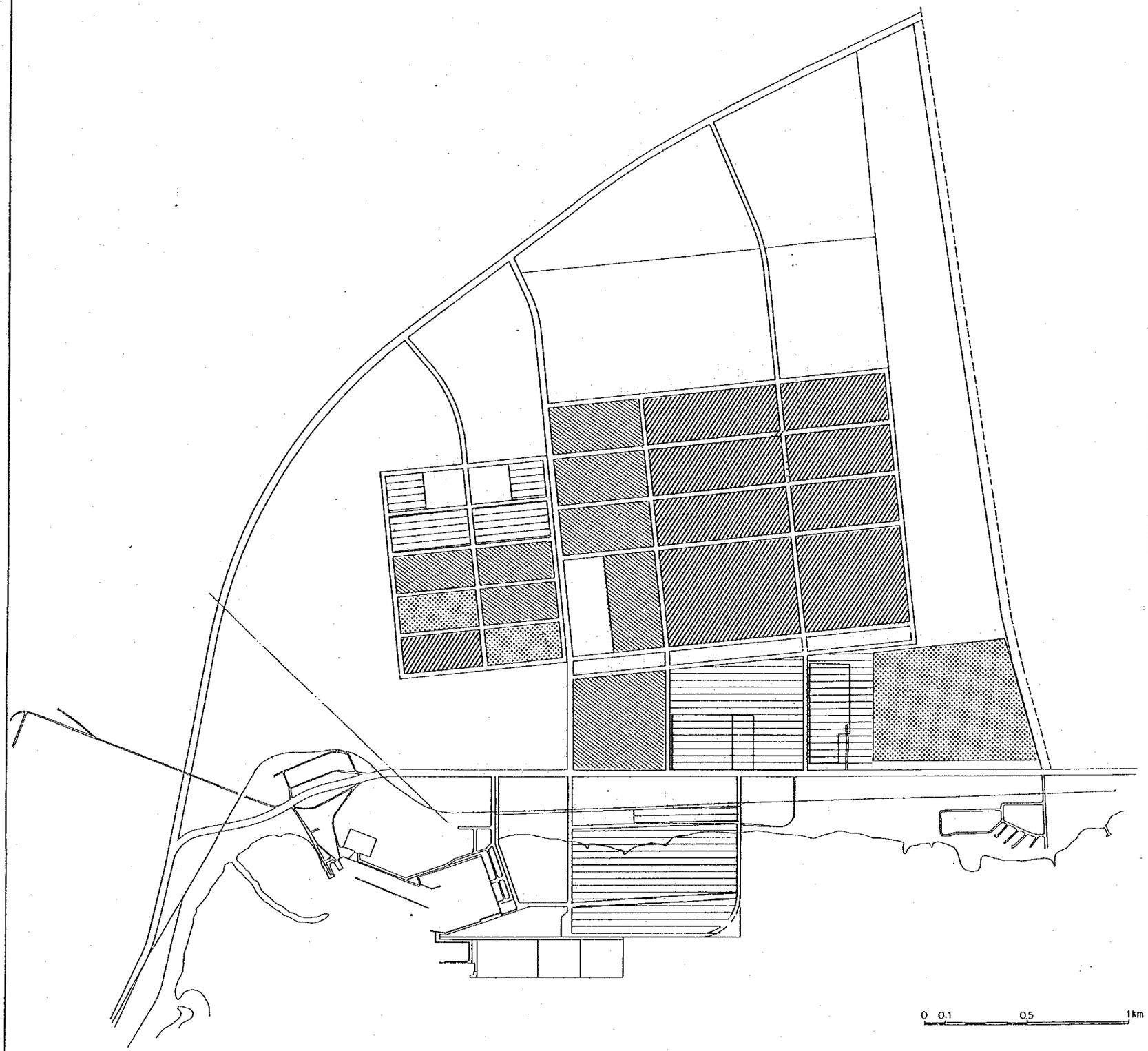


FIG. 2 A ZONING PLAN BY TYPE OF INDUSTRIES

LEGEND:

CONSUMER RELATED INDUSTRIES
Food, wood & furnitures
Spinning, weaving & apparels

BASIC MATERIAL INDUSTRIES
Plastic & rubber industries
Building material industries
Chemicals

ENGINEERING & ASSEMBLY INDUSTRIES
Electrical machinery, electronics
Transportation equipment
Mechanical and metal working

OTHERS

Figure 2.7.2 A Zoning Plan by Type of Industries

Table 2.7.1: A Model of Industrial Mix of the Proposed Ataqa Industrial Estate

NO. TYPE	MIX RATIO (%)	SPACE(ha) REQUIRED	NO. OF COMPANY	NO. OF WORKERS	INVESTMENT EL000	PRODUCTION EL 000	WAGES EL 000
1. Food Industries	8	27	41	2214	172692	2333	4207
2. Wood Products	8	27	39	1716	22308	20592	858
& Metal Furniture		0					
3. Plastic Industries	6	21	41	1722	89544	99876	2411
4. Paper Products	7	24	19	1482	81510	74100	4001
5. Spinning & Weaving	13	45	52	4108	230048	267020	9038
6. Electrical &	10	34	26	2262	108576	126672	4298
Engineering Ind.		0					
7. Mechanical &	5	17	18	1476	66420	63468	3100
Metal Ind.		0					
8. Building Materials	16	55	39	1365	124215	146055	3003
9. Chemiclas &	10	34	37	2405	165945	182780	4810
Pharmaceuticals		0					0
10.Others	17	58	67	3015	235170	289440	6030
	100	343	379	21765	1296428	1272336	41755

source:Study Team

Table 2.7.2: A Model of Industrial Mix of the Proposed Adabiya Industrial Free Zone

NO. TYPE	MIX RATIO (%)	SPACE(ha) REQUIRED	NO. OF COMPANY	NO. OF WORKERS	INVESTMENT EL000	PRODUCTION EL 000	WAGES EL 000
1. Food Industries	2	1	2	216	16632	25704	410
2. Wood Products		0			0		
& Metal Furniture	2	1	2	176	2288	2112	88
3. Plastic Industries	2	1	2	168	8736	9744	235
4. Paper Products	2	1	2	280	15400	14000	756
5. Spinning & Weaving	28	17	34	5372	300832	349180	11818
6. Electrical &					0		
Engineering Ind.	28	17	17	2958	139026	165648	5620
7. Mechanical &					0		
Metal Ind.	2	2	2	328	14760	14104	689
8. Building Materials	6	4	4	280	25480	29960	616
9. Chemiclas &							
Pharmaceuticals	2	1	1	130	8970	9880	260
10.Others	25	16	24	2160	168480	207360	4320
	100	61	90	12068	700604	827692	24813

source: Study Team

Table 2.7.3: Average Size of Production by Type of Industry and New Community — Unit of Per Factory : LE x 1,000

	New Community	10th of Ramadan			6th of October			Sadat			N.Borg	Elarab		New	Salhya		Total		
	Type of Industry	Per Factory	Per Worker	Per sq.m.	Per Factory	Per Worker	Per sq.m.	Per Factory	Per Worker	Per sq.m.	Per Factory	Per Worker	Per sq.m.	Per Factory	Per Worker	Per sq.m.	Per Factory	Per Worker	Per sq.m.
1	Food Industries	315087	104	8402	52000	51	4483	109516	215	10002	191221	206	17227	2850	29	2681		121	8559
2	Wood Products & Metalic Furniture	83276	56	2687	25150	3	1453	2664	47	4440	17966	27	2581	3526	33	35260		33	9304
3	Plastic Industries	174209	45	5427	19350	45	449	56483	144	7531	49920	110	6088	1410	22	1763		73	4252
4	Paper Products	81214	84	3743	33275	34	1228	6960	18	3164	5900	14	776	0	0	0		30	1782
5	Spinning & Weaving	474859	71	6443	30000	16	1596	154576	136	13212	11190	18	1472	0	0	0		48	4545
6	Electrical & Engineering	248723	54	8203	26977	40	1686	54180	623	9505	14575	50	1080	24750	89	7279		171	5151
7	Mechanical & Metalic Industries	72362	79	4307	7580	7	1226	23970	39	2923	41289	62	4801	775	6	369		39	2725
8	Building Materials	263608	136	4068	68921	64	1560	92975	125	2372	3920	17	360	923	17	1319		72	1936
9	Chemicals & Pharmaceuticals	238975	79	6128	52130	48	2402	74810	111	4562	29986	56	2478	27200	95	38857		79	10885
10	Others	551344	110	7160	152724	65	2747	3965	18	862	13499	47	3750	180	5	300		49	2964
		2503657			487107			580099			379466			61614			0		
								470583											

Table 2.7.4: Average Size of Factory Lots by Type of Industry and Industrial Mix by New Community — Unit of Total : Sq.meter

	New Community	10th of Ramadan			6th of October			Sadat			N.Borg	Elarab		New	Salhya		Total		
	Type of Industry	Total	Average Size sq.m	Ratio	Total	Average	Ratio	Total	Average	Ratio	Total	Average	Ratio	Total	Average	Ratio	Total	Average	Ratio
1	Food Industries	374771	6575	8.6%	115506	6794	5.2%	2295352	191279		110584	7899	12.6%	10361	5181	9.5%	611222	6612	8.1%
2	Wood Products & Metalic Furniture	311471	10047	7.2%	180030	12859	8.1%	5995	1499	0.6%	66932	6693	7.6%	9993	3331	9.1%	568426	6886	7.5%
3	Plastic Industries	321619	6843	7.4%	43302	4811	2.0%	75237	5374	7.8%	82340	5881	9.4%	7970	2657	7.3%	455231	5113	6.0%
4	Paper Products	216827	9034	5.0%	270565	30063	12.2%	21705	10853	2.2%	55311	13828	6.3%	0	0	0.0%	542703	12756	7.2%
5	Spinning & Weaving	736646	10524	17.0%	188331	9912	8.5%	116623	11662	12.1%	76356	10908	8.7%	0	0	0.0%	1001333	8601	13.3%
6	Electrical & Engineering	401242	10288	9.3%	159766	9398	7.2%	56656	7082	5.9%	135085	22514	15.4%	33430	16715	30.6%	729523	13199	9.7%
7	Mechanical & Metalic Industries	168255	9348	3.9%	62151	5650	2.8%	82485	5499	8.5%	85805	5720	9.8%	21101	21101	19.3%	337312	9464	4.5%
8	Building Materials	647782	16195	14.9%	424892	10895	19.2%	391692	26113	40.6%	109078	10908	12.4%	13908	6954	12.7%	1195660	14213	15.9%
9	Chemicals & Pharmaceuticals	389552	10251	9.0%	216833	10325	9.8%	168464	12959	17.5%	121488	10124	13.8%	6750	2250	6.2%	734623	9182	9.7%
10	Others	769207	7122	17.7%	556277	13907	25.1%	46436	11609	4.8%	36213	4527	4.1%	5840	5840	5.3%	1367537	8601	18.1%
		4337372		100.0%	2217653		100.0%	3260645			879192		100.0%	109353		100.0%	7543570		100.0%
								965293		100.0%									

Table 2.7.5 Average Number of Workers by Type of Industry and New Community

New Community	10th of Ramadan		6th of October		Sadat		N.Borg	Elarab	New	Salhya	Total	
Type of Industry	Total	Average	Total	Average	Total	Average	Total	Average	Total	Average	Total	Average
1 Food Industries	3016	53	1010	59	509	42	927	66	100	50		54
2 Wood Products & Metalic Furniture	1491	48	887	63	57	14	606	61	106	35		44
3 Plastic Industries	3883	83	427	47	392	28	452	32	65	22		42
4 Paper Products	971	40	965	107	189	95	432	108	0	0		70
5 Spinning & Weaving	5716	96	1827	96	1139	114	623	89	0	0		79
6 Electrical & Engineering	4615	118	680	40	692	87	291	49	278	139		87
7 Mechanical & Metalic Industries	911	51	1040	95	615	88	660	44	134	134		82
8 Building Materials	1938	48	1039	27	744	50	220	22	53	27		35
9 Chemicals & Pharmaceuticals	3013	79	1095	52	676	52	534	45	285	95		85
10 Others	5023	46	1932	48	215	54	282	35	40	40		45
	31577		10902		4719		5027		1061			

source: Study team -original data from MODANC

Table 2.7.6: Average Size of Investment by Type of Industry and New Community

Unit of Per Factory : LE x 1,000

New Community	10th of Ramadan			6th of October			Sadat			N.Borg	Elarab		New	Salhya		Total		
Type of Industry	Per Factory	Per Worker	Per sq.m.	Per Factory	Per Worker	Per sq.m.	Per Factory	Per Worker	Per sq.m.	Per Factory	Per Worker	Per sq.m.	Per Factory	Per Worker	Per sq.m.	Per Factory	Per Worker	Per sq.m.
1 Food Industries	258396	86	689	47300	47	409	40476	80	18	85783	93	776	3535	36	341		78	447
2 Wood Products & Metalic Furniture	95324	64	306	24055	3	134	1378	24	230	16800	28	251	2379	22	238		13	232
3 Plastic Industries	189750	49	590	27600	65	637	12772	33	170	36960	82	449	1466	23	184		52	406
4 Paper Products	95287	98	439	32275	34	123	5965	32	2749	7171	17	130	0	0	0		55	688
5 Spinning & Weaving	457716	68	621	30965	17	164	76014	67	652	10469	17	137	0	0	0		56	315
6 Electrical & Engineering	250898	54	625	25112	37	157	11905	17	210	11616	40	86	8520	31	255		48	267
7 Mechanical & Metalic Industries	96668	106	575	6630	6	108	18653	30	485	28274	43	330	2041	15	97		45	319
8 Building Materials	180152	93	278	99721	96	235	76286	103	195	6802	31	82	2117	40	152		91	184
9 Chemicals & Pharmaceuticals	254028	84	652	61640	56	284	37632	56	228	28873	50	221	7175	25	1.07		69	276
10 Others	452185	90	588	105724	55	190	6950	32	150	15985	57	441	490	12	83		78	290
	2330404			462022			288031 247555			246733			27723			0		

source: Study team-original data from MODANC

Table 2.7.7: Average Size of Wage by Type of Industry and New Community

Unit Per Factory and Per Worker : LE x 1,000

New Community	10th of Ramadan			6th of October			Sadat			N.Borg	Elarab		New Salhya			Total		
Type of Industry	Per Factory	Per Worker	Per sq.m.	Per Factory	Per Worker	Per sq.m.	Per Factory	Per Worker	Per sq.m.	Per Factory	Per Worker	Per sq.m.	Per Factory	Per Worker	Per sq.m.	Per Factory	Per Worker	Per sq.m.
1 Food Industries	4652	1.542		2765	2.738		1030	2.024		1960	2.114		236	2.39			2.1616	
2 Wood Products & Metalic Furniture	2338	1.568		1923	2.168		113	1.982		900	1.485		128	1.208			1.6822	
3 Plastic Industries	4234	1.09		1281	3		865	2.207		1026	2.27		104	1.6			2.0334	
4 Paper Products	2832	2.917		2871	2.975		282	1.492		815	1.887		0	0			1.8542	
5 Spinning & Weaving	12615	1.878		5481	3		3039	2.668		1350	2.17		0	0			1.9432	
6 Electrical & Engineering	7370	1.597		2022	2.974		1743	2.519		477	1.639		607	2.183			2.1824	
7 Mechanical & Metalic Industries	1718	1.886		3140	3.019		1077	1.751		1131	1.714		111	0.828			1.8396	
8 Building Materials	3974	2.05		2953	2.842		1252	1.683		399	1.814		85	1.604			1.9986	
9 Chemicals & Pharmaceuticals	3901	1.295		3382	3.089		1597	2.362		982	1.839		1080	3.79			2.529	
10 Others	7958	1.584		5884	3.046		451	1.599		524	1.859		120	3			2.2176	2984
	51592			31702			11449 10419			9564			2471			0		

Table 2.7.8: An Analysis of Factory Lot Size in the 10th of Ramadan (Under Construction)

		L O T S I Z E (SQ.M.)																							
NO.	TYPE	under 500		501- 1000		1001- 3000		3001- 6000		6001-10000		10001-20000		20001 -30000		30001 -50000		50001-100000		above 100001		TOTAL			
		nos.	%	nos.	%	nos.	%	nos.	%	nos.	%	nos.	%	nos.	%	nos	%	nos.	%	nos.	%	nos.	%		
1.	Food Industries		0.0%		0.0%	3	11.5%	11	42.3%		0.0%	4	15.4%	5	19.2%	3	11.5%		0.0%		0.0%	26	100.0%		
2.	Wood Products & Metal Furniture		0.0%	3	10.3%	11	37.9%	6	20.7%		0.0%		0.0%		0.0%		0.0%	9	31.0%		0.0%	29	100.0%		
3.	Plastic Industries		0.0%		0.0%	2	12.5%	14	87.5%		0.0%		0.0%		0.0%		0.0%		0.0%		0.0%	16	100.0%		
4.	Paper Products		0.0%		0.0%		0.0%	2	50.0%	2	50.0%		0.0%		0.0%		0.0%		0.0%		0.0%	4	100.0%		
5.	Spinning & Weaving		0.0%		0.0%	22	84.6%		0.0%	2	7.7%	1	3.8%		0.0%	1	3.8%		0.0%		0.0%	26	100.0%		
6.	Electrical & Engineering Ind.		0.0%		0.0%	4	21.1%	5	26.3%	9	47.4%	1	5.3%		0.0%		0.0%		0.0%		0.0%	19	100.0%		
7.	Mechanical & Metal Ind.	1	5.3%		0.0%	4	21.1%	1	5.3%	5	26.3%	7	36.8%		0.0%	1	5.3%		0.0%		0.0%	19	100.0%		
8.	Building Materials		0.0%		0.0%		0.0%	12	80.0%		0.0%		0.0%	1	6.7%		0.0%	2	13.3%		0.0%	15	100.0%		
9.	Chemiclas & Pharmaceuticals		0.0%		0.0%	6	33.3%	6	33.3%		0.0%		0.0%	3	16.7%	3	16.7%		0.0%		0.0%	18	100.0%		
10.	Others	2	2.9%	18	26.1%	18	26.1%	13	18.8%	4	5.8%	12	17.4%		0.0%	2	2.9%		0.0%		0.0%	69	100.0%		
		3	1.2%	21	8.7%	70	29.0%	70	29.0%	22	9.1%	25	10.4%	9	3.7%	10	4.1%	11	4.6%	0	0.0%	241	100.0%		

source: Study team-original data from MODANC

Table 2.7.9: An Analysis of Factry Lot Size in 10th of Ramadan (In Operation)

	L O T S I Z E (SQ.M.)																							
NO. TYPE	under 500		501- 1000		1001- 3000		3001- 6000		6001-10000		10001-20000		20001 -30000		30001 -50000		50001-100000		above 100001		TOTAL			
	nos.	%	nos.	%	nos.	%	nos.	%	nos.	%	nos.	%	nos.	%	nos	%	nos.	%	nos.	%	nos.	%		
1. Food Industries	1	1.8%	1	1.8%	24	42.1%	16	28.1%	5	8.8%	8	14.0%		0.0%	2	3.5%		0.0%		0.0%	57	100.0%		
2. Wood Products & Metal Furniture		0.0%		0.0%	2	6.5%	18	58.1%	3	9.7%	2	6.5%	5	16.1%	1	3.2%		0.0%		0.0%	31	100.0%		
3. Plastic Industries		0.0%		0.0%	15	31.9%	15	31.9%	14	29.8%		0.0%	1	2.1%	2	4.3%		0.0%		0.0%	47	100.0%		
4. Paper Products		0.0%	5	20.8%	7	29.2%		0.0%		0.0%	10	41.7%		0.0%		0.0%	2	8.3%		0.0%	24	100.0%		
5. Spinning & Weaving		0.0%		0.0%	3	4.3%	28	40.0%	24	34.3%	12	17.1%	1	1.4%	1	1.4%		0.0%	1	1.4%	70	100.0%		
6. Electrical & Engineering Ind.		0.0%	3	7.7%		0.0%	6	15.4%	12	30.8%	14	35.9%		0.0%	4	10.3%		0.0%		0.0%	39	100.0%		
7. Mechanical & Metal Ind.	2	11.1%		0.0%	2	11.1%	3	16.7%	6	33.3%	4	22.2%		0.0%	1	5.6%		0.0%		0.0%	18	100.0%		
8. Building Materials		0.0%		0.0%	1	2.5%	13	32.5%	17	42.5%	2	5.0%	1	2.5%	2	5.0%	3	7.5%	1	2.5%	40	100.0%		
9. Chemiclas & Pharmaceuticals		0.0%		0.0%	2	5.3%	20	52.6%		0.0%	10	26.3%	5	13.2%		0.0%	1	2.6%		0.0%	38	100.0%		
10.Others	9	8.3%	4	3.7%	35	32.4%	25	23.1%	11	10.2%	11	10.2%	10	9.3%	2	1.9%	1	0.9%		0.0%	108	100.0%		
	12	2.5%	13	2.8%	91	19.3%	144	30.5%	92	19.5%	73	15.5%	23	4.9%	15	3.2%	7	1.5%	2	0.4%	472	100.0%		

Table 2.7.10: An Analysis of Lot Size of the 10th of Ramadan (Combiend)

	L O T S I Z E (SQ.M.)																							
NO. TYPE	under 500		501- 1000		1001- 3000		3001- 6000		6001-10000		10001-20000		20001 -30000		30001 -50000		50001-100000		above 100001		TOTAL			
	nos.	%	nos.	%	nos.	%	nos.	%	nos.	%	nos.	%	nos.	%	nos	%	nos.	%	nos.	%	nos.	%		
1. Food Industries	1	1.2%	1	1.2%	27	32.5%	27	32.5%	5	6.0%	12	14.5%	5	6.0%	5	6.0%		0.0%		0.0%	83	100.0%		
2. Wood Products & Metal Furniture		0.0%	3	5.0%	13	21.7%	24	40.0%	3	5.0%	2	3.3%	5	8.3%	1	1.7%	9	15.0%		0.0%	60	100.0%		
3. Plastic Industries		0.0%		0.0%	17	27.0%	29	46.0%	14	22.2%		0.0%	1	1.6%	2	3.2%		0.0%		0.0%	63	100.0%		
4. Paper Products		0.0%	5	17.9%	7	25.0%	2	7.1%	2	7.1%	10	35.7%		0.0%		0.0%	2	7.1%		0.0%	28	100.0%		
5. Spinning & Weaving		0.0%		0.0%	25	26.0%	28	29.2%	26	27.1%	13	13.5%	1	1.0%	2	2.1%		0.0%	1	1.0%	96	100.0%		
6. Electrical & Engineering Ind.		0.0%	3	5.2%	4	6.9%	11	19.0%	21	36.2%	15	25.9%		0.0%	4	6.9%		0.0%		0.0%	58	100.0%		
7. Mechanical & Metal Ind.	3	8.1%		0.0%	6	16.2%	4	10.8%	11	29.7%	11	29.7%		0.0%	2	5.4%		0.0%		0.0%	37	100.0%		
8. Building Materials		0.0%		0.0%	1	1.8%	25	45.5%	17	30.9%	2	3.6%	2	3.6%	2	3.6%	5	9.1%	1	1.8%	55	100.0%		
9. Chemiclas & Pharmaceuticals		0.0%		0.0%	8	14.3%	26	46.4%	10	17.9%	8	14.3%	3	5.4%	1	1.8%		0.0%		0.0%	56	100.0%		
10.Others	11	6.2%	22	12.4%	53	29.9%	38	21.5%	15	8.5%	23	13.0%	10	5.6%	4	2.3%	1	0.6%		0.0%	177	100.0%		
	15	2.1%	34	4.8%	161	22.6%	214	30.0%	124	17.4%	96	13.5%	27	3.8%	23	3.2%	17	2.4%	2	0.3%	713	100.0%		

Table 2.7.11: An Analysis of Lot Size in the 6th of October (In Operation)

NO. TYPE	under 500		501- 1000		1001- 3000		3001- 6000		6001-10000		10001-20000		20001 -30000		30001 -50000		50001-100000		above 100001		TOTAL	
	nos.	%	nos.	%	nos.	%	nos.	%	nos.	%	nos.	%	nos.	%	nos	%	nos.	%	nos.	%	nos.	%
1. Food Industries	0	0.0%	0	0.0%	12	48.0%	6	24.0%	1	4.0%	3	12.0%	3	12.0%	0	0.0%	0	0.0%	0	0.0%	25	100.0%
2. Wood Products & Metal Furniture	0	0.0%	0	0.0%	1	14.3%	5	71.4%	1	14.3%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	7	100.0%
3. Plastic Industries	0	0.0%	0	0.0%	14	93.3%	0	0.0%	1	6.7%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	15	100.0%
4. Paper Products	0	0.0%	2	25.0%	2	25.0%	2	25.0%	0	0.0%	2	25.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	8	100.0%
5. Spinning & Weaving	0	0.0%	0	0.0%	19	90.5%	1	4.8%	1	4.8%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	21	100.0%
6. Electrical & Engineering Ind.	0	0.0%	2	8.7%	9	39.1%	11	47.8%	0	0.0%	0	0.0%	1	4.3%	0	0.0%	0	0.0%	0	0.0%	23	100.0%
7. Mechanical & Metal Ind.	0	0.0%	0	0.0%	7	41.2%	10	58.8%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	17	100.0%
8. Building Materials	0	0.0%	0	0.0%	0	0.0%	1	5.9%	12	70.6%	0	0.0%	0	0.0%	0	0.0%	4	23.5%	0	0.0%	17	100.0%
9. Chemiclas & Pharmaceuticals	0	0.0%	0	0.0%	2	10.5%	11	57.9%	4	21.1%	0	0.0%	0	0.0%	2	10.5%	0	0.0%	0	0.0%	19	100.0%
10.Others	0	0.0%	3	4.9%	49	80.3%	2	3.3%	3	4.9%	3	4.9%	0	0.0%	1	1.6%	0	0.0%	0	0.0%	61	100.0%
	0	0.0%	7	3.3%	115	54.0%	49	23.0%	23	10.8%	8	3.8%	4	1.9%	3	1.4%	4	1.9%	0	0.0%	213	100.0%

Table 2.7.12: An Analysis of Lot Size in the 6th of October (In Poeration)

NO. TYPE	under 500		501- 1000		1001- 3000		3001- 6000		6001-10000		10001-20000		20001 -30000		30001 -50000		50001-100000		above 100001		TOTAL	
	nos.	%	nos.	%	nos.	%	nos.	%	nos.	%	nos.	%	nos.	%	nos	%	nos.	%	nos.	%	nos.	%
1. Food Industries	0	0.0%	0	0.0%	0	0.0%	8	47.1%	7	41.2%	2	11.8%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	17	100.0%
2. Wood Products & Metal Furniture	0	0.0%	0	0.0%	2	14.3%	2	14.3%	2	14.3%	8	57.1%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	14	100.0%
3. Plastic Industries	0	0.0%	0	0.0%	2	22.2%	3	33.3%	4	44.4%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	9	100.0%
4. Paper Products	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	6	66.7%	0	0.0%	0	0.0%	3	33.3%	0	0.0%	9	100.0%
5. Spinning & Weaving	0	0.0%	0	0.0%	0	0.0%	0	0.0%	18	94.7%	0	0.0%	0	0.0%	1	5.3%	0	0.0%	0	0.0%	19	100.0%
6. Electrical & Engineering Ind.	0	0.0%	0	0.0%	5	29.4%	2	11.8%	4	23.5%	4	23.5%	2	11.8%	0	0.0%	0	0.0%	0	0.0%	17	100.0%
7. Mechanical & Metal Ind.	0	0.0%	1	9.1%	2	18.2%	3	27.3%	1	9.1%	4	36.4%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	11	100.0%
8. Building Materials	0	0.0%	0	0.0%	0	0.0%	0	0.0%	37	94.9%	0	0.0%	1	2.6%	0	0.0%	0	0.0%	1	2.6%	39	100.0%
9. Chemiclas & Pharmaceuticals	0	0.0%	0	0.0%	8	38.1%	3	14.3%	5	23.8%	3	14.3%	1	4.8%	0	0.0%	1	4.8%	0	0.0%	21	100.0%
10.Others	0	0.0%	2	5.0%	18	45.0%	2	5.0%	2	5.0%	11	27.5%	1	2.5%	2	5.0%	0	0.0%	2	5.0%	40	100.0%
	0	0.0%	3	1.5%	37	18.9%	23	11.7%	80	40.8%	38	19.4%	5	2.6%	3	1.5%	4	2.0%	3	1.5%	196	100.0%

Table 2.7.13: An Analysis of Lot Size in the 6th of October (Combined)

NO.	TYPE	under 500		501- 1000		1001- 3000		3001- 6000		6001-10000		10001-20000		20001 -30000		30001 -50000		50001-100000		above 100001		TOTAL	
		nos.	%	nos.	%	nos.	%	nos.	%	nos.	%	nos.	%	nos.	%	nos	%	nos.	%	nos.	%	nos.	%
1.	Food Industries	0	0.0%	0	0.0%	12	28.6%	14	33.3%	8	19.0%	5	11.9%	3	7.1%	0	0.0%	0	0.0%	0	0.0%	42	100.0%
2.	Wood Products & Metal Furniture	0	0.0%	0	0.0%	3	14.3%	7	33.3%	3	14.3%	8	38.1%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	21	100.0%
3.	Plastic Industries	0	0.0%	0	0.0%	16	66.7%	3	12.5%	5	20.8%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	24	100.0%
4.	Paper Products	0	0.0%	2	11.8%	2	11.8%	2	11.8%	0	0.0%	8	47.1%	0	0.0%	0	0.0%	3	17.6%	0	0.0%	17	100.0%
5.	Spinning & Weaving	0	0.0%	0	0.0%	19	47.5%	1	2.5%	19	47.5%	0	0.0%	0	0.0%	1	2.5%	0	0.0%	0	0.0%	40	100.0%
6.	Electrical & Engineering Ind.	0	0.0%	2	5.0%	14	35.0%	13	32.5%	4	10.0%	4	10.0%	3	7.5%	0	0.0%	0	0.0%	0	0.0%	40	100.0%
7.	Mechanical & Metal Ind.	0	0.0%	1	3.6%	9	32.1%	13	46.4%	1	3.6%	4	14.3%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	28	100.0%
8.	Building Materials	0	0.0%	0	0.0%	0	0.0%	1	1.8%	49	87.5%	0	0.0%	1	1.8%	0	0.0%	4	7.1%	1	1.8%	56	100.0%
9.	Chemicias & Pharmaceuticals	0	0.0%	0	0.0%	10	25.0%	14	35.0%	9	22.5%	3	7.5%	1	2.5%	2	5.0%	1	2.5%	0	0.0%	40	100.0%
10.	Others	0	0.0%	5	5.0%	67	66.3%	4	4.0%	5	5.0%	14	13.9%	1	1.0%	3	3.0%	0	0.0%	2	2.0%	101	100.0%
		0	0.0%	10	2.4%	152	37.2%	72	17.6%	103	25.2%	46	11.2%	9	2.2%	6	1.5%	8	2.0%	3	0.7%	409	100.0%

Table 2.7.14: Features of the Cavite Export Processing Zone (Philippines)

TYPE	No of Company	(%)	Per Firm Employment (Persons)	Per Firm Land Area Occupied (sq.m.)	Total Employment (Persons)	(%)	Total Land Area Occupied (sq.m.)	(%)
Food	1	1.7	0	5000	0	0	5000	1.1
Textiles	3	5.3	142	8333	425	3.3	25000	5.4
Wearing Apparels	23	39.7	216	4689	4317	33.6	107836	23.3
Wood and Wood Products	1	1.7	0	5000	0	0	5000	1.1
Paper and Paper Products	2	3.5	98	4002	195	1.5	8003	1.7
Rubber Products	1	1.7	2034	31077	2034	15.8	31077	6.7
Plastic Products	1	1.7	0	5000	0	0	5000	1.1
Non-metallics Mineral Products	1	1.7	0	5000	0	0	5000	1.1
Iron and Steel Basic Industries	1	1.7	7	10000	7	0.1	10000	2.2
Non-ferrous Metal Basic Industries	1	1.7	40	10000	40	0.3	10000	2.2
Fabricated Metal Products	5	8.6	113	10000	565	4.4	50000	10.8
Machinery except electrical	2	3.4	293	11642	586	4.6	23284	5
Electrical Machinery	8	13.8	580	18725	4062	31.5	131076	28.4
Transport Eqipment	1	1.7	26	5000	26	0.2	5000	1.1
Other Eqipment and Infrastructure	1	1.7	39	3003	39	0.3	3003	0.6
Other Manufacturing Industries	6	10.4	113	6331	564	4.4	37984	8.2
Total	58	100	3701		12860	100	462263	100

source: EPZA

CHAPTER 3 DETAILED DESIGN STUDY

3.1 SURVEY AND SOIL INVESTIGATIONS

3.1.1 Topographic and Bathymetric Surveys

(1) General

Topographic and Bathymetric Surveys based on the proposed Urgent Development Plan were executed in the following areas:

1) Topographic survey at and nearby the proposed Ataqa I.E. and Adabiya I.F.Z. ares.

2) Route survey along the proposed raw water pipeline route including water intake and water treatment plant areas.

3) Route survey along the proposed wastewater pipeline route including pump stations and wastewater treatment plant areas.

4) Route surveying along the Suez/Adabiya Coastal Road.

5) Route surveying of access roads from Adabiya/Suez-Cairo Road, which is under constructions, to Ataqa I.E. and Adabiya I.F.Z.

6) Topographic survey at the proposed electrical power substation area.

7) Sounding works at and nearby the proposed Ataqa I.E. Coastal and Ataqa Port areas.

Arab Consulting Engineers (hereinafter calls ACE) undertook the topographic and bathymetric surveys under the supervision of JICA Study Team. The field surveys were executed at site during the period from April 1992 to June 1992. Topographic and Bathymetric Survey areas are shown in Figures 3.1-1-1 and 3.1-1-2 respectively.

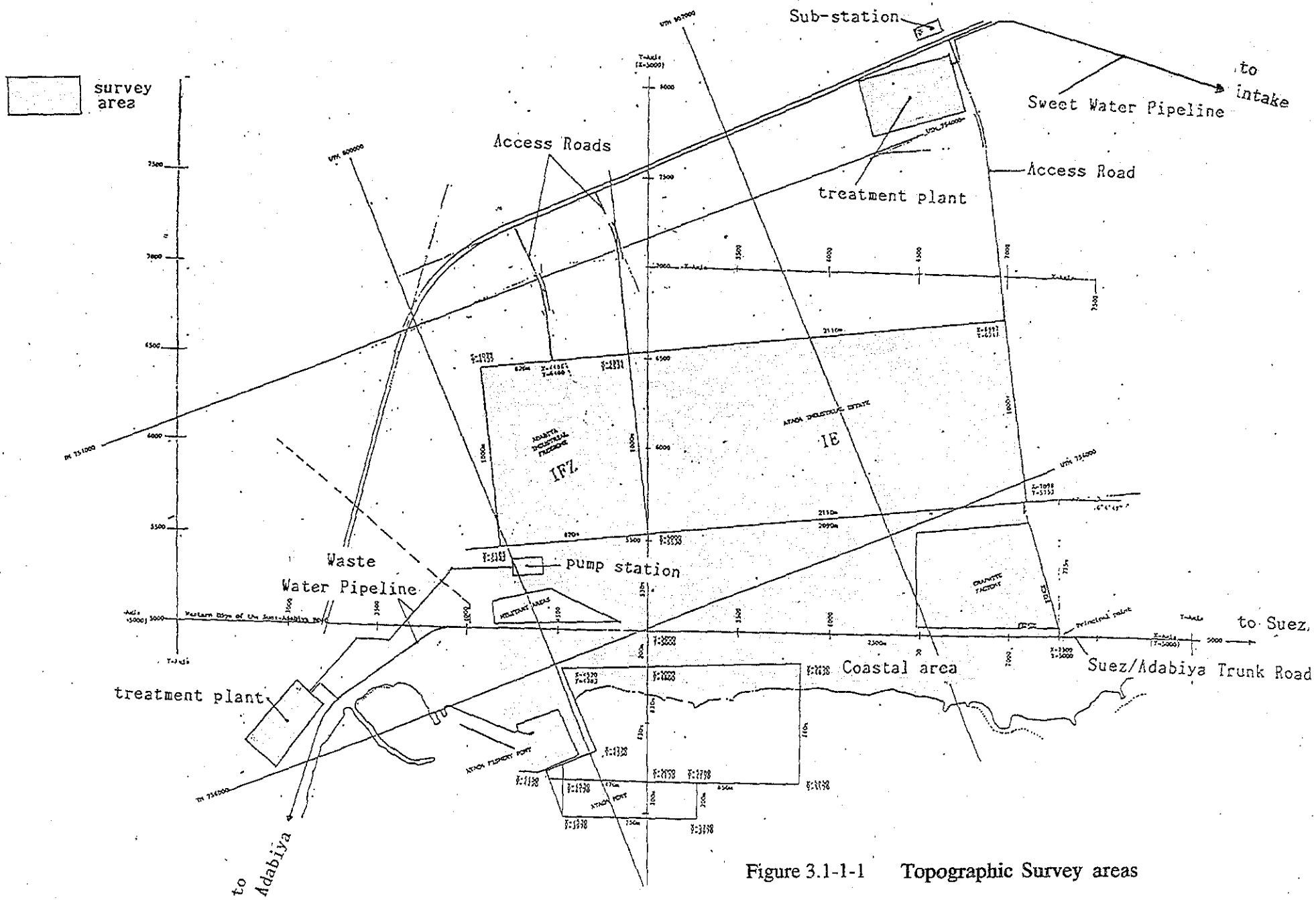


Figure 3.1-1-1 Topographic Survey areas

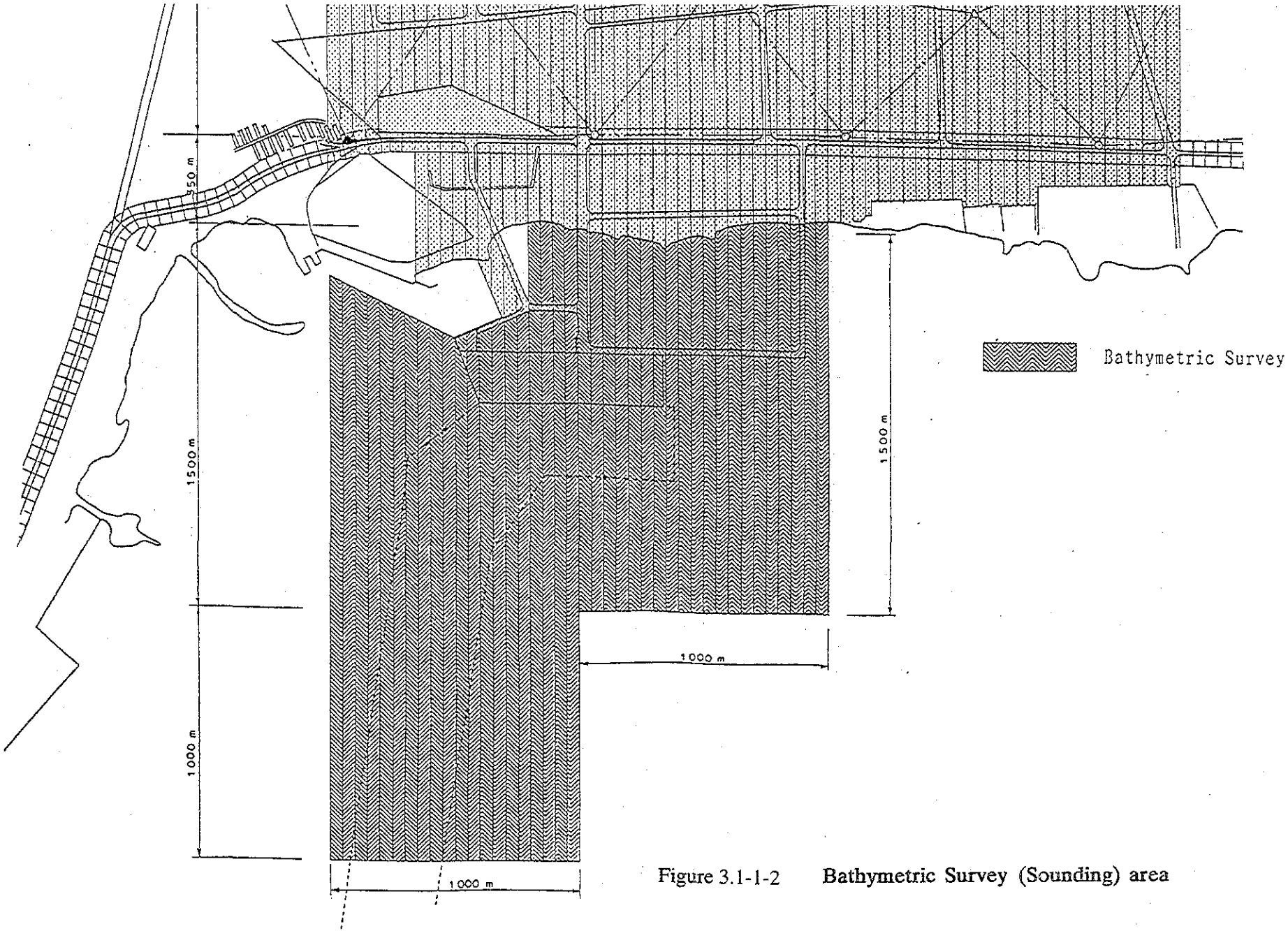


Figure 3.1-1-2 **Bathymetric Survey (Sounding) area**

(2) Topographic Survey

1) Instruments

The survey works were carried out by using the following instruments;

a) 2 Electric positioners
b) 2 Optical distance meters
c) 2 Mirrors
d) 3 Transits
e) 4 Levels
f) 2 Steel tape of 100m
g) 5 Walky-talkys of 0.5w
h) Others

2) Coordinate System

a) Horizontal Alignment

Following local coordinate system was defined as the project coordinate;

- The west side edge line of the existing Suez Adabiya Coastal Road regard as a base line of Y=5000.

- The X-axis is selected perpendicular to the Y=5000 line at the proposed intersection of the Suez Adabiya Coastal Road and proposed 30 m width arterial trunk road in the Ataqa I.E. The line matches southward right-of-way edge of the 30m width road.

*) The 30m width trunk road will be described in subsection 3.4.

Relations between local and national grid coordinate are as follows;

1) Local to National Grid Coordinate

$$N = Y\cos\theta + X\sin\theta + n, \quad n = 794{,}032.25$$
$$E = -Y\sin\theta + X\cos\theta + e, \quad e = 758{,}739.35$$

2) National Grid to Local Coordinate

$$Y = N\cos\theta - E\sin\theta + y, \quad y = 401{,}208.12$$
$$X = -N\sin\theta + E\cos\theta - x, \quad x = 1{,}022{,}352.51$$

where,

(N,E) : National Grid Coordinate
(Y,X) : Local Coordinate
θ : Angle from Y-axis of Local Coordinate to National Grid North
(Clockwise $\theta = 67^\circ\ 43'\ 44''$)

b) Elevation

All levels are related to the Egyptian National Datum Level (E.N.D.L.)

3) Topographic Survey at and nearby the Ataqa I.E. and Adabiya I.F.Z.
The principal points and the controlling points were set up in the area of I.E. and I.F.Z. based on the closed traverse survey by means of triangle network method.

UTM (Universal Transversal Mercator) coordinates were given to the important controlling points.

After setting up the controlling points each 50m interval, leveling along the lateral survey lines was carried out.

The elevation was taken at every 2m interval on the survey lines and the additional points where abrupt changes in ground elevation exist.

The topographic feature of the area reveals that the area of approximately 1,000ha (3km X 3km) is located between the Ataqa Mountain and the shore-line of Ataqa Fishery Port,with a gentle slope of 1:40 on average as shown in the sketch below.

There are several existing facilities in the areas. Along the Suez Adabiya Coastal Road, there are graphite and oil processing factories and embedded pipelines. And to the west from the road, there are two (2) electric power lines, four (4) embedded

pipelines, railway for loading stone and quarries. An oil pipeline company is planning to install two (2) additional pipelines at the west side of the existing ones. These facilities are as shown in the survey map.

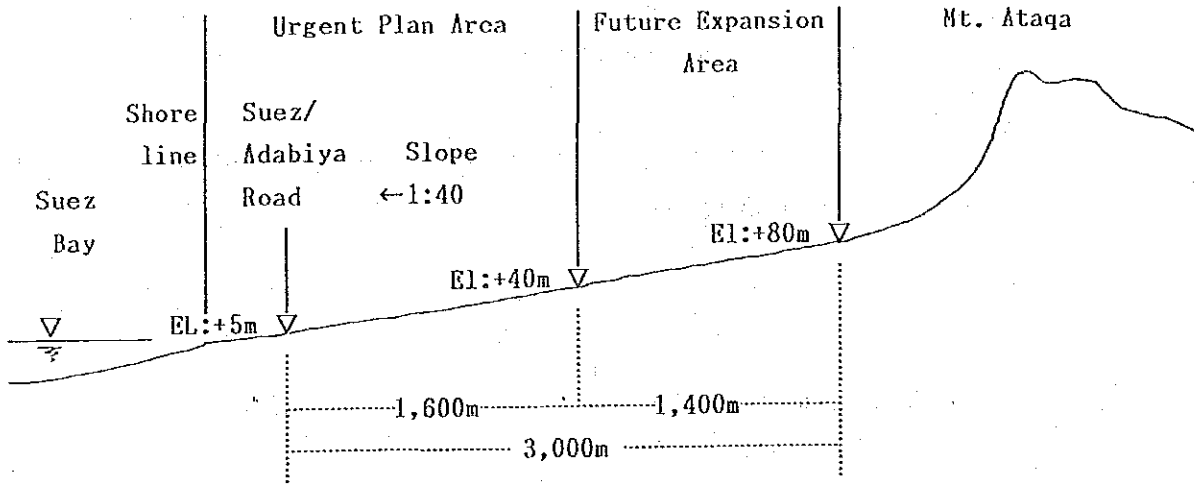


Figure 3.1-1-3 Typical Cross-Section of the Study Area

3) Route Survey

Route survey was executed with the following procedures.

a) Centerline survey:

Intersection points and curve length and angle were surveyed together with the controlling points at 100m intervals. Both coordinates and elevations of these points were calculated.

b) Leveling on center line:

Elevation of the top points were surveyed at every 10m intervals.

c) Lateral section survey:

The lateral survey crossing on all the points given by the centerline survey was carried out. The survey comprises leveling at every 10m intervals and coordinates/elevation of the existing structures and facilities within the limits of each 50m on both sides.

i) Route along the proposed raw water pipeline including the water intake and water plant areas:

After the locations of the water intake and potable water pipeline route were determined, the route survey was carried out.

ii) Route surveying along the waste water pipeline including the pump station and waste water treatment plant areas:

According to the planned route, two (2) routes survey was carried out, as shown in Figure 3.1.1.1.

iii) Route survey along Suez/Adabiya Coastal Road:

The planned route covers the existing road of approximate 13km in length between the end of road with median strip in Suez City and the road of entrance of Adabiya port.

iv) Route survey along the access road from Adabiya/Suez Cairo to Ataqa I.E. and Adabiya I.F.Z.

The planned three (3) routes of access roads were surveyed as shown in Figure 3.1-1-1.

(3) Bathymetric survey

The bathymetric survey (sounding) at the proposed port area including the coastal industrial estate as shown in Figure 3.1-1-2 was carried out. The sounding at the entrance of the proposed access channel was canceled due to the change of the channel route.

1) Instruments

Following instruments were used for the bathymetric survey.

a) 1 survey boat
b) 1 echo-sounder with digitizer
c) 1 optional distance meter
d) 2 transits
e) 3 walky-talkys
f) 1 level
g) Others

2) Coordinate system

a) Horizontal Alignment

Local coordinate system as same as topographic survey has been used.

b) Elevation

All bathymetric levels are related to the Chart Datum Level (C.D.L.) ±0.00m which is 1.137 m bellow Egyptian National Datum Level.

3) Lines of survey run

A new base line for the bathymetric survey was established by shifting to the seaward, based on the applied base line for the topographic survey. The survey lines were taken at every 50m intervals along the new base lines.

4) Depth control

In order to adjust the display and recording paper of the echo sounder to the correct depth the measurements by means of a check-bar were taken at the depth of 2m, 5m and 10m before starting the survey run.

A tide gauge was installed at the extremity of Ataqa Fishery Port. The reading was taken every quarter hours during sounding. Depth measured by the sounding was adjusted according to the tidal height from the chart datum level.

3) Survey Results

Topographic maps, sounding and bathymetric maps, profiles and cross section drawings were produced as the results of the works.

These lists of maps and drawings are shown in Appendix 3.1-1.

3.1.2 Soil Investigations

(1) General

The soil investigations were carried out in the following areas by Ardaman-ACE under the supervision of JICA Study Team.

1) Ataqa I.E. including its coastal area and Adabiya I.F.Z.

2) Route of the proposed raw water pipeline including the water intake and water treatment plant.

3) Route of the proposed sewerage water pipeline including the pump stations and sewer treatment plant.

4) Route of the Suez/Adabiya Coastal Road.

5) Route of access roads from Suez - Adabiya Coastal Road to the new Suez-Adabiya Road.

6) Electrical power substation area.

7) Offshore area including the dredging/reclamation area and proposed Ataqa Port.

The soil investigation consists of ;
- Borehole exploration, SPT and soil sampling.
- CBR test at site and laboratory along the Suez Adabiya Coastal Road.
- Electrical conductivity test at site and soil sampling along the proposed water pipeline for corrosion tests.
- Laboratory tests for the above obtained soil samples.

The main purposes of the investigation are;
- To examine the subsurface soil conditions.
- To analyze soil properties.
- To provide data and information of subsurface soil for detailed design study.

The field investigation were performed during the period from April 29 to June 30, and the laboratory tests were conducted until July 26, 1992.

(2) Field Investigations

(a) Borehole drillings were performed at the locations as shown in Figure 3.1-2-1. The Standard Penetration Tests (S.P.T.) were also carried out at 0.5m - 1.5m intervals in accordance with ASTM D-1586.

(b) Soil Sampling

1) Disturbed Samples

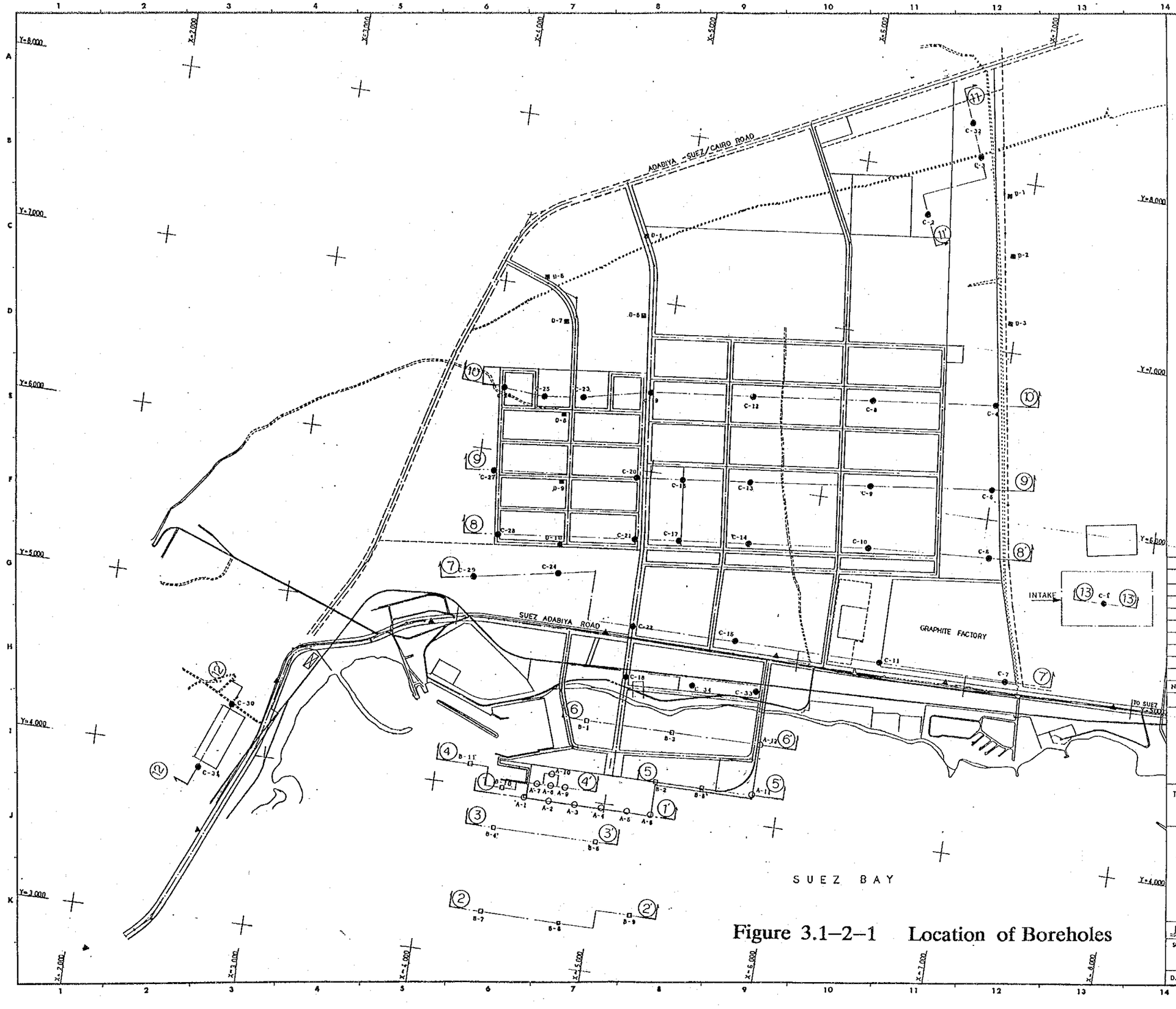
Disturbed samples were taken with splite spoon at 0.5 meter intervals where standard penetration tests were performed. Core samples were also collected from the rock and/or hard formations.

2) Undisturbed Samples

In the clayey layers, undisturbed samples were obtained in accordance with ASTM D 1587-83.

(3) Soil Investigation Results

Soil profiles are shown in Figure 3.1-2-2(1) to (5).



GENERAL NOTES

DESCRIPTIONS	DWG. NO.
REFERENCE DRAWINGS	

NO.	DATE	DESCRIPTIONS	BY	APP'D
REVISIONS				

ARAB REPUBLIC OF EGYPT

MINISTRY OF DEVELOPMENT,
NEW COMMUNITIES, HOUSING AND PUBLIC UTILITIES

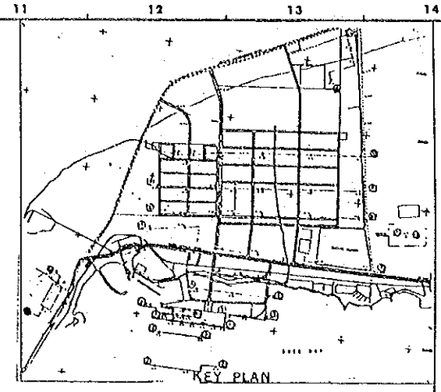
THE DETAILED DESIGN ON THE URGENT DEVELOPMENT PLAN
OF
THE SUEZ BAY COASTAL AREA DEVELOPMENT

LOCATION MAP OF BOREHOLES

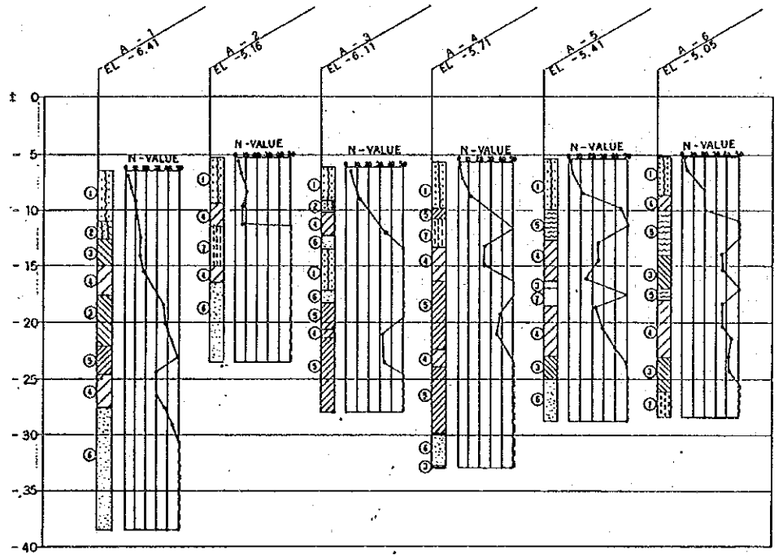
JICA JAPAN INTERNATIONAL COOPERATION AGENCY

SUBMITTED	APPROVED	SCALE	REV. NO.
		1 : 10,000	
DATE March,1993		DWG. NO. 2-2-01	

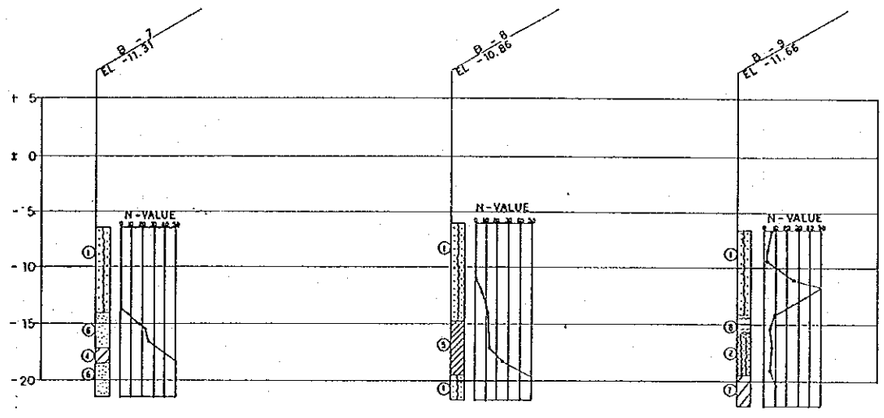
Figure 3.1–2–1 Location of Boreholes



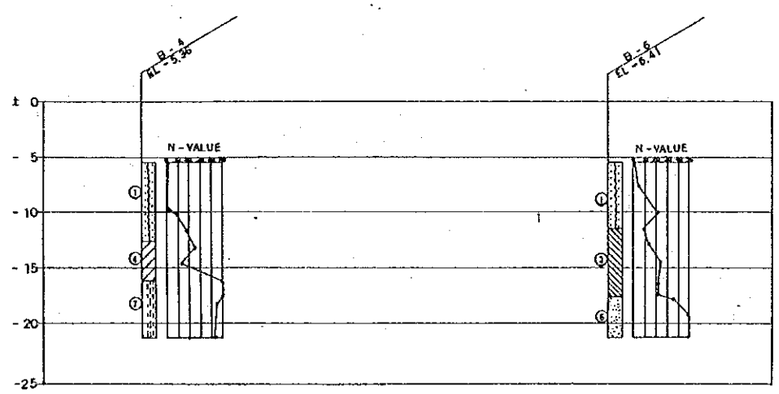
① - ①'



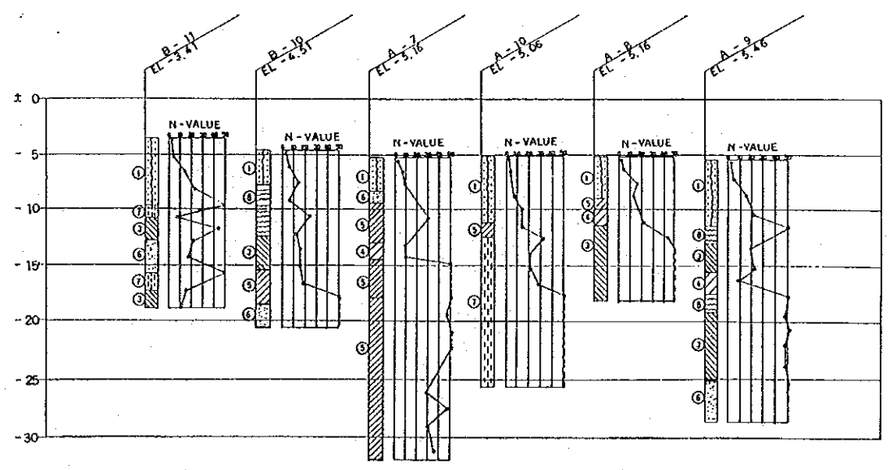
② - ②'



③ - ③'



④ - ④'



GENERAL NOTES

LEGEND

① OOLITIC SAND
② SILTY CLAY WITH LIMESTONE PIECES
③ LIMY SILTY WITH LIMESTONE PIECES
④ SILTY CLAY
⑤ LIMY SILTY CLAY WITH SAND
⑥ SAND
⑦ DOLOMETIC LIMESTONE FRAGMENTS
⑧ GRAVEL AND SAND
⑨ SAND AND SILT WITH GRAVEL

Elevation : Refer to Egypt National Datum Level
Horizontal Scale : None

DESCRIPTIONS	DWG. NO.

REFERENCE DRAWINGS

NO.	DATE	DESCRIPTIONS	BY	APP'D

REVISIONS

ARAB REPUBLIC OF EGYPT
MINISTRY OF DEVELOPMENT,
NEW COMMUNITIES, HOUSING AND PUBLIC UTILITIES

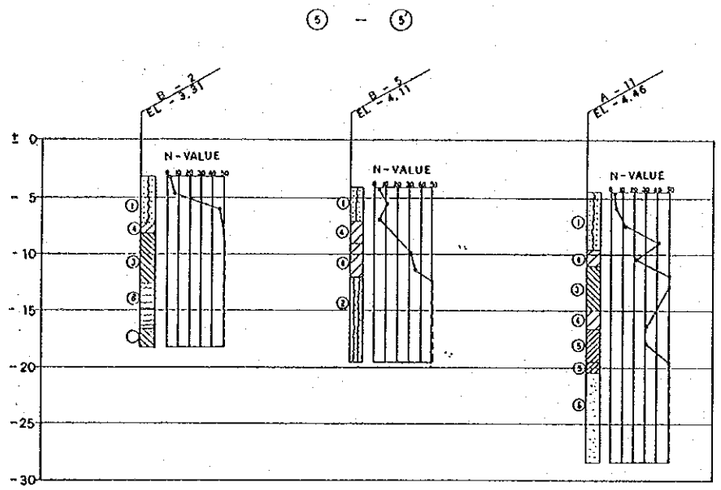
THE DETAILED DESIGN ON THE URGENT DEVELOPMENT PLAN OF THE SUEZ BAY COASTAL AREA DEVELOPMENT

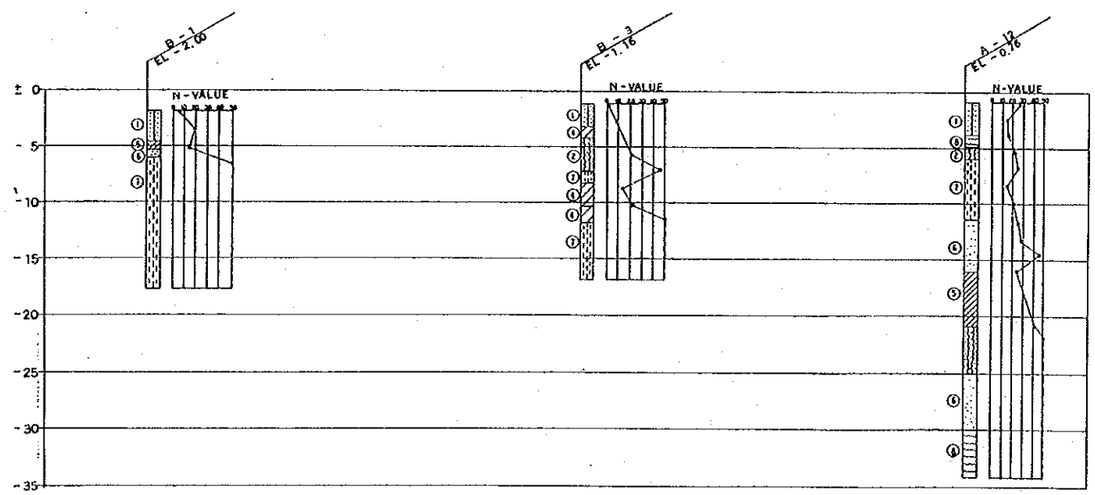
SOIL PROFILE (1)

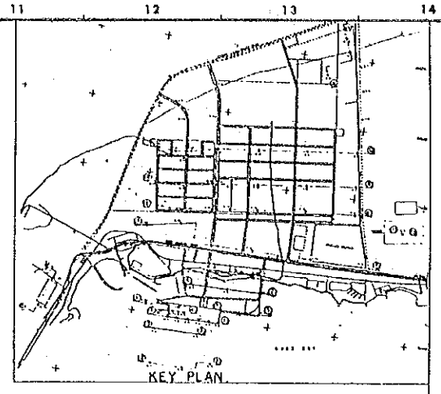
JICA JAPAN INTERNATIONAL COOPERATION AGENCY

SUBMITTED	APPROVED	SCALE	REV. NO.
		NON SCALE	
DATE March, 1993		DWG. NO. 2-2-02	

Figure 3.1-2-2 (1) Soil Profile (1)







GENERAL NOTES

LEGEND

- ① OOLITIC SAND
- ② SILTY CLAY WITH LIMESTONE PIECES
- ③ LIMY SILTY WITH LIMESTONE PIECES
- ④ SILTY CLAY
- ⑤ LIMY SILTY CLAY WITH SAND
- ⑥ SAND
- ⑦ DOLOMETIC LIMESTONE FRAGMENTS
- ⑧ GRAVEL AND SAND
- ⑨ SAND AND SILT WITH GRAVEL

Elevation : Refer to Egypt National Datum Level
Horizontal Scale : None

DESCRIPTIONS	DWG. NO.
REFERENCE DRAWINGS	

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ARAB REPUBLIC OF EGYPT

MINISTRY OF DEVELOPMENT,
NEW COMMUNITIES, HOUSING AND PUBLIC UTILITIES

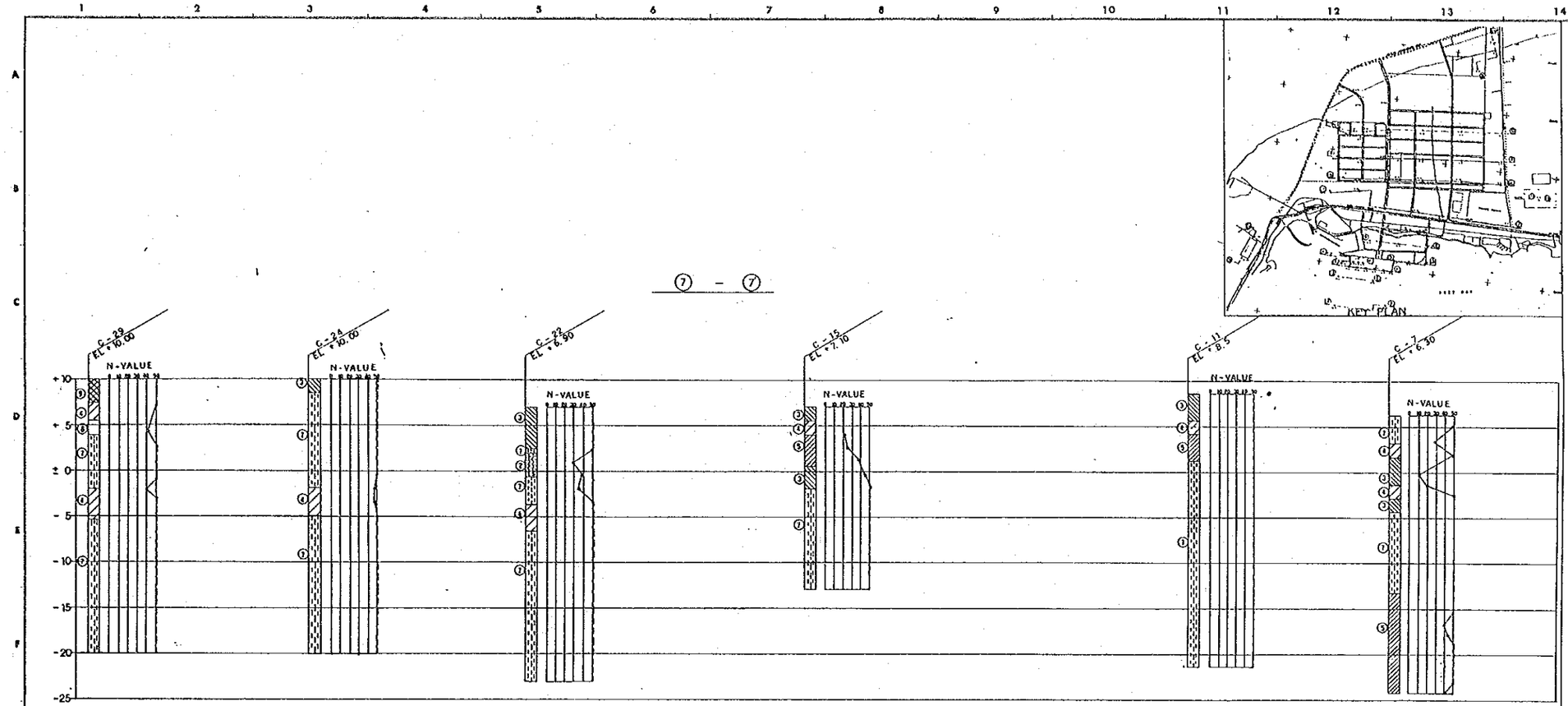
THE DETAILED DESIGN ON THE URGENT DEVELOPMENT PLAN
OF
THE SUEZ BAY COASTAL AREA DEVELOPMENT

SOIL PROFILE (2)

JICA JAPAN INTERNATIONAL COOPERATION AGENCY

SUBMITTED	APPROVED	SCALE	REV. NO.
		NON SCALE	
DATE March. 1993		DWG. NO. 2-2-03	

Figure 3.1–2–2 (2) Soil Profile (2)



GENERAL NOTES

LEGEND

(1) OOLITIC SAND
(2) SILTY CLAY WITH LIMESTONE PIECES
(3) LIMY SILTY WITH LIMESTONE PIECES
(4) SILTY CLAY
(5) LIMY SILTY CLAY WITH SAND
(6) SAND
(7) DOLOMETIC LIMESTONE FRAGMENTS
(8) GRAVEL AND SAND
(9) SAND AND SILT WITH GRAVEL

Elevation : Refer to Egypt National Datum Level
Horizontal Scale : None

DESCRIPTIONS	DWG. NO.
REFERENCE DRAWINGS	

NO.	DATE	DESCRIPTIONS	BY	APP'D
REVISIONS				

ARAB REPUBLIC OF EGYPT

MINISTRY OF DEVELOPMENT,
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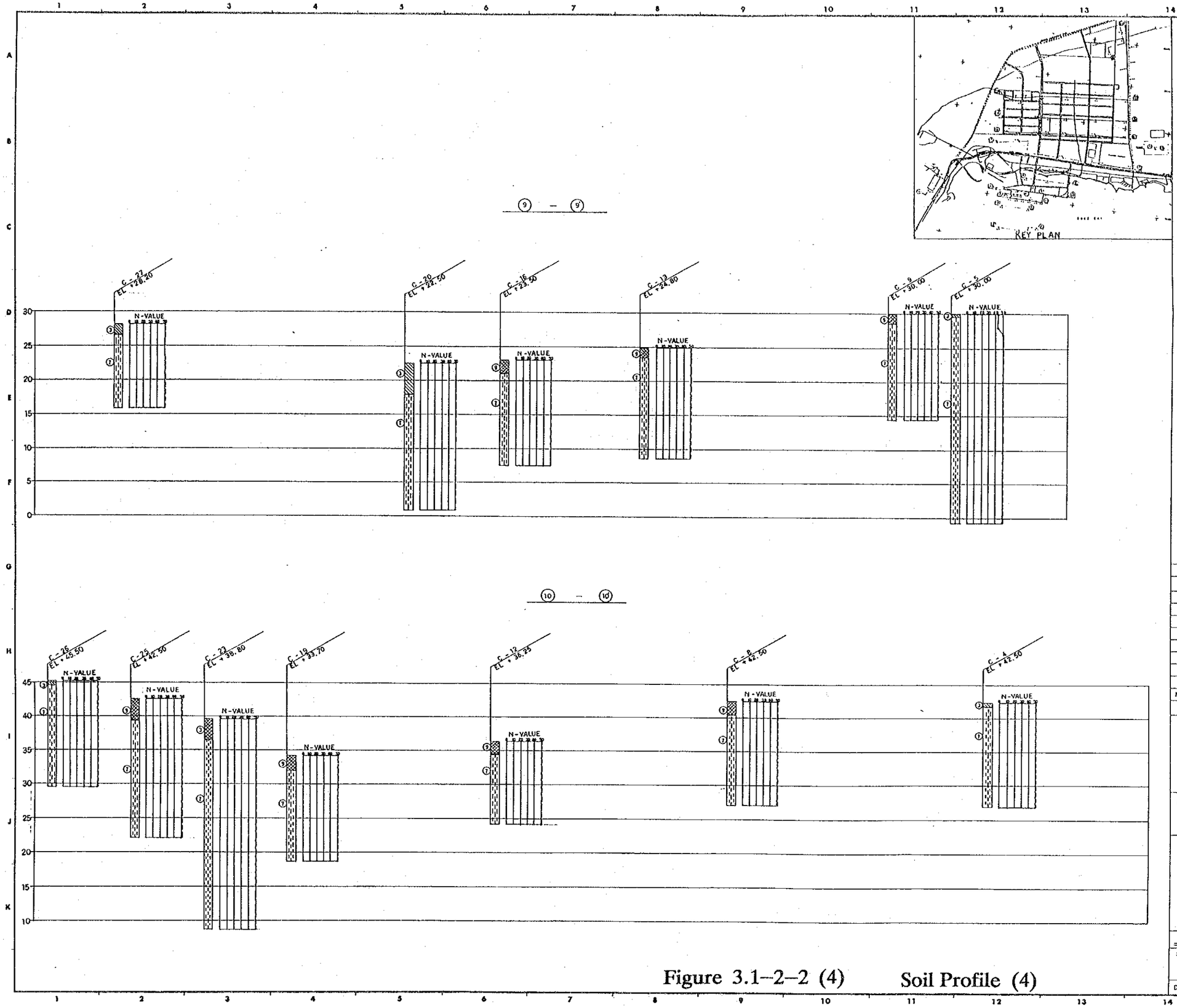
OF
THE SUEZ BAY COASTAL AREA DEVELOPMENT

SOIL PROFILE (3)

JICA JAPAN INTERNATIONAL COOPERATION AGENCY

SUBMITTED	APPROVED	SCALE	REV. NO.
		NON SCALE	
DATE March, 1993		DWG. NO. 2-2-04	

Figure 3.1–2–2 (3) Soil Profile (3)



GENERAL NOTES

LEGEND

1. OOLITIC SAND
2. SILTY CLAY WITH LIMESTONE PIECES
3. LIMY SILTY WITH LIMESTONE PIECES
4. SILTY CLAY
5. LIMY SILTY CLAY WITH SAND
6. SAND
7. DOLOMETIC LIMESTONE FRAGMENTS
8. GRAVEL AND SAND
9. SAND AND SILT WITH GRAVEL

Elevation : Refer to Egypt National Datum Level
Horizontal Scale : None

DESCRIPTIONS	DWG. NO.
REFERENCE DRAWINGS	

NO.	DATE	DESCRIPTIONS	BY	APP'D
REVISIONS				

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MINISTRY OF DEVELOPMENT,
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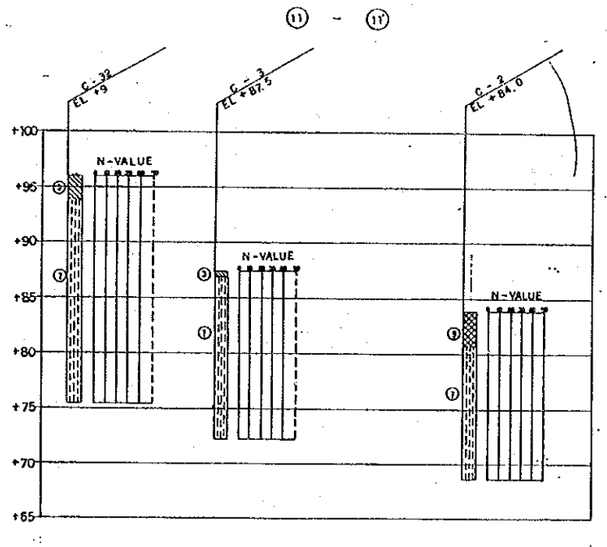
THE SUEZ BAY COASTAL AREA DEVELOPMENT

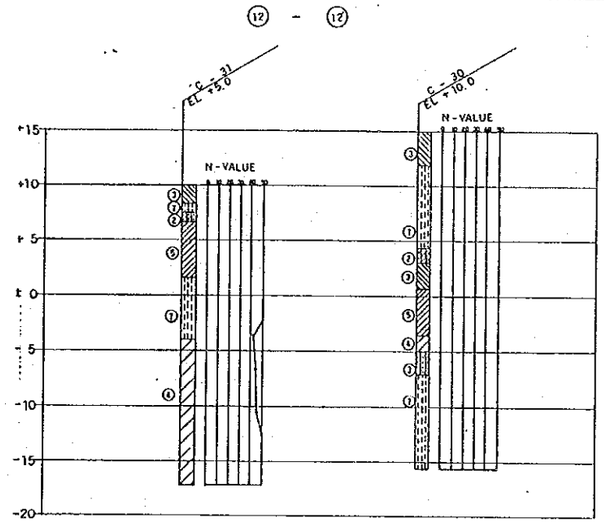
SOIL PROFILE (4)

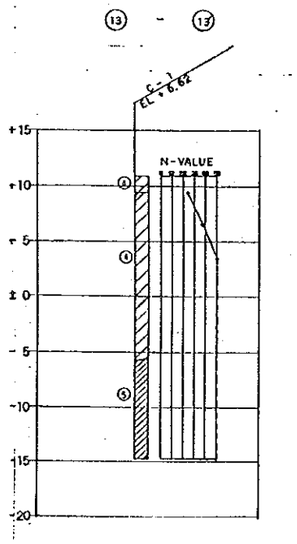
JICA JAPAN INTERNATIONAL COOPERATION AGENCY

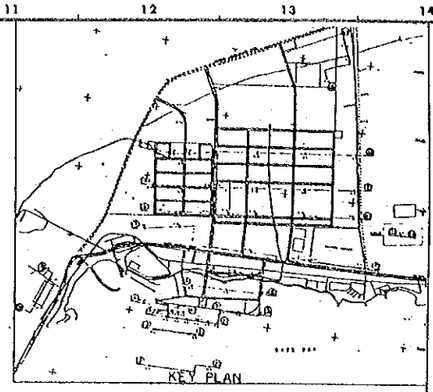
SUBMITTED	APPROVED	SCALE	REV. NO.
		NON SCALE	
DATE March.1993		DWG. NO. 2-2-05	

Figure 3.1–2–2 (4) Soil Profile (4)









GENERAL NOTES

LEGEND

- ① OOLITIC SAND
- ② SILTY CLAY WITH LIMESTONE PIECES
- ③ LIMY SILTY WITH LIMESTONE PIECES
- ④ SILTY CLAY
- ⑤ LIMY SILTY CLAY WITH SAND
- ⑥ SAND
- ⑦ DOLOMETIC LIMESTONE FRAGMENTS
- ⑧ SRAVEL AND SAND
- ⑨ SAND AND SILT WITH GRAVEL

Elevation : Refer to Egypt National Datum Level
Horizontal Scale : None

DESCRIPTIONS	DWG. NO.
REFERENCE DRAWINGS	

NO.	DATE	DESCRIPTIONS	BY	APP'D
REVISIONS				

ARAB REPUBLIC OF EGYPT

MINISTRY OF DEVELOPMENT,
NEW COMMUNITIES, HOUSING AND PUBLIC UTILITIES

THE DETAILED DESIGN ON THE URGENT DEVELOPMENT PLAN OF THE SUEZ BAY COASTAL AREA DEVELOPMENT

SOIL PROFILE (5)

JICA JAPAN INTERNATIONAL COOPERATION AGENCY

SUBMITTED	APPROVED	SCALE	REV. NO.
		NON SCALE	
DATE March.1993		DWG. NO. 2-2-06	

Figure 3.1–2–2 (5) Soil Profile (5)

LIST OF DRAWINGS

ITEM	SCALE	DWG. NO.	PCS
1) ATAQA AREA			
- Topographic Map	1:5000	CONT-1 CONT-2 CONT-4	3 PCS
- Topographic Map	1:1000	IE-A1 TO IE-F5	30 PCS
- Cross Section	HL 1:2500 VL 1:250	IE-CS.01 TO IE-CS.49	49 PCS
2) WASTEWATER TREATMENT PLANT			
- Topographic Map	1:1000	WW-C1 WW-C2	2 PCS
-Cross Section Dwg.	HL 1:2500 VL 1:250	SW-CS-01 TO SW-CS-03	3 PCS
3) WASTEWATER PIPEPLINE ROUTE			
- Longitudinal Drawing plan and profile	HL 1:1000 VL 1:100	WW-PP-01 TO WW-PP-03	3 PCS
- Cross Section Dwg.	HL 1:500 VL 1:50	WW-CS-01 TO WW-CS-07	7 PCS
4) WATER TREATMENT PLANT			
- Topographic Map	1:2500	WT-CON.01	1 PC
- Cross Section Dwg.	HL 1:2500 VL 1:250	WT-CS.01 TO WT-CS.06	6 PCS

ITEM	SCALE	DWG. NO.	PCS
5) WATER PIPELINE ROUTE			
- Longitudinal Drawing plan and profile	HL 1:1000 VL 1:100	WL-P01 TO WL-P23	23 PCS
- Lateral Cross Section	HL 1:500 VL 1:50	WL-CS.01 TO WL-CS.30	30 PCS
- WATER INTAKE TOPOGRAPHIC MAP	1:1000	WI-TOP1	1 PC
6) SUEZ/ADABIYAH ROAD ROUTE (R1)			
- Longitudinal Drawing plan and profile	HL 1:1000 VL 1:100	RD-PP.01 TO RD-PP.14	14 PCS
- Lateral Cross Section	HL 1:500 VL 1:50	RD-CS.01 TO RD-CS.35	35 PCS
7) THE PROPOSED ROAD (R2)			
- Longitudinal Drawing plan and profile	HL 1:1000 VL 1:100	R2-PP.01	1 PC
- Lateral Cross Section	HL 1:500 VL 1:50	R2-CS.01 R2-CS.02	2 PCS
8) THE PROPOSED ROAD (R3)			
- Longitudinal Drawing plan and profile	HL 1:1000 VL 1:100	R3-PP.01	1 PC
- Lateral Cross Section	HL 1:500 VL 1:50	R3-CS.01 TO R3-CS.03	3 PCS

ITEM	SCALE	DWG. NO.	PCS
9) THE PROPOSED ROAD (R4)			
- Longitudinal Drawing plan and profile	HL 1:1000 VL 1:100	R4-PP.01 TO R4-PP.03	3 PCS
- Lateral Cross Section	HL 1:500 VL 1:50	R4-CS.01 TO R4-CS.07	7 PCS
10) SOUNDING			
- Sounding Map	1:1000	P.A6 TO P.A10 P.B5 TO P.B10 P.C5 TO P.C 8 P.D5 TO P.D 8	19 PCS
- Bathymetric Map	1:5000 1:2000	S CONT.1 SO-01 TO SO-05	1 PC 5 PCS
-Cross Section Dwg.	HL 1:2500 VL 1:250	SO-CS.01 TO SO-CS.20	 20 PCS
11) GENERAL LAYOUT	1:10000 1:5000	 RD1, RD2	1 PC 2 PCS
12) CROSS SECTION LOCATION	1:10000		1 PC
13) PRINCIPAL POINTS	1:25000	S.1	1 PC
TOTAL SHEETS			274 PCS

3.2 DESIGN CONDITIONS

Design conditions described in this chapter are applied for all the project components otherwise described in the following chapters.

3.2.1 Natural Conditions

(1) Meteorological Conditions

(a) Temperature: Max. 45.8° C Min. 10.4° C

(b) Rainfall: 15.6mm/hr
23.4mm-day (30 year return period)

(c) Wind: Wind velocity for wave hindcast :41knot (21.1m/sec)
(For design of structures: 70m/sec is applied)
Wind Direction : N and NE

(2) Maritime Conditions

(a) Tide

High Water Level Spring (H.W.L.S.):	+1.90m
High Water Level Neap (H.W.L.N.):	+1.60m
Low Water Level Neap (L.W.L.N.):	+0.70m
Low Water Level Spring (L.W.L.S.):	+0.40m
Chart Datum (C.D.):	±0.00m
Egyptian National Datum Level (E.N.D.L.):	+1.137m

(Elevation for land structures refers to E.N.D.L. and for Marine Structures refers to C.D.)

(b) Wave

Significant	Wave Height H1/3:	1.3m
	Wave Period T1/3:	5.2 sec
	Wave Direction:	E and SSE

(c) Current

Max. velocity near the Suez Canal :1knot (51.4cm/sec)

(3) Topography and Hydrography

The design of structures and facilities are based on the results of the survey conducted by JICA Study Team from April to July in 1992 and the available maps provided by MODANC.

(4) Soil Conditions

Table 3.1-1 Reclamation and Filling Materials

Items	Unit Weight (t/m^3)	Internal Angle (Degree)
Dredged Material (sand silt)	1.7	30
Rubble Stone	1.8	40
Compacted Fill Sand	1.8	30

Soil conditions at each site are shown in CHAPTER 3.1.2

(5) Seismic Conditions

No seismic force is considered for the structures to be constructed for the project except the following:

Kh = 0.05 for quaywall and silos of Ataqa Port
(Kh:horizontal seismic coefficient)

However, taking into consideration the recent earthquake in Egypt, the detail of horizontal factors shall be selected carefully.

3.2.2 Materials

(1) Concrete

Concrete structure should be designed in accordance with the Standard Specifications for Plain and Reinforced Concrete (Japan Society of Civil Engineers) for civil structures, unless otherwise described in each chapter.

The following conditions should be taken into consideration for civil structures:

Table 3.2-1 Concrete Strength

Compressive Strength (28 days) (kg/cm2)	Allowable Bending Compressive Strength (kg/cm2)	Allowable Shear Stress (kg/cm2)	Allowable Bond Stress (kg/cm2) Round/Deformed
240	90	4.5	8.0/16.0
180	70	4.0	7.0/14.0

Table 3.2-2 Concrete Unit Weight

Type	Unit Weight (t/m^3)
RC Concrete	2.45/2.50
Plain Concrete	2.30

Table 3.2-3 Increase of Allowable Stress

Type	Normal Condition	Seismic Condition
RC Concrete	1.0	1.5
Reinforcing Bar	1.0	1.5

(2) Reinforcing Steel Bar

Table 3.2-4 Allowable Stress

Type	Allowable Stress (kg/cm^2)	Unit Weight (t/m^3)
Round Bar	1,400	7.85
Deformed Bar	1,800	7.85

(3) Stone

Table 3.2-5 Internal Angle and Unit Weight

Type	Internal Angle (Degree)	Unit Weight (t/m^3)
Rubble Stone	40	1.8
Unscreened Gravel	30	1.8

3.3 PORTS

3.3.1 Port Development Plan

(1) General

The port development proposed in the Short Term Development in JICA Feasibility Study in 1986 consists of four components; namely, Adabiya Commercial Port, Ataqa Commercial Port, Small Craft Basin, and Ataqa Fishery Port.

Their layout is shown in Figure 3.3.1-1.

1) Adabiya Commercial Port

In 1986, 4-berths of a water depth of -11.5 m (38 feet) had been completed on the pier, and 3-berths of the same depth, to be completed in 1987/88, were under construction on the marginal wharf. The development was in accordance with Suez Reconstruction Project. All the berths were planned to handle general cargoes.

In line with the above development in 1986, JICA proposed two multi-purpose berths (2 x 210 m) be constructed to handle special (e.g. iron & steel products, timbers) and containerized cargoes. The JICA proposal is shown in Figure 3.3.1-2.

The port expansion had been continued in accordance with the plan prepared by the Ministry of Maritime Transport (MOMT) but not JICA proposal. The expansion plan is shown in Figure 3.3.1-3. However, this expansion plan was abandoned because of a technical issue and revised. The revised plan is shown in Figure 3.3.1-4.

The revised port expansion plan was considered in line with JICA proposal prepared in 1986 and is currently implemented. Therefore, Adabiya Port development is excluded from the Urgent Development Plan JICA proposed in 1991.

2) Ataqa Commercial Port

JICA made a proposal in 1986 defining that Ataqa Commercial Port shall comprise one grain berth, two bulk cargo berths, and one coal berth.

The grain terminal was planned to have a berth of a 300 m length and a -15 m depth, and silos of a total capacity of 70,000 tons expandable to 100,000 tons. The terminal was to accommodate a grain carrier up to 80,000 DWT.

The bulk cargo terminals were planned to have two berths of a 420 m (2 x 210 m) length and a -11.5 m depth to accommodate a bulk cargo carrier up to 20,000 DWT.

The coal terminal were planned to have a berth of a 270 m length and a -13.0 m depth to accommodate a coal carrier up to 50,000 DWT.

JICA suggested to construct all of the berths with concrete caissons and to protect the northern and southern extremities with rock revetments.

After reviewing economic situation in Egypt in 1991, JICA decided that the Urgent Development Plan should include the grain terminal and two bulk cargo terminals only but defer the coal terminal.

Figure 3.3.1-5 shows the development stages of Ataqa Commercial Port suggested by JICA.

3) Small Craft Basin

JICA made a proposal in 1986 to construct a small craft basin at a location between Adabiya and Ataqa to accommodate working boats for Adabiya and Ataqa Commercial Ports. The basin was planned to have a -4 m water depth.

As the revised expansion plan of Adabiya Commercial Port involved the small craft basin, JICA excluded it from the Urgent Development Plan.

4) Ataqa Fishery Port

JICA has separately extended a grant aid to the construction of Ataqa Fishery Port. The fishery port is currently under construction in accordance with the proposal made by JICA in 1986.

The Ataqa Fishery Port was completed in February 1993 under the Japanese Grant Aid.

(2) Urgent Port Development Plan

The project components of the Urgent Development Plan are shown in Table 3.3.1-1 in comparison with those proposed in JICA Feasibility Study in 1986.

The explanation on the changes made in the major project components are provided briefly below:

1) Adabiya Commercial Port

The Egyptian Government is constructing the port at its own fund. The development is considered in line with the JICA Feasibility Study.

2) Coal Terminal at Ataqa Commercial Port

The Coal Terminal was planned to supply coal to the coal-fired thermal power plant to be constructed in Sinai and the steel mill at Helwan. Both the power plant project and the expansion of the steel mill were postponed. The Coal Terminal construction was accordingly postponed and excluded from the Urgent Plan of the Short Term Development

3) Ataqa Fishery Port

JICA has granted the aid for implementation of the Ataqa Fishery Port. The berth and breakwater were completed in February 1993.

4) Small Boats Basin

JICA considered that the small craft basin had to be constructed for accommodating working boats of Adabiya and Ataqa Commercial Ports. According to MODANC's request, the small boats basin is to be built under the Urgent Development Plan.

5) Northern Approach Channel

Deferment of the Northern Approach Channel from the Short Term Development Programme is simply due to that of the Coal Terminal.

Table 3.3.1 Project Components in Short Term and Urgent Development Plans

Components	Short Term Plan in JICA F/S in 1986	Urgent Plan
(1) Adabiya Commercial Port	2-multi-purpose terminals	Not included but already under construction by RSPA *
(2) Ataqa Commercial Port		
1) Terminals	1-Grain Terminal D=15 m, L=300 m	Included.
	2-Bulk Cargo Terminals D=-15 m, L=210 m x 2	Included
	1-Coal Terminal D=-13 m, L=270 m	Deferred
2) Land Reclamation	Port Area A=approx. 18 ha	Included.
	Industrial Estate A=approx. 60 ha	Included
3) Revetment	Rubble Mound/Parapet L=approx. 250 m	Included
4) Temporary Revetment	Quarry Mound L=approx. 930 m	Included
5) Approach Channel	Southern Channel L=7,100 m, Depth=-15 m	Included
	Northern Channel L=2,700 m, Depth=-15 m	Deferred
6) Mooring & Turning Basin	- For Grain Carriers D=-15 m, A=20 ha	Included
	- For Other Bulk Carriers D=-15 m, A=35 ha	Included
(3) Small Boat Basin	Quay walls, etc.	Included (According to MODANC's request, the project include small boat basin.)
(4) Fishery Port	Berth, breakwater, on-land facilities, etc.	Already under construction by JICA grant aid. (Therefore, exuded from this study.)

Note: * Red Sea Port Authority

(3) Review of Feasibility Study

1) Adabiya Commercial Port Development

Figure 3.3.1-4 shows the current expansion project of Adabiya Commercial Port. The project components are compared with those concluded in JICA Feasibility Study in 1986. The comparison is shown in Table 3.3.1-2.

Table 3.3.1-2 Comparison between Feasibility Study and Current Development of Adabiya Port

	Feasibility Study in 1986	Current Development
General Cargo Berths of Marginal Wharf		
Length	630 m	720 m
Depth	-11.5 m	-11.5 m
Completion Year	1988	1993
Multi-purpose Terminal Berths		
Length	420 m	500 m
Depth	-11.5 m	-13.6 m
Completion Year	1995	1995
Jetty type Wharves		
Completion Year	1985	1985
Length (north)	420 m	435 m
Length (south)	420 m *1)	420 m *2)
Depth	-11.5 m	-11.5 m

Notes: *1) Temporary use for cargo handling when other berths are congested.
*2) Exclusive use for mooring navy vessels.

Meanwhile, the projected throughput at Adabiya Commercial Port were estimated in JICA Feasibility Study in 1986 as shown in Table 3.3.1-3. In the table, the berth numbers shown in the latest development plan (Figure 3.3.1-6) were inserted.

Table 3.3.1-3 Projected Cargo Throughput at Adabiya Port in 1995

(unit: 1,000 ton)

Berth	Berth No.	Commodity	Export	Import
General Cargo	No.1 through No.5	General Cargoes	128	674
Multi-purpose (Special Cargo)	No.6	Timber Iron & Steel Products Heavy equipment & cars	7	90 191 21
Multi-purpose (Container)	No.7	Containers	35	178
Total	7-berths		170	1,154
				1,324

Source: JICA Feasibility Study - p.20 of Report on Short Term Plan

The required number of the berths at Adabiya Commercial Port is reviewed below:

General Cargo Berths

As computed below, 6-berths are required for handling the projected general cargoes:

Conditions:

Cargo throughput	800,000 tons
Average load	1,500 tons
Average stay	2.6 days
Working days	330 days/year

Required number of the berths

$$(800,000 \times 2.6)/(1,500 \times 0.7 \times 330) = 6 \text{ berths}$$

In addition to the 5-berths under the current development, one more berth will be required in case that the general cargo reaches to the projected cargo throughput. The port development should be accelerated.

Special Cargo Berth

As computed below, 1-berth will be sufficient for handling the projected special cargoes:

Conditions:	
Cargo throughput	309,000 tons
Average load	1,000 tons
Average stay	2.9 days
Working days	330 days/year

Required number of the berths

$$(309,000 \times 2.9)/(1,000 \times 0.5 \times 330) = 0.54 \text{ berth}$$

Container Cargo Berth

Conditions:	35,800 TEU
Cargo throughput	35,800 TEU
Ship size	12,000 DWT semi-container ships with 2-derrick cranes

Required number of the berths

$$(35,800 \text{ TEU})/(2 \times 9 \text{ TEU/hr} \times 21 \text{ hr/day} \times 330 \times 0.4) = 1.08$$

For handling special and container cargoes, 2-multi-purpose berths are concluded sufficient.

Conclusion

It is concluded from the computation above that all the projected cargo in 1995 can be handled in Adabiya Commercial Port.

When one more multi-purpose berth in addition to the 2-berths under current development is completed in 1997, it will handle increased cargoes as projected below:

	in 1995	in 2005	Volume
General cargo	800,000 tons	930,000 tons	130,000 tons
Special cargo	309,000 tons	585,000 tons	276,000 tons
Container	35,800 TEU	84,000 TEU	48,200 TEU

Therefore, the revision of the development of Adabiya Port which was made after JICA Feasibility Study in 1986 has no significant impact on the development plan of Ataqa Commercial Port. The berths to accommodate vessels for grain and other bulk-cargoes have to be built at Ataqa Commercial Port according to the Feasibility Study.

Figure 3.3.1-7 shows the comparison of the layout plan of Adabiya Commercial Port between JICA Feasibility Study and the current development.

2) Ataqa Commercial Port

As Coal Terminal is deferred from the Urgent Plan of the Short Term Development Plan, the projected cargo throughput at Ataqa Commercial Port in JICA Feasibility Study is to be revised as shown in Table 3.3.1-4. The berth numbers are shown in Figure 3.3.1-8.

Table 3.3.1-4 Projected Cargo Throughput at Ataqa Port in 1995

(unit: 1,000 ton)

Berth	Berth No.	Commodity	Export	Import
General Terminal	No.1	Grain		1,462
Bulk Cargo	No.2, No.3	Iron & Ore		501
		Salt/Sulphur	12	15
		Cotton		
		Rice		21
		Sugar		155
		Paper/Pulp		63
Total			12	2,217
				2,229

Source: JICA Study - p.20 of Report on Short Term Plan

The detailed design will be carried out to meet the above cargo throughput.

3) Offshore Facilities

There have been no significant changes with respect to offshore structures at the project site since JICA Feasibility Study in 1986 except the construction of Ataqa Fishery Port. Suez Canal Authority, however, expanded the vessel waiting area to the south across the approach channel to Adabiya Port. About a 500 m wide and -16 to -18 m deep channel between the Northern and Southern Waiting Areas may be used as the approach channel as interpreted from the chart, which does not clearly show the limit of the channel.

This expansion of the waiting area requires the rerouting of the approach channel to the Ataqa Commercial Port which JICA assumed in 1986; the channel must move up to the north so that it will run between the Northern and Southern Waiting Areas. Figure 3.3.1-8 shows the probable rerouting of the approach channel.

Minor changes along the seashore, which will not affect the Urgent Plan of the Short Term Development, are observed as follows:

1. Approx. 10 ha reclamation has been carried out in Adabiya Port.
2. A new causeway is built at Suez City near Port Tafic. There is no impact on the project, since the causeway is very far from the project site.

4) Navigation Aids

It was confirmed that Suez Canal Authority is responsible for towing vessels between Suez Canal and their waiting areas, while Red Sea Port Authority is responsible for towing them to and from the Adabiya Commercial Port.

There are two buoys along the approach channel leading to the Adabiya Commercial Port. Neither leading lights nor lighthouse exists at the project site.

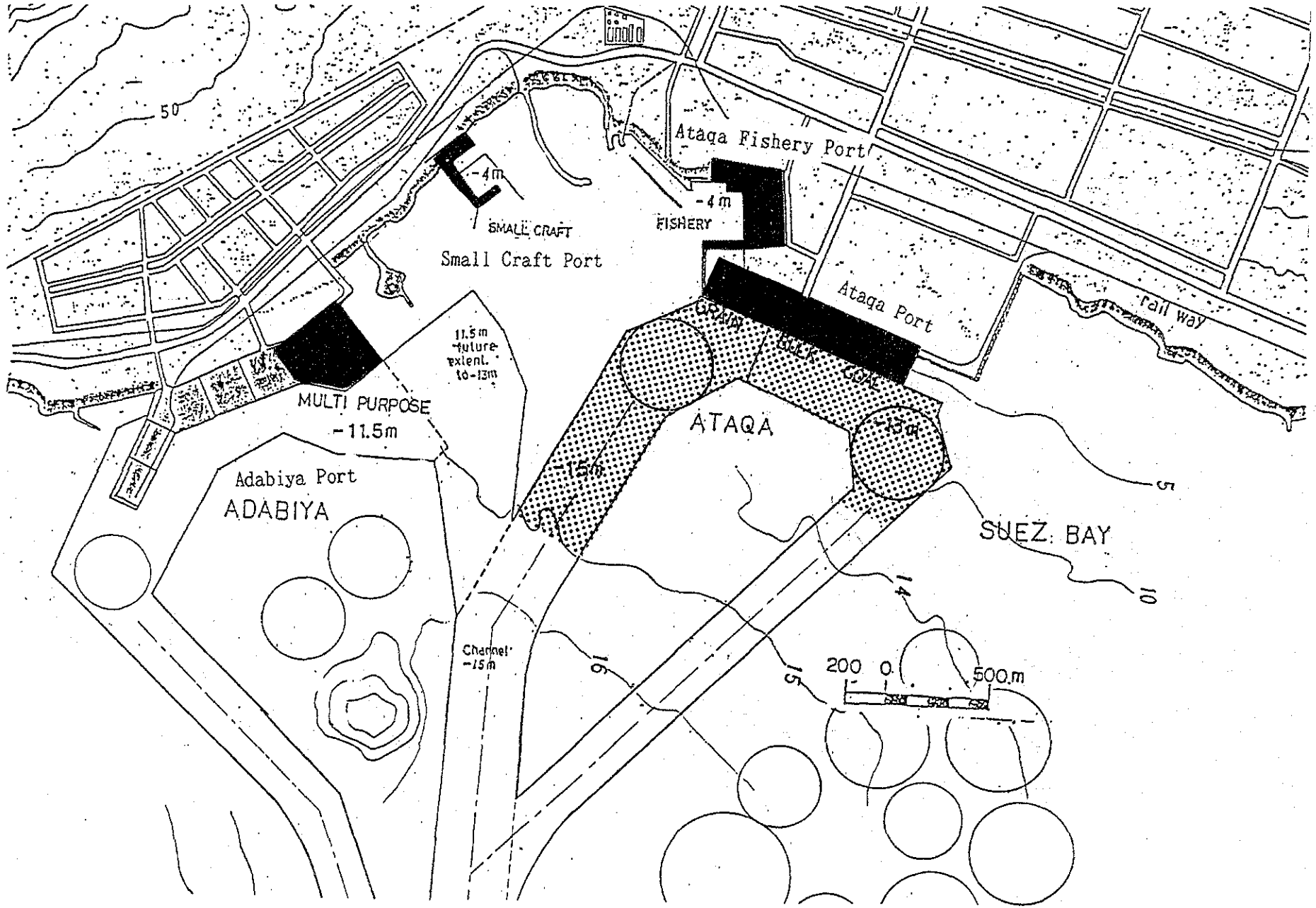


Figure 3.3.1-1 The location of the ports in 1995 planned by the JICA Study

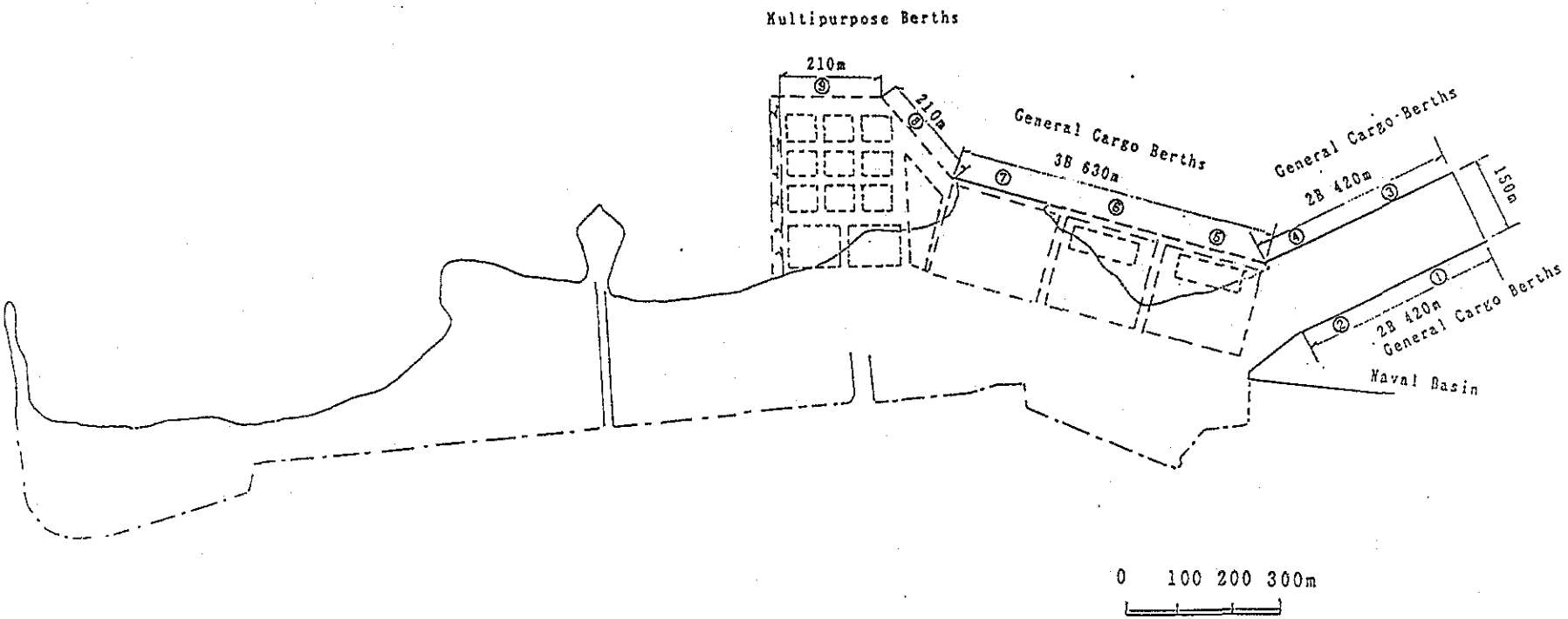


Figure 3.3.1-2 Short Term Development Plan in 1995 (by JICA Study)

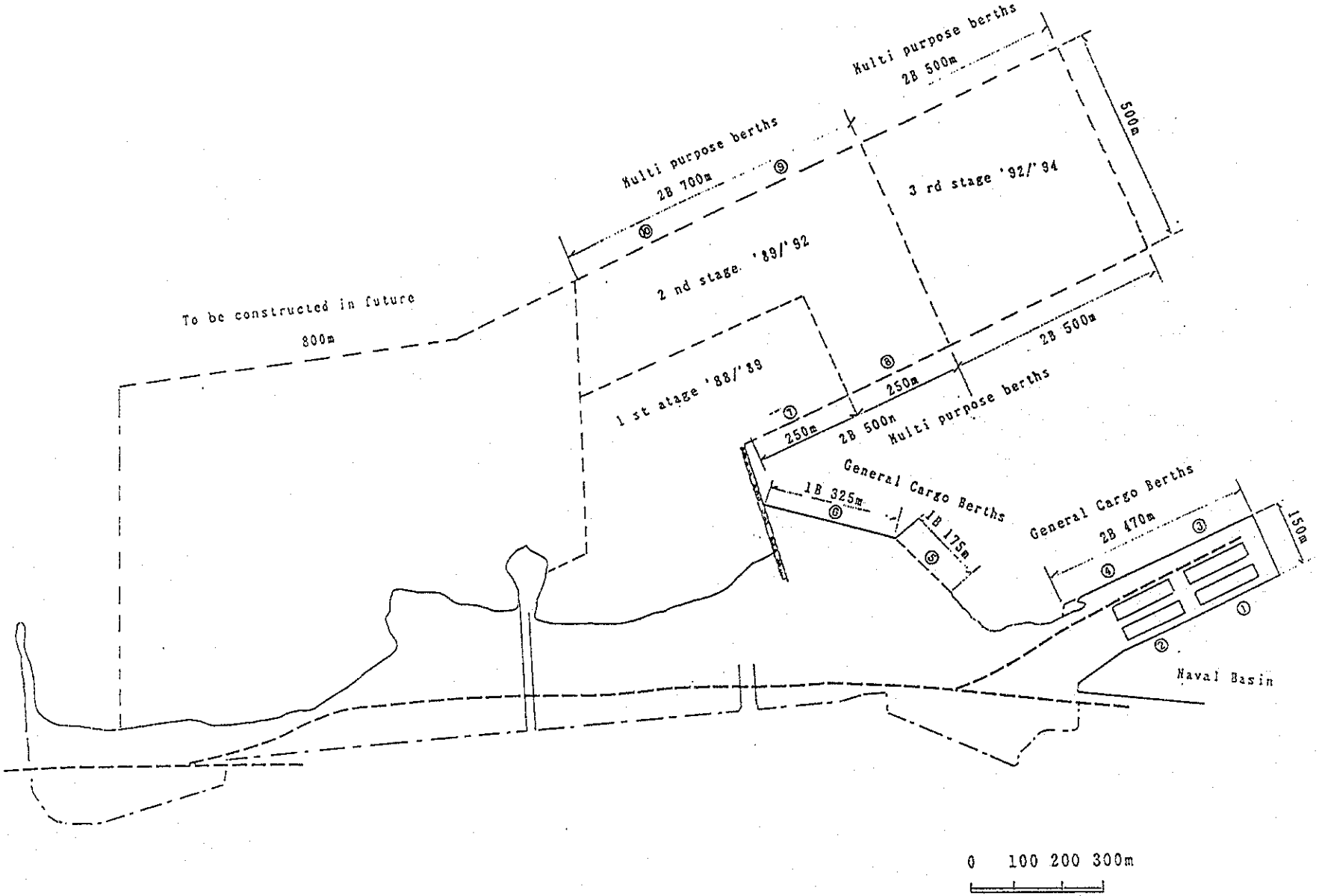


Figure 3.3.1-3 Adabiya Port Development Plan proposed by RSPA in 1986

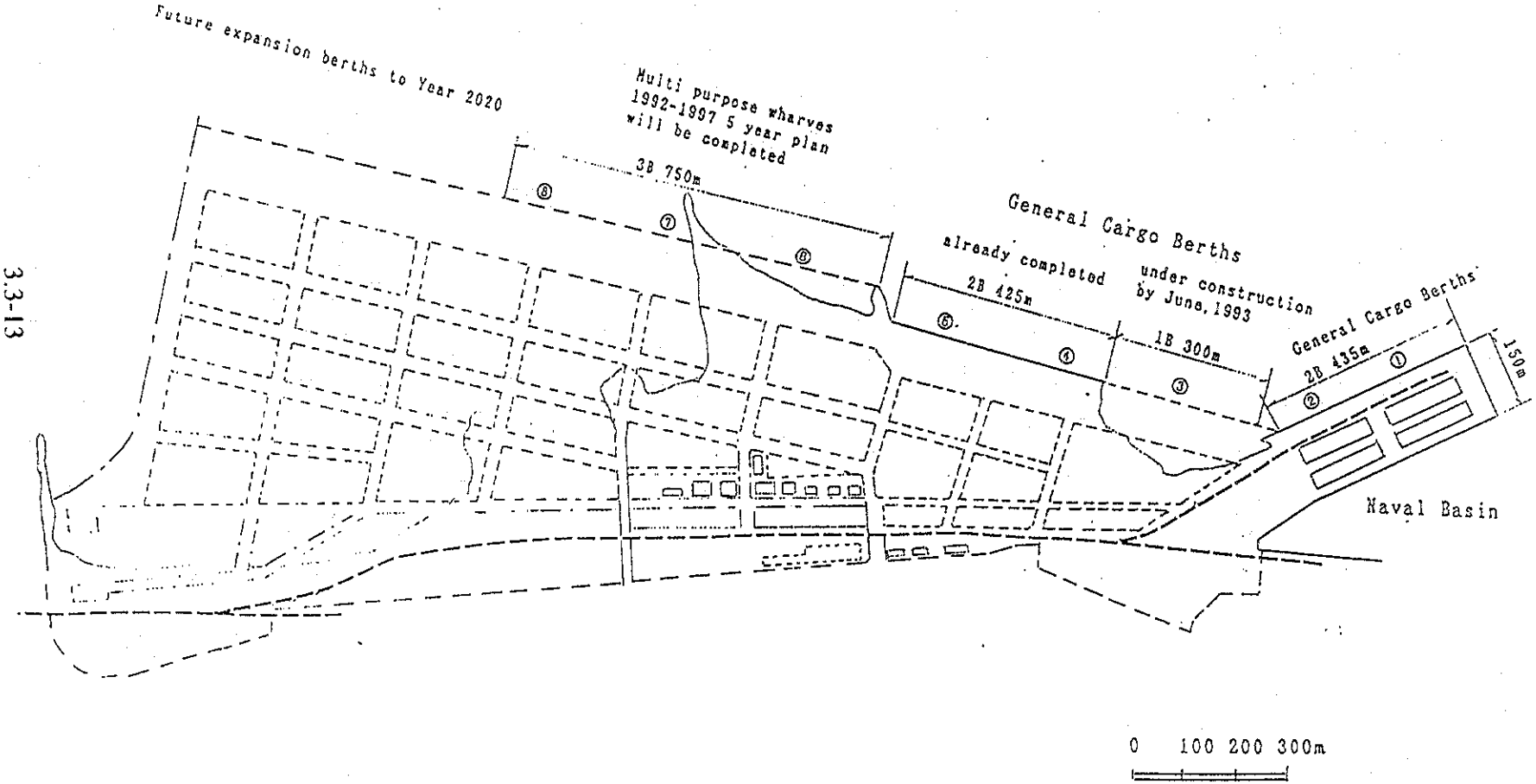


Figure 3.3.1-4 Layout Plan for the extension of ADABIYA PORT (uptodate)

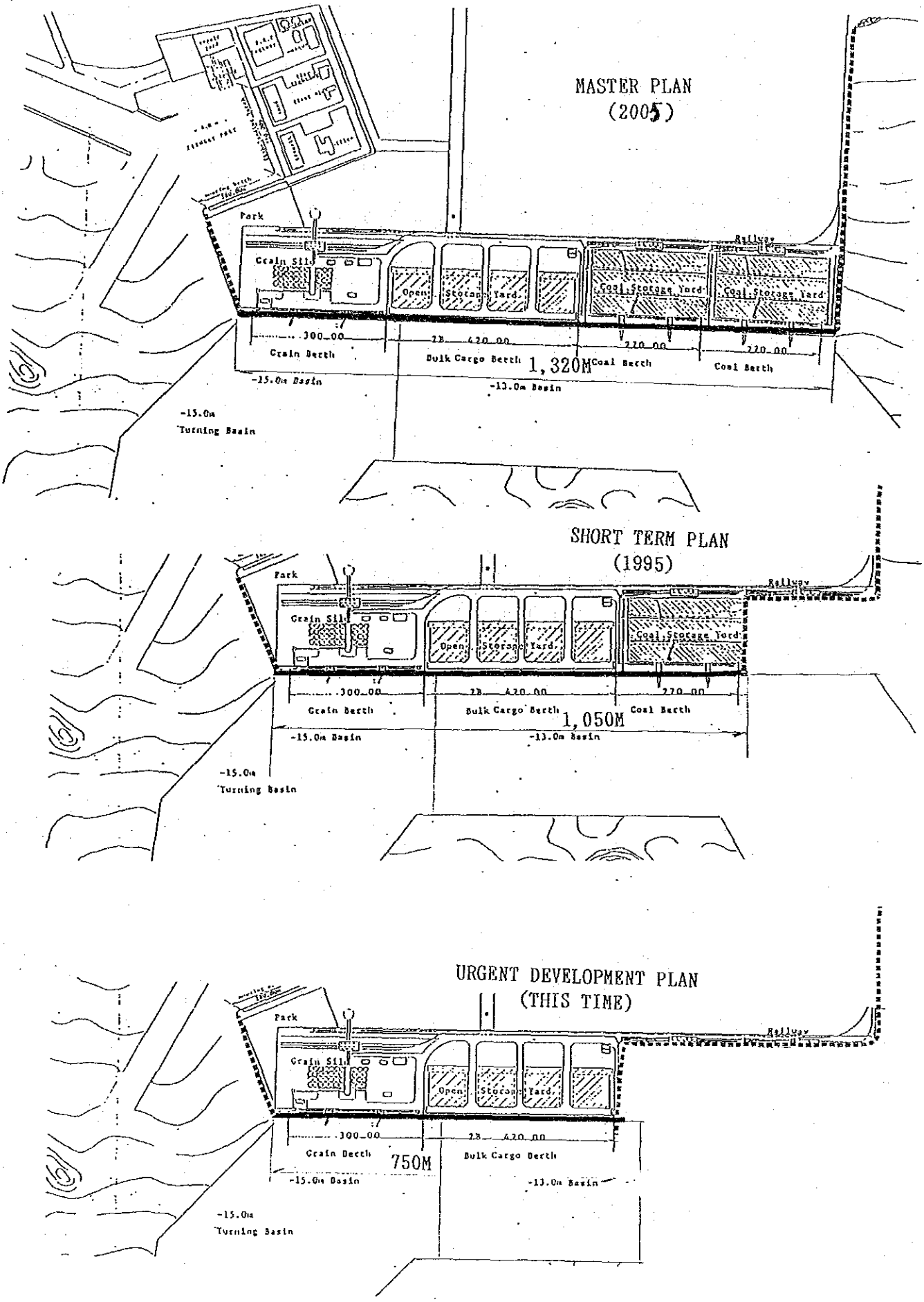


Figure 3.3.1-5 Ataqa Port Development Plan for each study

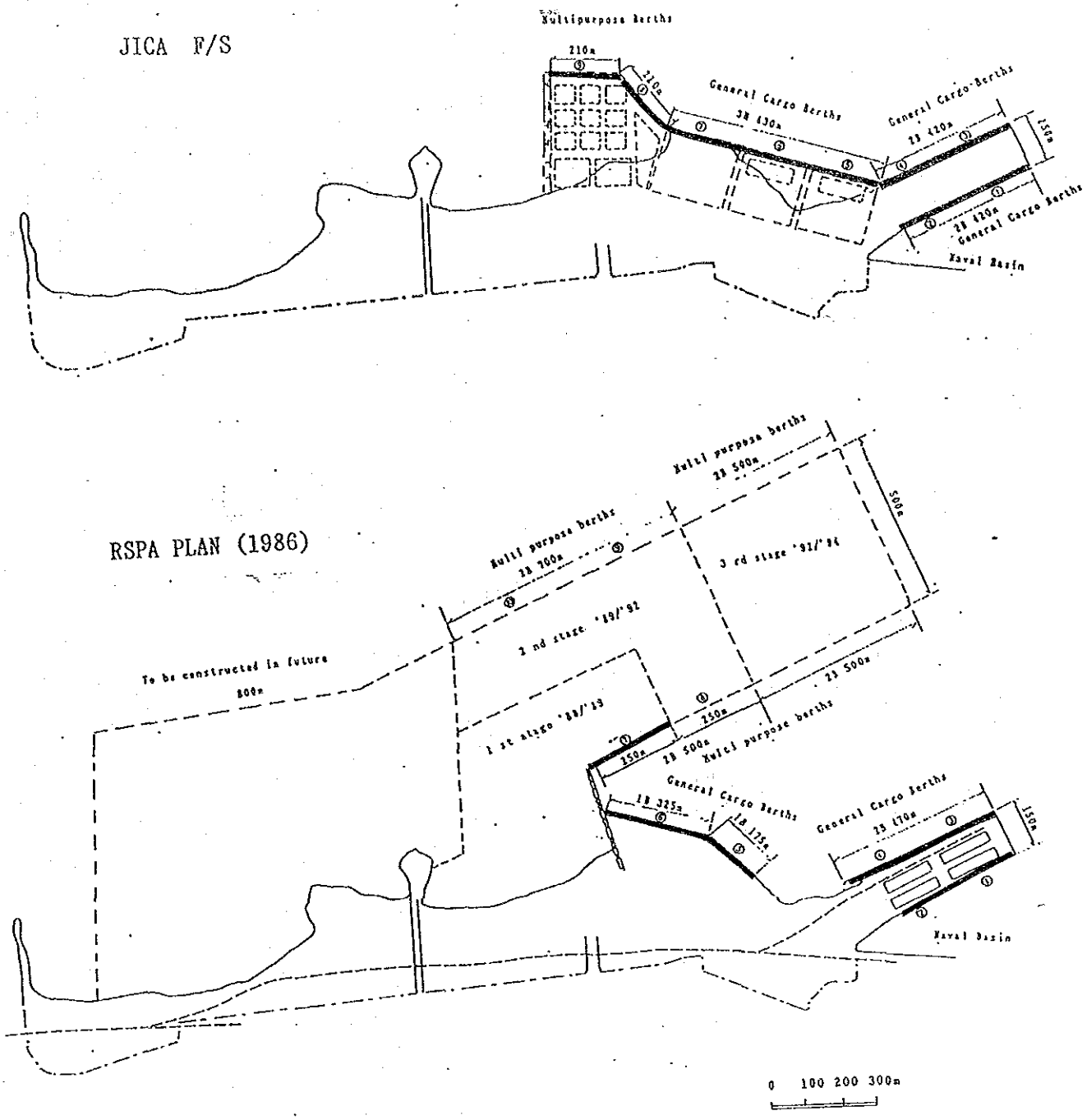


Figure 3.3.1-6 Comparison of the Layout Plan at ADABIYA PORT between JICA F/S and RSPA Plan (Year 1986)

Source: Aftercare study on Suez Bay Development Plan (1988 JICA)

Necessary scale of port facilities at Adabiya;

1.	General cargo berths	①,②,③,④,⑤,⑥	800,000 tons
2.	Special cargo berths	⑥,⑦	205,000 tons
3.	Container terminal (Multipurpose)	⑦	35,800 TEU

⑥ and ⑦ are used for the multipurpose up to 1995.

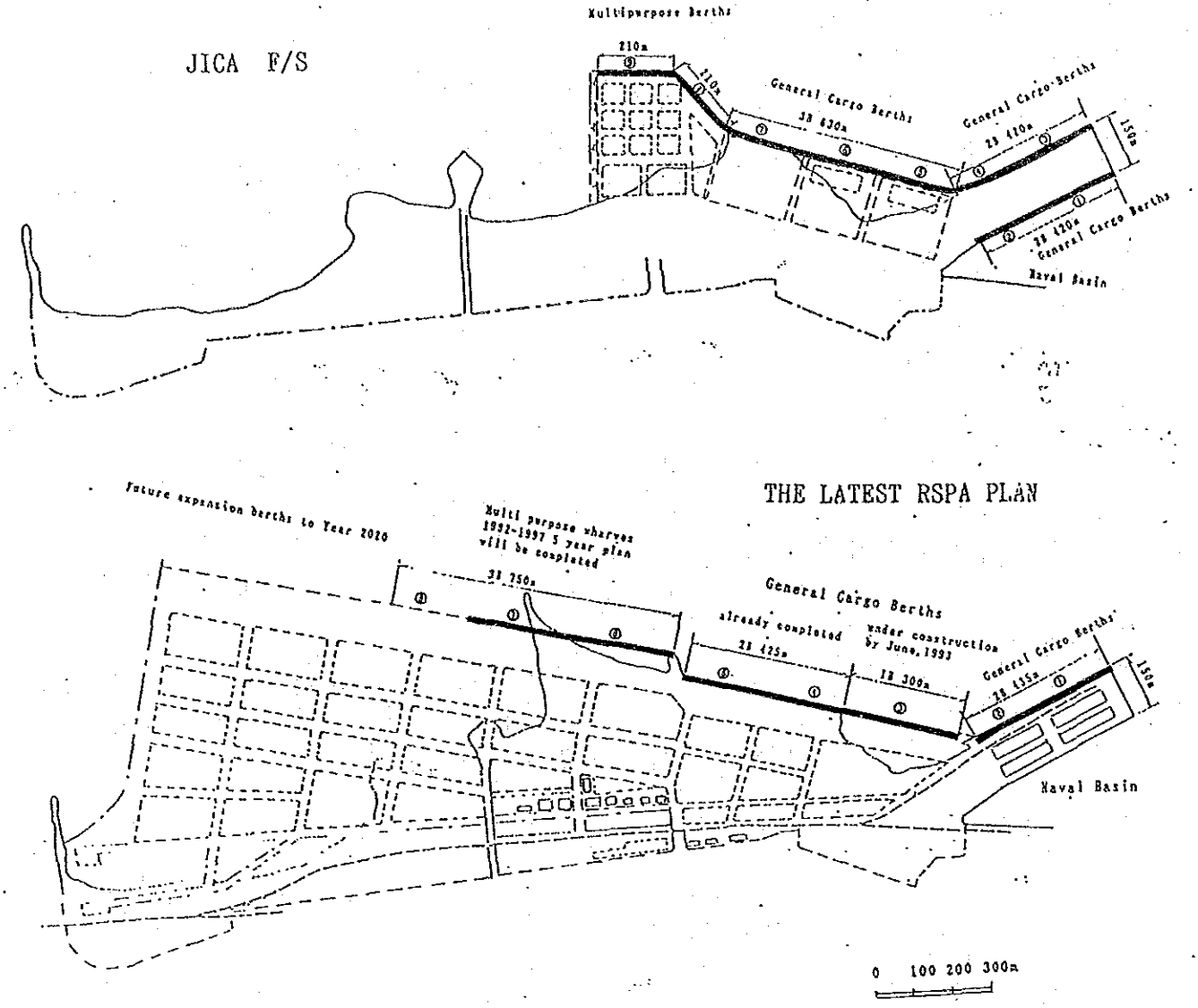


Figure 3.3.1-7 Comparison of the Layout Plan at ADABIYA PORT between JICA F/S and the Latest Plan of RSPA

Necessary scale of port facilities at Adabiya;

1.	General cargo berths	①,②,③,④,⑤,⑥	800,000 tons
2.	Special cargo berths	⑥,⑦	205,000 tons
3.	Container terminal (Multipurpose)	⑦	35,800 TEU

⑥ and ⑦ are used for the multipurpose up to 1995.

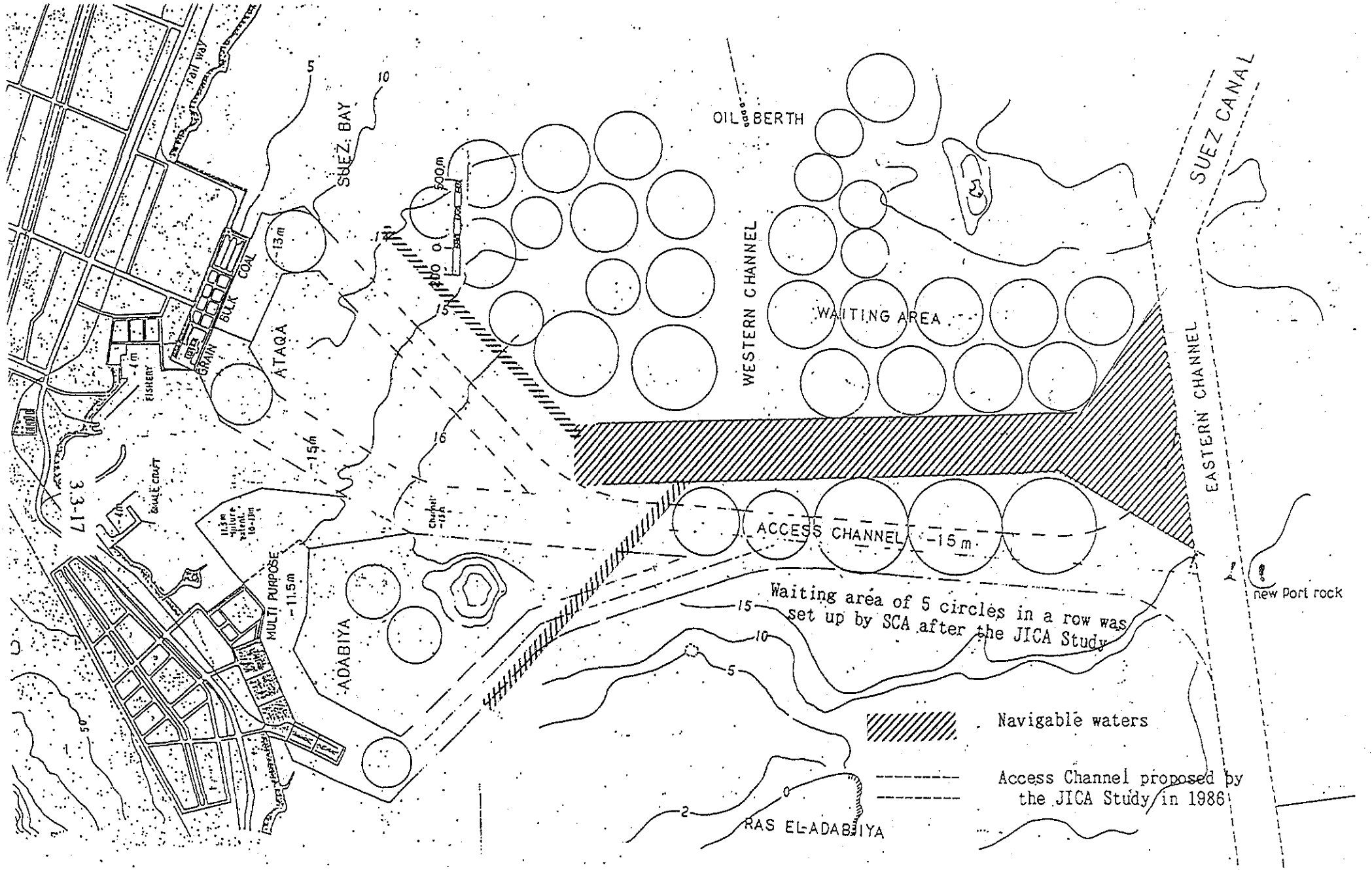


Figure 3.3.1-8 Navigable waters to the Suez ports set up by S.C.A.

3.3.2 Design Conditions and Structural Comparative Study

(1) Outline of Objective Port Facilities

The grain terminal comprises the construction of a 300 m grain berth with an alongside depth of 15.0 m below Chart Datum (C.D. -15m) and with grain silos of 100,000 tons. The grain wharf will be capable of accommodating one grain carrier of up to 80,000 DWT. The wharf will be constructed with reinforced concrete caissons.

The bulk cargo terminal comprises the construction of a 420 m bulk cargo wharf with an alongside depth of C.D. -13.0 m capable of accommodating two bulk carriers of up to 20,000 DWT or a container ship of 20,000 DWT or two container ships of up to 15,000 DWT. The wharf will consist of reinforced concrete caissons. The terminal also include asphalted concrete pavement for open storage yards of about 24,000 m2 and inner-port roads.

A small boat basin of C.D. -5.00 m in depth to accommodate five service boats has been planned.

A breakwater of rubble mound structure type is designed since a basin should secure appropriate calmness in both ordinary sea conditions and storms.

(2) Design conditions

(a) Natural conditions

Tidal level

Design tidal level is set shown below:

H.W.L.S. (High Water Level Spring)	+ 1.90 m
H.W.L.N. (High Water Level Neap)	+ 1.60 m
E.N.D.L. (Egyptian National Datum Level)	+ 1.137 m
L.W.L.N. (Low Water Level Neap)	+ 0.70 m
L.W.L.S. (Low Water Level Spring)	+ 0.40 m
C.D. = DL (Chart Datum Level)	0.00 m

C.D. is almost same level as Astronomical Lowest Low Tide.

Tidal range in spring tide is set as 1.5 m.

Waves

Waves used in the design of Ataqa Port facilities are set forth in the significant wave (H 1/3, T 1/3).

Design wave height	H 1/3 = 1.3 m
Design wave period	T 1/3 = 5.2 sec

Current

The majority of drift current in the Suez bay circulates anti-clockwise. The current direction is from the south at ebb tide and from the north at flood tide. The tide velocity at Port Ibrahim is more than 0.8 m/sec at the frequency of 5 %. However, as the current along the western coast of the Suez bay very stagnates due to the cape of Ras Adabiya, the tide velocity at the project site will not exceed 1 knot.

Design tide current is set as 1 knot.
(Maximum current velocit)

Wind

The wind velocity varies from 1 knot to 27 knots. Mainly a velocity range of 11 to 16 knots, and a wind direction of N to NW with the occurrence frequency of 57 % prevail through the year.

Design wind velocity	20 m/sec
Wind direction for wave analysis	SSE to SSW

Earthquakes

No record of earthquakes in Suez region is available in recent centuries. However, significant earthquakes in the Dead Sea region which sometimes occur may affect the Suez region. Design seismic coefficient of 0.05 (1/20) was used in the design of the foundation for turbine - generator in the Ataqa Power Station Project.

Though any seismic force has not been considered to the Adabiya port facilities, it shall be considered in the design for important facilities of Ataqa Port such as quay walls and grain silo.

The acceleration of 0.05 g is applied for the design of quaywalls.

Bathymetric conditions at the quaywalls

The existing water depth at the face line of the quaywalls is approximately CD -5.5 m. The sea bottom around the area varies with small gradient ; the gradient is approximately 1/200. The results obtained from the sounding and the coastal topographic survey are applied to the detailed design.

Soil Conditions

• Grain Quay Wall Area

Three (3) borings for soil investigatons were carried out in the proposed grain wharf area. Figure 3.3.2-1 shows the soil profile at the grain wharf. Since the subsoil of boring No.1 is the most soft soil, it is applied for the design calculation of stability as the representative. Table 3.3.2-1 shows the applied soil conditions for the detailed design of the grain wharf.

• Bulk-Cargo Quay Wall Area

Four (4) borings for soil investigations were carried out on the proposed bulk cargo wharf. Since the sub-soil of boring No. A-5 is the softest, therefore, it is applied for the design calculation of stability as the representative. Table 3.3.2-2 shows the applied soil conditions for detailed design of the bulk cargo wharf.

Table 3.3.2.-1 Soil Conditions for Grain Wharf Design

(Below C.D. in meters)		N-value blow/ft	Angle of internal friction
To be dredged up to C.D. -17.5 m			
17.5 - 21.5	LIMY SILTY CLAY & LIMESTONE PIECES	38	-
21.5 - 24.0	LIMY SILTY SAND:	46	35
24.0 - 27.0	CLAY: silty with traces of sand	30	-
27.0 - 38.0	SAND: dense to very dense	37 to 57	35

Table 3.3.2.-2 Soil Conditions for Bulk Cargo Wharf Design

Depth (C.D.)	Strata	N-value blow/ft
To be dredged up to C.D. -15.5 m		
15.5 - 17.0	LIMY SILTY CLAY & LIMESTONE PIECES	37
17.0 - 18.0	DOLOMATIC GRAVEL:	50/6"
18.0 - 23.0	CLAY: Calcareous, silty	35 to 41
23.0 - 26.0	LIMY SILTY CLAY: with some sand, limestone	40
26.0 - 28.4	LIMESTONE PIECES	50/6"

(b) Objective Vessels and Load Conditions

1) Design conditions for grain wharf

Vessels

Size of vessels	80,000 DWT
Overall length	250 m
Molded breadth	38.5 m
Full load draft	14.5 m
Length of hatch	180 m

The dimensions above were determined in reference to Standard of ships in " Technical Standards for Port and Harbor Facilities in Japan ", as the dimensions of the ships are not known clearly.

Berthing conditions

Berthing speed	0.10 m/sec
Berthing angle	Not more than 6 degree

Wharf condition

Surcharge	4.0 ton/sq.m
Design depth	CD -15 m
Design length	310 m

Handling equipment

Type	Continuous mechanical unloader
Number of unloaders	2 units
Handling capacity	630 ton/hour.each
Weight of unloader	420 tons
Span of wheel gauge	9 m
Vertical wheel load	35 tons/wheel
Number of wheels	Refer to Figure 3.3.2-3

Loading combination acting on the wharf

Case 1 (ordinary):	Structure+Earth P+Surcharge
Case 2 (tractive):	Structure+Earth P+Bitt
Case 3 (earthquake):	Structure+Earth P+Earthquake Force+1/2 Surcharge
Case 4 (unloader working):	Structure+Earth P+Unloader P.
Case 5 (unloader+earthquake):	Structure+Earth P+Unloader weight+Earthquake Force

Tractive forth

Tractive forth on bollard:	200 t
Tractive forth on bitt:	100 t

2) Design conditions for bulk cargo wharf

Vessels

Size of vessels 20,000 DWT

Standard size of ships in case of bulk carrier;

Overall length	170 m
Molded breadth	23.7 m
Full load draft	9.6 m
Molded depth	12.9 m

Standard size of ships in case of container ship;

Overall length	201 m
Molded breadth	27.1 m
Full load draft	10.6 m
Molded depth	15.6 m

(source) Technical standards for port and harbor facilities in Japan

Berthing conditions

Berthing speed	0.15 m/sec.
Berthing angle	Not more than 6 degree

Wharf conditions

Surcharge	6.0 ton/sq.m
Design depth	DL -13.0 m
Design length	210 m

Loading combination

Case 1 (ordinary):	Structure+Earth P+Surcharge
Case 2 (tractive):	Structure+Earth P+Bitt
Case 3 (earthquake):	Structure+Earth P+Earthquake Force+1/2 Surcharge

Tractive forth

Tractive forth on bollard:	100 t
Tractive forth on bitt:	70 t

(c) Design standard and calculation method of caisson

TECHNICAL STANDARDS FOR PORT AND HARBOR FACILITIES IN JAPAN and the other international standards and codes are applied in the design of the port facilities. And also the design of existing ports such as Port Ibrahim, Adabiya Port, Safaga Port and Damietta Port are referred to for the design of Ataqa port.

Stability and structural stress of concrete caissons are calculated with a computer in the calculation sequence as shown in Figure 3.3.2-4.

(3) Structural Evaluation of Quay Walls

(a) The criteria to evaluate the structural type of quaywalls

The evaluation for the structural type of quaywalls was made in accordance with the following items.

1) Construction cost
2) Effect on the employment opportunities
3) Rough maintenance cost to assure the life span of 50 years
4) Utilization of local material
5) Examination of stability calculation
6) Technical achievement for the construction works
7) Availability of the construction machinery & equipment for the project
8) Other advantages
9) Other disadvantages
10) Overall evaluation

(b) Structural evaluation of the grain quay wall

Figure 3.3.2-5 to 3.3.2-8 show the typical cross section of concrete caisson type, concrete block type, the type of open-type pier with batter piles and the type of sheet pile quaywall for the grain wharf, respectively.

Table 3.3.2-3 shows the comparison list for the each type, and caisson type is selected for the structure of Grain Quaywall.

(c) Structural evaluation of the bulk cargo quaywall

Figure 3.3.2-9 to 3.3.2-12 show the typical cross section of concrete caisson type, concrete block type, the type of open-type pier with batter piles and the type of sheet pile quaywall for the bulk cargo wharf, respectively. Table 3.3.2-4 shows the comparison list for the each type, and caisson type is selected for the structure of Bulk-Cargo quay wall.

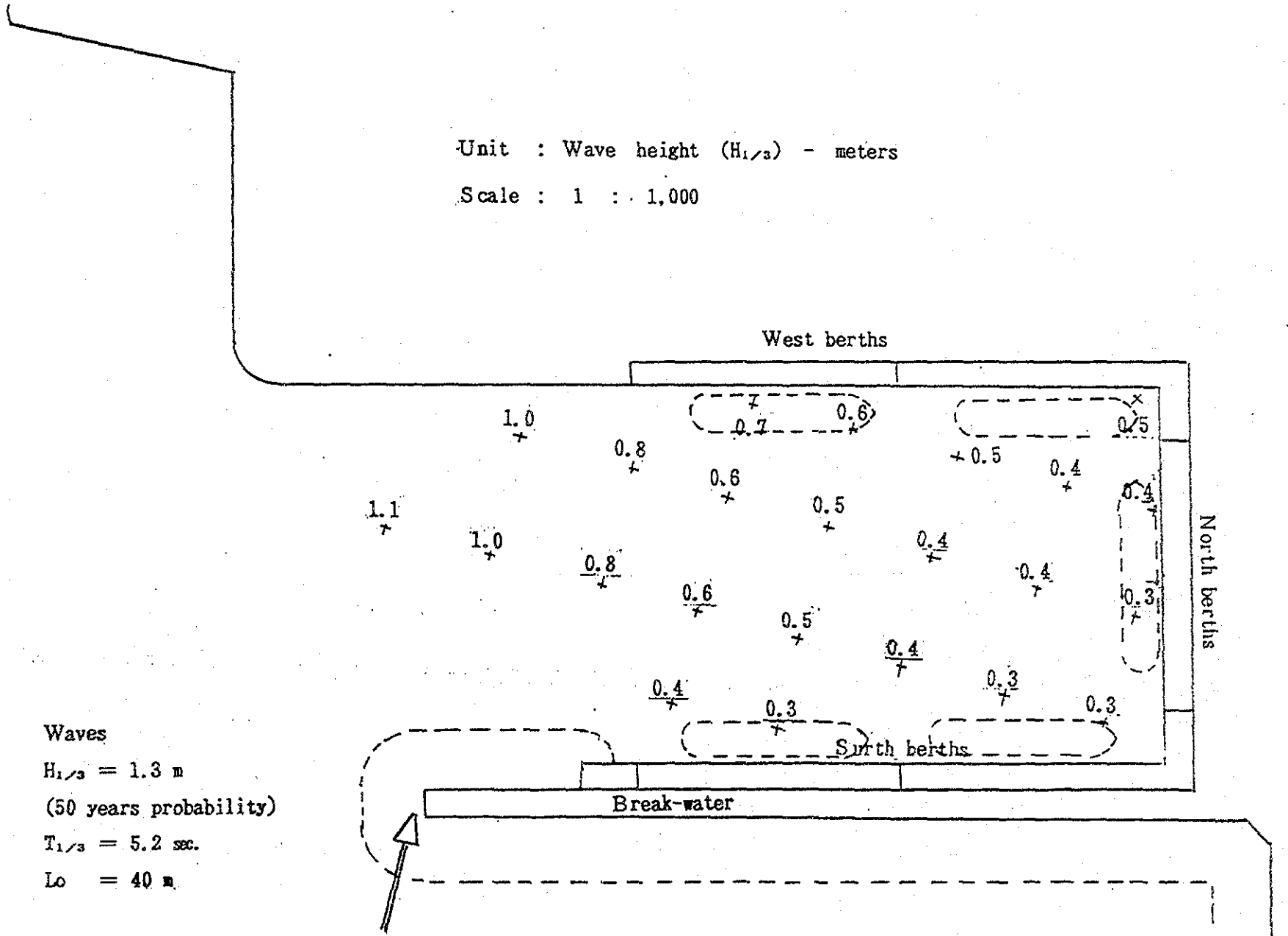
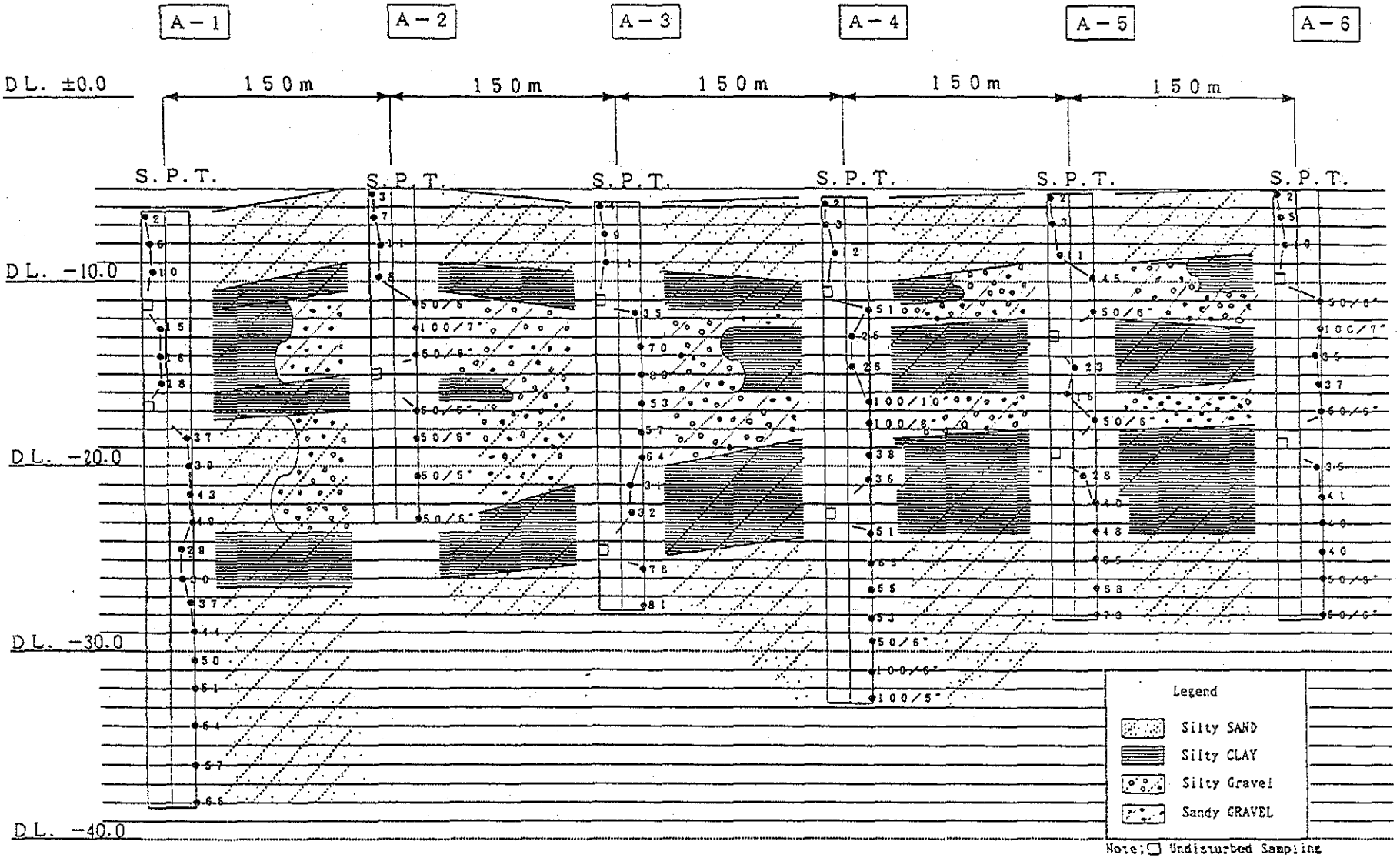


Figure 3.3-2-1 Significant Wave Height inner Basin

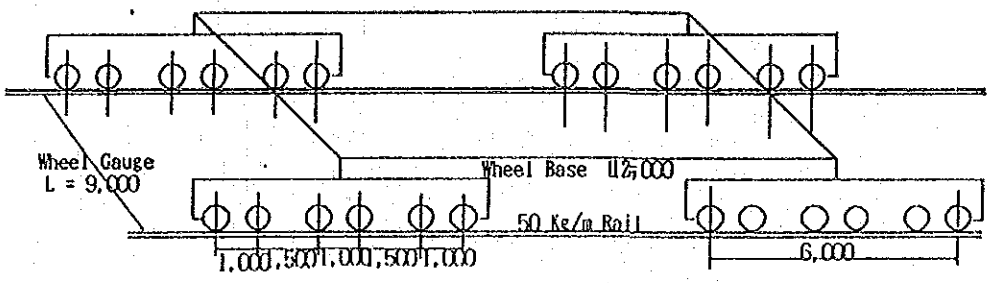
Figure 3.3-2-2 Soil Profile at Quay Line



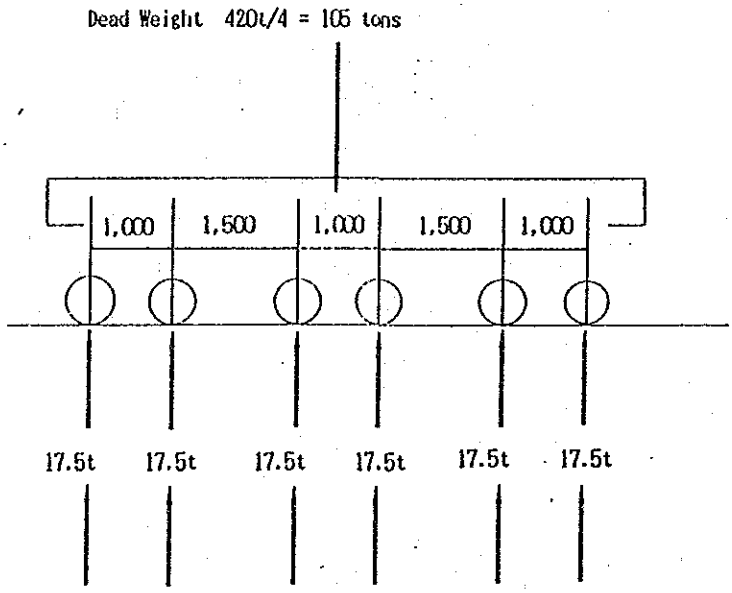
Wheel Load Conditions of Unloader

Dead Weight of an Unloader	420 tons
Wheel Gauge	9.0 m
Wheel Base	12 m
Number of Corners	4 foots

Sketch of Unloader Wheels



Wheel Conditions at a Corner



Dead Weight	17.5t	17.5t	17.5t	17.5t	17.5t	17.5t
Load Conditions						
A. At service conditions						
Sea Side	35t	35t	35t	35t	35t	35t
Land Side	17.5t	17.5t	17.5t	17.5t	17.5t	17.5t
B. At rest conditions						
Sea Side ┐	30t or	30t or	30t or	30t or	30t or	30t or
Land Side ┘	17.5t	17.5t	17.5t	17.5t	17.5t	17.5t
C. At earthquakes						
Both Sides	35t	35t	35t	35t	35t	35t
HORIZONTAL FORCE	7t	7t	7t	7t	7t	7t

Figure 3.3-2-3 Wheel Load Conditions of Unloader

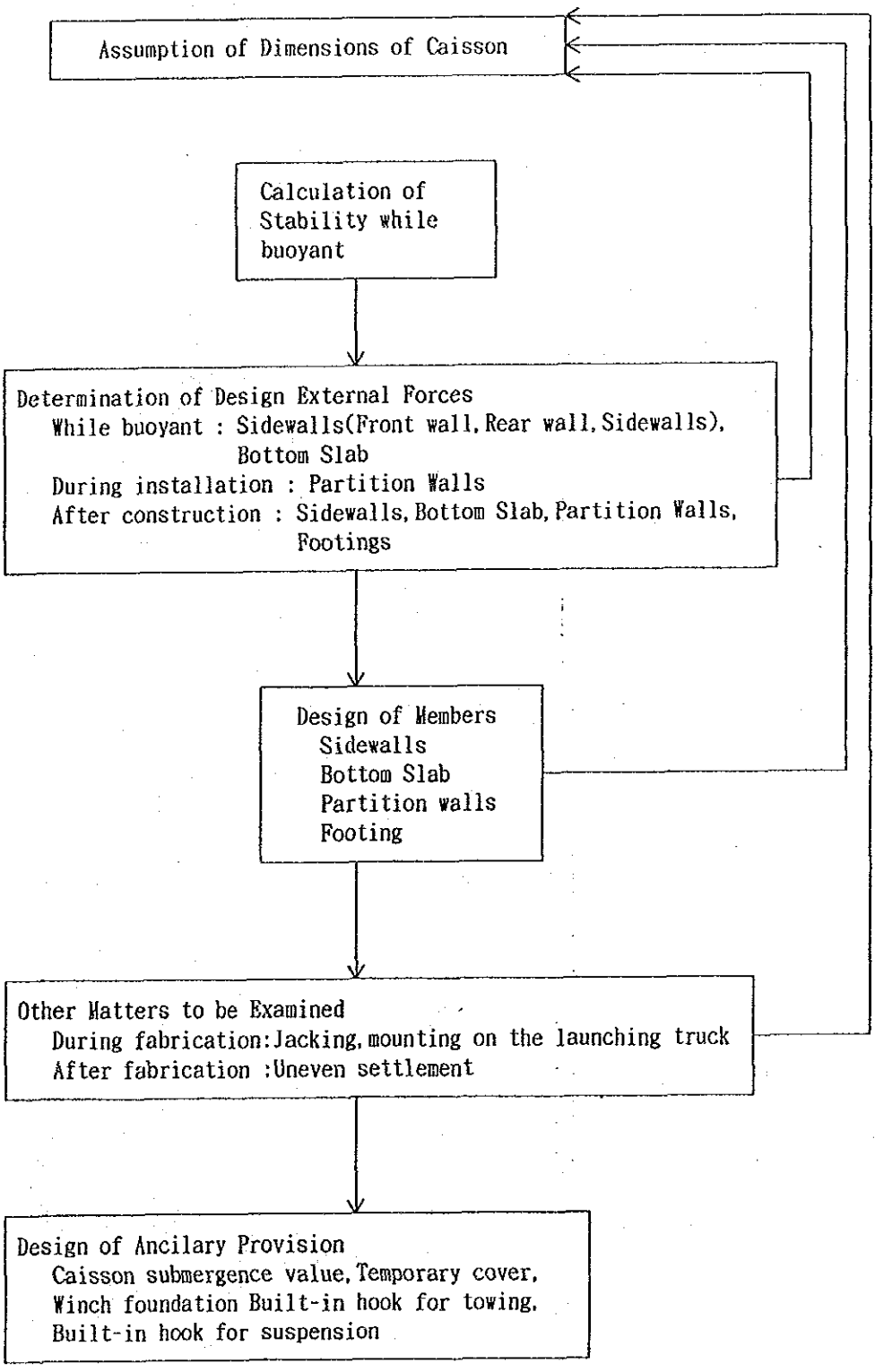


Figure 3.3-2-4 Sequence of Design of Box Caisson

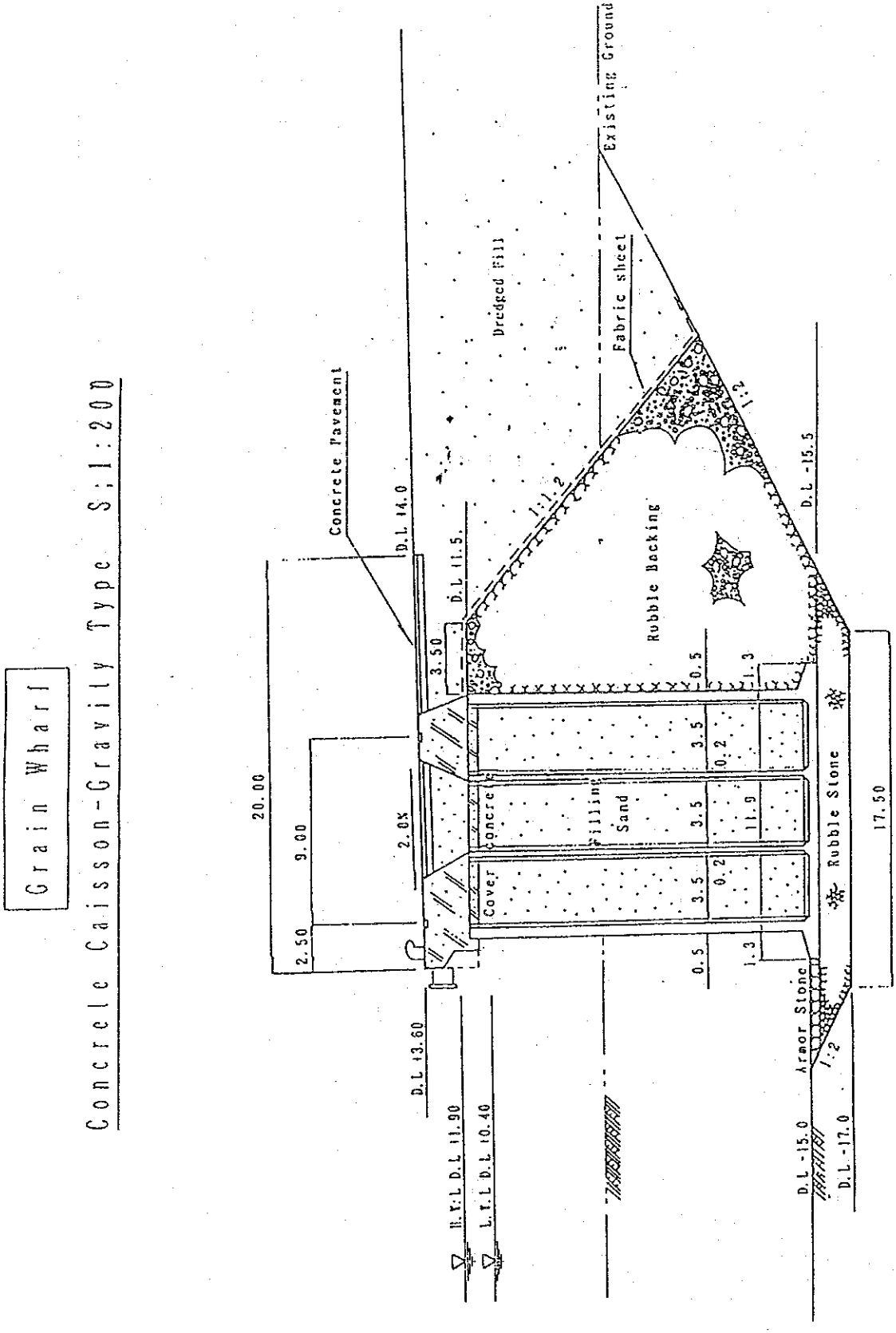


Figure 3.3–2–5 Gravity Type of Concrete Caisson for Grain Quaywall

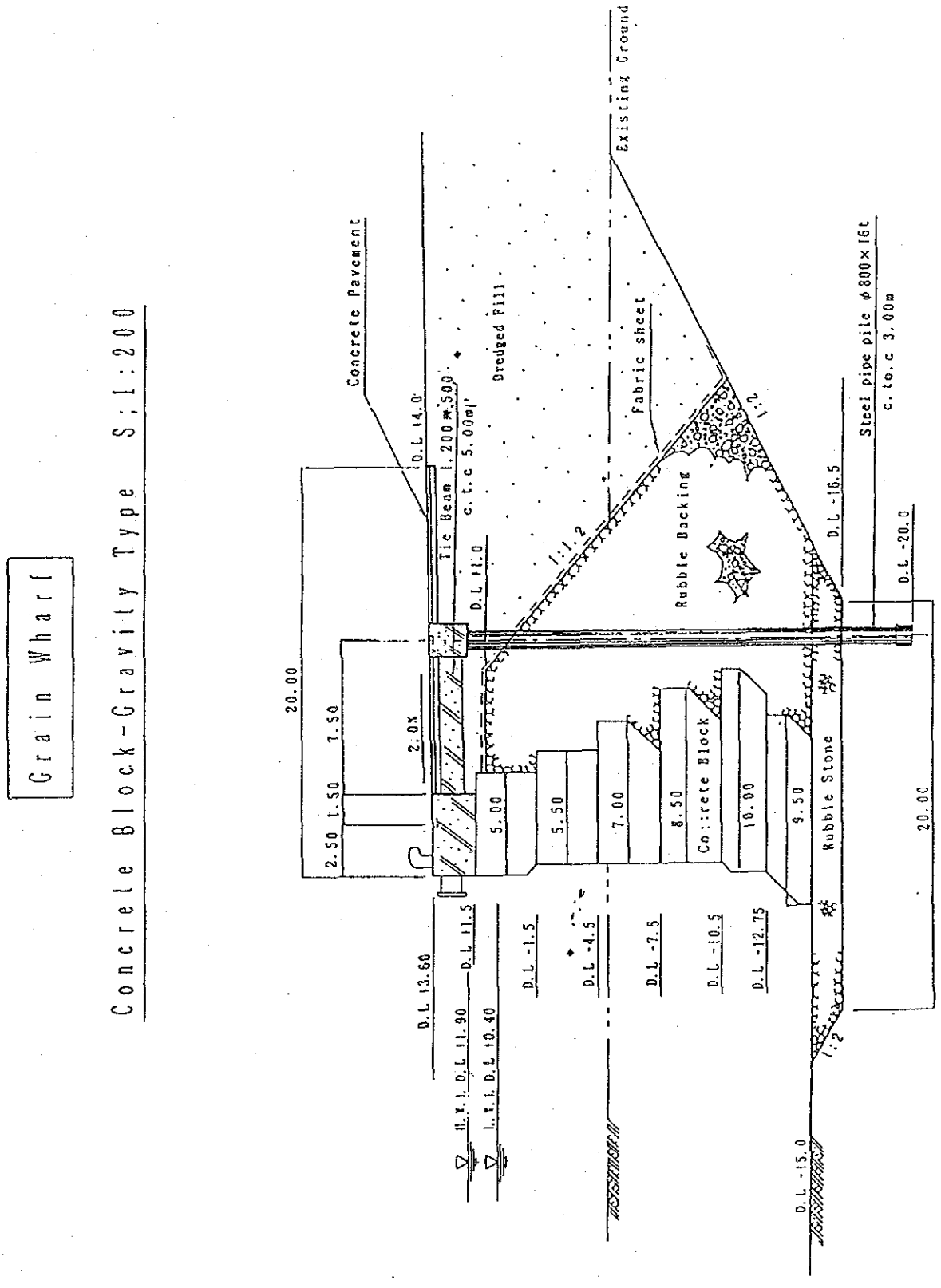


Figure 3.3–2–6 Gravity Type of Concrete Block for Grain Quaywall

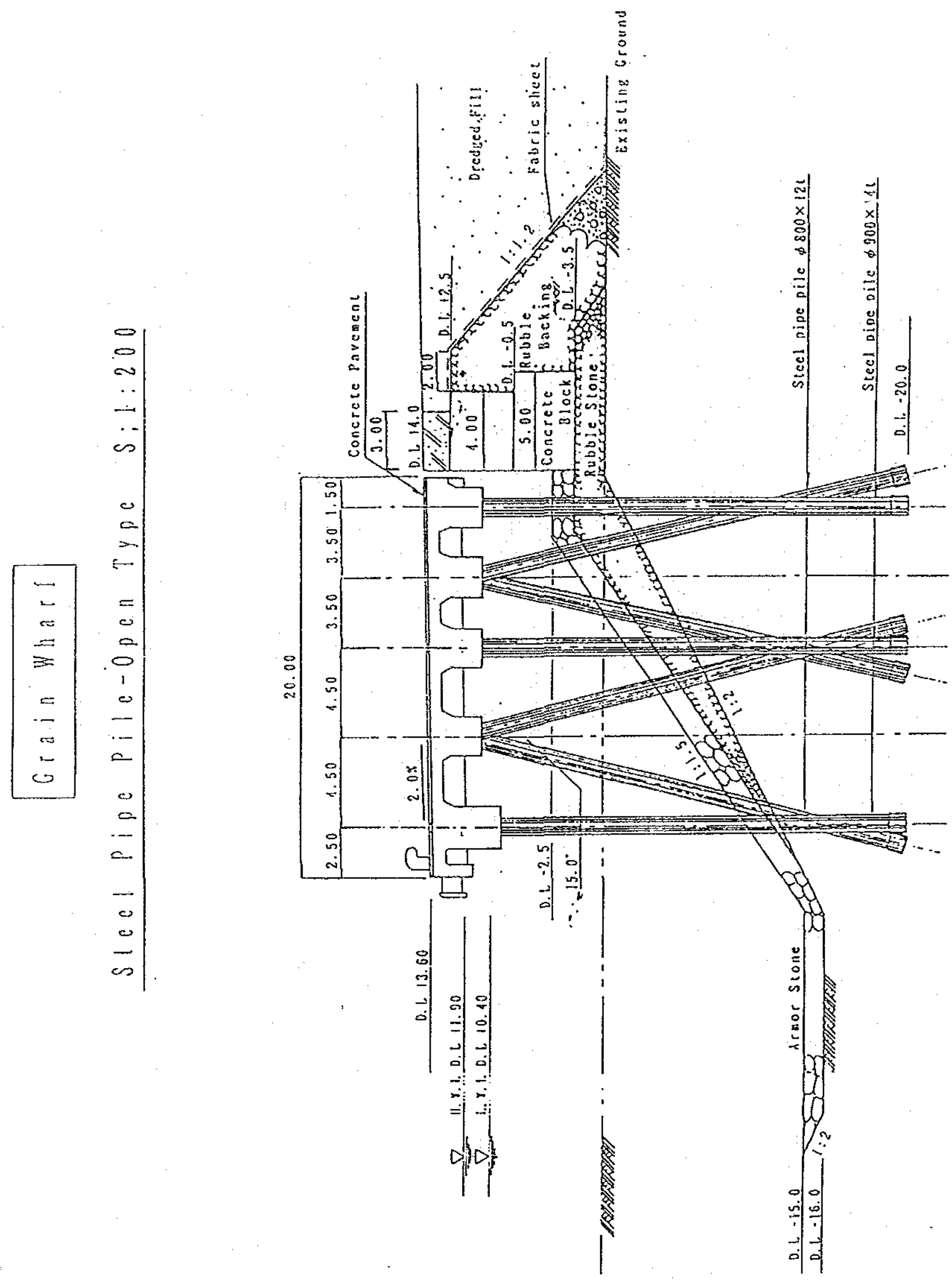


Figure 3.3–2–7 Open Type of Steel Pipe Pile for Grain Quaywall

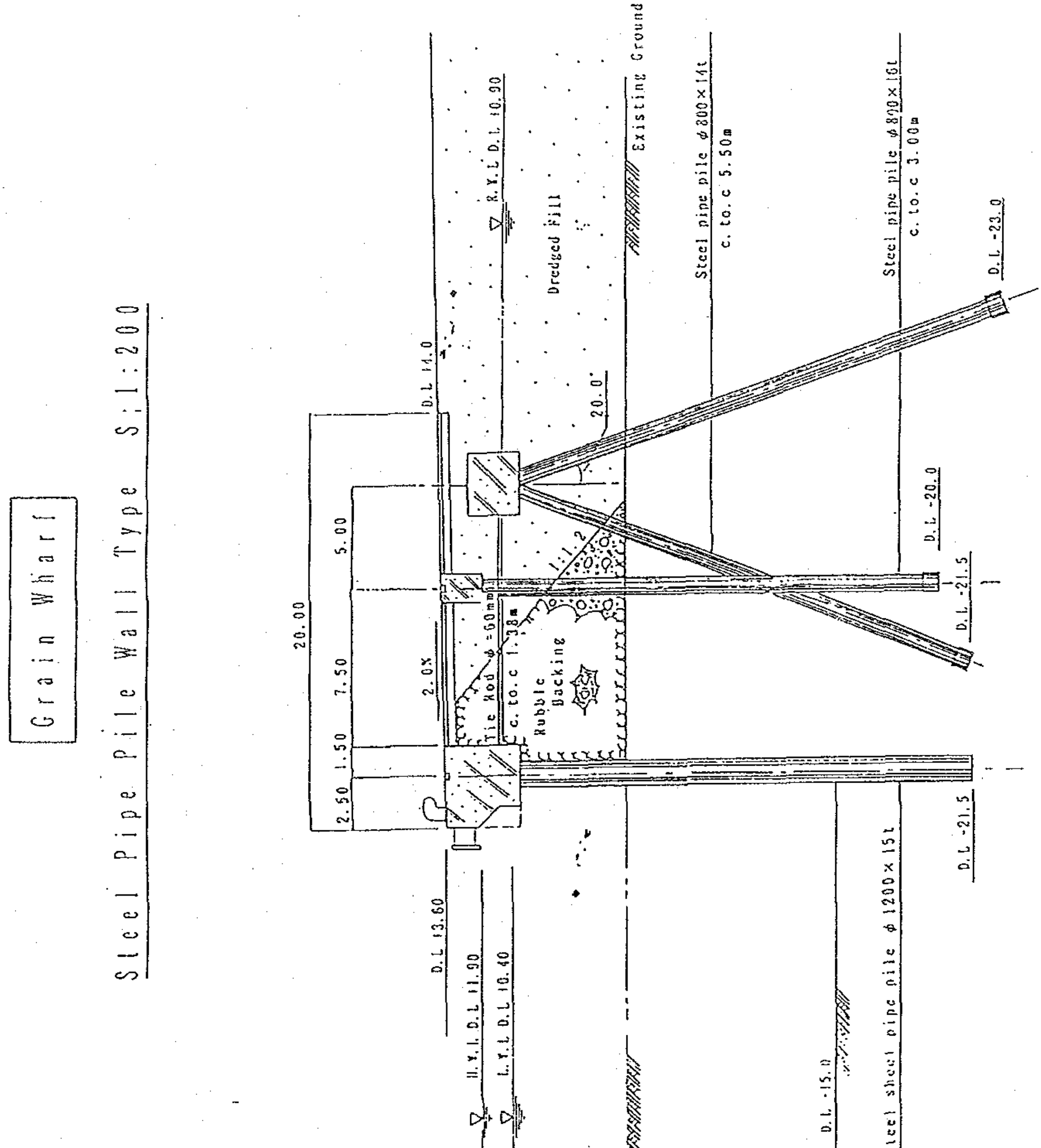


Figure 3.3–2–8 Steel Pipe Pile Wall Type for Grain Quaywall

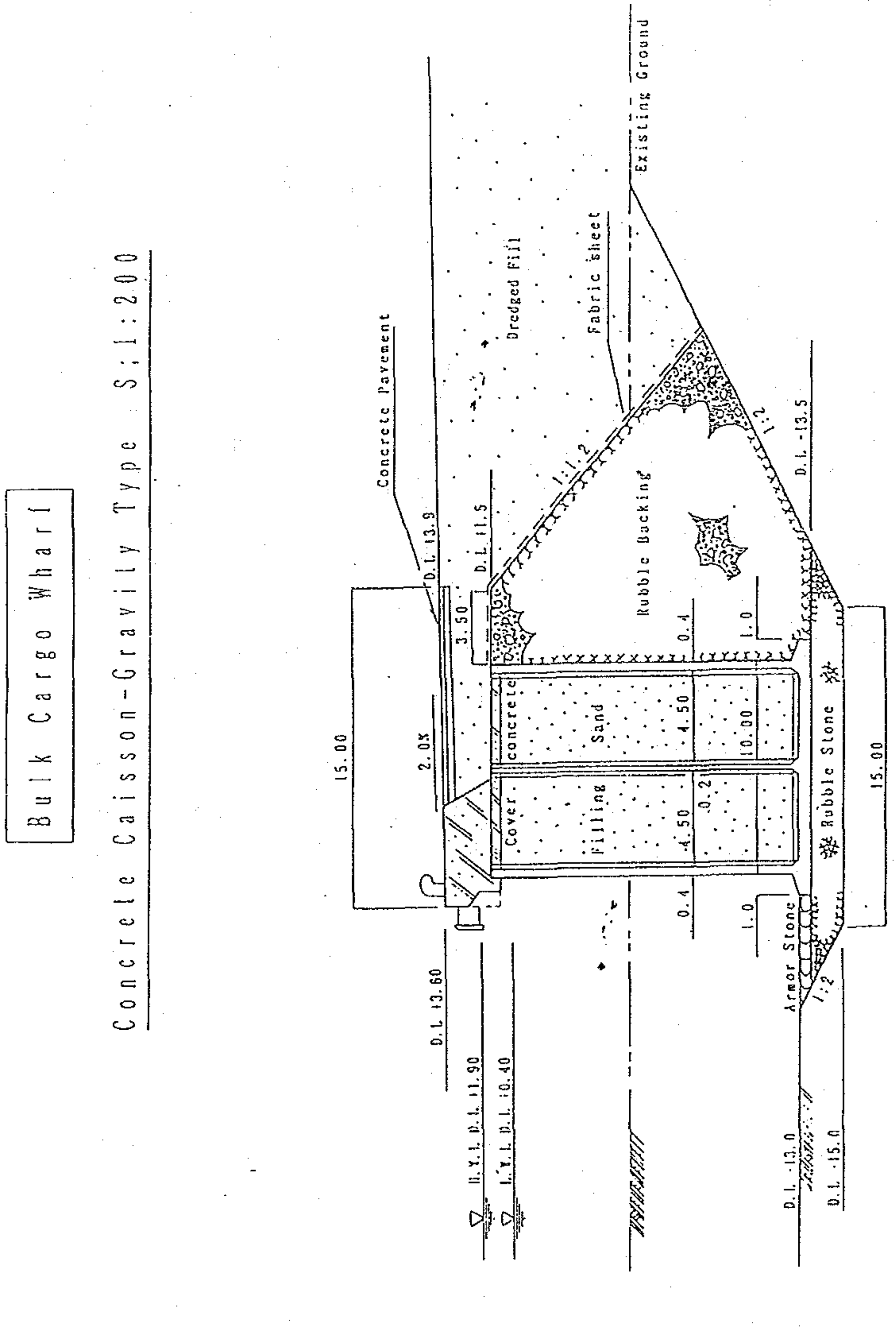


Figure 3.3–2–9 Gravity Type of Concrete Caisson for Bulk Cargo Quaywall

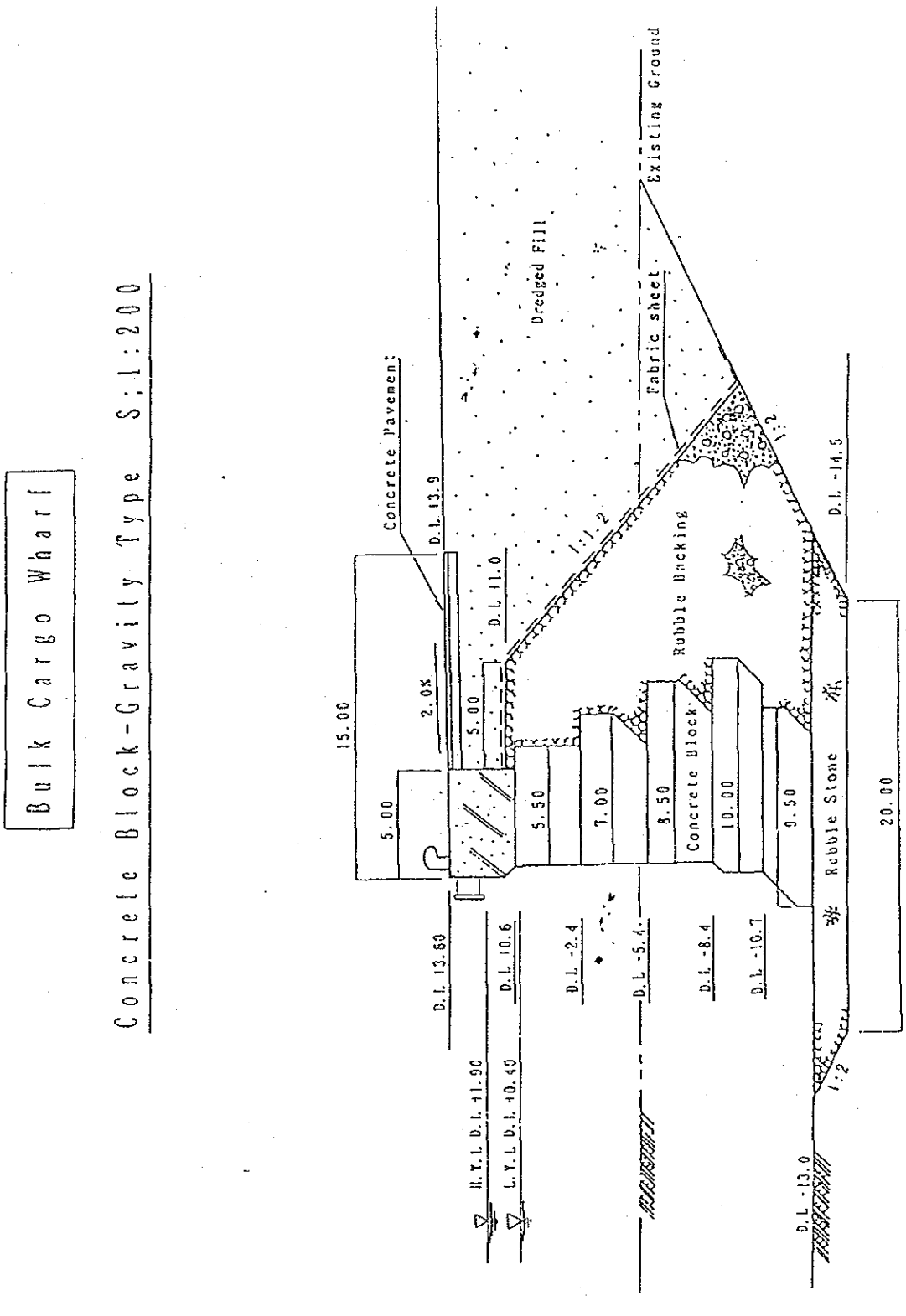


Figure 3.3–2–10 Gravity Type of Concrete Block for Bulk Cargo Quaywall

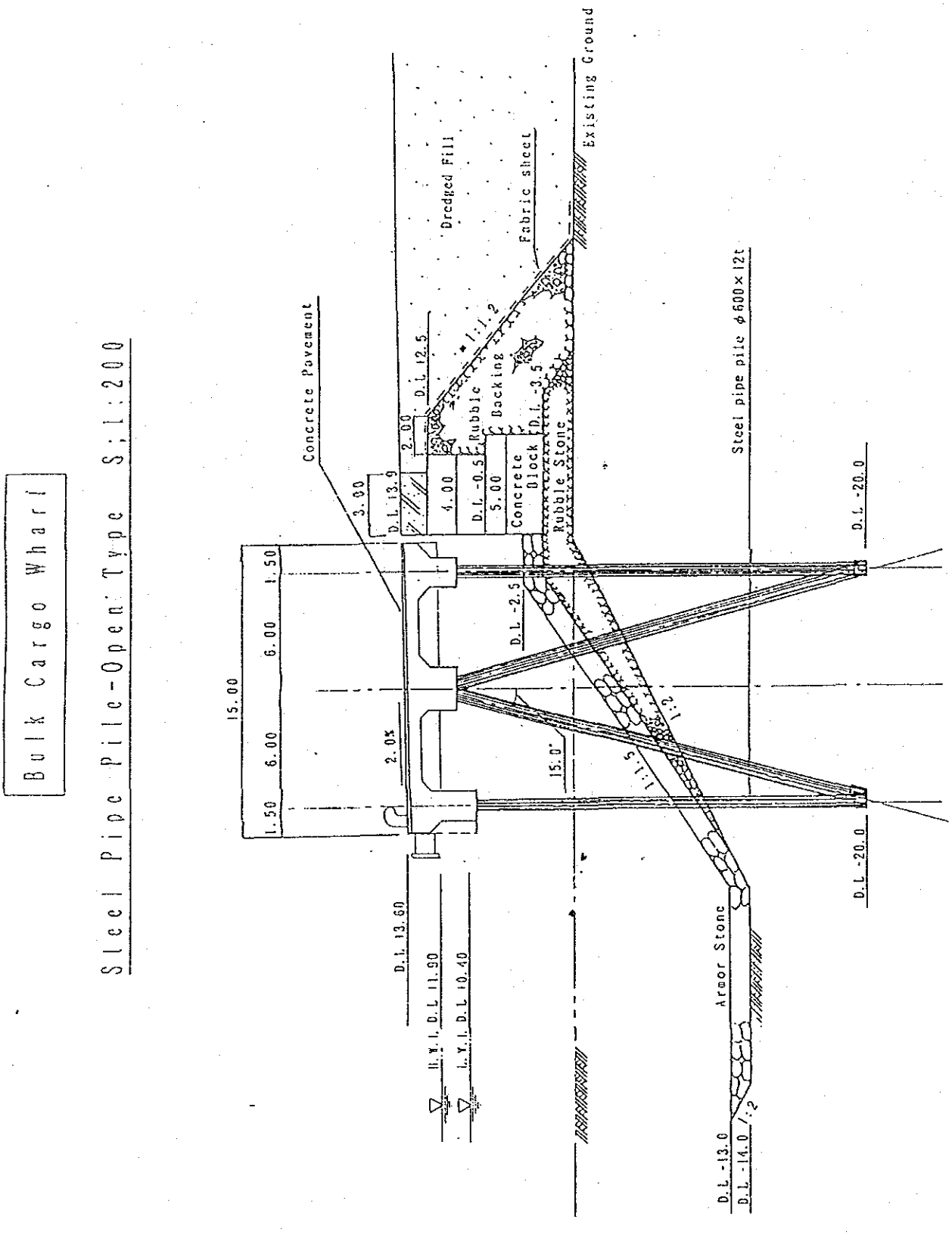


Figure 3.3–2–11 Open Type of Steel Pipe Pile for Bulk Cargo Quaywall

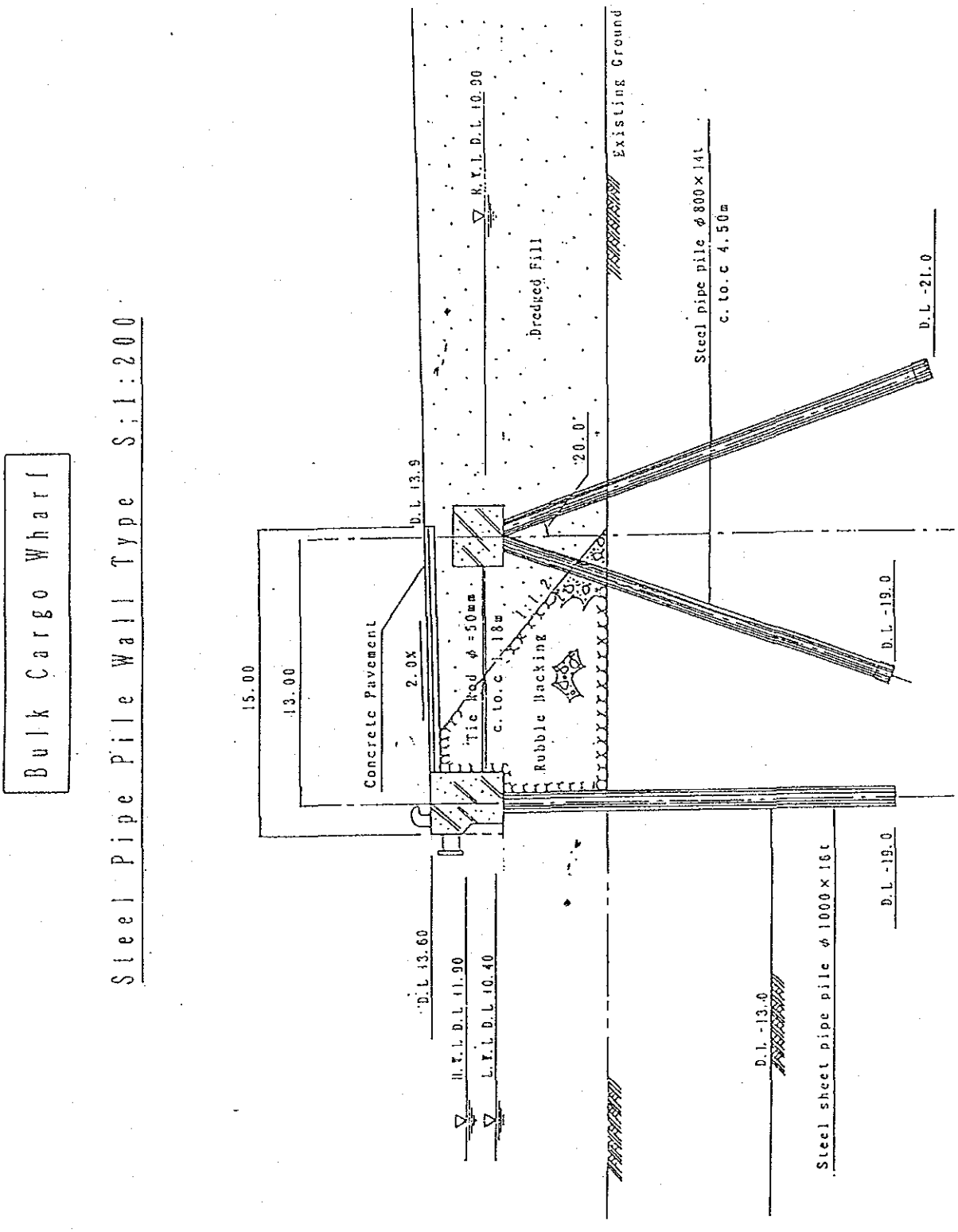


Figure 3.3–2–12 Steel Pipe Pile Wall Type for Bulk Cargo Quaywall

Table 3.3-2-3

Comparison List for Structural Type of Grain Quaywall

Item of evaluation	Caisson type	Concrete block	Open type pipe	Steel pipe pile wall
1) Number of employment				
Skilled labor	many	usual	many	usual
Skilled seaman	many	usual	many	many
Engineer	many	usual	many	usual
Tech. assist of foreigner	need	no need	need	need
Evaluation of (1)	No. 1	No. 3	No. 2	No. 4
2) Use of local material				
Concrete 100% local cu. m/m	68	127	45	22
Steel bar 80% local t/m	7	1	2	1
Steel pipe/sheet pile N. A	N. N	N. N	10t/m	5t/m
Evaluation of (2)	No. 2	No. 1	No. 3	No. 4
3) Stability of structure	stable	different settlement	stable	stable
4) Execution of work				
Experience	SCA	many	a few	none
Availability of equipment				
Floating equipment	avail.	avail.	avail.	none
Place of availability	canal	site	ALX.	ALX.
Other equipment on land	avail.	avail.	avail.	avail.
Construction period (Mon. /100m)	6	12	4	3
Sequence of works for				
Workers	good	good	good	good
equipment	regular	good	regular	regular
Evaluation of (4)	No. 1-2	No. 1-2	No. 3	No. 4
5) Maintenance				
Corrosion control	none	none	need	need
Regular repair	seldam	seldam	seldam	seldam
Evaluation of (5)	good	good	regular	regular
6) Construction cost LE/l. m				
Concrete	50, 800	61, 000	36, 100	14, 000
Steel bar	14, 800	1, 000	3, 400	3, 900
Steel pipe/corrosion control	0	11, 800	67, 000	87, 000
Other material/etc.	21, 200	15, 000	9, 800	3, 000
Total (excluding funct. faci.)	86, 800	88, 800	116, 400	107, 900
7) Overall evaluation	No. 1	No. 2	No. 3	No. 4

Remarks; N. A -- not available: avail. -- available:
SCA -- Suez Canal Authority: ALX. -- Alexandria
N. N -- not necessary: canal -- canal zone

Table 3.3-2-4

Comparison List for Structural Type of Bulk Cargo Quaywall

Item of evaluation	Caisson type	concrete block	open type pipe	steel pipe pipe wall
1) Number of employment				
Skilled labor	many	usual	many	usual
Skilled seaman	usual	usual	many	usual
Engineer	many	usual	many	usual
Tech. assist of foreigner	need	no need	need	need
Evaluation of (1)	No. 1	No. 3	No. 2	No. 3
2) Local material				
Concrete 100% local cu. m/m	46	116	37	22
Steel bar 80% local t/m	5	1	2	1
Steel pipe/sheet pile t/m	N. N	N. N	4	1
Evaluation of (2)	No. 2	No. 1	No. 3	No. 4
3) Stability of structure	stable	different settlement	stable	stable
4) Execution of work				
Experience	SCA	many	a few	none
Availability of equipment				
Floating equipment	avail.	avail.	avail.	avail.
Place of availability	Canal	site	ALX.	ALX.
Other equipment on land	avail.	avail.	avail.	avail.
Construction schedule mon. 100m	6	9	3	6
Sequence of works for				
workers	good	good	good	good
equipment	regular	good	regular	regular
Evaluation of (4)	No. 1-2	No. 1-2	No. 3	No. 4
5) Maintenance				
Corrosion control	none	none	need	need
Regular repair cost	seldam	seldam	regular	regular
6) Construction cost LE/Berth m				
Concrete	33, 500	55, 600	31, 200	12, 400
Steel bar	9, 800	0	2, 500	2, 900
Steel pile/etc.	0	0	23, 800	71, 700
Other material / etc.	16, 700	12, 900	8, 300	3, 000
Total	60, 000	68, 500	65, 800	90, 000
7) Over evaluation	No. 1	No. 2-3	No. 2-3	No. 4

Remarks; N. A -- not available: avail. -- available
canal--canal zone: SCA -- Suez Canal Authority
ALX>-- Alexandria: N. N -- not necessary