PART III SHORT-TERM DEVELOPMENT PLAN

CHAPTER 1 BASIC CONCEPTS OF THE SHORT-TERM DEVELOPMENT PLAN

1. Basic Concepts

The overall development course and policy are determined in the Master Plan, and the Short-term Development Plan is formulated in accordance with the Master Plan.

The basic concepts of the Short-term Development Plan are as follows:

(1) To improve the cargo handling system.
(2) To cope with containerization.
(3) To have continuity with the Master Plan.
(4) To be based on the evaluation of the existing facilities.
(5) To be designed and executed in such a way that the distruption of regular port activities by the construction works shall be minimized.

2. Goals of the Short-term Development Plan

The major goal of the Short-term Development Plan is to improve the port facilities to meet the requirements of the Port in 1995.

The main problem at present is that the port facilities are insufficient and superannuated.

So, the goals of the Short-term Development Plan are set as follows:

(1) To evaluate the existing port facilities, improve the existing facilities and construct new facilities as necessary.
(2) To improve the wharf facilities to handle all types of cargoes including ro/ro and lo/lo containers.
(3) To increase the cargo handling productivity by introducing a mechanized cargo handling system.
(4) To improve the entrance channel and the turning basin for safe ship navigation.

CHAPTER 2 PORT TRAFFIC FOR THE SHORT-TERM DEVELOPMENT PLAN

Table III.2.1 shows a summary of the traffic forecast for the port of San Pedro de Macoris in 1995.

Table III.2.2 shows the estimated ship size at the port of San Pedro de Macoris in 1995.

Table III.2.1 Summary of Estimated Port Traffic at the Port of San Pedro de Macoris in 1995.

(Unit: 1,000 tons, TEU)

		Cargo Volume	TEU
Export	Sugar	151	
	Molasses	56	
	Fertilizer	39	
	Cement	99	
	Clinker	90	
	Cargo of the F.Z.	24	3,700
	Agricultural products *,**	38	3,000
	Miscellaneous general cargo **	51	4,100
	Total Export Cargo	548	10,800
Import	Raw materials for fertilizer	130	
	Coal	113	
	Fuel oil	120	
	Cargo of the F.Z.	22	3,300
	Miscellaneous general cargo **	69	5,500
	Total Import Cargo	454	8,800
T o t a l		1,002	19,600
Regular ferry service		5 times a week	
Regular passenger boats		twice a month	

Remarks: *) Containerized ratio of exported agricultural products is presumed to be 80%, the same as that of miscellaneous general cargo.

**) The number of containers is estimated assuming that the unit load is 10 tons per TEU.

Table III.2.2 Estimated Average Ship Size

	Average Ship Size		Cargo Volume	Average Cargo Volume per Ship	Number of Ship Calls
	(GRT)	(DWT)	(tons/year)	(tons)	
Exp. Cargo					
Sugar (bag)	700	1,500	15,000	600	25
Sugar (bulk)	7,000	10,500	136,000	7,000	19
Fertilizer (bag)	1,000	1,500	39,000	1,000	39
Cement (bag)	3,000	4,500	99,000	3,000	33
Clinker (bulk)	5,000	7,500	90,000	5,000	18
Free Zone (container)	3,000	4,500	24,000	460	52
General Cargo	8,000	12,000	89,000	1,700	52
Imp. Cargo					
Fertilizer (bulk)	7,000	10,500	130,000	6,000	22
Coal (bulk)	13,000	19,500	113,000	15,000	8
Fuel Oil (bulk)	13,000	19,500	120,000	15,000	8
Free Zone (container)	3,000	4,500	22,000	420	52
General Cargo	8,000	12,000	69,000	1,300	52
Ferry	3,000	4,500	-	-	260
Passenger Boats	20,000	-	-	-	24

CHAPTER 3 PORT PLANNING

1. Scale of the Port Facilities

The required number of berths except facilities for ferries or official use vessels is roughly estimated to be 4 based on the forecast ship calls assuming the target berth occupancy ratio is 60%. Then, in order to determine the optimum number of berths, three alternatives are considered. None of these alternatives includes facilities for ferries or official use vessels.

- Alternative - 1 3 berths
- Alternative - 2 4 berths
- Alternative - 3 5 berths

Conceptual layouts of the three alternatives are shown in Fig. III.3.1.

Here, comparing the berth construction cost and the maintenance cost with the benefit (the reduction of ship waiting cost), the optimum number of berths is determined based on a queuing simulation. The IRR is used to evaluate the annual cost and benefit of the three alternatives throughout the project life.

Assuming that Alternative-1 is the "Without" investment case, the IRRs of the "With" investment cases, Alternative-2 and Alternative-3, are 27.9% and 2.5% respectively. Thus, Alternative-2 is determined to be the best alternative. The required wharfs are as follows:

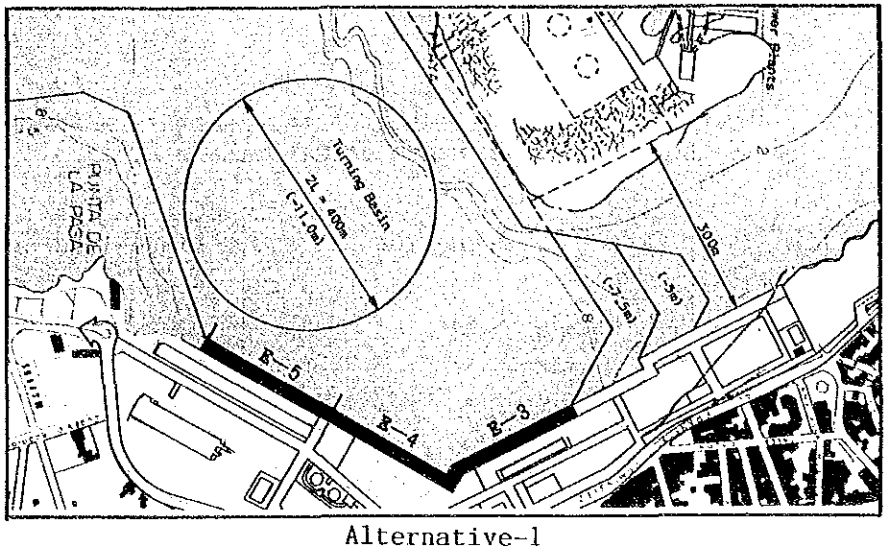
- E.1 Official use wharf (-5.0m) L = 100m
- E.2 Ferry berth (-7.5m) L = 130m
- E.3 Main Wharf (-11.0m) L = 210m
- E.4 Main Wharf (-11.0m) L = 210m
- E.5 Main Wharf (-11.0m) L = 210m
- E.6 Main Wharf (-7.5m) L = 130m

The proposed principal port facilities for the Short-term Development Plan are summarized in Table III.3.1.

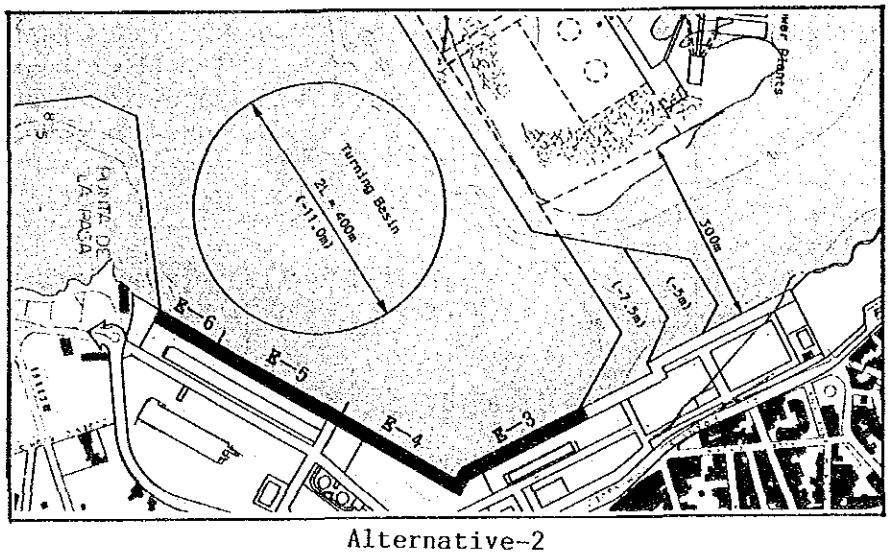
2. Port Layout and Land Use

The proposed Short-term Development Plan (Alternative-2) is shown in Fig. III.3.2.

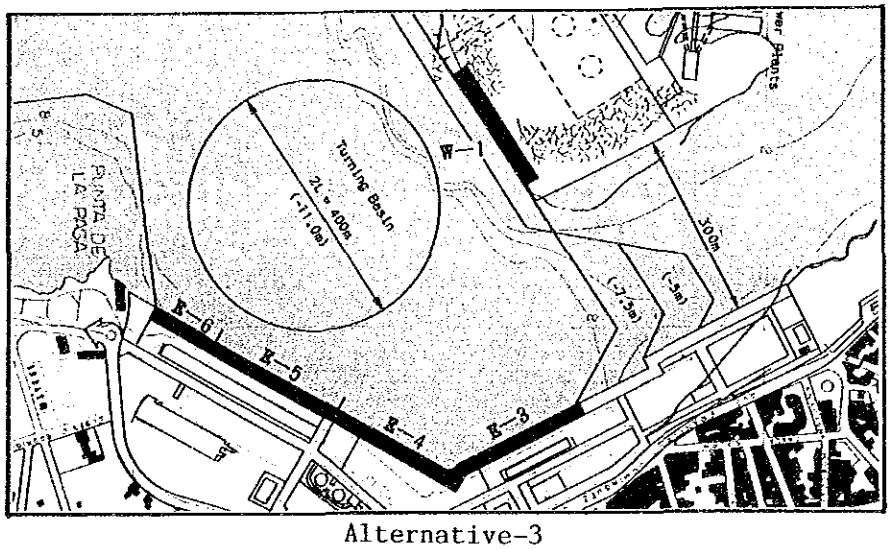
The land use and the layout of the port facilities for the Short-term Development Plan are shown in Fig. III.3.3.



Alternative-1



Alternative-2



Alternative-3

Fig. III.3.1 Conceptual Layouts of the Three Alternatives

Table III.3.1 Proposed Port Facilities for the Short-term Development Plan of the Port of San Pedro de Macoris

Facility	Function	Dimensions or Contents
i) Basin and channel	(a) Turning basin	Diameter = 400m, Depth = -11.0m
	(b) Channel	Width = 130m, Depth = -11.0m
ii) Breakwater		Repair work of the existing structure
iii) Mooring facilities	(a) Service boat wharf (E-1)	L = 100m Depth = -5.0m
	(b) Ferry berth (E-2)	L = 130m Depth = -7.5m
	(c) Main wharf (E-3)	L = 210m Depth = -11.0m
	" (with ro-ro ramp) (E-4)	L = 210m Depth = -11.0m
	" (E-5)	L = 210m Depth = -11.0m
	" (E-6)	L = 130m Depth = -7.5m
iv) Storage facilities	(a) Container yard (Chassis)	6,000m^2
	" (Forklift)	9,500m^2
	" (Reefer)	800m^2
	(b) CFS	50m x 30m = 1,500m^2
	(c) Transit shed	2,100m^2
	(d) Open yard (coal and clinker)	2,700m^2
v) Ferry terminal	(a) Terminal building	20m x 40m x 2 stories = 1,600m^2
	(b) Parking area	16,800m^2
vi) Port administration facilities	(a) Administration office (Building)	600m^2
	(Parking)	1,500m^2
	(b) Reserved area for the port commander's office	1,700m^2
vii) Maintenance shop	Maintenance shop (Building)	800m^2
	(Area)	1,750m^2
viii) Road		
ix) Green area		

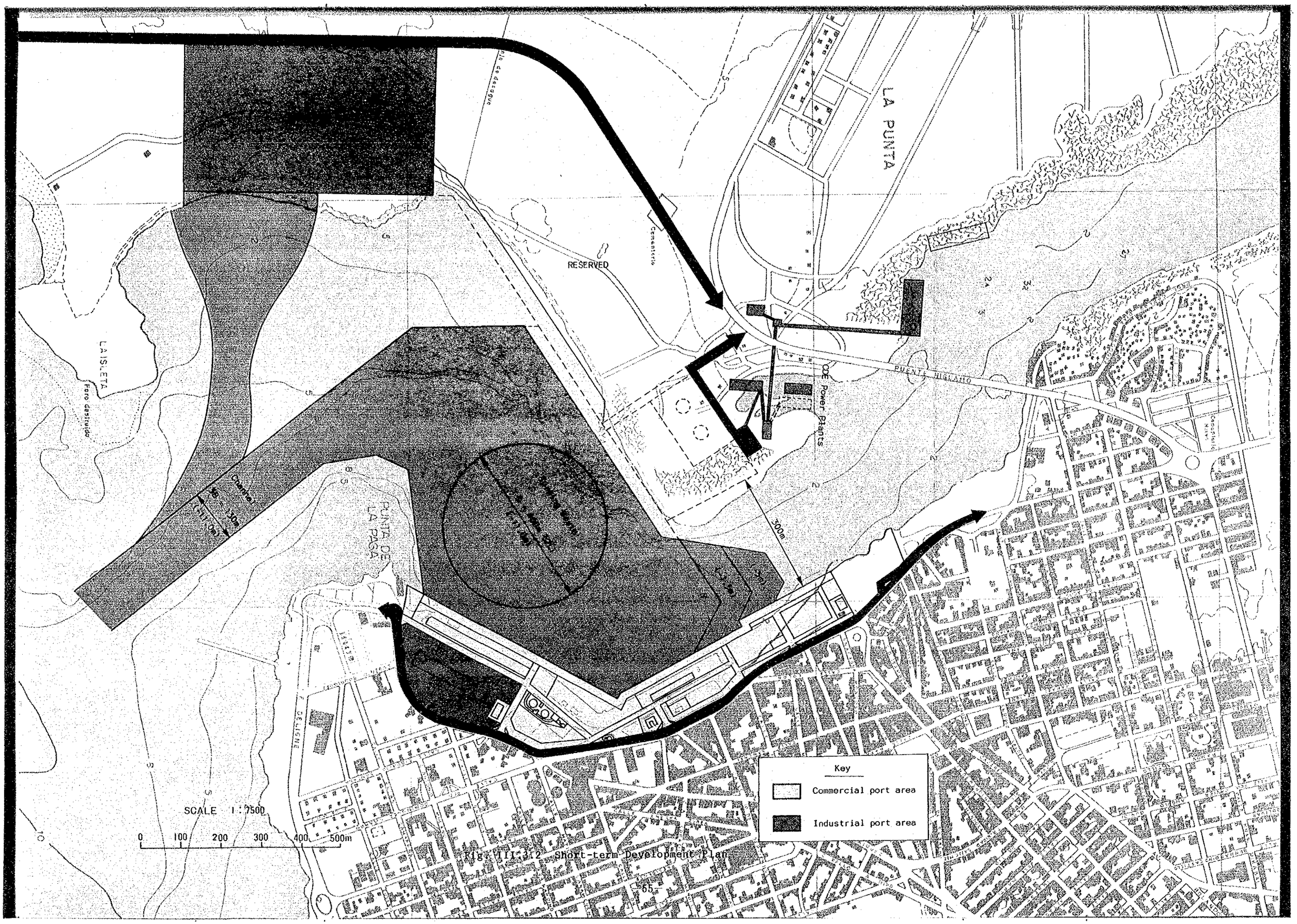


Fig. III-3.2 Short-term Development Plan

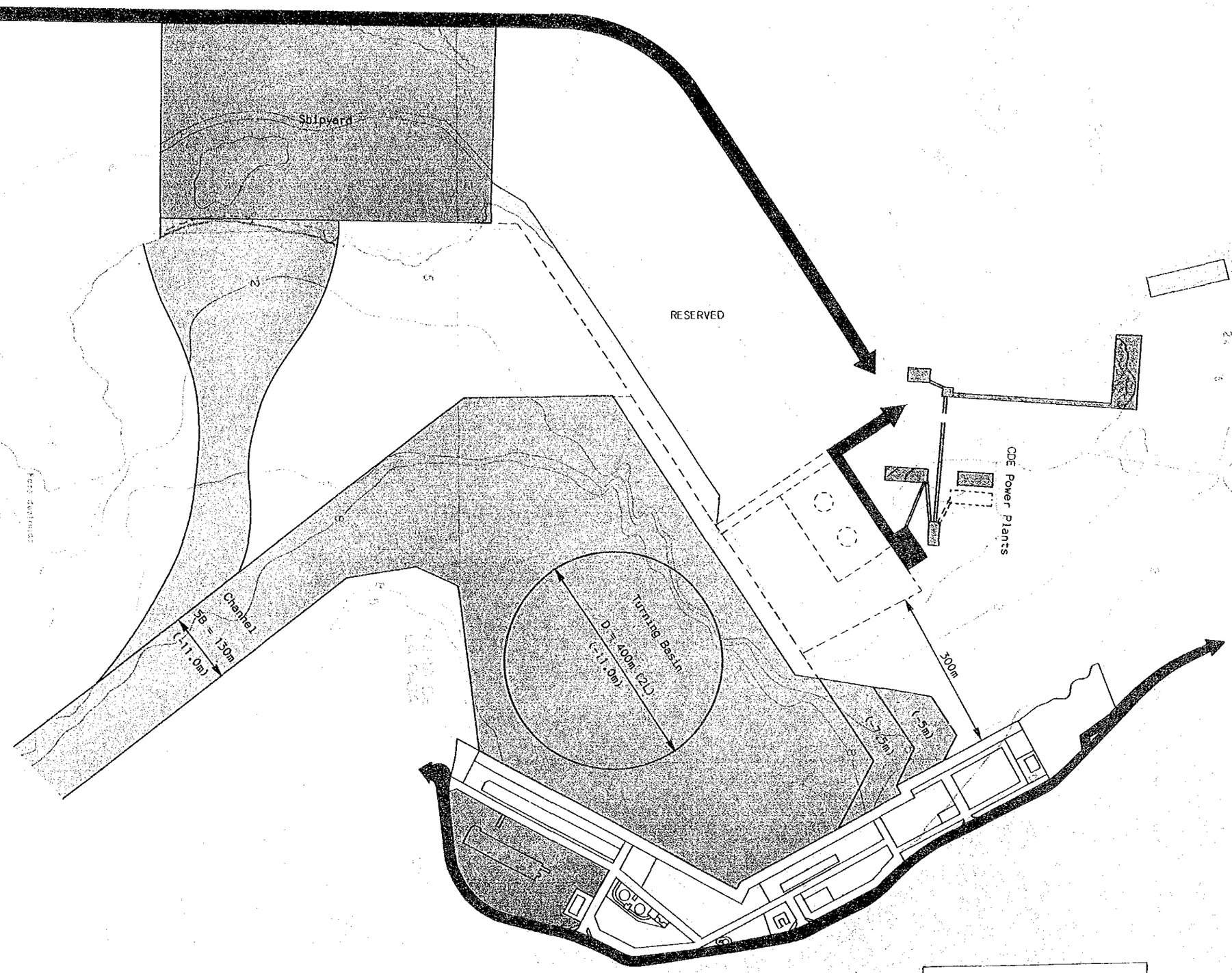


Fig. III.3.2 Short-term Development Plan

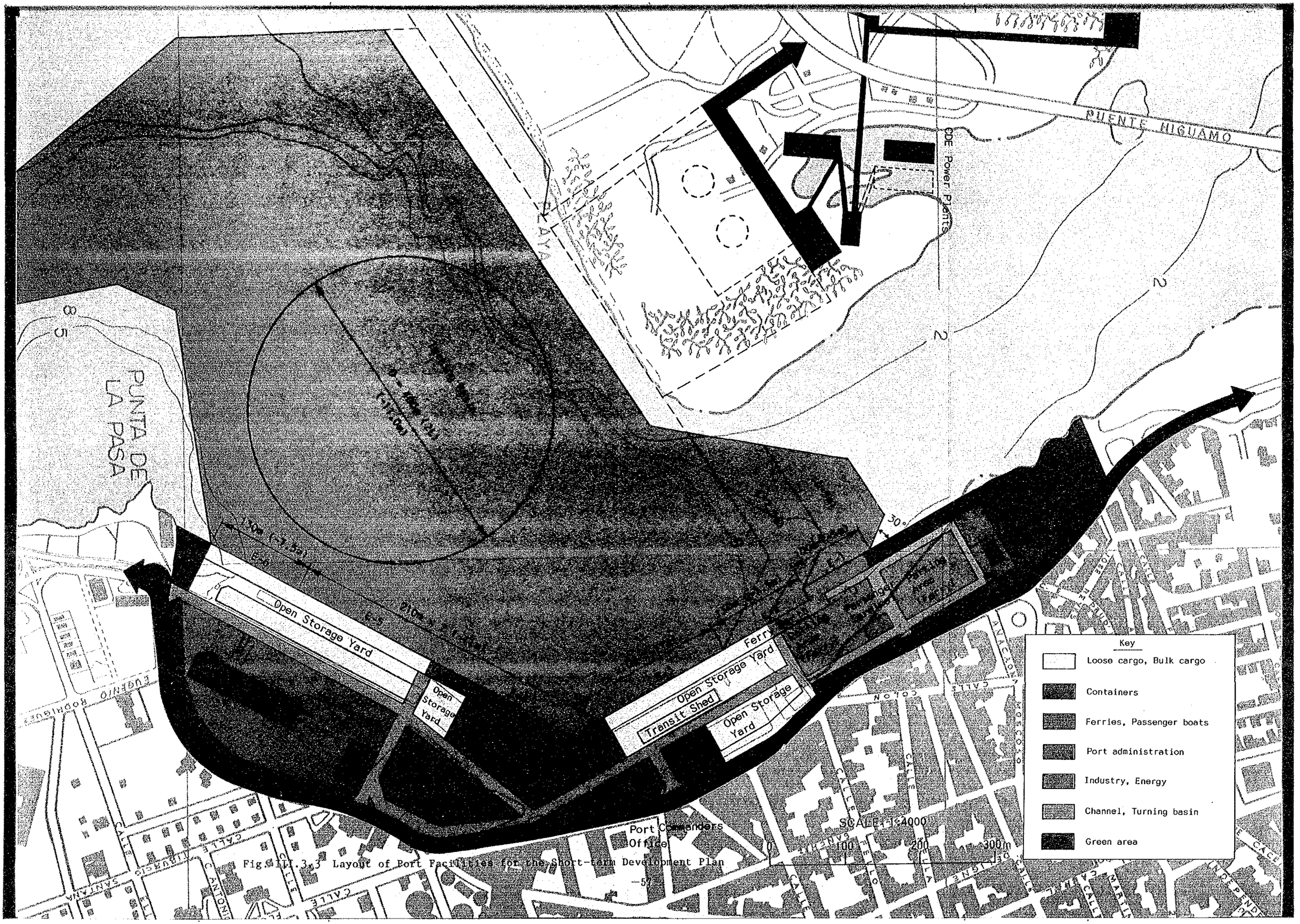


Fig. III.3.3 Layout of Port Facilities for the Short-term Development Plan

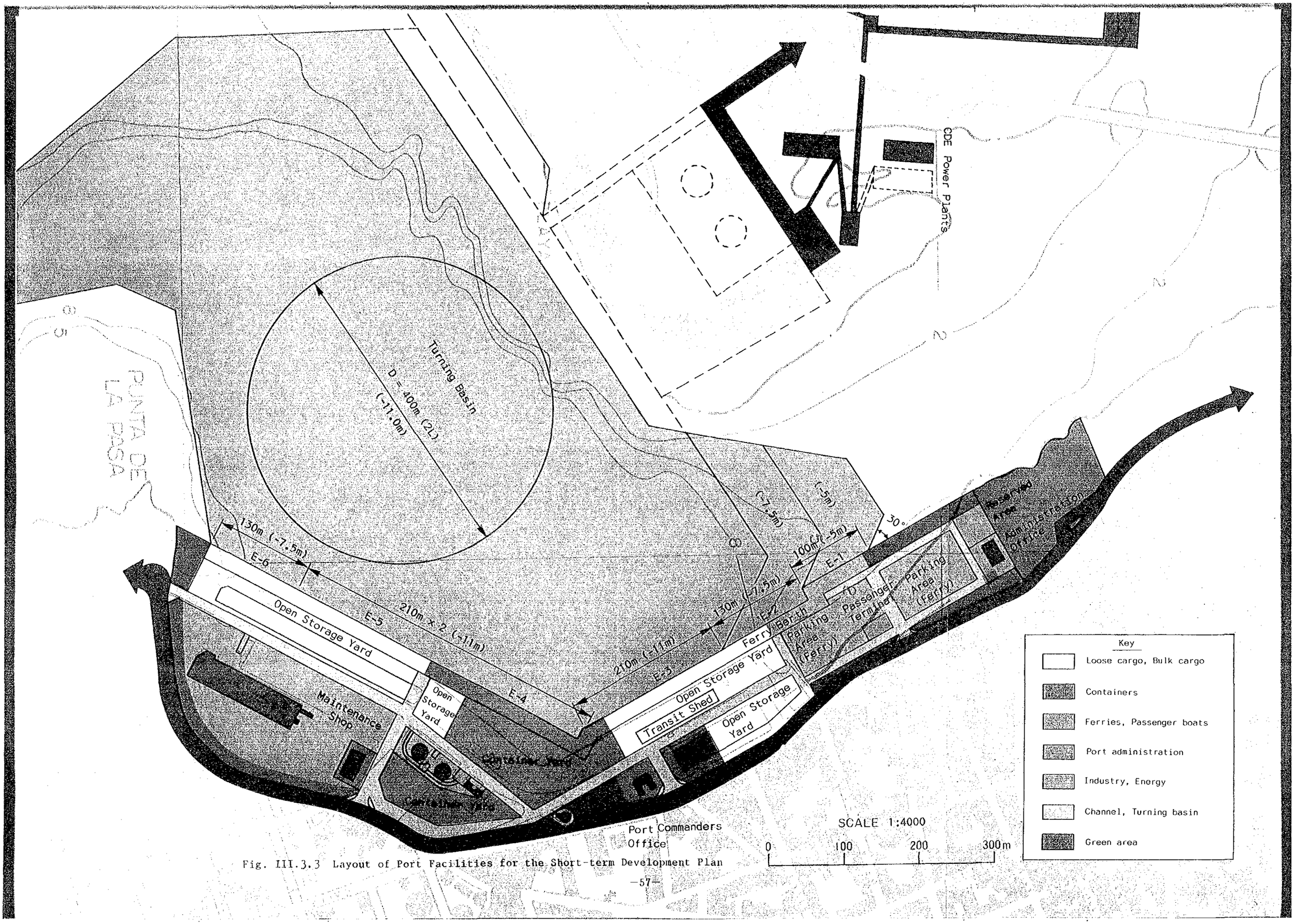


Fig. III.3.3 Layout of Port Facilities for the Short-term Development Plan

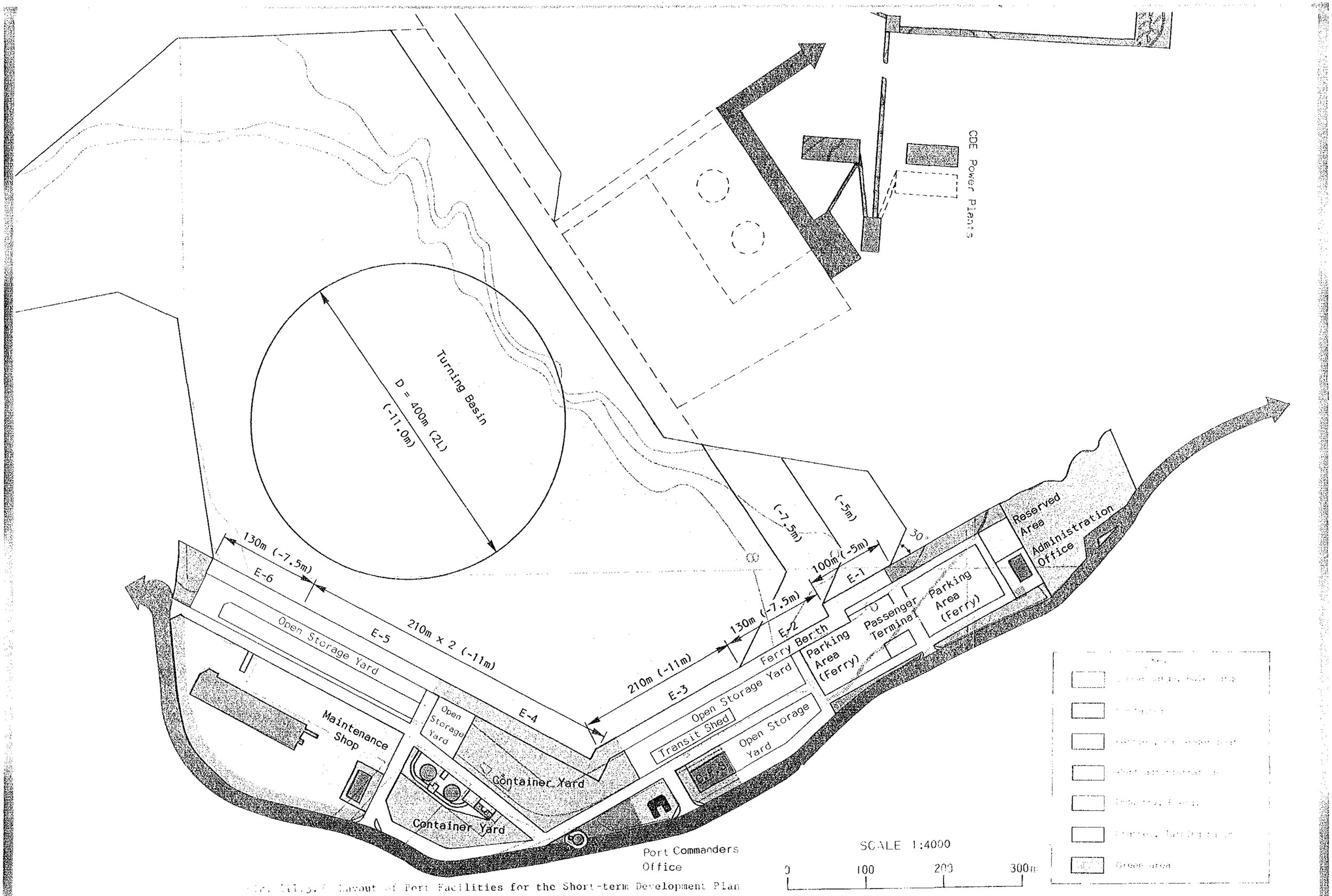


Fig. III.9.1 Layout of Port Facilities for the Short-term Development Plan

3. Cargo Handling and Harbor Craft

Cargo handling should be carried out by the private sector, and the responsibility for the integrity of the cargo should also rest with the private sector.

The productivity of cargo handling will be improved as follows:

Commodity	Effective Productivity		Cargo Handling
	Current Conditions	Future Conditions	Equipment or System
Bulk Sugar	346 tons/day	1,300 tons/day	Sugar container
Sugar in Bags	108	150	Pallet, forklift
Fertilizer in Bags	143	280	"
Cement in Bags	88	530	"
Containers	-	5340 TEU/hour	ro/ro, lo/lo

Required cargo handling equipment and harbor craft are summarized in Table III.3.2.

Table III.3.2 Required Cargo Handling Equipment and Harbor Craft

Item	Capacity	Number	Remarks
(Cargo Handling Equipment)			
Truck crane	100 ton	2	Wire rope truck crane
Forklift	30 ton	2	
"	2.5 ton (D)	6	
"	2.5 ton (E)	4	Used exclusively in the CFS
Truck	10 ton	2	
Chassis	40 foot	17	
Yard truck	320 HP	9	
Sugar container	14 ton (Net)	60	
Pallet	1.5 ton	3,300	
(Harbor Craft)			
Tug boat	1500 HP	1	
"	500 HP	1	
Pilot boat	50 HP	1	

Notice : (D) Disel engine
(E) Electric power

CHAPTER 4 DESIGN, CONSTRUCTION AND COST ESTIMATE

1. Structural Design

1.1 Design Conditions

The design conditions are shown in Table III.4.1.

1.2 Structure of Facilities

The standard cross sections of the wharfs and breakwater are shown in Fig. III.4.1 - III.4.2.

2. Construction Schedule

The construction schedule of the Short-term Plan is shown in Fig. III.4.3.

3. Cost Estimate

The project cost for the Short-term Plan is estimated as shown in Table III.4.2 - III.4.4.

Fig. III.4.1(1) Standard Cross Section of Wharf E-1 (Unit:m)

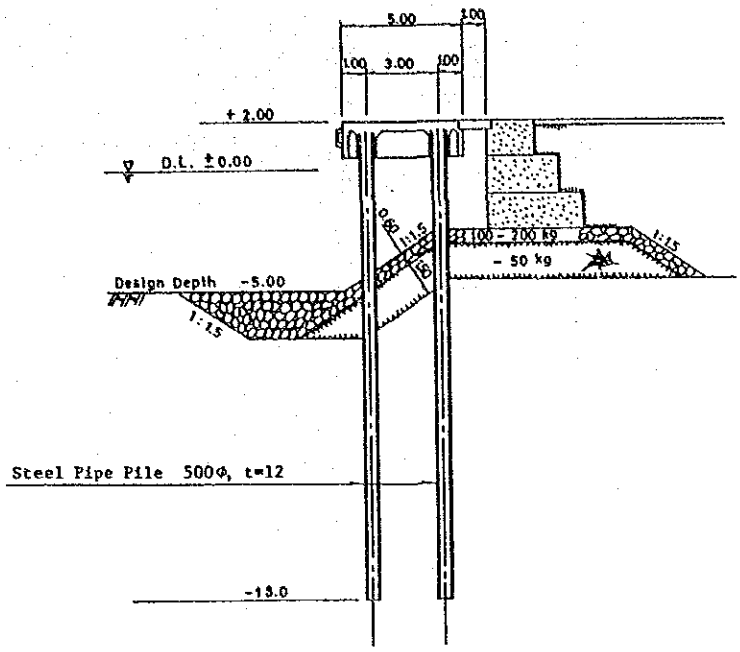


Fig. III.4.1(2) Standard Cross Section of Wharf E-2 (Unit:m)

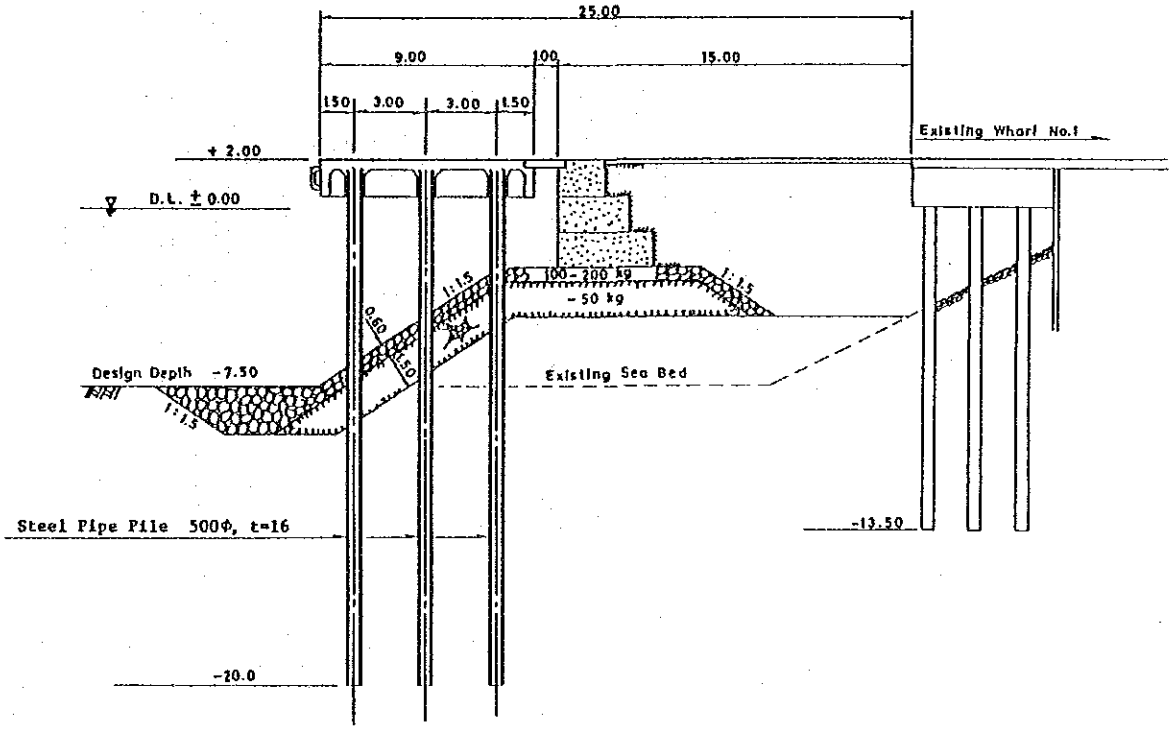


Fig. III.4.1(3) Standard Cross Section of Wharf E-3 (Unit:m)

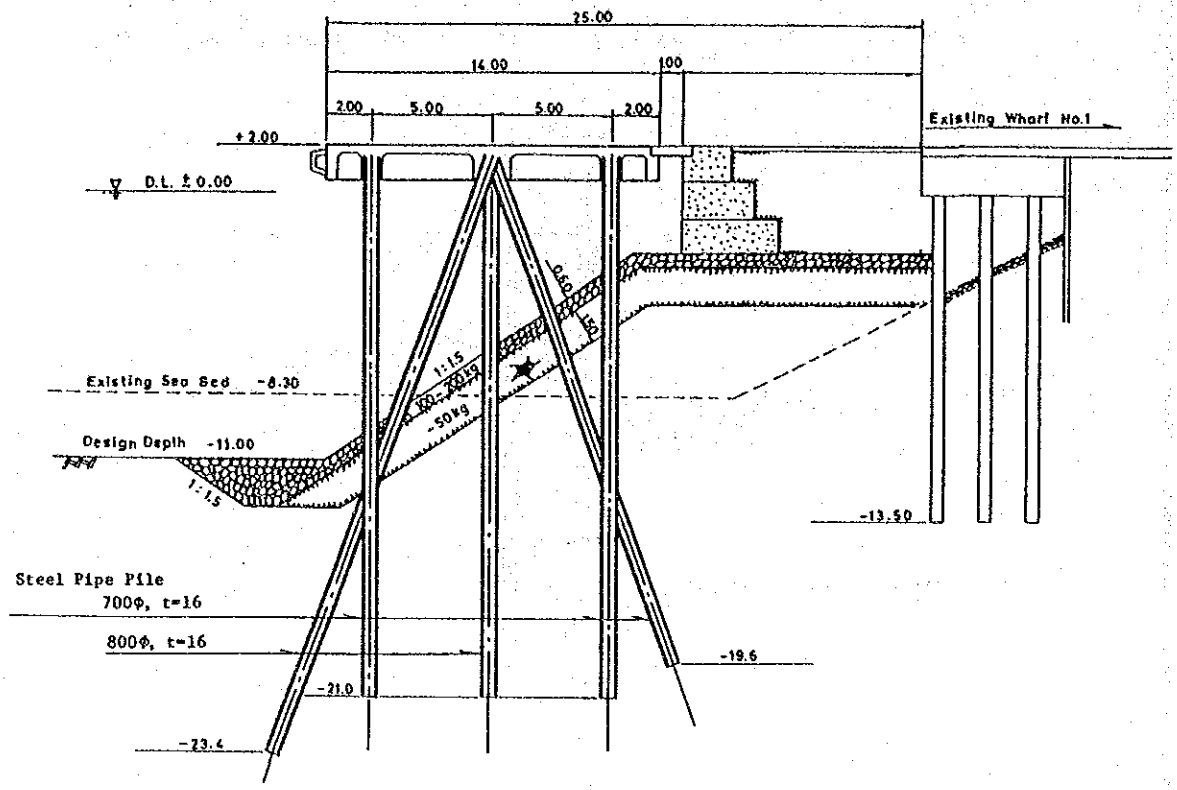
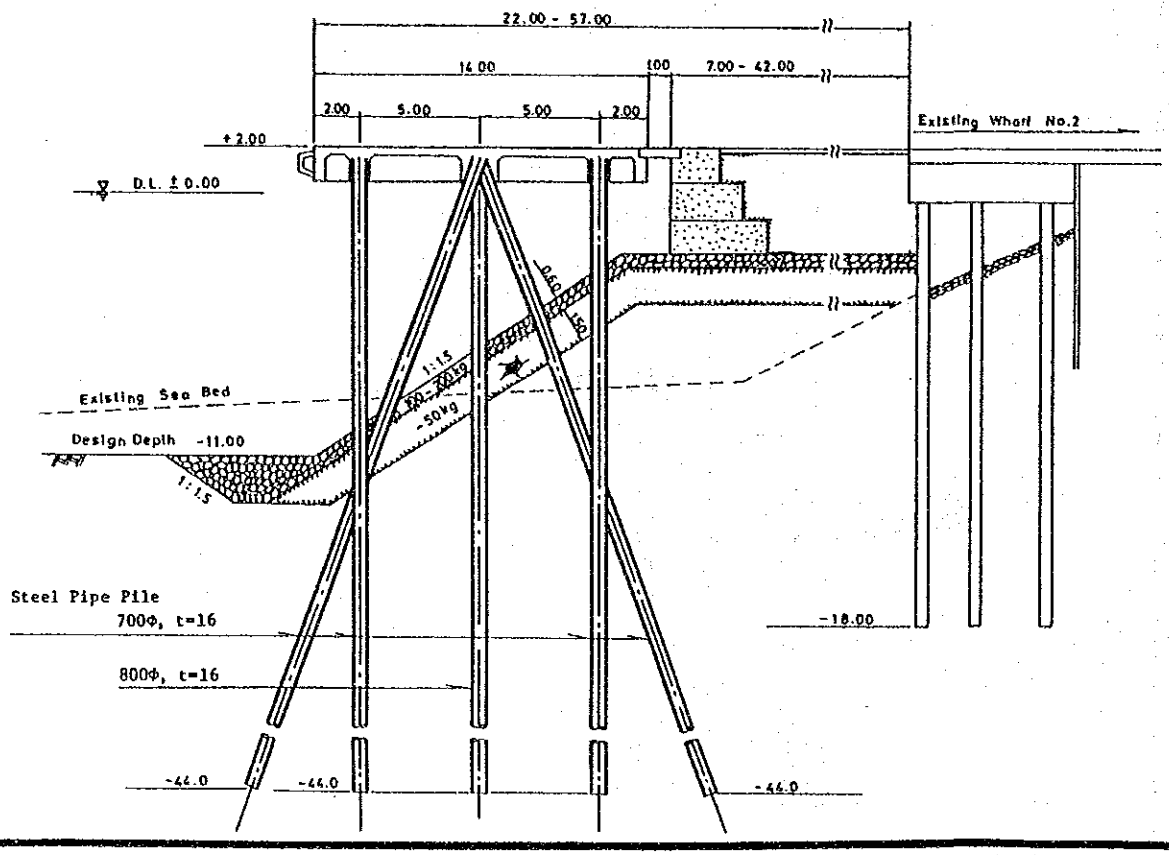


Fig. III.4.1(4) Standard Cross Section of Wharf E-4 (Unit:m)



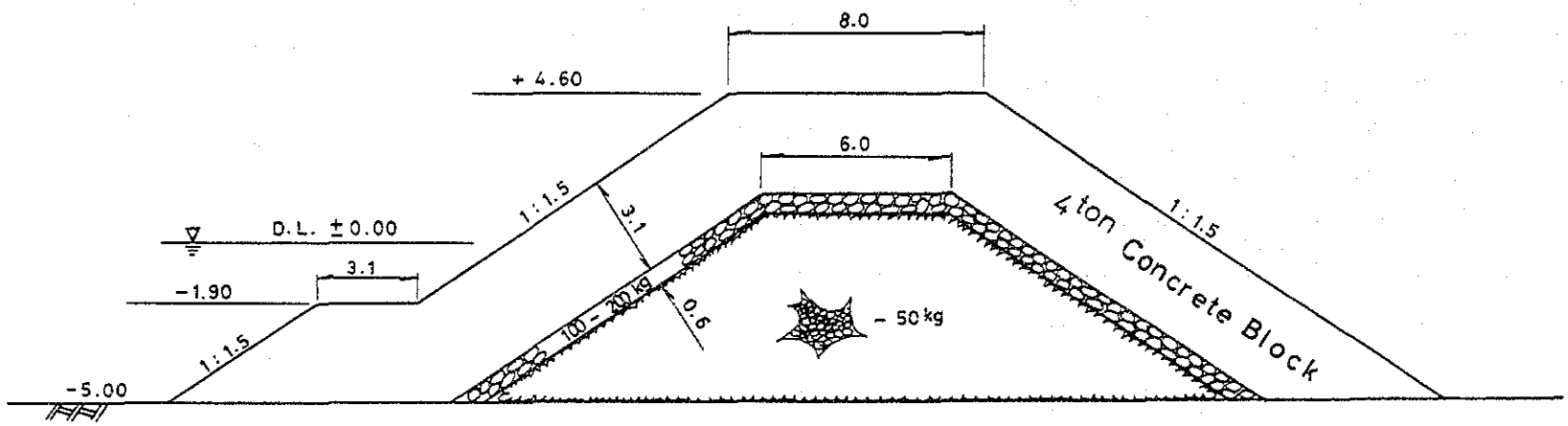


Fig. III.4.2 Standard Cross Section of Breakwater Repair (Unit:m)

YEAR / PROJECT ITEM	UNIT	QUANTITY	1989	1990	1991	1992	1993	1994	REMARKS
			2 4 6 8 10 12	2 4 6 8 10 12	2 4 6 8 10 12	2 4 6 8 10 12	2 4 6 8 10 12	2 4 6 8 10 12	
1 Detailed Design	L/S	1							
2 Mobilization	L/S	1							
3 Wharf Construction	m	990							
Wharf E-1 (-5.0 m)	m	100							
Wharf E-2 (-7.5 m)	m	130							
Wharf E-3 (-11.0 m)	m	210							
Wharf E-4 (-11.0 m)	m	210							
Wharf E-5 (-11.0 m)	m	210							
Wharf E-6 (-7.5 m)	m	130							
4 Pavement	m^2	97970							
5 Office & Building	m^2	7350							
6 Cargo H. Equipment	L/S	1							
7 Breakwater Repair	m	51							
8 Channel Buoy	Nos	5							
9 Harbour Craft	Nos	3							
10 Others	L/S	1							
11 Removal of Building	L/S	1							
12 Demobilization	L/S	1							
13 Const'n Supervision	L/S	1							

Note: Tendering and contract award will be conducted from 6/1990 to 12/1991.

Fig. III.4.3 Construction Schedule of Short-term Development Plan

Table III.4.1 Design Conditions of Wharfs

1)	Design Ship Size	20,000 DWT	5,000 DWT	1,000 DWT
2)	Water Depth	-11.0 m	-7.5 m	-5.0 m
3)	Apron Height	+2.0 m	+2.0 m	+2.0 m
4)	Tidal Plane			
	M.H.W.L.	+0.36 m	+0.36 m	+0.36 m
	M.S.L.	+0.24 m	+0.24 m	+0.24 m
	M.L.W.L.	+0.14 m	+0.14 m	+0.14 m
	L.W.L.	DL ±0.00 m	DL ±0.00 m	DL ±0.00 m
5)	Surcharge			
	Ordinary Condition	3.0 t/m^2	2.0 t/m^2	1.0 t/m^2
	Seismic Condition	1.5 t/m^2	1.0 t/m^2	0.5 t/m^2
6)	Seismic Coefficient			
	Horizontal	0.1	0.1	0.1
	Vertical	0.0	0.0	0.0
7)	Berthing Velocity	0.10 m/sec	0.10 m/sec	0.10 m/sec
8)	Rubber Fender System			
	Energy Absorption	6.2 t/m	2.6 t/m	0.6 t/m
	Reaction Force	39.0 t/m	26.8 t/m	10.1 t/m
9)	Tractive Force	70 t	35 t	15 t
10)	Wave force	not considered	not considered	not considered
11	Service life	50 years	50 years	50 years

Table III.4.2 Detailed Construction Cost of Short-term Development Plan
(1,000 RD$)

Project Items	Unit	Qnty	Unit Cost	Foreign Material	Foreign Labor	Foreign Total	Local Material	Local L.S. Labor	Local L.U.Labor	Local Total	Grand Total
Wharf Construction				36998.0	10586.4	47584.5	18757.8	5539.0	1867.9	26164.7	73749.1
Wharf E-1 (-5)	m	100.0	41.22	1652.6	585.8	2238.5	1361.1	394.2	128.4	1883.7	4122.2
" E-2 (-7.5)	m	130.0	56.27	3213.4	1040.6	4254.1	2232.4	626.7	201.4	3060.5	7314.6
" E-3 (-11)	m	210.0	68.27	6873.4	2031.4	8904.8	3860.7	1185.8	386.0	5432.4	14337.3
" E-4 (-11)	m	210.0	100.61	10661.9	3040.6	13702.4	5588.7	1373.4	464.3	7426.5	21128.9
" E-5 (-11)	m	210.0	86.07	10214.3	2604.6	12819.0	3543.0	1275.4	437.2	5255.6	18074.6
" E-6 (-7.5)	m	130.0	67.47	4382.3	1283.4	5665.7	2171.9	683.4	250.6	3106.0	8771.7
Pavement				2686.8	1530.5	4217.3	6122.3	356.2	187.5	6666.0	10883.3
Heavy Duty	m^2	52980.0	.122	1617.1	909.6	2526.7	3638.5	202.1	101.1	3941.7	6468.4
Light Duty	m^2	44040.0	.098	1041.8	604.9	1646.7	2419.6	151.2	84.0	2654.8	4301.5
Concrete	m^2	950.0	.119	28.0	15.9	43.9	64.2	2.8	2.4	69.5	113.4
Breakwater Repair	m	51.0	41.81	820.3	299.9	1120.2	837.4	131.9	43.1	1012.4	2132.6
Channel Buoy	Nos	5.0	78.14	316.3	54.9	371.2	9.7	8.7	1.1	19.5	390.7
Office & Building				6101.9	4109.7	10211.6	2913.9	540.5	215.8	3670.2	13881.7
Administration Office	m^2	1200.0	2.44	1282.0	869.9	2151.9	618.1	114.5	45.8	778.3	2930.2
Passenger Terminal	m^2	1600.0	1.71	1196.5	811.9	2008.4	576.9	106.8	42.7	726.4	2734.8
CFS	m^2	1500.0	1.95	1282.0	869.9	2151.9	618.1	114.5	45.8	778.3	2930.2
Maintenance Shop	m^2	800.0	1.71	658.9	416.3	1075.2	289.6	54.6	21.4	365.5	1440.7
Transit Shed	m^2	2250.0	1.71	1682.6	1141.7	2824.3	811.2	150.2	60.1	1021.6	3845.9
Cargo H. Equipment				10302.2	.0	10302.2	.0	761.2	.0	761.2	11063.3
Sugar Container	Nos	60.0	19.08	572.3	.0	572.3	.0	572.3	.0	572.3	1144.6
Pallet	Nos	3300.0	.114	188.9	.0	188.9	.0	188.9	.0	188.9	377.7
Forklift (2.5t, E)	Nos	6.0	50.55	303.3	.0	303.3	.0	.0	.0	.0	303.3
" (2.5t, B)	Nos	4.0	83.17	332.7	.0	332.7	.0	.0	.0	.0	332.7
" (30t, E)	Nos	2.0	820.30	1640.6	.0	1640.6	.0	.0	.0	.0	1640.6
Mobile Crane (100t)	Nos	2.0	2460.89	4921.8	.0	4921.8	.0	.0	.0	.0	4921.8
Tractor	Nos	9.0	162.15	1459.4	.0	1459.4	.0	.0	.0	.0	1459.4
Chassis	Nos	17.0	36.25	616.2	.0	616.2	.0	.0	.0	.0	616.2
Truck (10t)	Nos	2.0	133.54	267.1	.0	267.1	.0	.0	.0	.0	267.1
Harbor Craft				5055.3	.0	5055.3	.0	.0	.0	.0	5055.3
Tug Boat (1500ps)	Nos	1.0	3605.49	3605.5	.0	3605.5	.0	.0	.0	.0	3605.5
" (500ps)	Nos	1.0	1354.44	1354.4	.0	1354.4	.0	.0	.0	.0	1354.4
Pilot Boat	No	1.0	95.38	95.4	.0	95.4	.0	.0	.0	.0	95.4
Others	L/S	1.0	-	489.9	333.0	822.9	251.5	124.1	32.2	407.8	1230.7
Mob./Demob.	L/S	1.0	-	6602.1	.0	6602.1	.0	.0	.0	.0	6602.1
Engineering Services			-	1116.0	2394.1	3510.1	448.3	1259.1	124.0	1831.4	5341.5
Detailed Design	L/S	1.0	-	858.5	848.9	1707.4	190.8	744.0	124.0	1058.8	2766.1
Const. Supervision	L/S	1.0	-	257.5	1545.2	1802.7	257.5	515.1	.0	772.6	2575.4
Physical Contingency	L/S	1.0	-	7089.5	2323.4	9413.0	4186.7	976.7	341.2	5504.6	14917.6
Total				77578.2	21632.0	99210.2	33527.5	9697.4	2812.7	46037.6	145247.9

Table III.4.3 Project Cost of the Short-term Development Plan (1,000 RD$)

Items	Unit	Qnty	Foreign Total	Local Total	Grand Total	Remarks
Wharf Construction	m	990.0	47,584.5	26,164.7	73,749.1	Wharfs E-1 - E-6
Pavement	m^2	97,970.0	4,217.3	6,666.0	10,883.3	Cont. Yard, etc.
Breakwater Repair	m	51.0	1,120.2	1,012.4	2,132.6	
Channel Buoy	Nos	5.0	371.2	19.5	390.7	
Offices & Buildings	m^2	7,350.0	10,211.6	3,670.2	13,881.7	
Cargo H. Equipment	L/S	1.0	10,302.2	761.2	11,063.3	Mobile Crane, etc.
Harbor Craft	Nos.	3.0	5,055.3	.0	5,055.3	Tug Boat, etc.
Others	L/S	1.0	822.9	407.8	1,230.7	Drainage, etc.
Mob./Demob.	L/S	1.0	6,602.1	.0	6,602.1	
Engineering Services	L/S	1.0	3,510.1	1,831.4	5,341.5	
Physical Contingency	L/S	1.0	9,413.0	5,504.6	14,917.6	
Total			99,210.2	46,037.6	145,247.9	

Table III.4.4 Annual Investment Cost of Short-term Development Plan

(1,000 RD$)

Item \ Year	1989	1990	1991	1992	1993	1994	Total
Wharf Construction	.0	.0	.0	14657.9	28660.7	30430.5	73749.1
Wharf E-1 (-5)	.0	.0	.0	2061.1	2061.1	.0	4122.2
" E-2 (-7.5)	.0	.0	.0	7314.6	.0	.0	7314.6
" E-3 (-11)	.0	.0	.0	.0	10752.9	3584.3	14337.3
" E-4 (-11)	.0	.0	.0	5282.2	15846.7	.0	21128.9
" E-5 (-11)	.0	.0	.0	.0	.0	18074.6	18074.6
" E-6 (-7.5)	.0	.0	.0	.0	.0	8771.7	8771.7
Pavement	.0	.0	.0	.0	.0	10883.3	10883.3
Heavy Duty	.0	.0	.0	.0	.0	6468.4	6468.4
Light Duty	.0	.0	.0	.0	.0	4301.5	4301.5
Concrete	.0	.0	.0	.0	.0	113.4	113.4
Breakwater Repair	.0	.0	.0	.0	.0	2132.6	2132.6
Channel Buoy	.0	.0	.0	.0	.0	390.7	390.7
Offices & Buildings	.0	.0	.0	.0	.0	13881.7	13881.7
Administ'n Office	.0	.0	.0	.0	.0	2930.2	2930.2
Passenger Terminal	.0	.0	.0	.0	.0	2734.8	2734.8
CFS	.0	.0	.0	.0	.0	2930.2	2930.2
Maintenance Shop	.0	.0	.0	.0	.0	1440.7	1440.7
Transit Shed	.0	.0	.0	.0	.0	3845.9	3845.9
Cargo H. Equipment	.0	.0	.0	.0	.0	11063.3	11063.3
Sugar Container	.0	.0	.0	.0	.0	1144.6	1144.6
Pallet	.0	.0	.0	.0	.0	377.7	377.7
Forklift (2.5t, E)	.0	.0	.0	.0	.0	303.3	303.3
" (2.5t, B)	.0	.0	.0	.0	.0	332.7	332.7
" (30t, E)	.0	.0	.0	.0	.0	1640.6	1640.6
Mobile Crane (100t)	.0	.0	.0	.0	.0	4921.8	4921.8
Tractor	.0	.0	.0	.0	.0	1459.4	1459.4
Chassis	.0	.0	.0	.0	.0	616.2	616.2
Truck (10t)	.0	.0	.0	.0	.0	267.1	267.1
Harbor Craft	.0	.0	.0	.0	.0	5055.3	5055.3
Tug Boat (1500ps)	.0	.0	.0	.0	.0	3605.5	3605.5
" (500ps)	.0	.0	.0	.0	.0	1354.4	1354.4
Pilot Boat	.0	.0	.0	.0	.0	95.4	95.4
Others	.0	.0	.0	410.2	410.2	410.2	1230.7
Mob./Demob.	.0	.0	.0	4691.1	.0	1910.9	6602.1
Eng. Services	1844.1	922.0	.0	858.5	858.5	858.5	5341.5
Detailed Design	1844.1	922.0	.0	.0	.0	.0	2766.1
Const. Supervision	.0	.0	.0	858.5	858.5	858.5	2575.4
Ph. Contingency	.0	.0	.0	2494.8	4360.6	8062.2	14917.6
Total	1844.1	922.0	.0	23112.5	34290.0	85079.3	145247.9

CHAPTER 5 ADMINISTRATION, MANAGEMENT AND OPERATIONS

1. General

There is currently no management body which is responsible for the overall administration of the port of San Pedro de Macoris. However, the Port will be placed under the control and administration of APD in the near future. Therefore, the administration, management and operation of the Port by APD is considered in this study.

APD, the Dominican Port Authority, is an autonomous corporate institution and owns its own assets and shall administer and manage the national commercial ports following its regulations. However, considering that there will still be a lot of social, economic, and financial difficulties at the port of San Pedro de Macoris in 1995, it may be impossible for APD to carry out the administration and management of the port of San Pedro de Macoris at that time following the regulations perfectly. Therefore, the following basic policy is set in this study.

(1) The Dominican government shall construct the main facilities of the port of San Pedro de Macoris including the entrance channel, the turning basin, the breakwater, the revetments and the wharves.

(2) APD shall construct or purchase all the facilities of the port of San Pedro de Macoris except for those listed in (1) and shall own these as its own property.

(3) APD shall administer, manage, maintain and keep open for public use all the facilities of the port of San Pedro de Macoris.

(4) APD shall establish an organization for the administration and management of the port of San Pedro de Macoris.

(5) APD shall prepare financial plans for the administration and management of the port of San Pedro de Macoris including the determination of port tariffs, and APD shall operate the Port in accordance with these plans.

2. Administration, Management and Operations

A proposed organization of the administration office is presented in this study. The total number of staff is estimated as 70.

It is important to improve cargo handling and promote rationalization of marine cargo movement in order to realize efficient utilization of the Port. Improvement of cargo handling includes improvement of the safety, reliability and productivity of cargo handling. This will be realized by mechanizing cargo handling and unitizing the cargo. The productivity of cargo handling will be improved as mentioned in Chapter 3 by the proposed cargo handling systems.

Cargo handling should be carried out by and the responsibility for the integrity of the cargo should rest with the private sector.

3. Proposed Port Tariffs

In this study, the charges for the port equipment and facilities which APD will purchase or construct newly for the port of San Pedro de Macoris are calculated based on the costs. Table III.5.1 shows the proposed port tariffs of the port of San Pedro de Macoris. In this table, the charges and the vessel and cargo fees are based on the existing port tariffs.

Table III.5.1 Proposed Port Tariff Rates

Item	Unit charge
(A) Charge and dues for vessels and cargo	
(a) Pilotage	
i) Base	$ 4 per each draft foot (in and out)
ii) Service	up to 400 GRT $ 32.50
	up to 2,000 GRT 37.50
	up to 10,000 GRT 51.00
	over 10,000 GRT 63.50
(b) Towing service	from 400 up to 600 GRT $ 100.00 per vessel
	from 601 up to 800 GRT 150.00 " "
	from 801 up to 1,000 GRT 200.00 " "
	from 1,001 up to 2,000 GRT 250.00 " "
	from 2,001 up to 4,000 GRT 300.00 " "
	from 4,001 up to 8,000 GRT 400.00 " "
	from 8,001 up to 10,000 GRT 500.00 " "
	from 10,001 up to 14,000 GRT 600.00 " "
	from 14,001 up to 18,000 GRT 650.00 " "
	from 18,001 up to 20,000 GRT 700.00 " "
	from 20,001 up to 24,000 GRT 800.00 " "
	from 24,001 up to 28,000 GRT 850.00 " "
	from 28,001 up to 30,000 GRT 900.00 " "
	from 30,001 up to 35,000 GRT 1,000.00 " "
	over 35,001 GRT 1,250.00 " "
(c) Mooring and unmooring	
i) Line handling	$ 1.50 per vessel (in and out)
ii) Watching	$ 1.50 per vessel
(d) Port dues	
i) Wharfage	First 200 GRT $ 0.07 /ton.day
	over 200 GRT $ 0.025/ton.day
ii) Loading and unloading	$ 0.3 per ton of loaded or unloaded cargo
iii) Watching	$ 6.25 per vessel
iv) Sanitary	$ 6.25 per vessel
v) Document	$ 5.0 per vessel
(e) Additional Charge	12% of total amount of (a) - (d)
(f) Import of cargo	
i) General cargo	$ 2.0 per ton
ii) Wood	$ 1.0 per ton
iii) Solid bulk	$ 0.25 per ton
iv) Liquid bulk	$ 0.35 per m^3
(g) "ARRIMO"	
i) Import of general cargo	$ 2.0 per ton
ii) Import of wood	$ 0.5 per ton
iii) Export of general cargo	$ 0.5 per ton
iv) Export of fruits	$ 0.3 per ton
(B) Charges for Port equipment and facilities	
(a) 100 ton truck crane	RD$ 485/hour
(b) 30 ton forklift	RD$ 133/hour
(c) 2.5 ton forklift (diesel)	RD$ 8.1/hour
(d) 2.5 ton forklift (electric)	RD$ 13.3/hour
(e) 10 ton truck	RD$ 21.3/hour
(f) Sugar container	RD$ 1.4/ton
(g) Pallet	RD$ 0.3/unit.day
(h) Transit shed	RD$ 0.5/m^2.day
(i) CFS	RD$ 28.4/TEU
(j) Container yard (chassis)	RD$ 15.3/TEU
(k) Container yard (forklift)	RD$ 17.8/TEU
(l) Open storage yard (bulk cargo)	RD$ 0.2/m^2.day
(m) Open storage yard (general cargo)	RD$ 0.1/m^2.day
(n) Parking space (ferry)	RD$ 1.6/car
(o) Passenger terminal	RD$ 7.2/m^2.month
(p) Administration building	RD$ 10.6/m^2.month

CHAPTER 6 ECONOMIC ANALYSIS

1. Purpose of the Economic Analysis

The purpose of the economic analysis is to appraise the economic feasibility of the Short-term Development Plan of the Port. Therefore, the analysis investigates the economic benefits as well as the economic costs which will arise from the Project, and evaluates whether the net benefits exceed those which could be derived from other investment opportunities (the opportunity cost of capital) in the Dominican Republic.

In this study, the benefits of the Project are the difference between 1) the ship staying costs and the land transport costs under the "With" case and 2) the ship staying costs and land transport costs under the "Without" case throughout the project life. Similarly, the project costs are the difference between the construction and maintenance costs under the "With" and "Without" investment cases throughout the project life.

2. Methodology of the Economic Analysis

The economic return is evaluated in terms of the economic internal rate of return (EIRR) based on cost-benefit analysis using the Discount Cash Flow Method. In estimating the costs and benefits of the Project, "economic pricing" is applied. Economic pricing here means the appraisal of costs and benefits in terms of international prices (border prices).

The EIRR is a discount ratio which makes the costs and benefits of a project during the project life equal, and it is calculated using the following formula:

$$\sum_{i=o}^{n-1} \frac{Bi - Ci}{(1+r)^i} = 0$$

n : Period of economic calculation

B_i : Benefit in i-th year

C_i : Cost in i-th year

r : Discount rate

3. Without Case

In this study, the following conditions are adopted as the "Without" case:

(1) No investment is made and the existing wharfs at the Port will be retired by 1995 due to their superannuation.
(2) All of the cargoes to be handled at the Port under the "With" case will be handled at the port of Haina and will be transported overland to the hinterland of San Pedro de Macoris.

4. Benefits

The following two tangible benefits are considered in this study:

(1) Reduction of ships' staying costs
(2) Reduction of land transport costs

Investment for the port development will reduce the waiting time for unoccupied berths and the mooring time. The total staying time of ships (waiting time + mooring time) will be reduced, and this cost reduction is one main benefit of the Project.

The land transport costs saved under the "With" case are the other main benefit of the Project.

5. Costs

For the calculation of the costs, the following prerequisites are considered:

(1) The period of economic calculation (project life) is assumed as 30 years from the starting year of the engineering services, i.e. 1989-2018, and all of the construction and maintenance costs during the project life are included in the economic calculation.
(2) The lives of the equipment and facilities are as follows:
    (a) Wharfs and pavement - 50 years
    (b) Buildings and channel buoys - 30 years

(c) Harbor craft - 20 years

(d) Cargo handling equipment - 10 years

(e) Pallets - 5 years

(3) The salvage values of the cargo handling equipment and harbor crafts in 2018 are considered.

6. Economic Profitability

The EIRR of the Project is calculated to be 20.0%.

The project is feasible if the EIRR exceeds the local opportunity cost of capital.

In the case of this project, it is considered that the Project is economically feasible if the EIRR is more than 10%.

In this study, only taking into consideration the two items which are easily quantified, the EIRR of the Project is 20.0%. Therefore, the Project is considered to be feasible.

7. Sensitivity Analysis

(1) Assumption of Cases

Sensitivity analysis is made for three cases as follows:

(a) Case A : The construction costs increase by 10%.

(b) Case B : The forecast port cargo volume decreases by 10%.

(c) Case C : The costs increase by 10% and the cargo volume decreases by 10% simultaneously.

(2) Results

The EIRR is calculated for each of the three cases. The calculation results are Case A 18.3%, Case B 14.7%, and Case C 13.2%. Each EIRR exceeds 10%. The results of the sensitivity analysis thus prove that each case would be feasible.

8. Conclusion

From the viewpoint of the economic analysis, that is, the benefit of

the project to the nation, this project can be regarded as feasible.

CHAPTER 7 FINANCIAL ANALYSIS

1. Viewpoint of the Financial Analysis

The purpose of the financial analysis is to examine the financial soundness of the organization designated to execute the Project, and the profitability of the project itself.

The profitability of the project itself is analysed through the financial internal rate of return (FIRR) using the Discount Cash Flow Method.

The financial viability of the organization is analysed and evaluated using the projected financial statements.

The following points are assumed for the analysis:

(1) The revenues which will be considered as arising from this project are the port tariffs under the "With" case.

(2) It is assumed that the cost for the construction of wharfs and the repair work of the breakwater shall be borne by the national government. The capital costs to be borne by the port management body are all of the costs excluding this cost and are comprised of the following equipment and facilities:

(a) Cargo handling equipment

(b) Harbor craft

(c) Pavement

(d) Offices and buildings

(e) Channel buoys

(3) All of the maintenance costs including maintenance costs for the wharfs shall be borne by the port managment body.

(4) The funds necessary to execute the consturction works are to be raised as follows:

(a) Local currency portion : Self finance

(b) Foreign currency portion: Loans from abroad under the following conditions:

a) Interest rate of 3.75% per annum

b) Repayment term of 25 years (including a 7 year grace period)

2. Results of Financial Analysis

(1) Evaluation of the FIRR

The FIRR is calculated as 7.0%. In this calculation, as the FIRR of 7.0% exceeds 2.69%, which is the weighted average interest rate for the project funds for equipment and facilities (a) to (e) in the preceeding section 1.(2), this project can be regarded as feasible.

(2) Evaluation by Financial Statements

Based on the estimated financial statements and analysis of financial ratios calculted from the financial statements, it can be said that the projected financial condition of the Project is favorable.

3. Sensitivity Analysis

(1) Assumption of Cases

Sensitivity analysis is made for two cases as follows:

(a) Case A : The expenditures increase by 10%.

(b) Case B : The revenues decrease by 10%.

(2) Results

The FIRR is calculated for each of the two cases. The calculation results are Case A 4.8% and Case B 4.5%. Each FIRR exceeds the average interest rate of 2.69%. The results of the sensitivity analysis thus prove that each case would be feasible.

4. Conclusion

From the viewpoint of the financial viability of the port management body and the profitability of the project itself, this project is financially feasible.

JICA