5-3 Design of Other Facilities

5-3-1 West Breakwater

The north part of the existing West Breakwater will be removed as shown in Figure 4-6-15 and a new West Breakwater will be constructed. Pertamina's bunker oil pipeline may be installed on the new breakwater.

This breakwater is designed with a stone mound on a bamboo mat, based on the sub-soil wave and water depth conditions.

A standard cross section is shown as Figure 5-3-1.

5-3-2 Revetments

Revetments will be built to retain the reclaimed areas built using dredging materials and as temporary embankments.

Standard cross sections of the revetments are shown as Figures 5-3-2 and 5-3-3. Type A revetments will be used offshore and Type B will be used on the land. The locations of these revetments are shown in Fig. 5-3-5.

5-3-3 Rehabilitation of Existing Breakwater

The south part of the existing West Breakwater will be rehabilitated as a revetment for the industrial zone by reinforcing its foundation.

A standard cross section is shown as Figure 5-3-4.

5-3-4 Roads/Bridge and Railways

The location of roads, bridge and railways to be constructed is shown in Fig. 5-3-6.

As the traffic demand of these roads are small for the time being, temporary roads should be designed. The details of the temporary roads are shown in Figs. 5-3-7, 5-3-8 and 5-3-9 and Table 5-3-1.

5-3-5 Channels and Basins

The dredging plan up to 1990 is shown in Fig. 5-3-10 and Table 5-3-2.

Most of the dredged soil will be used to fill in the reclaimed land which is enclosed within the revetments.

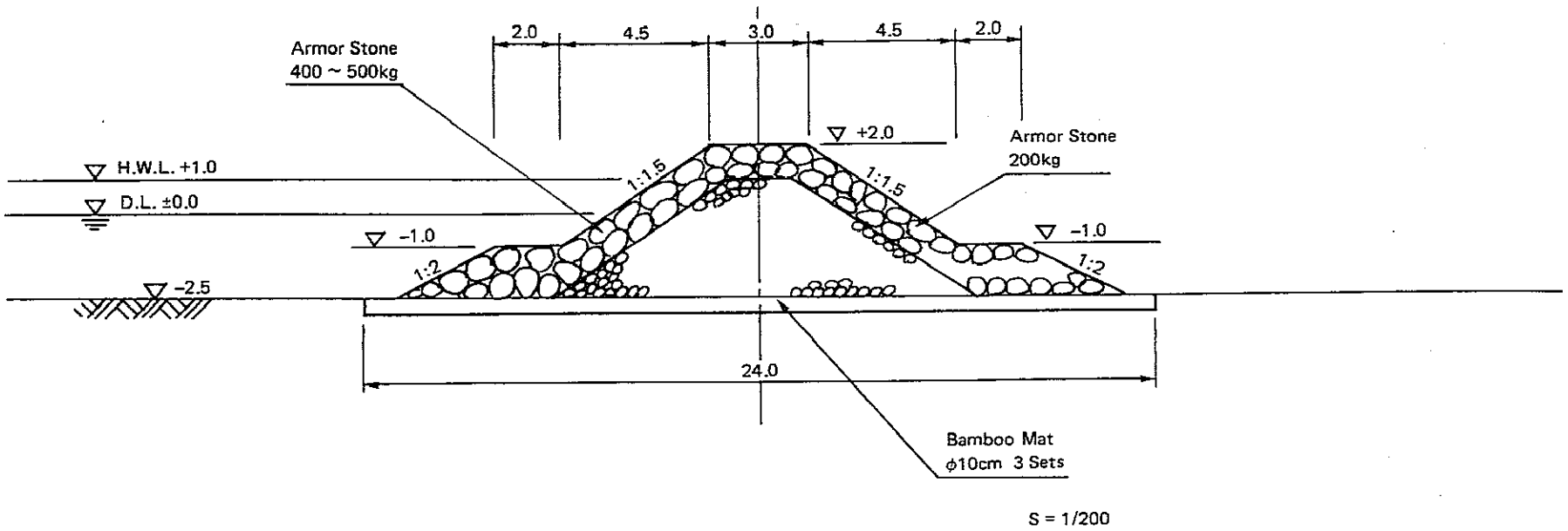


Fig. 5-3-1 New West Breakwater

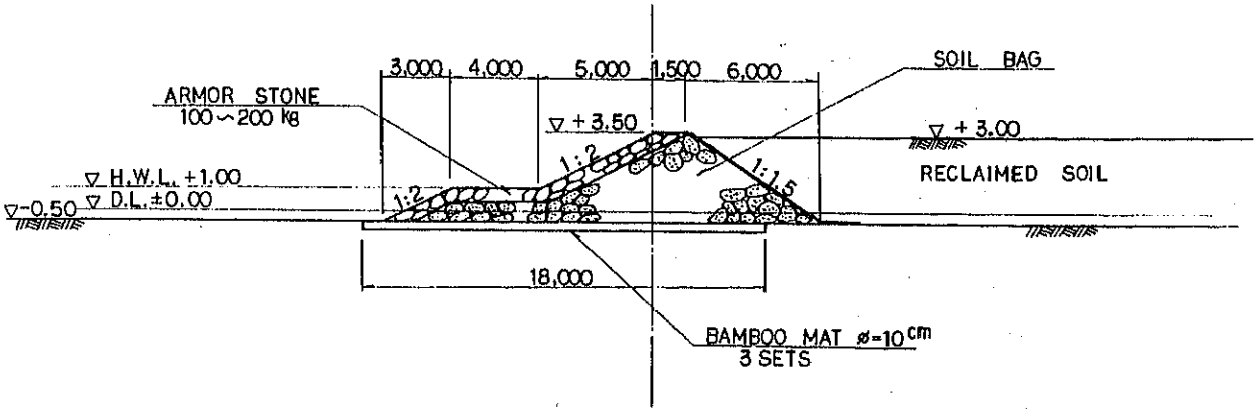


Fig. 5-3-2 Revetment Type-A

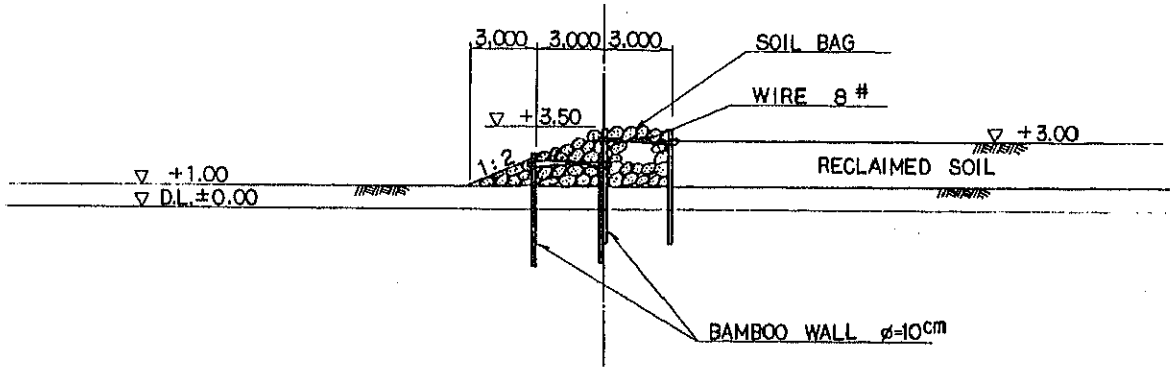


Fig. 5-3-3 Revetment Type-B

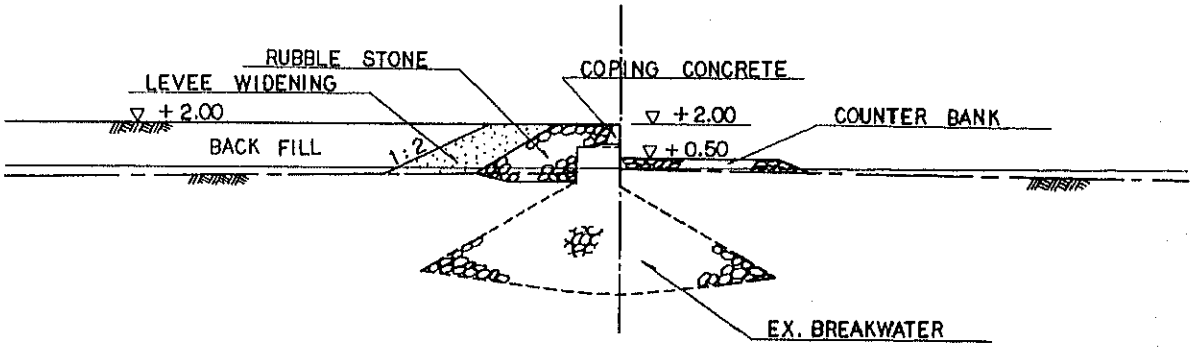
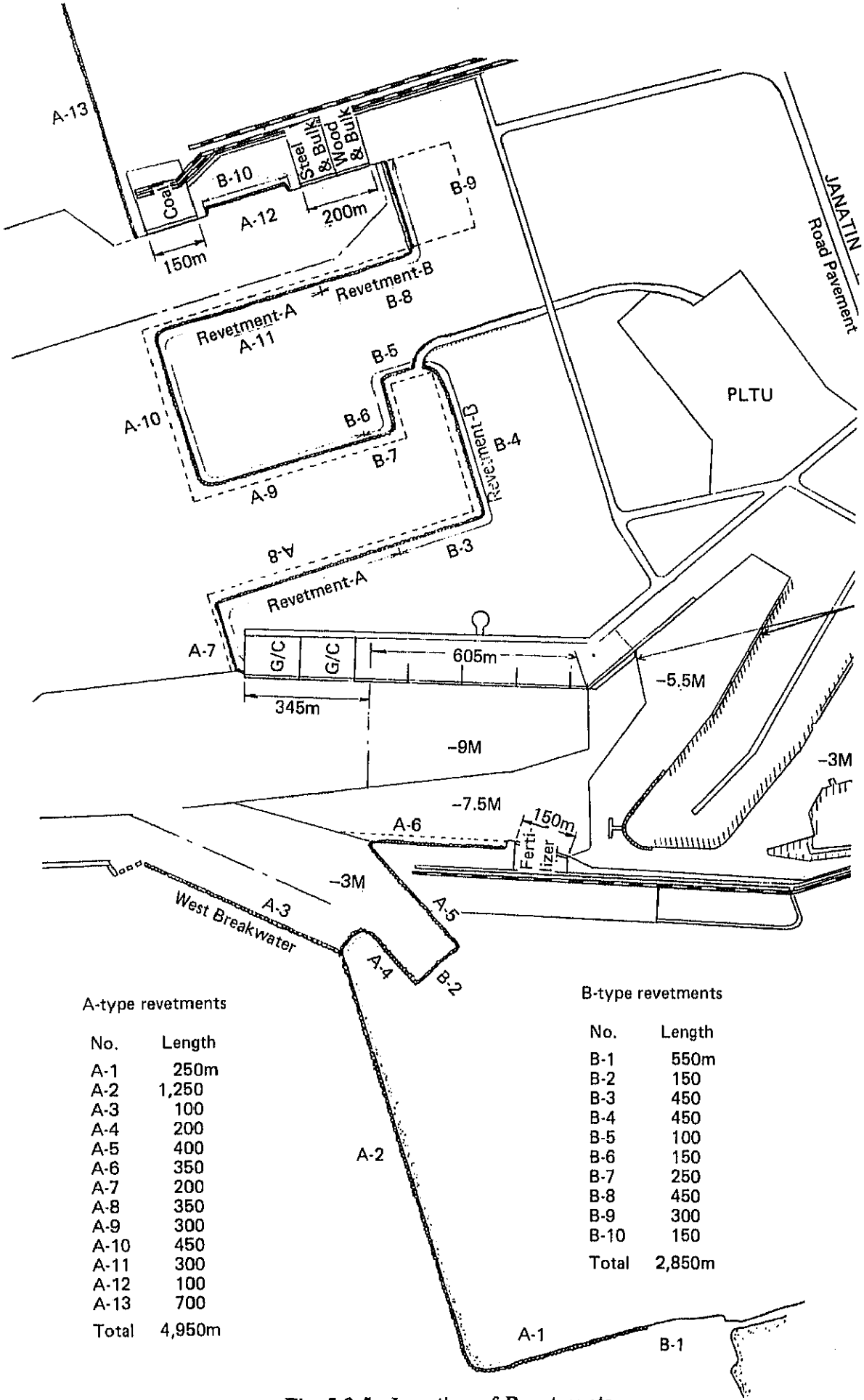


Fig. 5-3-4 Reinforcement of West Breakwater



A-type revetments

No.	Length
A-1	250m
A-2	1,250
A-3	100
A-4	200
A-5	400
A-6	350
A-7	200
A-8	350
A-9	300
A-10	450
A-11	300
A-12	100
A-13	700
Total	4,950m

B-type revetments

No.	Length
B-1	550m
B-2	150
B-3	450
B-4	450
B-5	100
B-6	150
B-7	250
B-8	450
B-9	300
B-10	150
Total	2,850m

Fig. 5-3-5 Location of Revetments

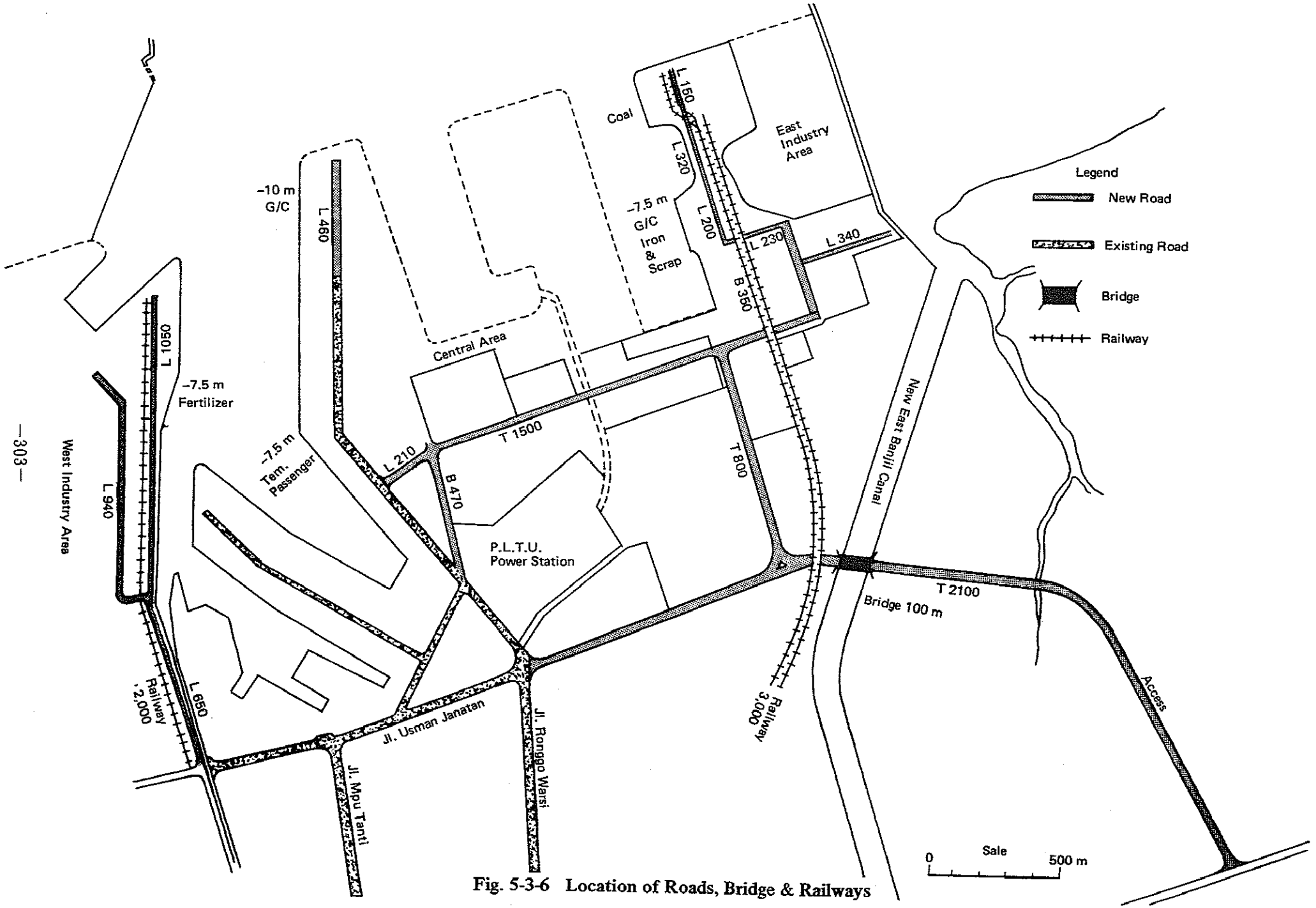


Fig. 5-3-6 Location of Roads, Bridge & Railways

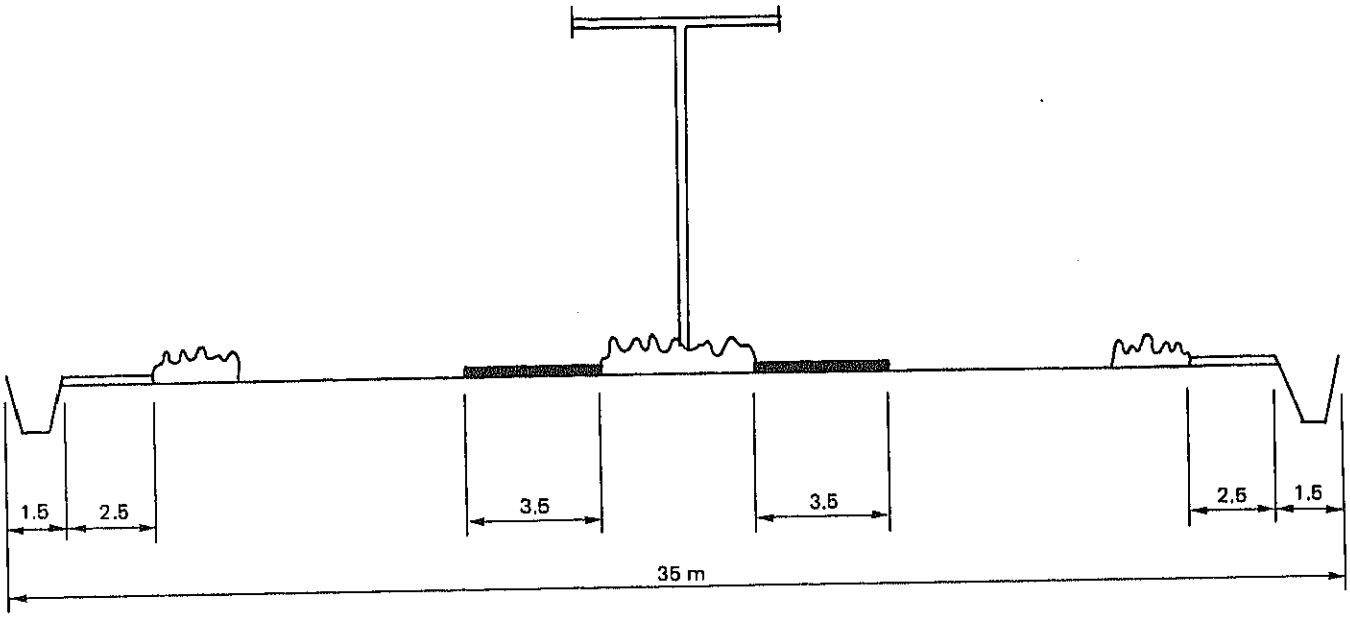


Fig. 5-3-7 Temporary Trunk Road Section (Urgent Plan)

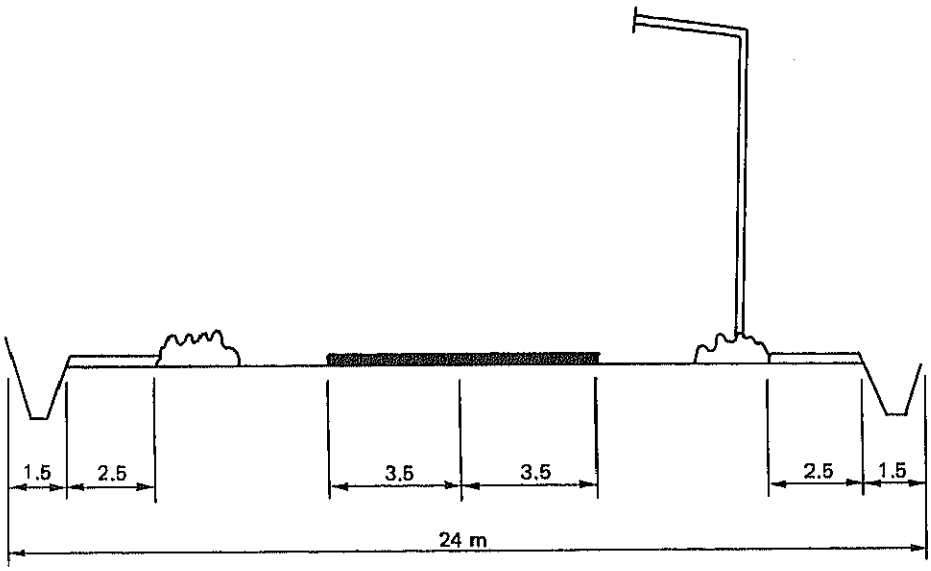


Fig. 5-3-8 Temporary Branch Road Section (Urgent Plan)

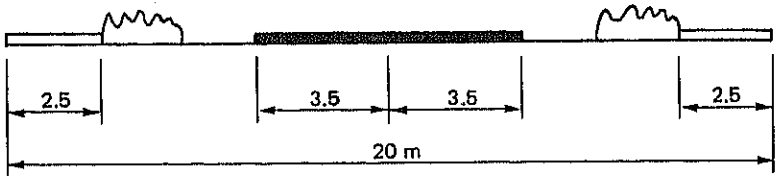


Fig. 5-3-9 Temporary Local Road Section (Urgent Plan)

Table 5-3-1 Road Plan (Urgent Plan)

No.	Class	Location	Length m	Width m	Area m^2	Note
1	Trunk Road	Main East/West	1,500	9	13,500	2 lanes + 2m
		North/South	800	9	7,200	1 lane=3.5m
		Access	2,100	9	18,900	
		Sub-total	4,400	9	39,600	
2	Branch Road	Central Area	470	8	3,760	
		East Industrial	350	8	2,800	
			350	8	2,800	
			320	8	2,560	
		Sub-total	1,020	8	11,920	
3	Local Road	West Industrial	940	8	7,520	
			650	8	5,200	
			1,050	8	8,400	
		Central Area	210	8	1,680	
			460	8	3,680	
		East Industrial	340	8	2,720	
			330	8	2,640	
			230	8	1,840	
			200	8	1,600	
			1,100	8	8,800	
		Sub-total	5,510	8	44,080	
	Total		10,930		95,600	
4	Railway (Sub-base)					
	East Line to Coal Terminal		3,000	10	30,000	
	West Line		2,000	5	10,000	
	Total				40,000 m^2	

*Cost for Construction

Road	95,600 m^2	@ 45,000 Rp./m^2	= 4,302 M. Rp.
Railway	40,000 m^2	@ 20,000 Rp./m^2	= 800 M. Rp.
Total (Road pavement including railway)			

5,102 M.Rp. ≒ 5,100 M. Rp.

Table 5-3-2 Dredging Volume (Urgent Plan)

No.	Location	Length (m)	Width (m)	Deepening Depth (m)	Volume (m3)	Depth of Channel/ Basin
	Main channel:					
①	deepening	3,500	200	1.0	700,000	-10.0 m
②	widening	3,500	50	4.0	700,000	
③	basin	1,000	350	1.0	350,000	-10.0 m
④	Front of West Breakwater:	850	150	2.0	255,000	- 3.0 m
⑤	〃	950	200	3.0	570,000	- 7.5 m
⑥	Inner harbour:	900	200	1.0	180,000	- 4.5 m
⑦	〃	700	200	1.0	140,000	- 3.0 m
⑧	East channel:	1,500	110	4.5	740,000	- 7.5 m including slope
⑨	basin:	500	300	6.5	975,000	
⑩	slip:	750	200	7.0	1,050,000	
⑪	Etc. (corners, edges & slopes)				140,000	
	Total				5,800,000	

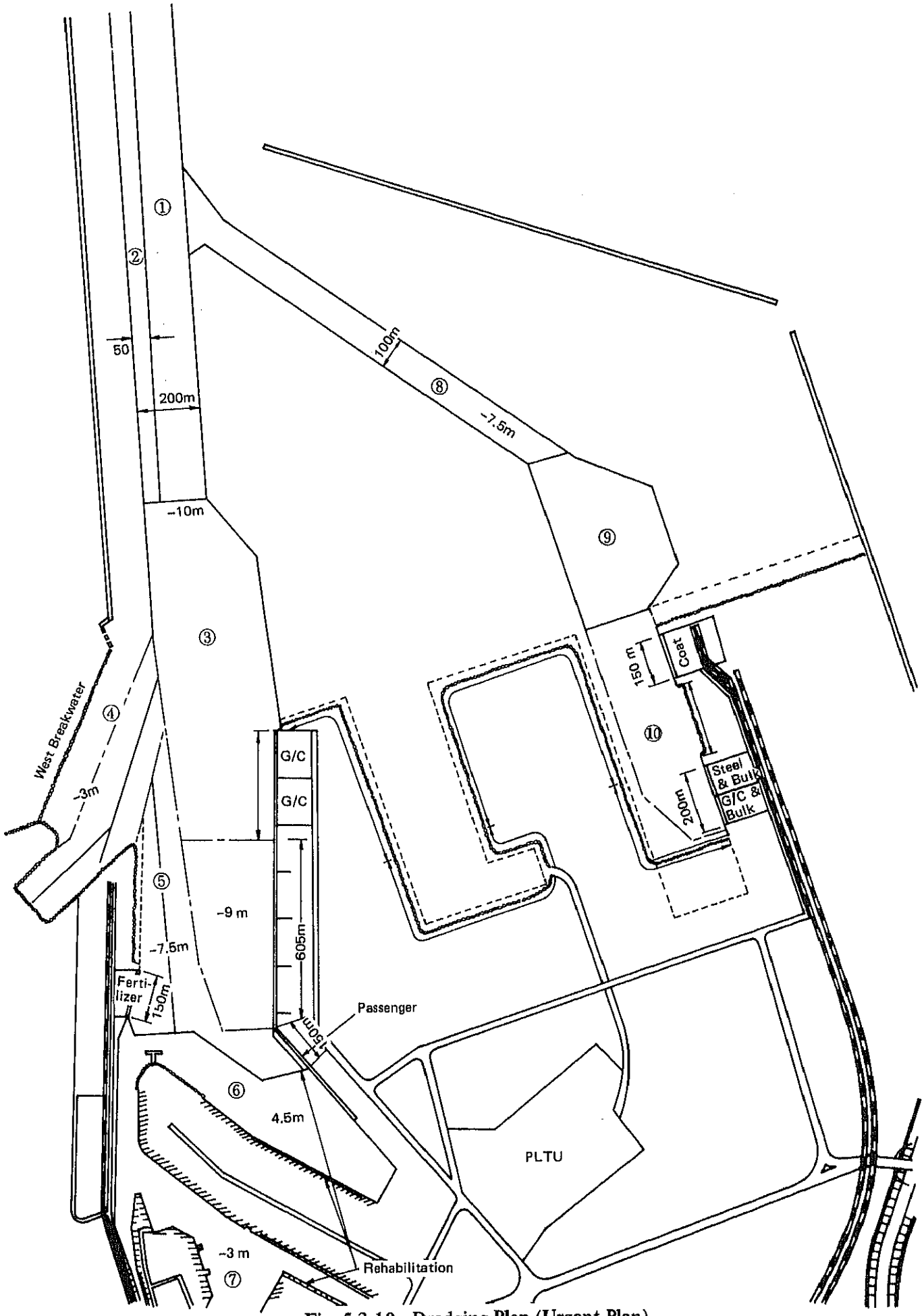


Fig. 5-3-10 Dredging Plan (Urgent Plan)

5-4 Reclaimed Land Plan (Urgent Plan)

The land use plan of the reclaimed land under the Urgent Development Plan up to 1990 is shown in Table 5-4-1 and Fig. 5-4-1. The Master Plan is shown in Fig. 5-4-2.

The reclaimed depth of each area is approximately 30 cm to 1 m by location. Accordingly, the Study Team estimates an average depth of 50 cm.

Table 5-4-1 Reclaimed Land Use Plan (Urgent Plan)

No.	Description		Area in m^2	Table
1	Government Office Area		85,800	85,800
2	Business Area	1	35,000	294,800
		2	22,400	
		3	15,000	
		4	38,700	
		5	85,800	
		6	47,300	
		7	50,600	
3	Distributiion Area (Timber Storage Area)		115,500	115,500
4	Littoral Industry Area (East)	1	22,500	273,600
		2	15,000	
		3	15,000	
		4	52,500	
		5	40,600	
		6	47,600	
		7	59,400	
		8	21,000	
5	International Terminal			118,700
	-10 m G/C Berth Area		73,100	
	-7.5 m Grain & Fertilizer Berth Area		45,600	
6	Manufacturing Industry Area (West)	1	126,500	233,500
		2	107,000	
	Total			1,100,900 m^2 ≒ 1,121,000 m^2

Therefore, the Study Team estimates that 110 ha of reclaimed land area will be necessary for the Urgent Development Plan.

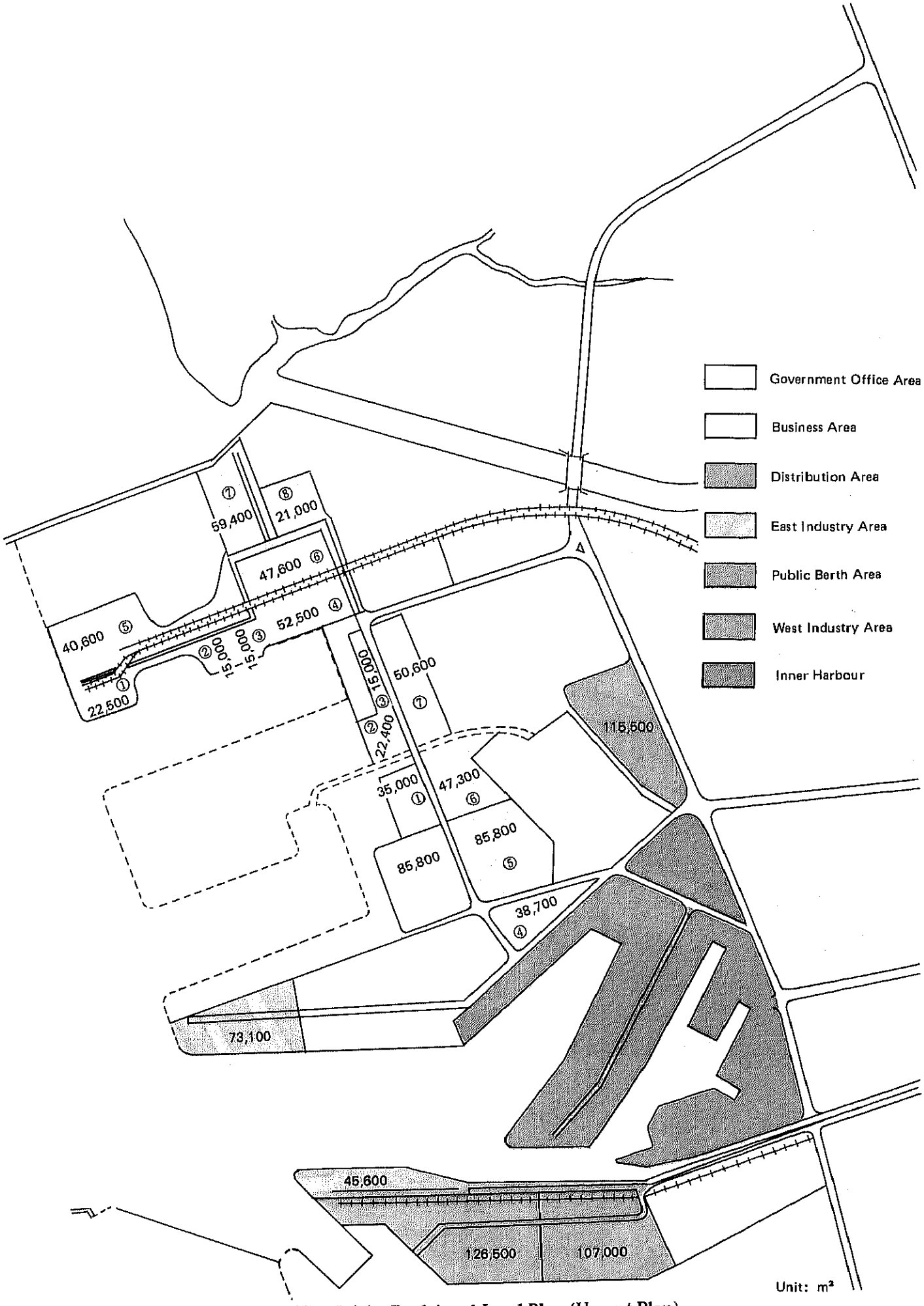


Fig. 5-4-1 Reclaimed Land Plan (Urgent Plan)

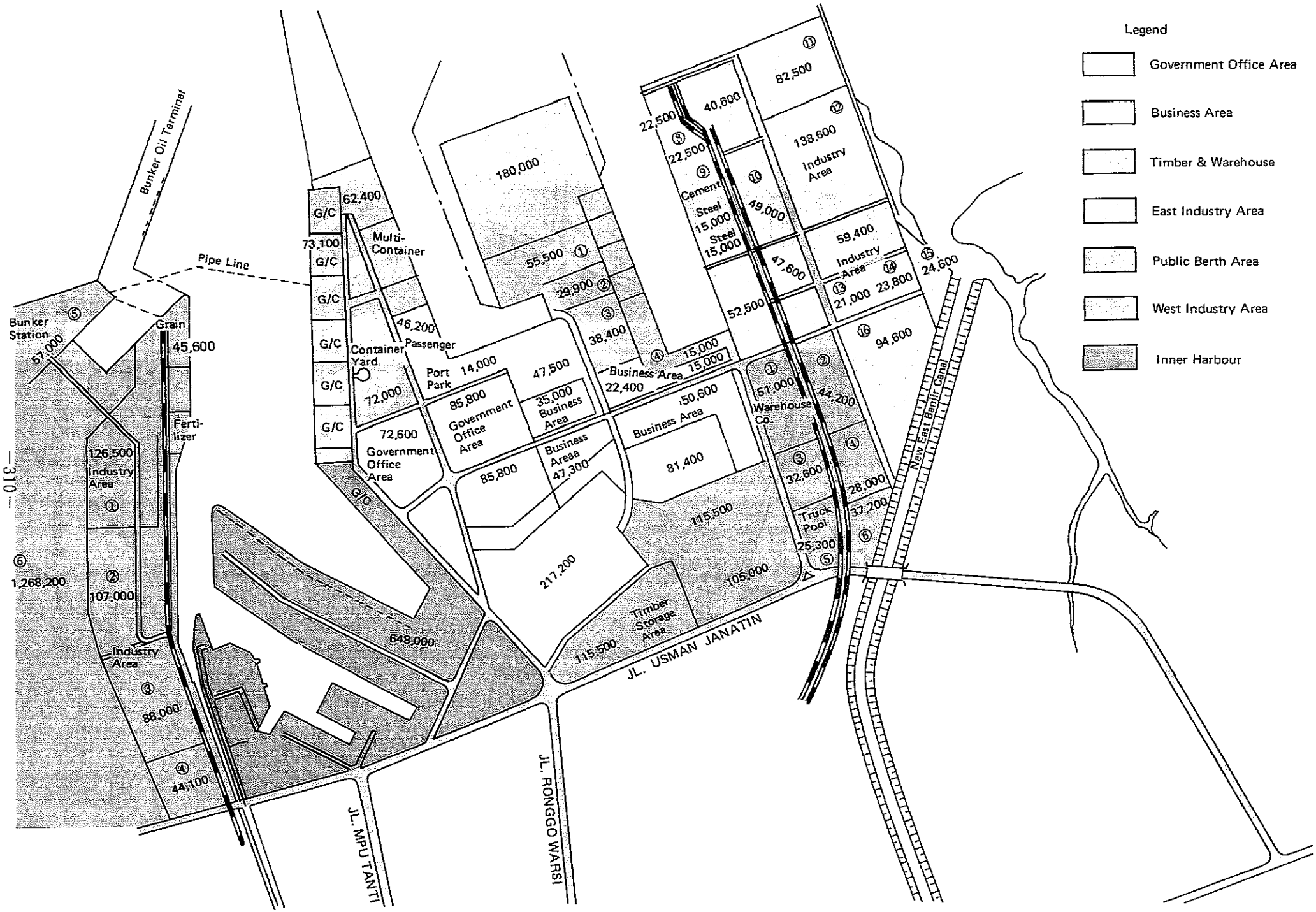


Fig. 5-4-2 Reclaimed Land Plan (Master Plan)

5-5 Design of Rehabilitation

In the old port area, many places which are generally flooded during high tide must be raised up so that they will become usable at all times.

The overall area to be rehabilitated is shown in Fig. 5-5-1.

The ground level for berths and revetments is presented as Fig. 5-5-3.

The rehabilitation of Kali Baru is presented as Fig. 5-5-2 and the details of the coping are shown in Fig. 5-5-4.

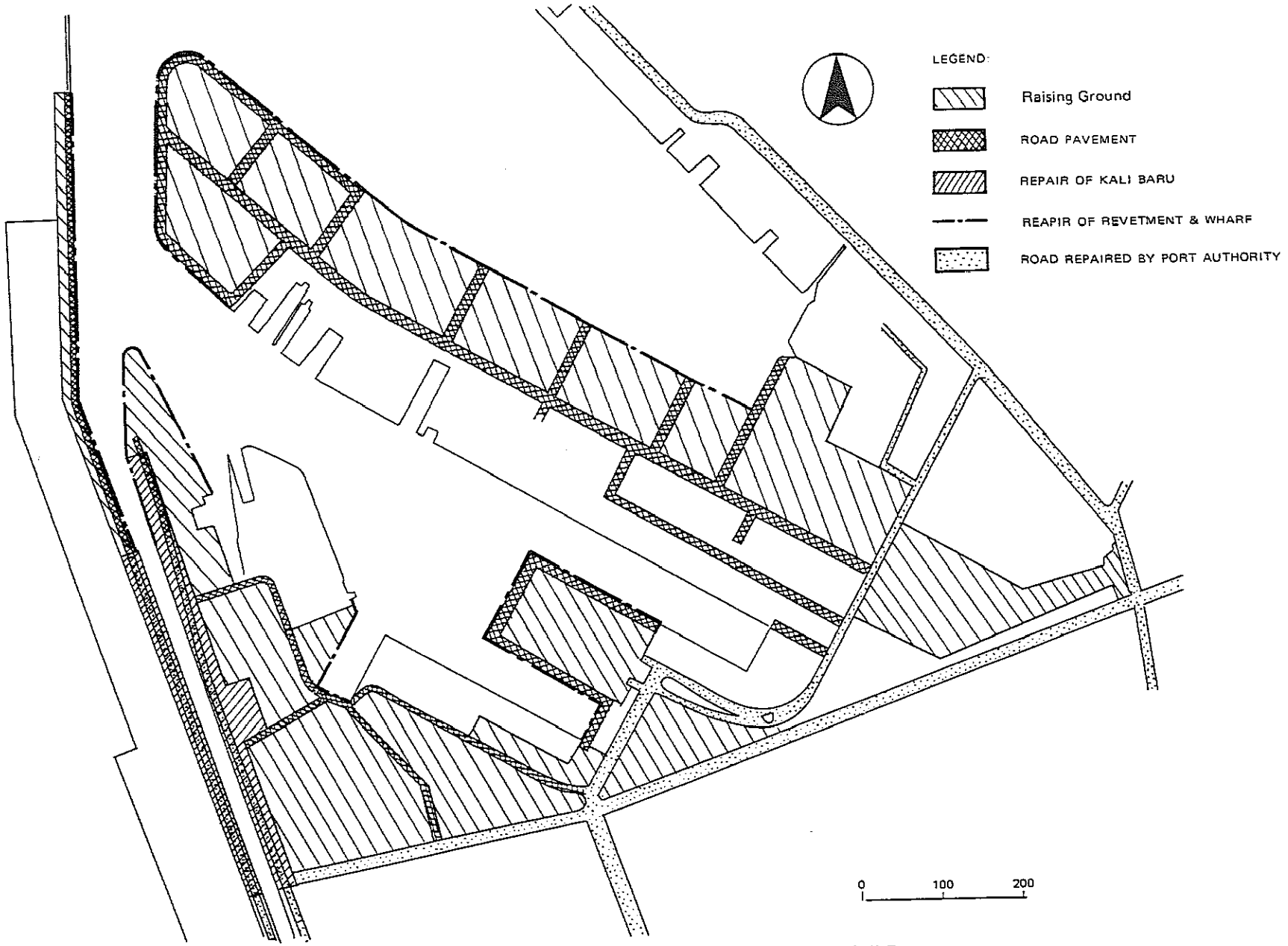


Fig. 5-5-1 Rehabilitation Plan of Inner Harbour and Kali Baru

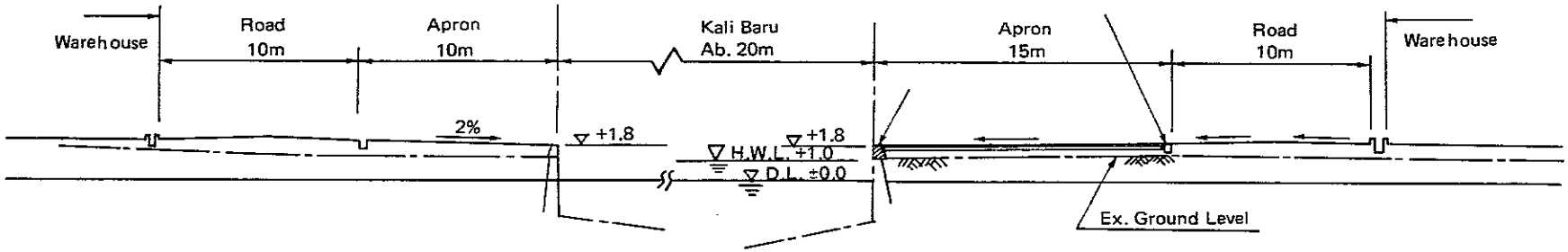


Fig. 5-5-2 Rehabilitation of Kali Baru

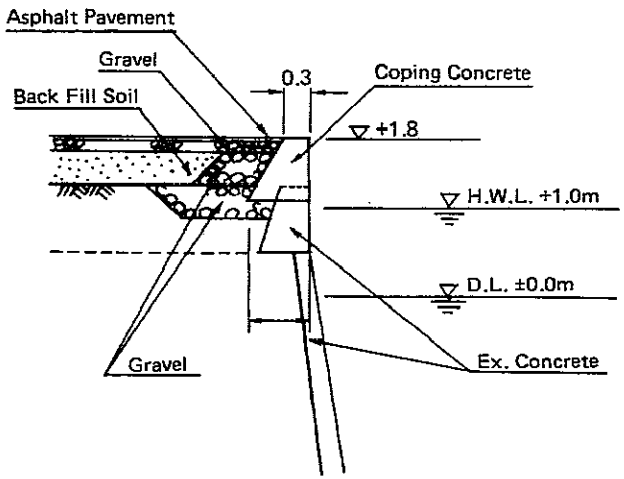


Fig. 5-5-3 Raising the Ground Level for Berths and Revetments

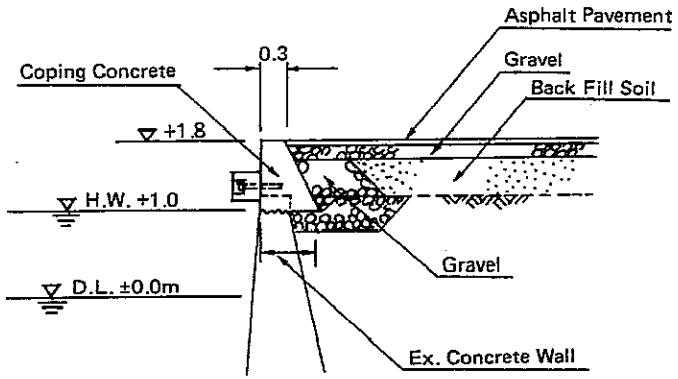


Fig. 5-5-4 Detail of Coping

5-6 Construction Plan

5-6-1 Premises

1) Natural Conditions for Construction Work

The Phase I Semarang Port Development Project was completed in November, 1985. The construction works included approximately 5,000 m of breakwater. Thus, almost all of the Phase II construction will take place inside the breakwater. This is a good condition for the Phase II construction.

Annual rainfall in the tropical rainy zone varies from 1,500 mm to 3,400 mm, and the average rainfall is 2,300 mm.

Wind velocity generally varies from 10 m/sec to 15 m/sec, with a maximum of 21 m/sec. The number of blue flag days (with wind over 15 m/sec) is 6 days per year outside of the breakwater.

Maximum wave height is 2 to 3 meters at the top of the breakwater on blue flag days. At these times, the maximum wave height within the breakwater is approximately 40 ~ 60 cm.

2) Construction Materials

Cement will be available due to a projected oversupply in the market up to 1990, but no sulfur-resistant cement (to use for marine concrete such as Type-5) is available. Re-bar is available but expensive due to transport from Jakarta. Steel pipe pile is similar to re-bar, but more expensive than imported piles.

Sources of stone for breakwater, revetment & concrete fabrication must be studied further as a large quantity is required. Gravel, sand, filling soil and bamboo are available.

Details must be studied further.

3) Construction Equipment & Machinery

Large scale floating pontoons for working are not available nearby, but normal scale construction equipment (such as bulldozers, power shovels, mobile cranes, etc.) are available at the site.

Details must be studied further.

4) Labor Force for Construction Works

Common labourers are available at any time, but skilled labourers are limited. Details must be studied further.

5) Unit Cost to be Applied for Cost Estimate

The Study Team has studied the basic unit costs for the port development project.

The unit costs for various construction items are summarized in Table 5-6-1 and 5-6-2.

Table 5-6-1 Unit Costs for Construction (1985 prices)

No.	Description	Size/dimensions/capacity	Unit Cost		Note
1	Steel Pipe Pile, ϕ500 to 700,t=12,	Supply:	180,000	Yen/t	inc. tranp, coating, jointing etc.
		Driving:	20,000	Rp./m	per pile length.
2	Prestressed Concrete Pile, ϕ600,t=150				
		Supply:	264	$/m^3	or 290,400 Rp./ m^3
		Driving:	30,000	Rp./m	inc.10% tax.
3	Concrete: 1:2:4		100,000	Rp./m^3	inc. supply, pouring etc.
4	Form		55,000	Rp./m^2	inc. fixing etc.
5	Re-bar		500,000	Rp./t	inc. fixing etc.
6	Armour stone: Supply & Dumping,		5,500	Rp./m^3	
	Rip-rap:		18,000	Rp./m^2	
7	Cathodic Protection:		10,000	Yen/m^2	
8	Fender: V600H,L=2.5m		9,220,000	Rp./No.	inc. fixing etc.
	V500H,L=2.5m		7,920,000	"	"
	V400H,L=1.5m		3,520,000	"	"
	V300H,L=1.5m		2,200,000	"	"
9	Bollard: 35t		3,520,000	"	"
	25t		2,640,000	"	"
	15t		1,760,000	"	"
10	Stone:		4,500	Rp./m^3	
11	Utilities: Electricity, Salt & Fresh Water, Drainage, Navigation Aids, Pavement of Storage Area, Small Buildings, etc.		30	%	of total cost of berth
12	Building for Passenger Berth		300,000	Rp./m^2	
13	Bamboo:		30,000	"	
14	Asphalt pavement: Main Road		50,000	"	
	Branch Road		27,000	"	
15	Demolition of Concrete:		132,000	Rp./m^3	
16	Excavation:		4,400	"	
17	Sand:		5,250	"	
18	Sand bag:		15,000	"	
19	Bridge: Wodth=20m		880,000	Rp./m^2	
20	Dredging: by Pump		1,320	Rp./m^3	
	by Grab		2,200	"	
	by Drag		880	"	
21	Reclamation:		5,000	Rp./m^2	inc. earth filling

*Note: Exchange rate: Rp. 4.4 = Yen 1.0

Table5-6-2 Unit Cost for Berth Construction (1985 Prices)

No.	Description	Unit	Unit cost (Rp.)	Note
1	-10m General Cargo Berth	m	39,600,000	per front line length
2	-7.5m General Cargo Berth	m	31,400,000	"
3	-7.5m Steel & Bulk berth	m	31,400,000	"
4	-7.5m Fertilizer berth	m	31,400,000	"
5	-7.5m Temporary Passenger berth	m	25,300,000	"
6	-7.5m Coal berth	m	31,400,000	"
7	West Breakwater	m	1,400,000	
8	Reinforcement of the existing west breakwater	m	400,000	
9	Dredging: by Pump dreder	m^3	1,320	
	by Grab dredger	"	2,200	
	by Drag dredger	"	880	
10	Reclamation	"	5,000	inc. earth filling
11	Level-up of the existing revetment	m	300,000	
12	Level-up of Kali-Baru	m	1,100,000	
13	Level-up of the ground	m^2	5,000	
14	Road pavement: Main route	m	50,000	
	Branch route	m	27,000	
15	Revetment: Type-A	m	1,300,000	
	Type B	m	500,000	
16	Bridge: 20m width	m	17,600,000	

5-6-2 Construction Schedule

The project schedule is as follows:

1) Completion of feasibility study on Phase-II project ..... June 1986
2) Period of detailed design & documentation for tender ..... 14 months
   Completion ..... Dec. 1987
3) Period of financial settlement for construction ..... 8 months
   Completion Dec.1987
4) Commencement of the Urgent Plan construction ..... Mar. 1988
5) Survey & soil investigation at the site of the proposed facilities
   (Bulk and Khusus berths etc.) ..... D.D. study
6) Removal of the existing obstacles & inhabitants ..... Up to the end of 1987
7) Leaving period of the reclaimed area by dredged materials ..... 1 year
8) Preparation period for dredging & reclamation and construction
   period of temporary revetments ..... 1 year
9) Construction period of ground surfacing works and pavement, etc. ..... 6 months
10) Completion of Semarang Port Development Project ..... Dec. 1989*
11) Final completion ..... Oct. 1990

*The east zone berths, pavement of roads and the bridge, and some of the reclamation works will not be completed until October, 1990.

Based on the above project schedule, the Study Team estimates the construction schedule of the Project as follows:

Commencement of the Urgent Plan construction ..... Mar. 1988
Construction period ..... 30 months
Completion of construction ..... Oct. 1990

5-6-3 Construction Plan

The detailed construction plan of the Short-term Development Plan up to 1995 is shown as Table 5-6-3.

The details of the main items of the construction plan are presented in the table.

(1) Preparation of the Project

This item shall include all necessary preparations for commencement of construction works such as mobilization of construction equipment & machinery, procurement of materials & labour, installation of offices, camps, warehouses, stockyards, workshops and temporary jetties, and necessary surveys and investigations of quarries, etc.

Table 5-6-3 Working Schedule

Item No.	Description	Q'ty (Year / Month)	1985	1986	1987	1988	1989	1990	1991
1	F/S by JICA	13 months							
2	E/S (D/D & Survey)	14 "							
3	Tender for Construction	5 "							
4	Construction	30 "							
	-10.0m G/C	345m							
	-7.5m G/C	100m							
	-7.5m Passenger	150m							
	-7.5m Steel & Bulk	100m							
	-7.5m Fertilizer	150m							
	-7.5m Coal	150m							
	West Breakwater								
	Channel & Basin	5.8M.M^3							
	Reclamation	60 ha							
	Rehabilitation	1 set							
	Revetment	8,000m							
	Road Pavement	102,000m^2							
	Bridge Railway	100m							
5	Port Services	1 set							
6	Consultant Service Supervision	30 months							
7	Maintenance & Operation								

(2) Dredging & Reclamation

Dredged materials from grab & drag dredgers shall be dumped at appropriate locations. These dumping areas shall be determined by the engineering service. Dredged materials from pump dredgers shall be re-used as fill for reclaimed lands. Temporary revetments shall be constructed prior to the commencement of the reclamation work. These revetments shall be installed at least 80 m behind the proposed future quaywall lines. The revetments are designed as +3.5 m to top-level; the initial top-level to be reclaimed is designed as +3.0 m and the settled level one year later as +2.0 m. Filling by earth-work is designed as 1.0 m and half of the filling soil will settle so the final settled level of the reclaimed land is designed as +2.5 m in elevation. Dredged materials shall not be used behind the −10 m general cargo and bulk berths but be able to be used in the government office area and business area. In these areas, only fill taken from land areas will be used.

The discharge channel of the power station shall be relocated to connect to the end of the central channel.

The existing bank of the east Banjil River shall be used as the new quaywall line, in view of technical and economic advantages.

The period of one year in which the reclaimed areas are left to settle should be observed under the engineer's control. The contractor shall pay attention to siltation problems.

(3) Relocation of the Existing Pipelines

There are 3 pipelines (one is Pertamina's and the other two are P.L.T.U.'s) in the harbour basin which cross the proposed navigation channel. These pipelines shall be relocated prior to the dredging operations. The Team recommends relocation of the pipelines to the East Breakwater. Regarding the relocation time, there are two alternatives to be considered. One is prior to the commencement of construction and the other is after the commencement of construction but before the dredging operations begin. Adequate time must be allowed for procurement & installation of the pipes.

(4) Wharves

The foundation piles such as steel pipe piles & prestressed concrete piles are designed as friction piles. Therefore, the penetration length shall be kept to the designed length. Supplied pipes must be as long as possible. The other working items of the wharf construction shall be performed under normal procedures.

(5) Others

The stone taken from the demolition of the existing West Breakwater shall be re-used for the rehabilitation works as much as possible.

Main access roads have 4 lanes. The roads will be reinforced for container traffic.

5-7 Cost Estimate

5-7-1 Cost Estimate Factors

The most basic factors involved in the cost estimate have been described in Sections 5-1 to 5-5.

Additional factors are presented as follows.

(1) Prices are shown in Indonesian Rupiah, based on July 1985 prices.

(2) The exchange rate is 4.4 Rp. = 1 Yen.

(3) Customs duties on imported construction materials & equipment are not included.

(4) A 10% Sales Tax in local currency is assumed.

(5) A physical contingency of 15% is assumed, but no price contingency is included.

5-7-2 Project Cost

The total project cost of the Urgent Development Plan is estimated as Rp. 86,372,000,000 as shown in Table 5-7-1, of which the local & foreign portions are

Local portion	Rp. 32,380,000,000	(37%)
Foreign portion	Rp. 53,992,000,000	(63%)

Table 5-7-1 Cost Estimate of Urgent Plan up to 1990

No.	Description	Q'ty	Unit Cost M.Rp.	Amount M. Rp.	Foreign Portion %	Foreign Portion M.Rp.	1985 Prices Note
(A)	Public Wharves						
1	-10m General cargo	345m	39.6	13,662	57	7,787	15,000 DWT
2	7.5m General Cargo	100m	31.4	3,140	58	1,821	5,000 DWT
3	7.5m G/C & Passenger	150m	25.3	3,800	58	2,204	5,000 DWT
	Sub Total			20,602	57	11,812	
(B)	Industrial Wharves						
1	7.5m Coal	150m	31.4	4,710	58	2,732	7,000 DWT
2	7.5m Steel & Bulk	100m	31.4	3,140	58	1,821	8,000 DWT
3	7.5m Fertilizer	150m	31.4	4,710	58	2,732	10,000 DWT
	Sub Total			12,560	58	7,285	
(C)	Port Facilities						
1	West Breakwater			900	20	179	cf. Table 5-7-3
2	Channel & Basin:						
	Dredging by Pump	3.0M. M^3	1.320	3,960	95	3,762	
	by Grab	0.3	2,200	660	90	594	
	by Drag	2.5	0.880	2,200	90	1,980	
3	Reclamation	120 ha	25	3,000	40	1,200	
	Sub Total			10,720	72	7,715	
(D)	Other Facilities						
1	Rehabilitation of the Old Port			5,100	33	1,681	cf. Table 5-7-3
2	Revetment Type A	5,000m	1.3	6,500	18	1,170	
3	Revetment Type B	3,000m	0.5	1,500	22	330	
4	Road pavement	95,600 m^2	0.045	4,300	40	1,720	
5	Bridge	100m	17.6	1,760	80	1,408	
6	Railway Site	40,000 m^2	0.02	800	40	320	
	Sub Total			19,960	34	6,629	
(E)	Total (A)+(B)+(C)+(D)			63,840	53	33,441	
(F)	Port Service Vessels & Equipments			7,524	100	7,524	cf. Table 5-7-2
(G)	Consulting Services			3,740	90	3,366	
(H)	Physical Contingency 15%x(E)			9,576	85	8,140	
	Physical Contingency 15%x(F)			1,129	90	1,016	
	Physical Contingency 15%x(G)			561	90	505	
Grand Total				86,372	63	53,992	
				(19.6 Billion Yen)		(12.3 Billion Yen)	

*Note: Exchange Rate Rp. 4.4 = Yen 1.0

Table 5-7-2 List of Port Service Vessels & Machinery

1985 Prices

No.	Description	Quantity	Unit cost (Yen)	Amount (Yen)	Note
1	*Tugboat 2,300 ps, 240 GT	1 set	300,000,000	300,000,000	
2	*Tugboat 1,700 ps, 200 GT	1 set	240,000,000	240,000,000	
3	*Pilot boats 250 ps, 40 GT	1 set	53,000,000	53,000,000	
	Sub total			593,000,000	
4	Mobile Crane 250t	1 set	350,000,000	350,000,000	
5	Mobile Crane 150t	1 set	160,000,000	160,000,000	
6	Forklift 40t	3 sets	70,000,000	210,000,000	
7	Tractor & Trailer	**sum		150,000,000	
8	Forklift 10t	4 sets	20,000,000	80,000,000	
9	Forklift 3t	6 sets	5,000,000	30,000,000	
	Sub-total			980,000,000	
10	Others	sum		137,000,000	
	Total		Yen	1,710,000,000	
			(Rp.	7,524,000,000)	

* These vessels and machines are based on general specifications.
Accordingly, details shall be studied deeply at the stage of implementation.

** 9 tractors & 18 trailers

Table 5-7-3 Cost Estimation of Rehabilitation of the Inner Harbour and Kali Baru

1985 Prices

No.	Description	Quantity	Unit Cost M. Rp.	Amount M. Rp.	Foreign Portion %	Foreign Portion M.Rp
1	Reconstruction of the West Breakwater	600m	1.4	840	20	168
2	Reinforcement of the Existing Breakwater	150m	0.4	60	18	11
	Sub Total (West Breakwater)			900	80	179
3	Level up of the Existing Revetment	2,460m	0.3	738	18	133
4	Level up of Kali-Baru	900m	1.1	990	25	248
5	Level up of the Ground in the Inner Harbour	210,000 m^2	0.005	1,050	40	420
6	Road Pavement in the Inner Harbour	60,000 m^2	0.027	1,620	40	648
7	Others: Demolition of Railway & Warehouses etc.	1 set		702	33	232
	Sub Total (rehabilitation)			5,100	33	1,681
				(1.16 Billion Yen)		(0.38 Billion Yen)
	Total			6,000	31	1,860
				(1.36 Billion Yen)		(0.42 Billion Yen)

* Note: Exchange rate Rp. 4.4 = Yen 1.0

Table 5-7-4 Investment Schedule for Construction of Urgent Plan

1985 Prices

No.	Description	Amount M. Rp.	1988 M. Rp.	1989 M. Rp.	1990 M. Rp.	Note
1	-10m General cargo	13,662	3,415	6,831	3,416	
2	-7.5m General	3,140	785	1,570	785	
3	7.5m G/C & Passenger	3,800		1,900	1,900	
4	7.5m Coal	4,710		2,355	2,355	
5	7.5m Steel & Bulk	3,140		1,570	1,570	
6	7.5m Fertilizer	4,710	1,177	2,355	1,178	
7	West Breakwater	900	300	600		
8	Rehabilitation	5,100	1,700	3,400		
9	Revetment A	6,500	2,500	4,000		
10	Revetment B	1,500	500	1,000		
11	Road Pavement and Railway	5,100		1,600	3,500	
12	Bridge	1,760		760	1,000	
13	Channel & Basin	6,820	4,120	2,700		
14	Reclamation	3,000		1,500	1,500	
15	Port Services	7,524		2,524	5,000	
16	Consultant Services	3,740	600	700	600	1,840 in 1987
17	Contingencies	11,266	2,243	5,583	3,119	321 in 1987
	Total	86,372	17,340	40,948	25,923	2,161 in 1987

CHAPTER 6
ECONOMIC ANALYSIS

CHAPTER 6 ECONOMIC ANALYSIS

6-1 Purpose of Economic Analysis

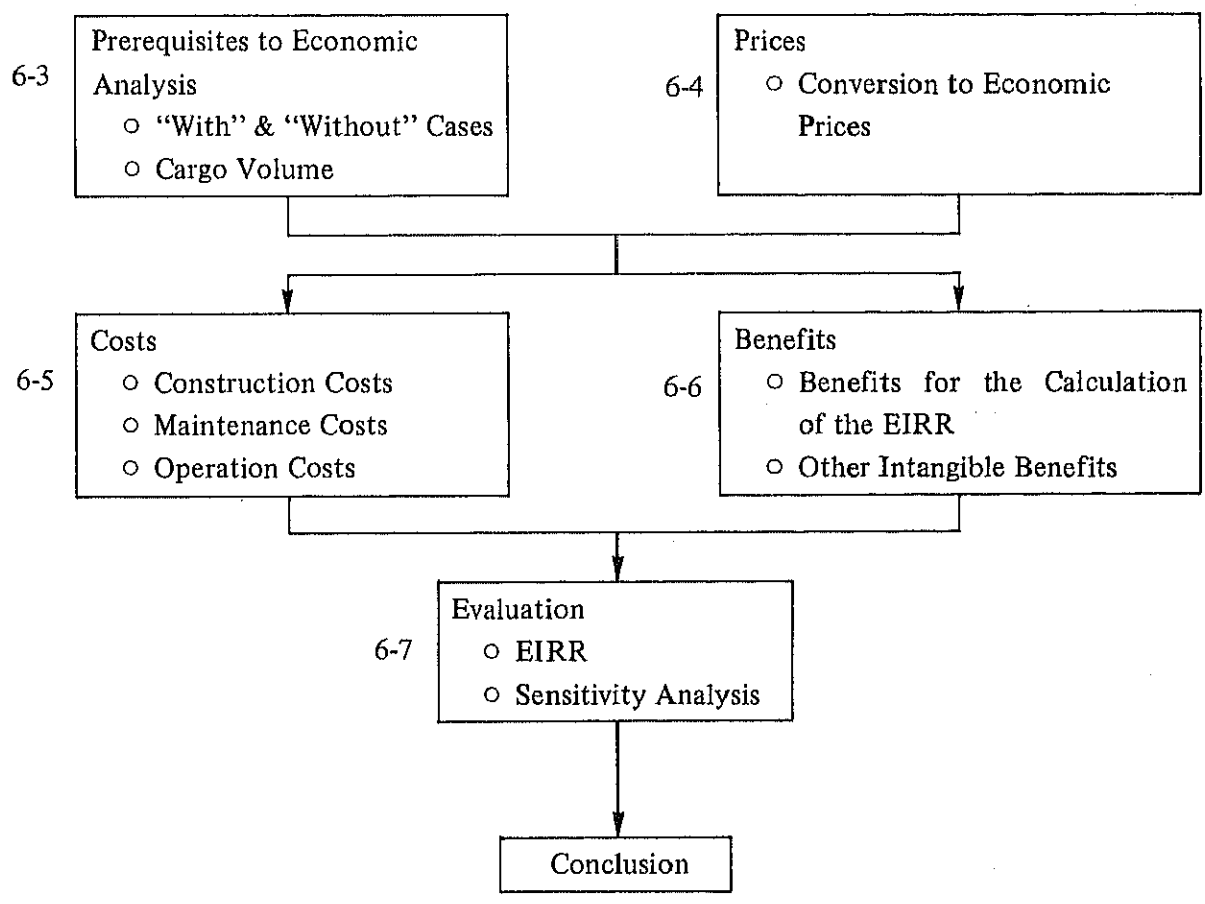
The purpose of this chapter is to appraise the economic feasibility of the Urgent Plan explained in Chapter 4.

The evaluation of a project should show whether the project is justifiable from the economic point of view by assessing its contribution to the national economy. Thus, the basic purpose of this chapter is to investigate the economic benefits as well as the economic costs which will arise from the project and to evaluate whether the net benefits exceed those which could be derived from other investment opportunities.

6-2 Approach and Methodology

6-2-1 Approach

The following figure is a flow chart of the economic analysis procedure. Each of the figures in the chart indicates the section number where each subject is discussed.



6-2-2 Methodology

The economic internal rate of return (EIRR) based on cost/benefit analysis is used to appraise the feasibility of the project.

In estimating the economic costs of the Urgent Plan, shadow pricing is applied. "Shadow pricing" here means the appraisal of benefits and costs in terms of international prices (border prices).

6-3 Prerequisites

6-3-1 "With" & "Without" Cases

A cost/benefit analysis is conducted on the difference between the "With" and "Without" investment cases. In this chapter, the "With" case means expansion and rehabilitation of the port facilities as mentioned in Chapter 4, and the "Without" case means no expansion and no rehabilitation of the existing port facilities.

Incremental benefits and costs arising from the proposed investment are compared, and we examine whether or not the net benefits generated by the project exceed the opportunity cost of capital in Indonesia. Therefore, determining the "Without" case is one of the key processes in the economic appraisal.

In this study, after various possibilities are discussed, the following conditions are adopted as the "Without" case.

- o No investment is made.
- o If the cargo volume exceeds the cargo handling capacity, excess cargoes will be handled at other ports such as Jakarta and Surabaya, and then transported to Semarang by land haul.
- o Oil is used as the fuel of the cement factories, because coal will not be handled at Semarang Port in this case.
- o Plywood will be handled offshore by Kayulapis as at present.

As for the "With" case, the following conditions are considered.

- o The Urgent Development Plan presented in Chapter 4 will be implemented.
- o At first, the cargo volume will increase in line with the forcast presented in Chapter 3.
- o Due to limited port capacity, however, the growth rate of the cargo throughput will decrease thereafter.

6-3-2 Cargo Throughput

(1) "With" Case

The total future cargo handling volume for the "With" case is based on the future estimate presented in Chapter 3.

However, in the economic analysis, any cargo volume beyond the cargo handling capacity of the port under the Urgent Plan is disregarded.

The cargo handling volume under the "With" case is shown in the following table.

Table 6-3-1 Cargo Handling Volume under the "With" Case

(Unit: Thousand tons)

			1990	1995	1996	2000	2014
Samudra (Included in containers)	Export	Rice	34	-	-	-	-
		Lumber	32	42	40	40	40
		Ag.-products	46	59	56	56	56
		G.C. & Others	56	103	108	108	108
		Total	168	204	204	204	204
	Import	Iron/Scrap	185	285	288	288	288
		Rice	-	60	88	88	88
		G.C. & Others	457	672	669	669	669
		Total	642	1,017	1,045	1,045	1,045
Khusus	Import	Iron/Scrap	185	200	200	200	200
		Grain	188	316	323	323	323
		Total	373	516	523	523	523
	Inward	Fertilizer	680	950	990	1,150	1,380
		Coal	150	300	374	600	1,200
		Total	830	1,250	1,364	2,188	2,580
Nusantara	Outward	Rice	19	21	21	21	21
		G/C. & Ag. products	47	66	68	68	68
		Total	66	87	89	89	89
	Inward	Lumber	9	15	20	20	20
		Steel	110	270	319	319	319
		G/C. & Ag. products	23	39	43	43	43
		Total	142	324	382	382	382
Local and Rakyat			571	905	1,030	1,030	1,030
Total			2,792	4,303	4,637	5,461	5,853

(2) "Without" Case

No investment is made under the "Without" case and so, the handling capacity of the port is as at present.

As mentioned in 6-3-1, the plywood is not handled at this port and so this cargo is excluded from the cargo handling volume.

Excess cargoes are handled at other ports and then transported overland to Semarang.

The cargo handling volume under the "Without" cargo is shown in the following table.

Table 6-3-2 Cargo Handling Volume under the "Without" Case

(Unit: Thousand tons)

			1990	1995	1996	2000	2014
Samudra (Included in Containers)	Export	Rice	34	-	-	-	-
		Lumber	32	30	24	24	24
		Ag.-products	46	42	34	34	34
		G.C. & Others	56	73	65	65	65
		Total	168	145	123	123	123
	Import	Iron/Scrap	185	204	171	171	171
		Rice	-	43	52	52	52
		G/C. & Others	457	481	398	398	398
		Grain	188	226	192	192	192
		Total	830	954	813	813	813
Nusantara	Outward	Rice	19	21	21	21	21
		G.C. Agri-products	47	66	68	68	68
		Total	66	87	89	89	89
	Inward	Lumber	9	15	20	20	20
		Steel	110	270	319	319	319
		G.C. Agri-products	23	39	43	43	43
		Total	142	324	382	382	382
Local and Rakyat			571	905	1,030	1,030	1,030
Total			1,635	2,415	2,437	2,437	2,437

6-4 Prices

6-4-1 General

Since the construction costs are estimated at market prices, it is necessary to re-evaluate them from the economic point of view.

In this study, the conversion to economic prices is conducted using the standard conversion factor and the conversion factor for consumption.

6-4-2 Economic Prices

In the calculation of economic prices the following methodology is used:

- o Trade goods are appraised in terms of international prices, while CIF prices and FOB prices are applied to imported goods and exportable goods, respectively.
- o Labour is divided into skilled labour and unskilled labour. Skilled labour costs are estimated based on local market wages, and unskilled labour costs are estimated based on the value of lost marginal product. International prices are then calculated by multiplying these costs by the conversion factor for consumption.
- o The standard conversion factor is applied to non-trade goods.

(1) Standard Conversion Factor (SCF)

Import duties and export subsidies create a price differential between the domestic market and the international market.

The standard conversion factor compensates for this price differential.

The standard conversion factor is obtained by the following formula.

$$SCF = \frac{\text{Total amount of imports} + \text{Total amount of exports}}{\begin{array}{l}(\text{Total amount of imports} + \text{Total amount of import duties} \\ + \text{Total amount of exports} - \text{Total amount of export duties})\end{array}}$$

The standard conversion factors for the five years from 1978/79 are listed in the following table.

Table 6-4-1 Standard Conversion Factors

(Unit: US$ Million)

	1978/79	1979/80	1980/81	1981/82	1982/83	Mean
Import (CIF)	6,690.4	7,202.3	10,834.4	13,272.1	16,858.9	10,971.6
Export (FOB)	11,643.2	15,590.1	23,950.4	25,164.5	22,328.3	19,735.3
Import Duties and Sales Tax on Import	673.3	723.9	1,025.7	1,179.4	1,169.1	954.3
Export Duties	265.9	620.6	486.4	199.4	128.1	340.1
S.C.F	0.978	0.995	0.985	0.975	0.974	0.981

For the present calculations, the mean value over this five year period is used. Thus, the standard conversion factor has a value of 0.981.

(2) Conversion Factor for Consumption

This factor is used for converting the prices of consumer goods from domestic prices to international prices.

Especially, this will be required to convert labour costs from domestic prices to international prices.

The conversion factor for consumption (CFC) is usually calculated in the same manner as the standard conversion factor, replacing total imports and total exports by imports and exports of consumer goods only.

However, due to the lack of required data such as duty revenue figures, the conversion factor for consumption can not be directly calculated. While its value can be assumed to be nearly the same as the standard conversion factor, usually higher duties are imposed on imported consumer goods than on producers' exported goods, and therefore a slightly lower figure of 0.950 is chosen.

(3) Shadow Wage Rate

For skilled labour, assuming that the market mechanism is functioning, the actual market wages are used.

As data are in domestic prices, they are converted to international prices by multiplying by the conversion factor for consumption.

$$\boxed{\text{The Conversion Factor for Skilled Labour}} = \boxed{\text{Local Market Wage Rate}} \times \boxed{\text{CFC}}$$

$$= 1.0 \times 0.950 = 0.950$$

Unskilled labour costs are evaluated by their opportunity cost.

Generally, wages paid to unskilled labour by the project by multiplying cost, and the correct price is obtained by multiplying by the ratio between the shadow wage rate and market wages.

The shadow wage rate is obtained by the following formula.

$$SWR = C - (C-m)/S$$

SWR : Shadow wage rate
C : Market wages
m : Opportunity cost
S : Premium for savings (or investment)

Here, we assume that when the premium for savings is 0, then S=1, and thus SWR=m.

Opportunity cost is estimated by calculating the per capita GDP of workers in the agriculture, forestry and fishery sectors. The total GDP for the agriculture, forestry and fishery sectors in Indonesia in 1980 is US$18,006 million, and the number of workers in these sectors is 28,834 thousand. By division, the per capita daily wage in 1980 is US$2.08, assuming 25 working days in a month. The per capita daily wage in 1971 is US$0.50 (Total GDP for the agriculture, forestry and fishery is US$3,988 million and the number of workers in these sectors is 26,473 thousand). Therefore, the average annual growth rate for the per capita daily wage in these sectors is 17 percent. The per capita daily wage in 1982 is expected to be US$2.84.

On the other hand, the average nominal wage for unskilled labourers in Central Java is about US$3.03. Thus, the wage rate in the agriculture, forestry and fishery sectors is 94 percent of the nominal wage.

The Conversion Factor for Unskilled Labour	$= 0.94 \times CFC = 0.940 \times 0.950 = 0.893$

6-5 Costs

6-5-1 Construction Costs

The total investment, estimatd at market prices in Chapter 5, has to be divided into the categories of trade goods, non-trade goods and labour. The investment for non-trade goods and labour are then converted into economic prices using the conversion factors estimated in 6-4-1. The trade goods for the construction of this project will be exempted from payment of customs, and so the investment for trade goods is appraised in CIF prices.

Table 6-5-1 shows the economic prices for the construction investment.

Table 6-5-1 Construction Investment

(Unit: Million Rp.)

	Local Currency		Foreign Currency at CIF Rice	Economic Price of the Construction Cost
	Market Price	Economic Price		
Berths and Breakwater	21,155	20,351	20,777	41,128
Channel, Basin and Reclamation	3,903	3,748	8,017	11,765
Others	7,322	7,048	17,675	24,723
Total	32,380	31,147	46,469	77,616

6-5-2 Maintenance Costs

The maintenance costs per year for the facilities are assumed to be 1.0 percent of the original investments excluding Consultant Services and Contingencies.

The calculation of these costs is given in Table 6-5-2.

Table 6-5-2 Maintenance Costs per Year

Unit: Million Rp.

Amount of Construction Cost at Economic Price.	Consultant Service and Contingency at Economic Prices.	Rate	Maintenance Cost at Economic Prices
76,965	11,188	0.01	658

6-5-3 Operation Costs

As mentioned in Chapter 8, operating costs are mostly personnel costs for port operations and services.

The current staff of PERUM PELABUHAN III CHABANG SEMARANG (hereafter "Semarang Port") will be sufficient to operate and manage the additional port facilities provided by the project.

So, the number of personnel in the future is assumed to be the same as at present.

Thus, additional operating costs need not be considered for this project.

6-6 Benefits

6-6-1 General

Considering the present situation presented in Chapter 2, the cargo forecast in Chapter 3, and the port planning in Chapter 4, the benefits of the "With" case and costs of the "Without" case are compared in the following table.

Table 6-6-1 Benefits and Costs

Benefits of the "With" case	Costs of the "Without" case
°Reduction of ship waiting costs	°Increase of ship waiting costs due to increased congestion in the port.
°Reduction of land transportation costs	°Increase of land transportation cost as cargoes must be carried overland from other ports.
°Reduction of cargo handling cost from reduced offshore cargo handling.	°Increase of cargo handling cost due to increased offshore cargo handling.
°Reduction of energy cost for cement products by changing from petroleum to coal.	°Increase of energy cost for cement products, because coal cannot be handled at Semarang Port and petroleum must be used to produce cement products.

In addition to the benefits in table 6-6-1, the following three intangible benefits are also expected.

- o Increase in employment opportunities.
- o Positive impact on port-related industries.
- o Reduction of cargo damage from reduced offshore cargo handling.

6-6-2 Tangible Benefits

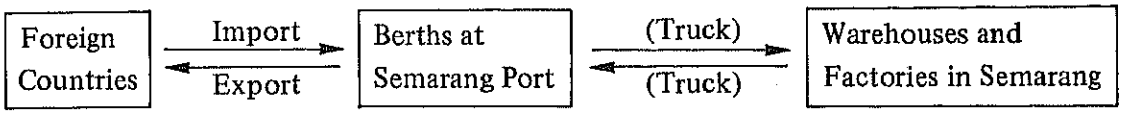
(1) "Without" Case

i) Samudra cargoes

Generally, lumber, general cargo, grain, rice, agricultural products and half the volume of iron and scrap are handled at berths under the "Without" case (A).

However, cargoes in excess of the cargo handling capacity at quay wall are handled offshore (B). If the offshore cargo handling volume exceeds the cargo handling capacity of berths for the barges, excess cargoes are handled at Tanjung Priok and then transported to Semarang (C).

(A)



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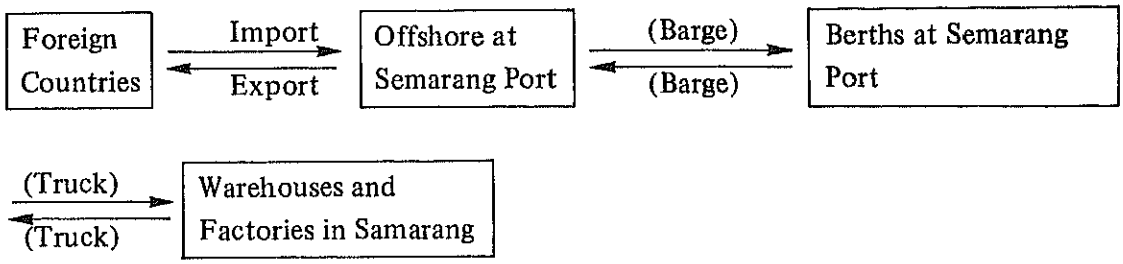

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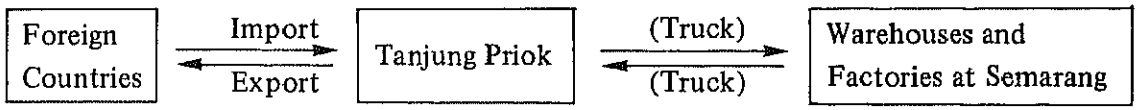
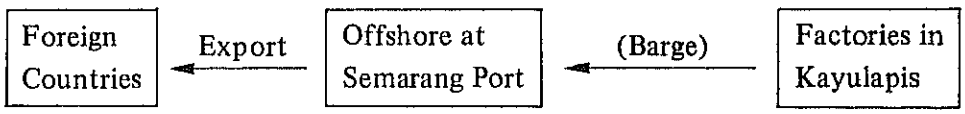


Under the "Without" case, plywood are handled offshore by Kayu Lapis (D) as at present.

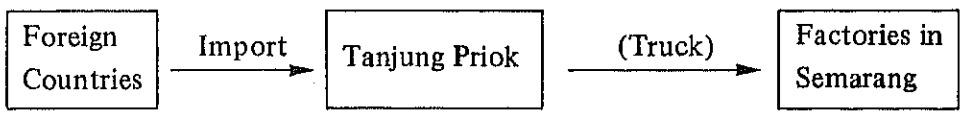
(D)



Half the throughput of iron and scrap is handled at berths.

The other half which will be handled at a special berth under the "With" case, is handled at Tanjung Priok under the "Without" case and then transported to Semarang (E).

(E)



2) Nusantara, Khusus, Local and Rakyat cargoes

For Nusantara cargoes, all the cargoes in excess of the cargo handling capacity of berths are handled offshore.

For Khusus cargoes, iron from foreign countries is handled at Tanjung Priok and then transported to Semarang by truck. Fertilizer for domestic trade is handled at Grisik Port and then transported to Semarang by truck.

Table 6-6-2 shows the share of cargo volume for land transportation, offshore cargo handling and cargo handling at berth under the "Without" case by commodity (except local and rakyat cargoes).

Table 6-6-2 Share of Cargo Volume for Land Transportation, Offshore Cargo Handling and Cargo Handling at Berth under the "Without" Case

(Unit: %)

Commodity \ Year / Traffic		1990			1993			1995			2000			2014		
		Land	Offshore	Berth	Land	Offshore	Berth	Land	Offshore	Berth	Land	Offshore	Berth	Land	Offshore	Berth
Foreign	Lumber	0	34	66	3	47	50	29	29	42	40	18	42	40	18	12
	Ag. Products	0	33	67	2	47	51	29	29	42	39	18	43	39	18	43
	General Cargo (Export)	0	34	66	1	48	51	29	28	43	40	18	42	40	18	42
	General Cargo (Import)	0	33	67	1	48	51	29	28	43	41	17	42	41	17	42
	Iron & Steel	50	17	33	45	27	28	28	17	55	65	10	25	65	10	25
	Wheat (Grain)	0	34	66	1	48	51	57	28	15	41	17	42	41	17	42
	Rice	0	32	68	5	45	50	28	28	44	41	17	42	41	17	42
Domestic	Lumber	-	11	89	-	30	70	-	38	62	-	44	56	-	44	56
	G.C. & Ag. Products (Out)	-	9	91	-	29	71	-	36	64	-	40	60	-	40	60
	G.C. & Ag. Products (In)	-	11	89	-	31	69	-	40	60	-	40	60	-	40	60
	Steel	-	9	91	-	30	70	-	37	63	-	40	60	-	40	60
	Rice	-	9	91	-	30	70	-	36	64	-	40	60	-	40	60
	Fertilizer	100	-	-	100	-	-	100	-	-	100	-	-	100	-	-

Table 6-6-3 shows the ratio of the cargo volume of vessels which have to wait for a berth to the total cargo volume (the volume of cargoes handled overland, offshore and at berth) by year under the "Without" case (except local and Rakyat cargoes).

Table 6-6-3 Ratio of Cargo Volume of Waiting Vessels to Total Cargo Volume

(Unit: %)

Commodity \ Year		1990	1993	1995	2000	2014
Foreign	Lumber	97	96	69	58	58
	Ag. Products	97	97	69	59	59
	General Cargo (Export)	97	98	69	58	58
	General Cargo (Import)	97	98	70	58	58
	Iron Steel	48	54	42	34	34
	Wheat (Grain)	97	98	69	58	58
	Rice	97	94	70	57	57
Domestic	Lumber	61	64	65	65	65
	G.C. & Ag. Products (Out)	64	65	63	63	63
	G.C. & Ag. Products (In)	64	61	65	63	63
	Steel	63	54	63	63	63
	Rice	63	63	62	63	63

Concerning local and rakyat cargoes, these cargoes are handled as at present at the quay wall.

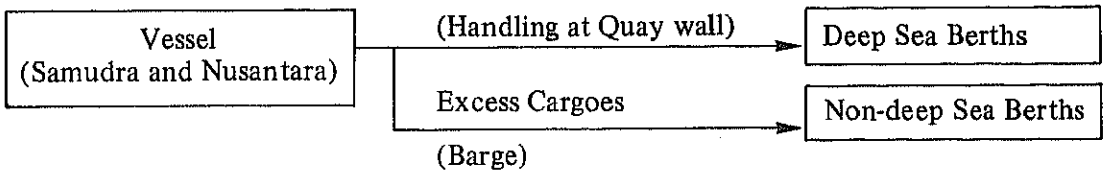
(2) "With" Case

1) Samudra and Nusantara cargoes

Generally, all Samudra and Nusantara cargoes are handled at quay wall under the

"With" case, but the cargoes in excess of the cargo handling capacity at quay wall are handled offshore and then transported by barge to the Inner Harbour, Kali Baru or other non-deep sea berths.

"With" case for Samudra and Nusantara



Khusus cargoes are handled at the quay wall at the special berths which are constructed as part of this project.

2) Coal

Coal is one of the Khusus cargoes which will be transported to Semarang Port under the "With" case by special ship.

However, under the "Without" case, coal can not be handled because the coal terminal will not be constructed.

(3) Reduction of Berth Waiting Costs

As mentioned in 6-3-2, the cargo volume of Samudra and Nusantara under the "Without" case can not be handled at the present facilities because the berth occupancy ratio exceeds 1.0 in 1990.

The cargo handling volume at quay wall under the "Without" case should be limited to those which can be handled within 3 berth-waiting days for calling ships at this port, and excess cargo should be handled offshore or transported from other ports by land transportation.

The 3 day maximum is obtained from experiences at other ports and information from shipping companies.

The benefit for reduction of berth waiting costs is the difference between the berth waiting costs under the "Without" case and those under the "With" case. Thus, the benefit is calculated by the following formula.

Reduction of Berth Waiting Costs	=	Difference of Waiting Time between the "Without" Case and the "With" Case	x	Ships' Waiting Costs per Unit Time (economic price)

There are two methods of calculating ship cost for berth waiting: one is to sum up all of the various expenses incurred during the wait, and the other is to evaluate overall costs by the charter rate.

The former is preferred in this study because the latter shows excessive fluctuation from year to year.

Tables 6-6-4 and 6-6-5 show the average berth waiting time and berth waiting cost by ship type respectively.

Table 6-6-4 Berth Wating Time

	Average Waiting Time under the "Without" Case	Average Waiting Time under the "With" Case	Difference
1,000 DWT	3.0	0.17	2.83
1,000 DWT LESS	3.0	0.13	2.87

Table 6-6-5 Ship Costs for Berth Waiting

Unit: $US/days

D.W.T	1,000	3,000	7,500	8,500	11,000	13,000
Cost	1,310	1,690	2,560	2,710	3,630	3,640

Table 6-6-6 Reduction of Berth Waiting Costs

Unit: Million Rp.

Year	Amount of Savings
1990	3,869
1993	5,359
1995	4,470
2014	4,470

(3) Reduction of Land Transportation Costs

As mentioned in 6-3-1, under the "Without" case cargo in excess of the capacity of the present facilities is to be transported from other ports by land transportation. The commodities and the land transportation routes are mentioned in 6-6-2, above.

No such land transportation cost will be incurred under the "With" case. Thus, the land transportation cost which would be incurred under the "Without" case is equal to the reduction of land transportation cost which is one of the main benefits of the development project. The figure is calculated as follows:

Reduction of Land Transportation Costs	=	Land Transportation Costs per ton/10 km (economic price)	x	Distance Transported

For this analysis, the following assumptions are made.

Waiting time at other ports is not considered.

Cargo handling costs at other ports is not significantly different from that at Semarang Port.

Table 6-6-7 shows the land transportation costs by truck per ton/10 Km and between Semarang and major cities.

Table 6-6-8 shows the cargo volume for land transportation:

Table 6-6-7 Land Transportation Costs per 6 Wheel Truck

(Unit: Rp.)

	Per 10 Km	Semarang-Jakarta (Round-trip)	Semarang-Cilacap (Round-trip)	Semarang-Cibinong	Semarang-Yogyakarta
Operating Costs	1,860	184,500	116,800	186,000	43,200
Fixed Costs	990	98,200	62,200	99,000	23,000
Others	430	52,400	36,800	52,750	19,900
Total	3,280	335,100	215,800	337,750	86,100
Distance	-	495 km x 2	415 km x 2	500 km x 2	116 km x 2
Note	Excluding cargo handling cost	Including cargo handling cost	Including cargo handling cost	Including cargo handling cost	Including cargo handling cost

Table 6-6-8 Cargo Volume for Land Transportation

Unit : 000 tons

	1990	1991	1992	1993	1994	1995	1996
Cargo Volume	185	200	200	213	424	633	836

Table 6-6-9 Reduction of Land Transportation Costs

Unit : Million Rp.

Year	Amount of Savings
1990	7,367
1993	9,134
1995	25,779
2000	30,650
2014	31,514

(4) Reduction of Cargo Handling Costs from Reduced Offshore Cargo Handling

As mentioned in 6-6-2, for Samudra and Nusantara, cargoes in excess of the cargo handling capacity at quay wall are, in principal, handled offshore using barges for the "Without" case. However, for Samudra, those offshore cargoes which exceed the handling capacity of berths for the barges must be handled at other ports and then transported overland to Semarang.

Under the "With" case, none of the cargoes will be transported overland; all of the cargoes will be handled directly at quay wall. As direct cargo handling at quay wall is more economical, decreasing the volume of cargoes handled offshore will significantly reduce the overall cargo handling costs. This benefit of the project is calculated as follows:

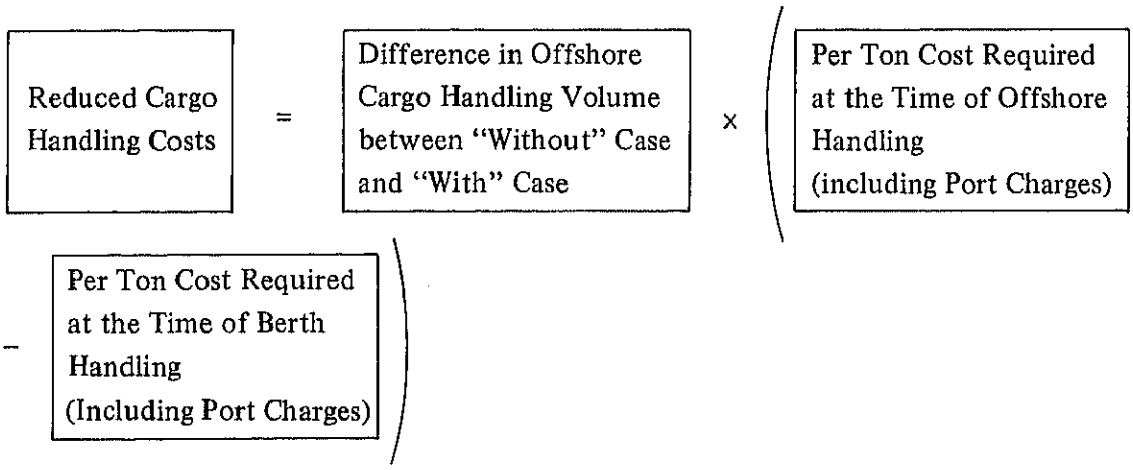


Table 6-6-10 shows offshore cargo handling costs and Table 6-6-11 cargo handling costs at berth.

Table 6-6-10 Offshore Cargo Handling Costs

Unit: Rp/ton

Item	Amount
Wage of Labour for Cargo Handling (including Crew of Barge)	1,134
Tugboat Expenses	497
Barge Expenses (excluding Crew Wages)	32
Total	1,663

Table 6-6-11 Cargo Handling Costs at Berth (Conventional Cargo Boat)

Item	Number of Persons per Gang (persons)	Wage (RP/person/shift)	Amount (RP/ton)
Stevedoring	12	35,856	366
Cargo Handling	9	26,454	270
Receiving & Delivery	9	26,454	270
Total	30	88,764	906 (≒ 910)

These costs exclude port charges such as anchorage fees are mooring fees which are paid to the port management body. These charges are calculated based on INPRES-4, and then added to the costs shown in these tables. The per ton cost for offshore cargo handling is estimated.

Table 6-6-12 shows the reduced cargo handling cost.

Table 6-6-12 Reduction of Cargo Handling Cost

Unit: Million Rp.

Year	Amount of Savings
1990	770
1993	1,738
1995	1,304
2014	1,304

(5) Reduction of Energy Costs of Cement Products by Changing from Petroleum to Coal

As mentioned in 6-6-1, fuel used in producing cement is coal under the "With" case and oil under the "Without" case.

According to Association Sement Indonesia and P.T. Semen Nusantara, about 0.14 tons of coal is required to produce 1 ton of cement. On the other hand, about 90 liters of oil is required to produce 1 ton of cement.

The coal price including transportation from South Sumatra to Central Java is about 66,000 RP/ton.

The oil price is about 200 RP/ℓ.

Therefore, the difference of fuel costs for producing cement is calculated by the following formula.

$$\text{Reduction of Energy Costs} = \left\{ 90\,\ell \times 200\ \text{RP}/\ell - 0.14\ \text{tons} \times 66{,}000\ \text{RP/ton} \right\} \times \text{Volume of Cement Production}$$

Table 6-6-13 shows the reduction of the energy costs.

Table 6-6-13 Reduction of Energy Costs

Unit: Million Rp.

Year	Amount of Savings
1990	1,320
1993	2,640
1995	2,640
2000	5,280
2014	8,800

6-6-3 Others (Intangible Benefits)

(1) Increase in Employment Opportunities

In order to assess the benefits of additional employment arising from the project, construction employment during the construction period and post-construction employment in port operation and factories at the new industrial complex are considered.

1) Benefit from employment during the construction period

There is an excess supply of unskilled labour in Central Java.

The construction will increase the employment opportunities for those people who would be unemployed without the project.

This employment effect is one of the major benefits of the project.

2) Benefits from employment after the construction

Here, there are two different types of jobs which will be created after the construction.

- Labourers for loading and unloading operations
- Employees of factories which will begin or expand operations due to the port development.

(2) Impact of Port-related Industries

Port-related industries, such as those shown in Table 6-6-14 (especially the first group) will become more numerous in the areas adjacent to the port due to the implementation of the project. This will be followed by secondary growth of banks, retailers, wholesalers, restaurants, insurance companies, etc.

Table 6-6-14 Port-related Industries

Group	Industries
A. Primary	Warehouses
	Stevedoring
	Transportation
	Construction
B. Secondary	Banks
	Retailers
	Wholesalers
	Restaurants
	Insurance Companies

(3) Reduction of Cargo Damage from Reduced Offshore Cargo Handling

Under the "Without" case, a considerable volume of cargoes have to be handled offshore. Offshore cargo handling means additional cargo handling and also cargo handling under less than ideal conditions. Thus cargoes which are handled offshore suffer more damage than those cargoes which are handled at quay wall. Furthermore, general cargo and iron are particularly susceptible to damage from sea water and rain, and offshore cargo handling increases the chances that such cargoes will be exposed to sea water and rain.

6-7 Evaluation

6-7-1 Prerequisites for Calculation

The lifespans of the major structures, that is, the quay walls, revetments and breakwater are 25 years, 25 years and 50 years, respectively.

On the other hand, EIRR calculation based on economic cost/benefit is carried out starting in 1988 and ending in 2014 (25 years from the start of operations in 1990).

Therefore, the breakwater will continue to be valuable after the end of the project.

The residual value of the breakwater in 2014 is considered as one of the benefits of the project.

6-7-2 Results

The EIRR of the project is 28.1 percent for the base case (Table 6-7-1). Usually, the EIRR is compared with the opportunity cost of capital in the country. In Indonesia, the opportunity cost of capital is said to be 12 percent.

From this point of view, this project can be judged as more than feasible.

Table 6-7-1 Internal Rate of Return Calculation Sheet

EIRR = 28.1%
Unit: Million Rp.

YEAR	COST	BENEFIT	BNFT. - COST
1988	17804.00	0.00	-17804.00
1989	38345.00	0.00	-38345.00
1990	21468.00	13303.00	-8165.00
1991	658.00	14222.00	13564.00
1992	658.00	15700.00	15042.00
1993	658.00	18871.00	18213.00
1994	658.00	23634.00	22976.00
1995	659.00	29466.00	28808.00
1996	658.00	35714.00	35056.00
1997	658.00	39916.00	39258.00
1998	658.00	40718.00	40060.00
1999	658.00	41518.00	40860.00
2000	658.00	41704.00	41046.00
2001	658.00	42651.00	41993.00
2002	658.00	43600.00	42942.00
2003	658.00	44540.00	43882.00
2004	658.00	45494.00	44836.00
2005	658.00	45562.00	44904.00
2006	658.00	45629.00	44971.00
2007	658.00	45697.00	45039.00
2008	658.00	45766.00	45108.00
2009	658.00	45833.00	45175.00
2010	658.00	45901.00	45243.00
2011	658.00	45968.00	45310.00
2012	658.00	46036.00	45378.00
2013	658.00	46088.00	45430.00
2014	658.00	46088.00	45430.00
Residual Value	0.00	12201.00	12201.00
TOTAL	93409.00	961820.00	868411.00

6-7-3 Sensitivity Analysis

(1) Identification of Cases

Since every project appraisal makes use of forecasting, various uncertain factors enter the projection. Therefore, sensitivity tests are made to see if the project is justifiable when some of these factors are vary.

The different assumptions for the sensitivity tests are as follows:

Case A . . . The cargo volume in each year (1990 ~ 2014) is decreased by 10 percent.

Case B . . . The construction cost is increased by 10 percent.

Case C . . . The exchange rate is changed from ¥1 = Rp. 4.4 to ¥1 = Rp. 6.2.

In the body of this report, all calculations are made assuming an exchange rate of ¥1 = Rp. 4.4. This rate is consistent with the actual rate at the time the field surveys were conducted. Recently, however, the Indonesian Rupiah has lost value versus the yen. As of March 1986, the exchange rate was ¥1 = Rp. 6.2. Thus, this sensitivity test checks the effects of a devalued Rp. on the economic appraisal of the Urgent Plan.

(2) Results

The results of the sensitivity test are shown in Table 6-7-2.

Table 6-7-2 Results of Sensitivity Test

Different Assumption			EIRR (%)
Case A	Cargo volume	-10%	24.9
Case B	Construction Cost	+10%	26.2
Case C	Exchange Rate Change		24.9

6-7-4 Conclusion

This Urgent Plan is judged to be more than feasible based on the EIRR

CHAPTER 7
FINANCIAL ANALYSIS

CHAPTER 7 FINANCIAL ANALYSIS

7-1 Purpose

In the economic analysis in the preceding chapter, the economic effectiveness of the investment is studied from the point of view of the national economy. The purpose of the financial analysis in this chapter is to ascertain the import of the Urgent Plan on the financial condition of Semarang Port and to determine whether the project itself is sound from a financial viewpoint. Specifically, the analysis covers:

(1) The financial viability of "Semarang Port" which is responsible for the Phase II Urgent Plan;

(2) The profitability of the Phase II Urgent Plan itself.

7-2 Methodology

The investment effects of this project are analyzed using the following two methods:

(1) Analysis by Financial Statements

The financial viability of the project is appraised based on the projected financial statements (income statement, cash flow statement and balance sheet) of "Semarang Port" to analyze revenues and expenditures, fund raising condition and financial status.

(2) Analysis by Discount Cash Flow

The profitability of the project itself is analyzed based on the financial rate of return (FRR) of the project using the Discount Cash Flow Method. The FRR is a discount rate which makes the net present value of the cash flow (revenues minus expenditures) equal to zero.

7-3 Prerequisite

The financial analysis of the development project for Semarang Port is executed based on the following premises:

(1) The financial status of Semarang Port is analyzed assuming a self-supporting business accounting system based on the cost principle.

(2) The project is financed using the interest-free development funds of the Indonesian Government and soft loans from overseas.

The financing conditions are assumed as follows:

Total Investment Amount	:	Rp. 86,372 million (100%)
Local Currency	:	Rp. 32,380 million (37%)
Foreign Currency	:	Rp. 53,992 million (63%)
Interest Rate	:	3.5% per annum
Grace Period	:	10 years
Repayment Period	:	30 years

(3) In analyzing the Phase II Project, the financial matters of the Phase I Project such as depreciation and payment of interest must be taken into account, because the financing period of the Phase I Project overlaps with that of the Phase II Urgent Plan.

The financing conditions of the Phase I Project are as follows:

Total Investment Amount	:	Rp. 65,590 million (100%)
Local Currency	:	Rp. 19,696 million (30%)
Foreign Currency	:	Rp. 45,894 million (70%)
Interest Rate	:	2.5% per annum
Grace Period	:	10 years
Repayment Period	:	30 years

(4) Costs and revenues are computed in 1985 prices.

(5) The project life covers the 30 years from 1985 to 2014.

(6) The revenues are calculated based on the current port tariff rate authorized by the Indonesian Government under INPRES No. 4/1985. Any cargo volume or number of calling vessels which exceeds the maximum wharf capacity (Table 4-8-1) is not considered in the financial calculations.

(7) Depreciation is calculated using the straight line method, assuming no residual value.

The depreciation periods are determined in accordance with the standards of the Indonesian Government.

(8) The present financial situation of Semarang Port, that is, income statement and balance sheet are shown in Tables 7-3-1 and 7-3-2, respectively.

Table 7-3-1 Income Statement of Semarang Port 1984

Unit: Million Rp

Revenue	Amount
Ship service	879
Wharfs & storage	664
Handling equipment	156
Other	330
Terminal division	259
Reduction from revenue	(100)
Total revenue	2,189
Expenses	Amount
Salary	1,051
Material	197
Maintenance	203
Depreciation	494
Insurance	16
General administration	390
Terminal division	250
Other profit	(74)
Total expenses	2,526
Net income	(337)

Source: ADPEL

Table 7-3-2 Balance Sheet of Semarang Port 1984 (12/31)

Assets — Unit: Million Rp

I Current Assets	1,341
Cash on hand	71
Bank deposits	343
Accounts receivable	363
Advance payment	27
Stock	52
Advance expenses	10
Outstanding income	68
Tax	410
Accounts receivable from other ports	(3)
II Fixed Assets	8,121
Non-depreciable assets (land)	1,705
Depreciable assets	7,246
Less: Accumulated depreciation	830
Total fixed assets	8,121
III Other Assets	2
Total Assets	9,465

Liabilities

IV Current Liabilities	1,572
Accounts payable	80
Advance payment (to be re-calculated in the invoice)	17
Share of profit to be paid to shipping company	12
Advance payment	138
Outstanding Tax	36
Outstanding expenses	129
Advance income	82
Outstanding corporate tax	247
Share of profit to be deposited to the government	162
Other debts	28
Accounts payable to other branches	642
V Long-term Debt	346
VI Foreign Exchange Profits to be received	8
VII Capital and Stock	7,538
Capital	13
Accounts payable to the head office	8,278
Profit/loss of former year	(417)
Profit/loss of current year	(337)
Total Liabilities	9,465

Source: ADPEL

7-4 Revenues

Revenues are calculated by item, based on the forecast cargo volume calculated in the preceding chapter, the number of calling vessels and the current tariff.

(1) Ship Charges

A. Anchoring Fee:
The unit charge per gross ton is determined on the basis of the tariff and multiplied by the per annum gross cargo tonnage classified by type.

B. Mooring Fee:
The unit charge per gross ton is determined on the basis of the tariff and multiplied by the per annum gross tonnage and mooring days for each type of vessel.

C. Pilotage Fee:
A cumulative computation is made based on the tariff, estimating the number of vessels classified by type and size for each fiscal year.

D. Towing Fee:
A cumulative computation is made based on the tariff, estimating the number of vessels classified by type and size for each fiscal year.

E. Water Supply:
Total revenues are estimated based on the tariff, estimating the water volume by ship size.

(2) Cargo and Facility Charges

A. Facility Charge:
The unit charge per ton of cargo is determined and multiplied by the volume of cargo passing through the facilities each year. This unit charge includes charges for anchoring and holding.

B. Equipment Rental:
The unit charge per ton of cargo handled is determined and multiplied by the total volume of cargo to be handled each year.

(3) Land Rental

The land rental area is assumed to increase at an annual rate of 7% from 1994, and is multiplied by the unit rental fee in the tariff.

The spreading of 1 m of topsoil after 1991 is assumed to be carried out by the private companies which use the land concerned.

(4) Fund management income is assumed to be 8.3% of the cash minimum of the previous year.

(5) Support revenue is estimated using the past records.

7-5 Expenses

(1) Classification of Expenditures

Expenditures are classified into five categories: Operating costs, general administrative costs, maintenance costs, depreciation expenses and interest on loans.

A. Operating costs are mostly personnel costs necessary for port operations and services.
The existing port organization includes approximately 520 ADPEL staff.
The current staff will be sufficient to operate and manage the additional port facilities provided by the project, considering an advance of working efficiency by mechanization, and improved labour productivity.
Therefore, the number of personnel in the future is assumed to be the same as at present.
Operating costs and general administration costs are estimated using the past business record.

B. The maintenance cost of each facility is assumed to be 1 percent of the construction cost.

C. The depreciation expense of fixed assets is calculated using the straight line method.
The service life and depreciation rate of each of the facilities are determined based on the standards of the Indonesian Government, as shown in Table 7-5-1.

D. Interest on the long-term loan is calculated assuming the foreign currency portion of the project cost is met by the foreign loan described in Section 7-3.

Table 7-5-1 Specification of Depreciation Rate on Fixed Assets

Item	Depreciation Rate	Lifetime (Years)
Quays	0.04	25
Breakwaters	0.02	50
Transit Sheds	0.04	25
Open Storage Areas	0.04	25
Roads	0.05	20
Office Buildings	0.04	25
Water Supply	0.04	25
Power Supply	0.04	25
Cargo Handling Equipment	0.10	10
Vessels	0.05	20
Others	Nil	Nil
Navigation Aids	Nil	Nil

(2) Surplus of Funds:

After depreciation, payment of interest and fund management income, the net income (A) is reduced by tax (B) and payment to the Government fund (C). The net surplus (D) is to be maintained as retained earnings.

These variables are calculated as follows:

A : $A = B + C + D$

B : When $A \leqq$ Rp 10,000,000

$$B = A \times \frac{15}{100}$$

When Rp 10,000,000 $< A \leqq$ Rp 50,000,000

$$B = 10{,}000{,}000 \times \frac{15}{100} + (A - 10{,}000{,}000) \times \frac{25}{100}$$

When $A >$ Rp 50,000,000

$$B = 10{,}000{,}000 \times \frac{15}{100} + 40{,}000{,}000 \times \frac{25}{100} + (A - 50{,}000{,}000) \times \frac{35}{100}$$

C : $C = (A - B) \times \frac{55}{100}$

D : $D = A - B - C$

7-6 Evaluation

7-6-1 Evaluation of the Profitability of the Project

(1) Profitability of the Project Itself

The profitability of the project itself is appraised based on the FRR.

For the calculation of the FRR, benefits are revenues derived from new port facilities provided by the Phase II Urgent Plan, while costs are construction and maintenance costs. The residual value of the new investment in 2015 is taken into account. The results of the calculation are shown in Table 7-6-1.

The FRR of this project is 3.8%.

The desirable level of FRR varies, depending on time, place, lender and borrower. For the borrowers, the interest rate paid on raised funds is the lower limit. In this project, 63% of the overall construction cost (i.e. the foreign portion) is assumed to be raised by loans with a 3.5% interest rate.

Thus, the FRR is required to exceed 2.2%, which is the weighted average interest rate for all the project funds. Judging from this point of view, this project can be regarded as feasible.

Table 7-6-1 Finncial Rate of Return Calculation Sheet (Base case)

FRR = 3.80
Unit: Million Rp

YEAR	COST	BENEFIT	BNFT.-COST
1988	18060.00	0.00	-18060.00
1989	41669.00	0.00	-41669.00
1990	27356.00	3760.00	-23596.00
1991	713.00	4026.00	3313.00
1992	713.00	4319.00	3606.00
1993	713.00	4581.00	3868.00
1994	713.00	4684.00	3971.00
1995	713.00	4792.00	4079.00
1996	713.00	5009.00	4296.00
1997	713.00	5224.00	4511.00
1998	713.00	5441.00	4728.00
1999	713.00	5667.00	4954.00
2000	713.00	5892.00	5179.00
2001	713.00	6060.00	5347.00
2002	713.00	6220.00	5507.00
2003	713.00	6385.00	5672.00
2004	713.00	6550.00	5837.00
2005	713.00	6724.00	6011.00
2006	713.00	6906.00	6193.00
2007	713.00	7091.00	6378.00
2008	713.00	7279.00	6566.00
2009	713.00	7476.00	6763.00
2010	713.00	7681.00	6968.00
2011	713.00	7890.00	7177.00
2012	713.00	8072.00	7359.00
2013	713.00	8219.00	7506.00
2014	713.00	8357.00	7644.00
Residual Value	0.00	12426.00	12426.00
Total	104197.00	166731.00	62534.00

(2) Sensitivity Analysis

Sensitivity analysis is made for the following three cases.

Case A: Assuming a revenue decrease of 10%

Case B: Assuming a construction cost increase of 10%

Case C: Assuming a construction cost increase of 20%

Case C, a 20% construction cost increase, is equivalent to a change in the foreign rate from ¥1 = Rp. 4.4 to ¥1 = Rp. 6.2. (This rate was the actual exchange rate in March 1986)

The FRR is computed for each of these cases.

The results are shown in Fig. 7-6-1.

The results of the sensitivity analysis show that every financial return of the project exceeds the lower limit of 2.2% even if revenues decline or costs increase by 10% or 20%.

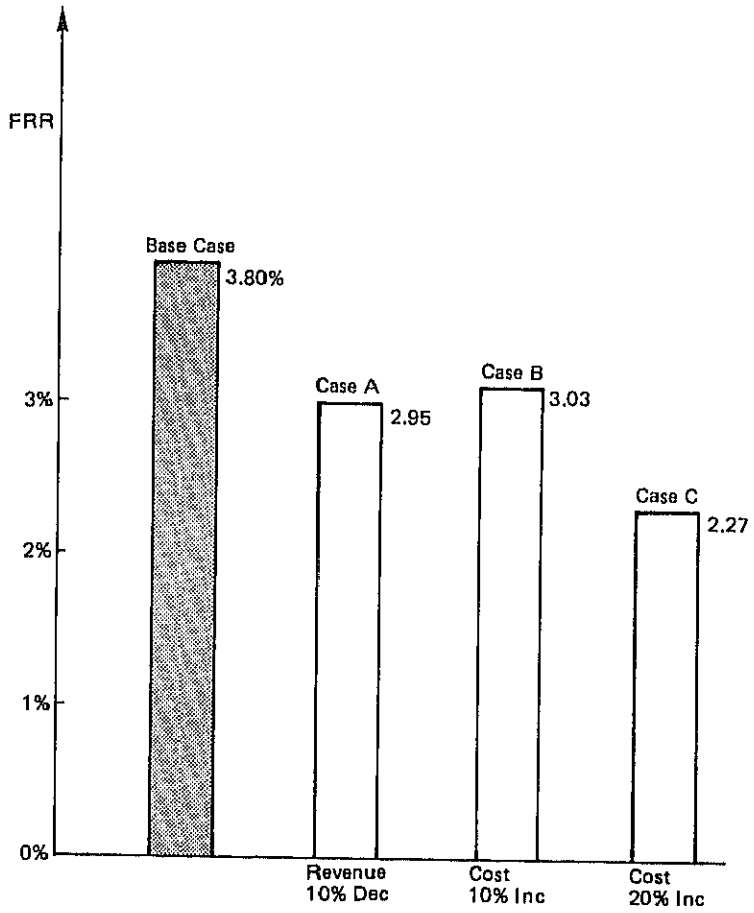


Fig. 7-6-1 Sensitivity Analysis

7-6-2 Financial Situation of "Semarang Port"

(1) Financial Statements and Ratios

The soundness of the financial affairs of "Semarang Port" is examined based on three projected financial statements (income statement, cashflow statement and balance sheet) and financial ratios for each year.

The following ratios are selected for the evaluation.

A. Working Ratio . . . . . to ascertain the income position

$$\frac{\text{Operating expenses}}{\text{Total operating revenues}} \times 100$$

B. Operating Ratio . . . . . to ascertain the income position

$$\frac{\text{Total operating expenses}}{\text{Total operating revenues}} \times 100$$

C. Return on Net Fixed Assets . . . . . to ascertain the earning capacity

$$\frac{\text{Net operating income}}{\text{Net fixed assets at end of year}} \times 100$$

D. Debt Service Ratio . . . . . to ascertain loan repayment capacity

$$\frac{\text{Net operating income before depreciation}}{\text{Repayment and interest on long term loans}} \times 100$$

(2) Influence of Changes in the Exchange Rate

The financial situation of "Semarang Port" may be susceptible to changes in foreign exchange rates, particularly in the ¥-Rp. rate, under this project.

Financial calculations are carried out for the following two cases to analyze the influence of possible changes in the exchange rates.

Base Case

In this case, it is assumed that any losses which "Semarang Port" would incur from a devalued Rp. would be covered by direct subsidies from the central Government.

Under the present situation, the port cannot bear any significant losses from exchange rate fluctuations, because the current tariff is on a Rp. basis and "Semarang Port" doesn't have any revenues linked with foreign currency and also doesn't have any authority to change the current tariff.

On the other hand, as a devaluation of the Rp. versus the Yen could, overtime, improve the balance of trade between Indonesia and Japan, it may be reasonable to assume that the central Government should subsidize "Semarang Port" for any exchange rate losses.

Case A

In this case, it is assumed that as "Semarang Port" is supposed to be a self-supporting entity, any losses incurred from a devaluation of the Rp. versus the Yen should be borne by the port management body directly.

The financial calculations for this case are based on the following assumptions.

1) New Phase I cost is calculated as follows:

$$\text{New Phase I cost} = \text{Phase I cost} \times \left[\text{Foreign portion } (0.7) \times \frac{\text{ex. rate Phase II } (4.4)}{\text{ex. rate Phase I } (2.9)} + \text{Local portion } (0.3)\right]$$

2) In response to the cost increase, revenues (tariffs) are assumed to increase 20% every year.

The projected financial statements and financial ratios of "Semarang Port" for the base case are shown in Tables 7-6-2, 7-6-3 and 7-6-4.

Table 7-6-5 presents the evaluation ratios of "Semarang Port" under Case A.

(3) Evaluation

1) Base Case

Working ratios throughout the project life (from 1985 to 2014) are in the order of 20 ~ 60 percent, so these figures can be said to be good.

On the other hand, other financial ratios are not so good during the first several years. First of all this is because the interest and depreciation of both the Phase I and Phase II projects place a great burden on "Semarang Port", and strongly influence its financial situation.

Second is that the enforcement of the new tariff from 1985 under INPRES No. 4 drastically decreased port revenues.

However, as depreciation and loan interest begin to decrease during the latter half of the porject life, these ratios improve gradually and finally reach desirable levels.

2) Case A

As far as the influence of the exchange rate is concerned, judging from the financial evaluation ratios in Tables 7-6-4 and 7-6-5, a revenue increase of roughly 20% seems necessary to ensure that the finances of "Semarang Port" balance.

3) Conclusion

Judging from the projected statement and ratios, as a whole, it can be said that "Semarang Port" has a sufficient financial capacity to execute the Phase II Urgent Plan and this project can be regarded as feasible.

Table 7-6-2 Projected Income Statement (Base Case)

	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2,000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Operating Revenues																														
Revenue from Ship	1,560	2,020	2,100	2,180	2,270	3,583	3,658	3,742	3,817	3,859	3,914	3,957	3,999	4,041	4,085	4,131	4,174	4,204	4,233	4,259	4,289	4,321	4,350	4,376	4,406	4,437	4,464	4,482	4,489	4,490
Revenue from Cargo	1,160	1,510	1,570	1,630	1,700	3,487	3,730	4,048	4,355	4,580	4,890	4,842	4,791	4,741	4,691	4,706	4,775	4,846	4,917	4,987	5,058	5,128	5,199	5,270	5,341	5,411	5,481	5,526	5,538	5,538
Revenue from Land Rental	170	170	170	170	170	420	510	600	680	728	779	833	891	954	1,020	1,092	1,168	1,250	1,338	1,431	1,531	1,639	1,753	1,876	2,007	2,148	2,298	2,459	2,631	2,816
Total Operating Revenue	2,890	3,700	3,840	3,980	4,140	7,490	7,898	8,390	8,852	9,167	9,583	9,632	9,681	9,736	9,796	9,929	10,117	10,300	10,488	10,677	10,878	11,088	11,302	11,522	11,754	11,996	12,243	12,467	12,658	12,844
Operating Expenses																														
Cash Operating Expenses																														
Personnel & Administration	1,900	1,900	1,900	1,900	1,900	1,900	1,900	1,900	1,900	1,900	1,900	1,900	1,900	1,900	1,900	1,900	1,900	1,900	1,900	1,900	1,900	1,900	1,900	1,900	1,900	1,900	1,900	1,900	1,900	1,900
Maintenance	200	680	680	680	680	1,396	1,396	1,396	1,396	1,396	1,396	1,396	1,396	1,396	1,396	1,396	1,396	1,396	1,396	1,396	1,396	1,396	1,396	1,396	1,396	1,396	1,396	1,396	1,396	1,396
Sub-Total	2,100	2,580	2,580	2,580	2,580	3,296	3,296	3,296	3,296	3,296	3,296	3,296	3,296	3,296	3,296	3,296	3,296	3,296	3,296	3,296	3,296	3,296	3,296	3,296	3,296	3,296	3,296	3,296	3,296	3,296
Non-Cash Charges																														
Depreciation Expenses	1,602	1,983	1,983	1,983	2,796	4,574	5,328	5,328	5,328	5,328	5,328	5,328	5,328	5,328	5,328	5,328	4,974	4,974	4,974	4,974	4,974	4,974	4,974	4,974	4,974	4,476	4,303	4,303	4,303	3,801
Total Operating Expenses	3,702	4,563	4,563	4,563	5,376	7,870	8,624	8,624	8,624	8,624	8,624	8,624	8,624	8,624	8,624	8,624	8,270	8,270	8,270	8,270	8,270	8,270	8,270	8,270	8,270	7,772	7,599	7,599	7,599	7,097
Net Operating Income (NOI)	-812	-863	-723	-583	-1,236	-380	-726	-234	228	542	958	1,008	1,057	1,112	1,172	1,305	1,847	2,030	2,217	2,407	2,608	2,817	3,032	3,252	3,484	4,224	4,644	4,868	5,059	5,746
NOI before Depreciation	790	1,120	1,260	1,400	1,560	4,194	4,602	5,094	5,556	5,871	6,287	6,336	6,385	6,440	6,500	6,633	6,821	7,004	7,192	7,381	7,582	7,792	8,006	8,226	8,458	8,700	8,947	9,171	9,362	9,548
Other Income & Expenses																														
Fund Management Income	0	0	0	7	25	25	118	250	432	594	710	833	993	1,174	1,380	1,314	904	914	940	964	993	1,038	1,105	1,183	1,273	1,124	721	772	850	925
Interest on Loans	1,147	1,147	1,147	1,147	1,546	2,450	3,037	3,037	3,037	3,019	2,974	2,916	2,858	2,800	2,742	2,664	2,541	2,388	2,235	2,083	1,930	1,777	1,625	1,472	1,319	1,167	1,014	861	709	556
Net Income	-1,959	-2,010	-1,870	-1,724	-2,756	-2,805	-3,645	-3,021	-2,377	-1,882	-1,306	-1,075	-808	-514	-189	-45	210	555	922	1,288	1,671	2,078	2,512	2,963	3,438	4,181	4,351	4,779	5,200	6,115
Tax	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	68	188	317	445	579	721	873	1,031	1,197	1,457	1,517	1,667	1,814	2,134
Payment to the Government	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	78	202	333	464	601	746	901	1,062	1,232	1,498	1,559	1,712	1,862	2,189
Retained Earnings	-1,959	-2,010	-1,870	-1,724	-2,756	-2,805	-3,645	-3,021	-2,377	-1,882	-1,306	-1,075	-808	-514	-189	-45	64	165	272	379	492	611	737	869	1,008	1,226	1,275	1,401	1,524	1,791
Accumulated Net Income	-1,959	-3,970	-5,840	-7,564	-10,320	-13,124	-16,769	-19,790	-22,168	-24,050	-25,356	-26,431	-27,240	-27,754	-27,943	-27,989	-27,778	-27,223	-26,302	-25,014	-23,343	-21,264	-18,752	-15,790	-12,352	-8,171	-3,819	959	8,159	12,274

Table 7-6-3 Projected Cashflow Statement (Base Case)

Cashflow Statement

	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2,000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Cash Beginning	414	0	0	79	305	306	1,427	3,013	5,202	7,151	8,550	10,035	11,959	14,149	16,632	15,833	10,891	11,007	11,323	11,612	11,965	12,511	13,310	14,254	15,340	13,545	8,691	9,307	10,236	11,143
Cash Inflow																														
Total Operating Revenue	2,890	3,700	3,840	3,980	4,140	7,490	7,898	8,390	8,852	9,167	9,583	9,632	9,681	9,736	9,796	9,929	10,117	10,300	10,488	10,677	10,878	11,088	11,302	11,522	11,754	11,996	12,243	12,467	12,658	12,844
Fund Management Income	0	0	0	7	25	25	118	250	432	594	710	833	993	1,174	1,380	1,314	904	914	940	964	993	1,038	1,105	1,183	1,273	1,124	721	772	850	925
Long-term Loans	10,570	0	0	11,377	25,830	16,785	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Equity of Government	6,325	0	0	6,683	15,839	9,858	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Other Liabilities Increment	-2	119	0	0	0	177	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Current Liabilities Beginning	521	519	637	637	637	637	814	814	814	814	814	814	814	814	814	814	814	814	814	814	814	814	814	814	814	814	814	814	814	814
Current Liabilities Ending	519	637	637	637	637	814	814	814	814	814	814	814	814	814	814	814	814	814	814	814	814	814	814	814	814	814	814	814	814	814
Total	19,783	3,819	3,840	22,047	45,834	34,335	8,016	8,640	9,284	9,760	10,292	10,465	10,674	10,910	11,177	11,243	11,021	11,214	11,427	11,641	11,872	12,126	12,407	12,705	13,028	13,120	12,985	13,240	13,508	13,788
Cash Outflow																														
Addition to Fixed Assets	16,895	0	0	18,060	41,669	26,643	0	0	148	190	119	0	0	0	3,034	6,000	0	0	148	190	119	0	0	0	3,034	6,000	0	0	148	190
Cash Operating Expenses	2,100	2,580	2,580	2,580	2,580	3,296	3,296	3,296	3,296	3,296	3,296	3,296	3,296	3,296	3,296	3,296	3,296	3,296	3,296	3,296	3,296	3,296	3,296	3,296	3,296	3,296	3,296	3,296	3,296	3,296
Interest on Loans	1,147	1,147	1,147	1,147	1,546	2,450	3,037	3,037	3,037	3,019	2,974	2,916	2,858	2,800	2,742	2,664	2,541	2,388	2,235	2,083	1,930	1,777	1,625	1,472	1,319	1,167	1,014	861	709	556
Loan Repayment	0	0	0	0	0	0	0	0	742	1,782	2,318	2,318	2,318	2,318	2,888	4,193	5,024	5,024	5,024	5,024	5,024	5,024	5,024	5,024	5,024	5,024	5,024	5,024	5,024	4,282
Tax	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	68	188	317	445	579	721	873	1,031	1,197	1,457	1,517	1,667	1,814
Payment to the Government	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	78	202	333	464	601	746	901	1,062	1,232	1,498	1,559	1,712	1,862
Other Assets Increment	166	209	34	34	38	825	98	118	111	76	100	12	12	13	15	32	45	44	45	46	48	50	52	53	56	58	59	54	46	44
Current Assets Beginning	591	757	965	999	1,033	1,071	1,896	1,994	2,112	2,223	2,299	2,399	2,411	2,422	2,435	2,450	2,482	2,527	2,571	2,616	2,661	2,710	2,760	2,811	2,864	2,920	2,978	3,037	3,091	3,137
Current Assets Ending	757	965	999	1,033	1,071	1,896	1,994	2,112	2,223	2,299	2,399	2,411	2,422	2,435	2,450	2,482	2,527	2,571	2,616	2,661	2,710	2,760	2,811	2,864	2,920	2,978	3,037	3,091	3,137	3,181
Total	20,308	3,936	3,761	21,821	45,833	33,214	6,431	6,451	7,334	8,362	8,807	8,542	8,484	8,427	11,975	16,185	10,906	10,898	11,138	11,287	11,326	11,327	11,464	11,619	14,822	17,974	12,349	12,311	12,601	12,045
Cash Inflow-Cash Outflow	-525	-118	79	226	1	1,121	1,585	2,189	1,950	1,398	1,486	1,923	2,190	2,483	-798	-4,942	116	316	289	354	546	799	943	1,086	-1,795	-4,854	616	929	907	1,724
Cash Ending	-111	-118	79	305	306	1,427	3,013	5,202	7,151	8,550	10,035	11,959	14,149	16,632	15,833	10,891	11,007	11,323	11,612	11,965	12,511	13,310	14,254	15,340	13,545	8,691	9,307	10,236	11,143	12,867
Amount Payable to Head Office	111	118	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Beginning	8,601	8,712	8,830	8,830	8,830	8,830	8,830	8,830	8,830	8,830	8,830	8,830	8,830	8,830	8,830	8,830	8,830	8,830	8,830	8,830	8,830	8,830	8,830	8,830	8,830	8,830	8,830	8,830	8,830	8,830
Ending	8,712	8,830	8,830	8,830	8,830	8,830	8,830	8,830	8,830	8,830	8,830	8,830	8,830	8,830	8,830	8,830	8,830	8,830	8,830	8,830	8,830	8,830	8,830	8,830	8,830	8,830	8,830	8,830	8,830	8,830

Table 7-6-4 Projected Balance Sheet and Financial Ratios (Base Case)

Balance Sheet

	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Assets																														
Current Assets																														
Cash & Bank Deposit																														
Cash Minimum	63	77	77	77	77	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99
Cash Excess	0	0	79	305	306	1,427	3,013	5,202	7,151	8,550	10,035	11,959	14,149	16,632	15,833	10,891	11,007	11,323	11,612	11,965	12,511	13,310	14,254	15,340	13,545	8,691	9,307	10,236	11,143	12,867
Total Cash & Bank Deposit	63	77	156	382	383	1,526	3,112	5,300	7,250	8,649	10,134	12,057	14,248	16,731	15,932	10,990	11,106	11,422	11,711	12,064	12,610	13,409	14,353	15,439	13,644	8,790	9,406	10,335	11,242	12,966
Other Current Assets	694	888	922	955	994	1,798	1,896	2,014	2,124	2,200	2,300	2,312	2,324	2,337	2,351	2,383	2,428	2,472	2,517	2,563	2,611	2,661	2,713	2,765	2,821	2,879	2,938	2,992	3,038	3,082
Total Current Assets	757	965	1,078	1,337	1,377	3,324	5,007	7,314	9,375	10,849	12,434	14,369	16,571	19,067	18,284	13,373	13,534	13,894	14,228	14,627	15,221	16,070	17,065	18,204	16,465	11,669	12,344	13,327	14,280	16,048
Fixed Assets																														
Non-Depreciable Assets	11,967	11,967	11,967	17,100	22,148	23,948	23,948	23,948	23,948	23,948	23,948	23,948	23,948	23,948	23,948	23,948	23,948	23,948	23,948	23,948	23,948	23,948	23,948	23,948	23,948	23,948	23,948	23,948	23,948	23,948
Depreciable Assets																														
Depreciable Assets	61,740	61,740	61,740	74,667	110,535	135,378	135,378	135,378	135,378	135,378	135,378	135,378	135,378	135,378	135,378	135,378	129,719	129,719	129,719	129,719	129,719	129,719	129,719	129,719	129,719	117,264	112,942	112,942	112,942	100,389
Accumulated Depreciation	1,602	3,585	5,568	7,551	9,594	14,168	19,496	24,824	30,005	35,143	40,352	45,680	51,008	56,336	58,630	57,958	57,274	62,248	67,075	71,859	76,715	81,689	86,664	91,638	81,123	75,278	79,581	83,884	75,487	79,098
Net Depreciable Assets	60,138	58,155	56,172	67,116	100,941	121,210	115,882	110,554	105,373	100,235	95,026	89,698	84,370	79,042	76,748	77,420	72,445	67,471	62,644	57,860	53,004	48,030	43,055	38,081	36,141	37,664	33,361	29,058	24,902	21,291
Total Fixed Assets	72,105	70,122	68,139	84,216	123,089	145,158	139,830	134,502	129,321	124,183	118,974	113,646	108,318	102,990	100,696	101,368	96,393	91,419	86,592	81,808	76,952	71,978	67,003	62,029	60,089	61,612	57,309	53,006	48,850	45,239
Total Assets	72,862	71,087	69,217	85,553	124,466	148,481	144,837	141,816	138,696	135,032	131,408	128,015	124,889	122,057	118,979	114,741	109,927	105,312	100,820	96,435	92,173	88,048	84,069	80,233	76,554	73,281	69,653	66,332	63,130	61,287
Liabilities & Equity																														
Liabilities																														
Current Liabilities	519	637	637	637	637	814	814	814	814	814	814	814	814	814	814	814	814	814	814	814	814	814	814	814	814	814	814	814	814	814
Long-term Liabilities	45,894	45,894	45,894	57,271	83,101	99,886	99,886	99,886	99,144	97,362	95,045	92,727	90,409	88,091	85,203	81,009	75,985	70,962	65,938	60,914	55,890	50,866	45,842	40,818	35,795	30,771	25,747	20,723	15,699	11,417
Amount Payable to Head Office	8,712	8,830	8,830	8,830	8,830	8,830	8,830	8,830	8,830	8,830	8,830	8,830	8,830	8,830	8,830	8,830	8,830	8,830	8,830	8,830	8,830	8,830	8,830	8,830	8,830	8,830	8,830	8,830	8,830	8,830
Total	55,125	55,361	55,361	66,738	92,568	109,530	109,530	109,530	108,788	107,006	104,688	102,371	100,053	97,735	94,847	90,653	85,629	80,606	75,582	70,558	65,534	60,510	55,486	50,462	45,439	40,415	35,391	30,367	25,343	21,061
Equity																														
Government Fund	19,696	19,696	19,696	26,379	42,218	52,076	52,076	52,076	52,076	52,076	52,076	52,076	52,076	52,076	52,076	52,076	52,076	52,076	52,076	52,076	52,076	52,076	52,076	52,076	52,076	52,076	52,076	52,076	52,076	52,076
Retained Earnings	0	-1,959	-3,970	-5,840	-7,564	-10,320	-13,124	-16,769	-19,790	-22,168	-24,050	-25,356	-26,431	-27,240	-27,754	-27,943	-27,989	-27,924	-27,759	-27,487	-27,108	-26,616	-26,006	-25,268	-24,399	-23,391	-22,165	-20,889	-19,489	-17,965
Net Income	-1,959	-2,010	-1,870	-1,724	-2,756	-2,805	-3,645	-3,021	-2,377	-1,882	-1,306	-1,075	-808	-514	-189	-45	210	555	922	1,288	1,671	2,078	2,512	2,963	3,438	4,181	4,351	4,779	5,200	6,115
Total	17,737	15,726	13,856	18,815	31,898	38,952	35,307	32,286	29,908	28,026	26,720	25,645	24,836	24,322	24,133	24,087	24,298	24,707	25,238	25,877	26,639	27,538	28,582	29,771	31,115	32,867	34,262	35,965	37,787	40,226
Total Liabilities & Equity	72,862	71,087	69,217	85,553	124,466	148,481	144,837	141,816	138,696	135,032	131,408	128,015	124,889	122,057	118,979	114,741	109,927	105,312	100,820	96,435	92,173	88,048	84,069	80,233	76,554	73,281	69,653	66,332	63,130	61,287
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Financial Ratios

	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Working Ratio	72.7%	69.7%	67.2%	64.8%	62.3%	44.0%	41.7%	39.3%	37.2%	36.0%	34.4%	34.2%	34.0%	33.9%	33.6%	33.2%	32.6%	32.0%	31.4%	30.9%	30.3%	29.7%	29.2%	28.6%	28.0%	27.5%	26.9%	26.4%	26.0%	25.7%
Operating Ratio	128.1%	123.3%	118.8%	114.6%	129.9%	105.1%	109.2%	102.8%	97.4%	94.1%	90.0%	89.5%	89.1%	88.6%	88.0%	86.9%	81.7%	80.3%	78.9%	77.5%	76.0%	74.6%	73.2%	71.8%	70.4%	64.8%	62.1%	61.0%	60.0%	55.3%
Return on Net Fixed Assets	-1.1%	-1.2%	-1.1%	-0.7%	-1.0%	-0.3%	-0.5%	-0.2%	0.2%	0.4%	0.8%	0.9%	1.0%	1.1%	1.2%	1.3%	1.9%	2.2%	2.6%	2.9%	3.4%	3.9%	4.5%	5.2%	5.8%	6.9%	8.1%	9.2%	10.4%	12.7%
Debt Service Ratio	68.9%	97.6%	109.8%	122.0%	100.9%	171.2%	151.5%	167.7%	147.0%	122.3%	118.8%	121.1%	123.4%	125.8%	115.5%	96.7%	90.2%	94.5%	99.1%	103.9%	109.0%	114.6%	120.4%	126.6%	133.3%	140.5%	148.2%	155.8%	163.3%	197.3%

Table 7-6-5 Projected Financial Ratios (Case A)

Financial Ratios

	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Working Ratio	60.6%	58.1%	56.0%	54.0%	51.9%	36.7%	34.8%	32.7%	31.0%	30.0%	28.7%	28.5%	28.4%	28.2%	28.0%	27.7%	27.1%	26.7%	26.2%	25.7%	25.2%	24.8%	24.3%	23.8%	23.4%	22.9%	22.4%	22.0%	21.7%	21.4%
Operating Ratio	117.6%	114.2%	110.1%	106.2%	118.5%	93.2%	96.4%	90.7%	86.0%	83.0%	79.4%	79.0%	78.6%	78.2%	77.7%	76.7%	72.3%	71.0%	69.8%	68.5%	67.3%	66.0%	64.7%	63.5%	62.2%	56.3%	53.6%	52.7%	51.9%	47.9%
Return on Net Fixed Assets	-0.6%	-0.7%	-0.5%	-0.3%	-0.6%	0.4%	0.2%	0.6%	1.0%	1.3%	1.7%	1.9%	2.0%	2.1%	2.3%	2.4%	3.0%	3.4%	3.8%	4.3%	4.8%	5.4%	6.1%	6.9%	7.6%	8.8%	10.2%	11.4%	12.6%	14.8%
Debt Service Ratio	79.9%	108.7%	118.5%	128.3%	113.2%	188.9%	171.7%	188.0%	159.3%	129.0%	123.7%	126.1%	128.5%	131.1%	122.8%	106.4%	100.7%	105.2%	110.1%	115.1%	120.6%	126.3%	132.5%	139.0%	146.0%	153.5%	161.4%	169.4%	177.2%	218.6%

CHAPTER 8
PORT MANAGEMENT AND OPERATION

CHAPTER 8 PORT MANAGEMENT & OPERATION

8-1 General

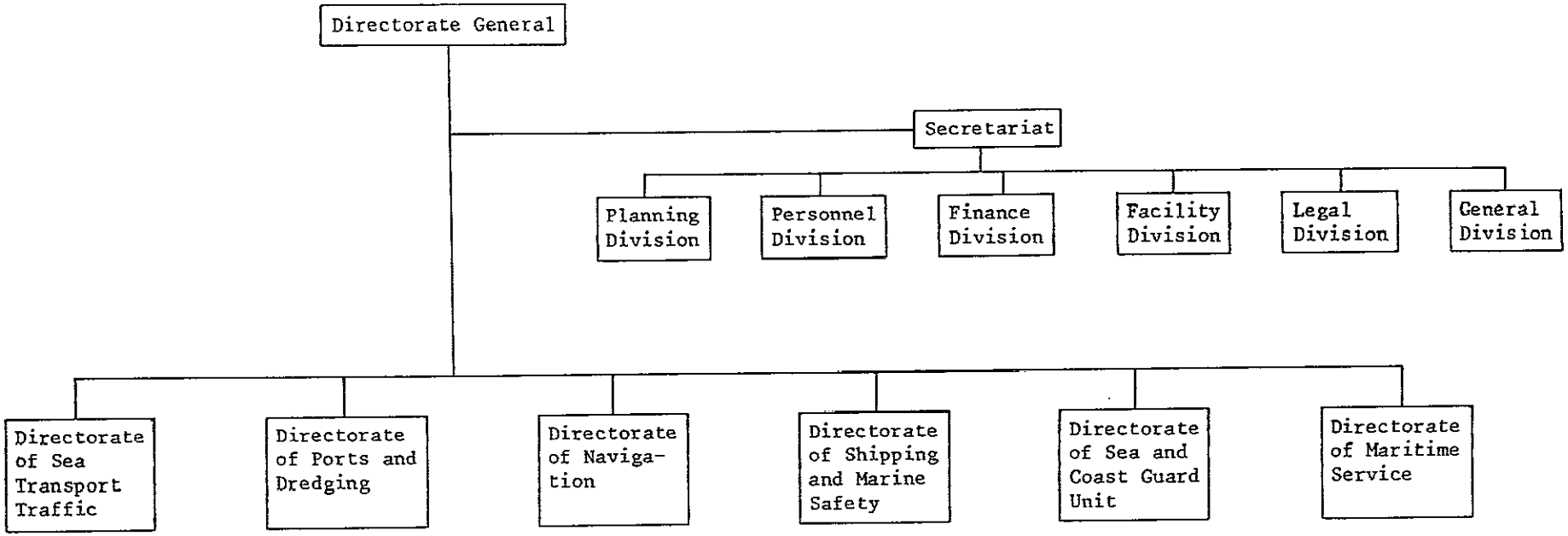
It has been said that the efficiency of a harbour is basically dependent on two major factors: planning and management and operations are the two main and equally important pillars. This chapter is aimed at improving the future management and operations of Semarang Port.

From the geographical point of view, Semarang Port is located at a very important position in the central part of Java Island. Currently, with the new berths completed in November of 1985 as part of Phase I of the development project, Semarang Port has become an international trade port in reality as well as in name. As Semarang grows, many new tasks will be required in the field of management and operations, including the operation of berths for specific uses. As new facilities are constructed and improved under Phase II of the project, management and operations will become increasingly complex. Thus, it is necessary to tackle these problems vigorously and systematically in order to help Semarang Port play an active role in the future.

8-2 Organization

The administration and operation of all Indonesian ports is under the control of the Ministry of Communications supported by the Directorate General of Sea Communications which is in charge of port administration in general, sea communications and port development in line with the policies on sea communications. Fig. 8-2-1 shows the organization of the Directorate General of Sea Communications. For the abovementioned purposes, all water areas in Indonesia are divided into 9 districts, and a Directorate General of District Sea Communications (KANWIL HUBLA) is provided in the central cities of each of the districts. (Fig. 8-2-2).

On the other hand, there are public port administrations which are as autonomous as possible, financially self-sufficient, and operated based on commercial principles. Following the above principles, and in an effort to strengthen port management, the Government established in 1984 4 Perum Pelabuhan responsible for 4 major Indonesian ports: Tanjung Priok, Surabaya, Belawan and Ujungpandang, and for other smaller ports. Semarang port is under the primary control of Perum Pelabuhan III whose head office is at Surabaya (Fig. 8-2-3).



Source: DGSC

Fig. 8-2-1 Organization Chart of the Directorate General of Sea Communications (DGSC)

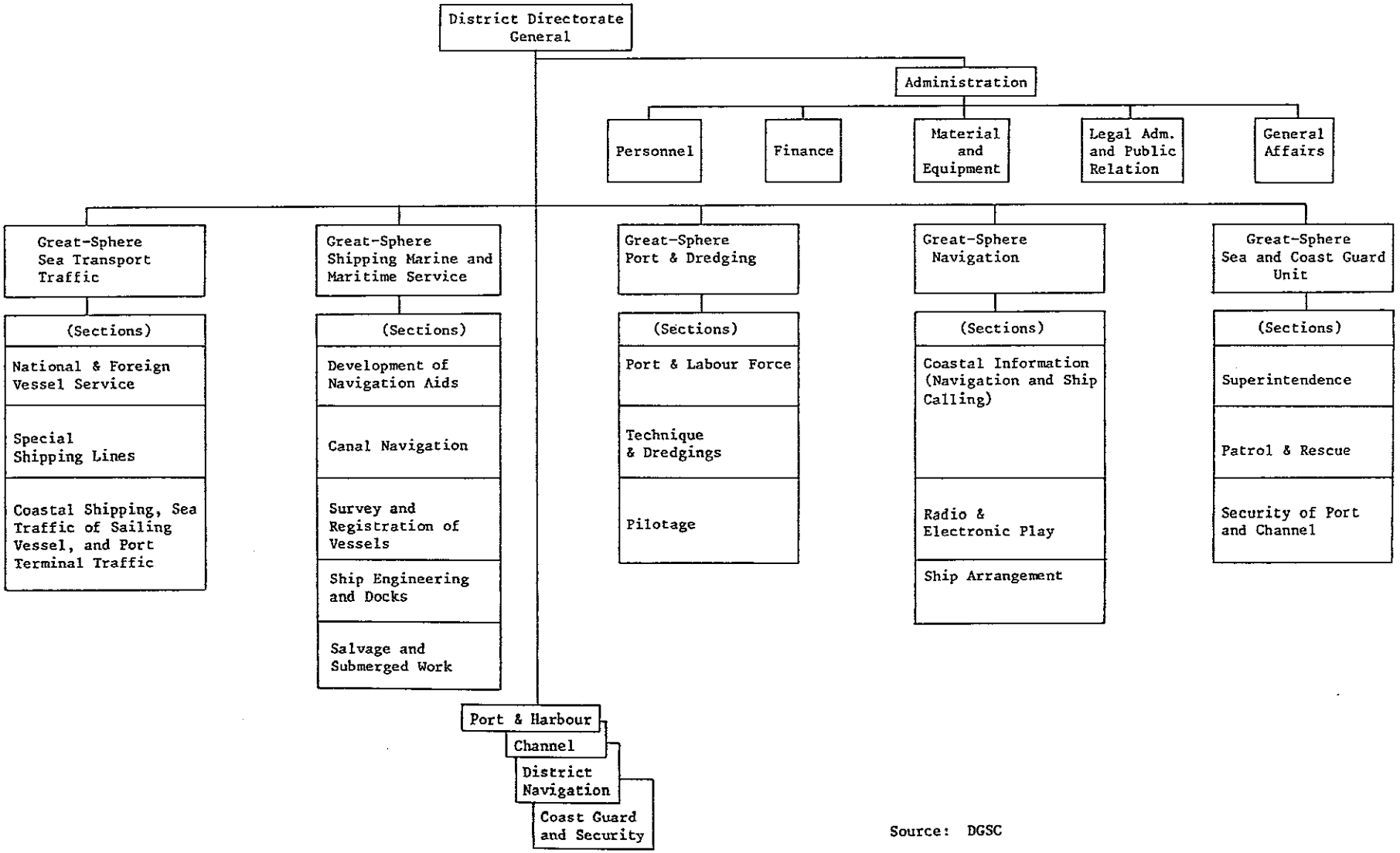
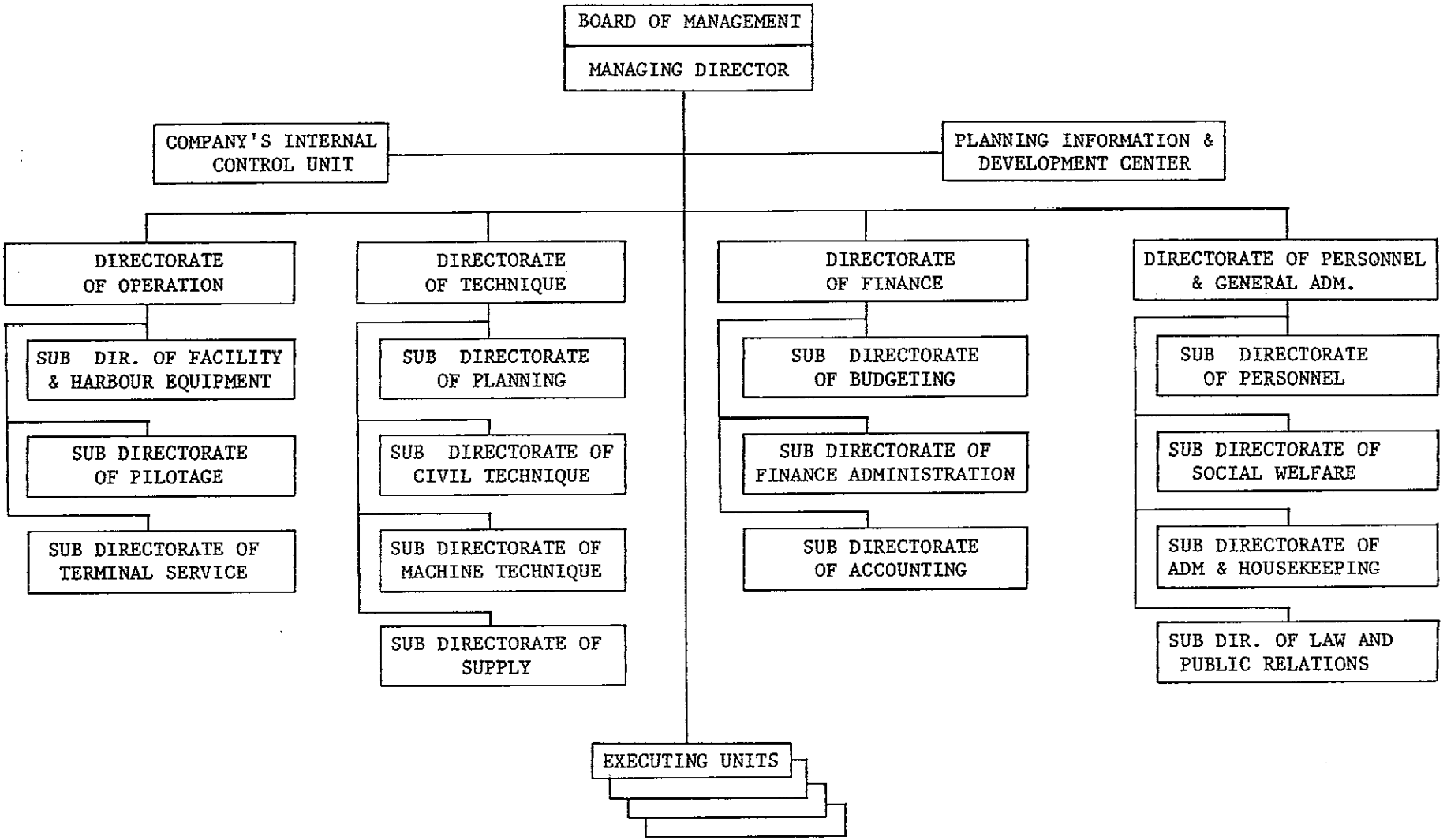


Fig. 8-2-2 Organization Chart of the Directorate General of District Sea Communications



Source: ADPEL Semarang

Fig. 8-2-3 Organization Chart of Public Company Sea Port III Surabaya

Perum Pelabuhan III is expected to be operated as a semi-autonomous public corporation responsible for the following functions:

- Planning and development of port facilities
- Commercialization of port services
- Financing of its own investment

The organization chart of Semarang port is shown as Fig. 8-2-4. In general, port activities in the Port of Semarang are classified into four major flows, and are performed by four organizations.

The general concept of the main port-related organizations in Indonesia is as follows:

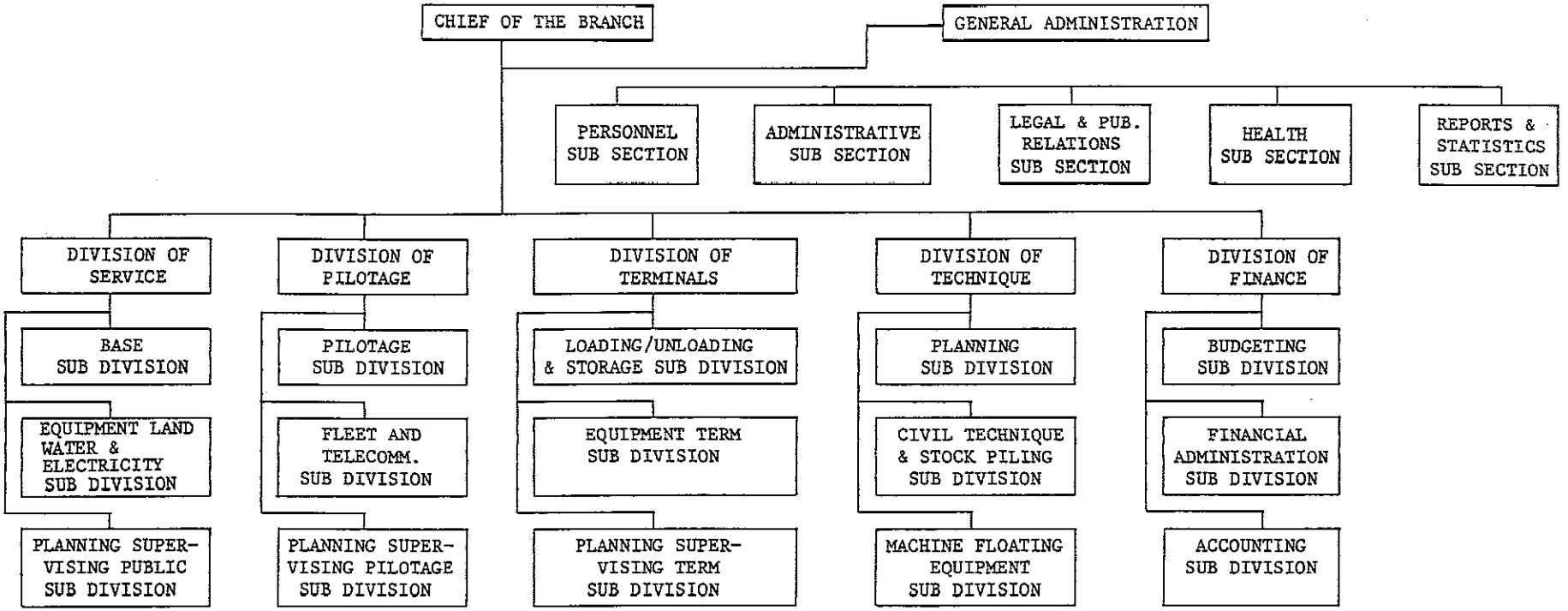
1. Perum Pelabuhan consists of, for the most part, profitable sections dealing with all port activities. Its accounting system is expected to be self-supporting. The greatest portion of income is from revenue paid by users of port facilities including the charges for anchoring, mooring, piloting, towing and water supply.

2. The office of dredging is in charge of dredging work in the port area including maintenance and construction of new channels. Its accounting system is the same as that of Perum Pelabuhan.

3. Kanwil is a kind of regional office of the Government and under the control of DGSC. Its duties include the basic public services executed by the Harbourmaster, and traffic control including navigational aids. Expenditures for these services are covered by the budget of the Government, and so they should not be considered in the financial analysis of Semarang Port Project Phase II.

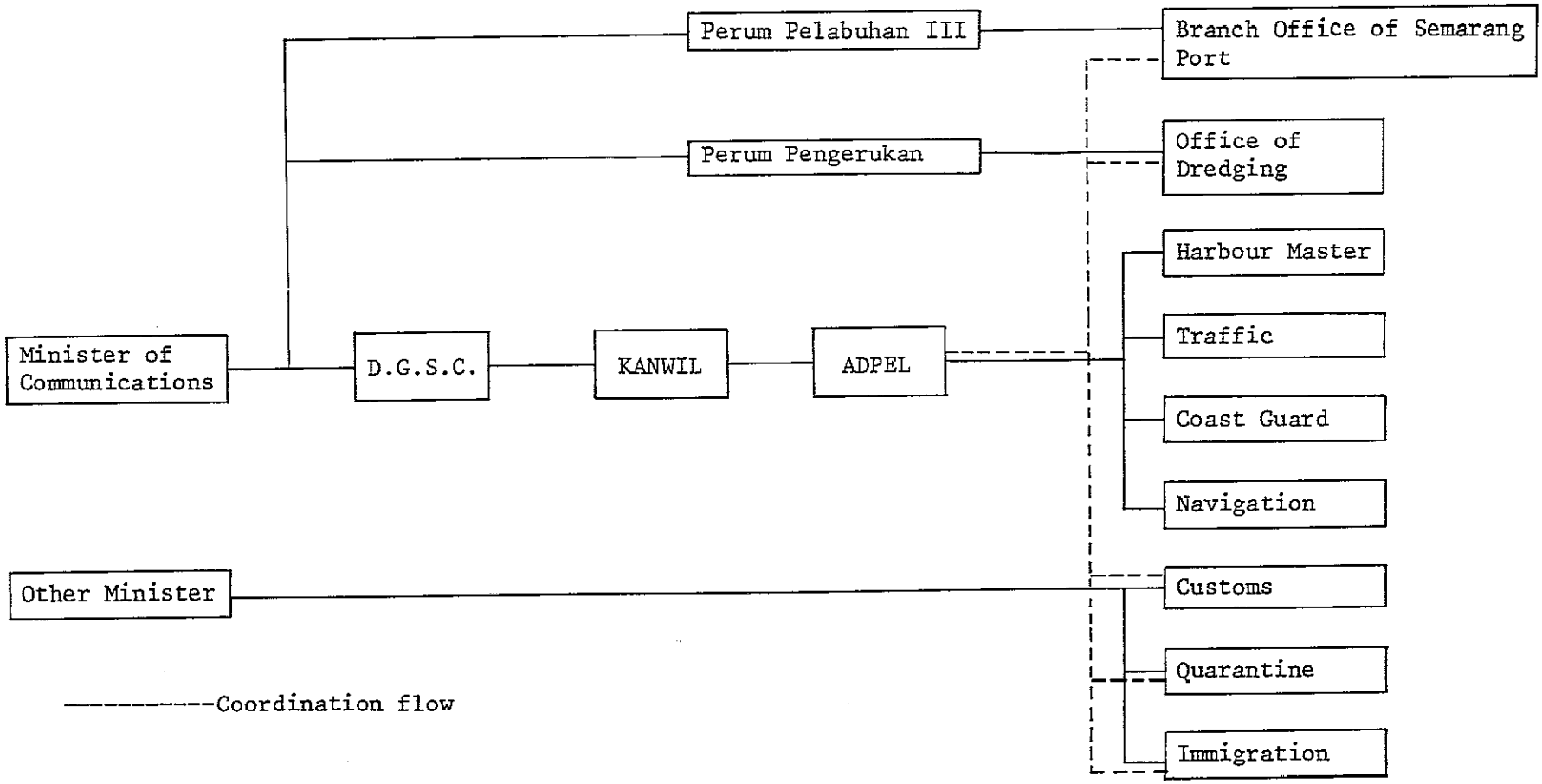
4. The Customs is a public organization belonging to the Ministry of Finance and its major duty is to levy customs duties.

5. ADPEL plays an important role in adjustment to coordinate the various port-related organizations and to promote smooth and efficient port activities. The functions of ADPEL and all the other port organizations at Semarang are illustrated in Fig. 8-2-5.



Source: ADPEL Semarang

Fig. 8-2-4 Organization Chart of Branch of Perum Pelabuhan III Class II Semarang



Source: ADPEL Semarang

Fig. 8-2-5 Organization Chart of Semarang Port

8-3 Present Conditions of Port Management

8-3-1 Management Personnel and Labourers

The number of labourers engaged in cargo handling from 1982 to 1984 at Semarang Port 1982 to 1985 is listed in Table 8-3-1.

Table 8-3-1 Number of Personnel

	1982	1983	1984	1985
General Administration	69	71	92	89
Finance Division	38	41	42	41
Technique Division	156	157	100	95
Terminal Division	59	62	63	70
Pilotage Division	26	28	35	36
Service Division	146	146	159	160
Port Hospital	27	28	28	27
Total	516	533	519	518

Source: ADPEL Semarang

It can be seen from the table that the total number of staff has been nearly constant during the past four years. Strong pressure to increase the number of personnel is expected to emerge as Semarang Port develops in the future. However, it seems desirable to limit the increase in the number of management personnel as much as possible, considering that personnel expenses presently account for about 40 percent of the total expenditure.

The number of labourers engaged in cargo handling from 1982 to 1984 at Semarang Port are shown in Table 8-3-2.

Table 8-3-2 Number of Labourers

	1982	1983	1984
Number of labourers	1844	1467	1415

Source: YUKA Semarang

Table 8-3-2 lists figures registered with YUKA. However, the YUKA organization has been virtually broken up since INPRES No. 4, and it has been decided that all harbour labourers should belong to private companies which are engaged in cargo handling.

It is feared that employment opportunities for these harbour labourers may decrease at Semarang Port as mechanization of cargo handling grows.

Therefore, careful measures should be taken to solve this problem including providing alternative employment and vocational training. Table 8-3-3 lists the current number of members who belong to the major organizations related to harbour works at Semarang Port.

Table 8-3-3 Number of Staff of Port Related Organizations at Semarang Port (1985)

Organization	No. of Staff
"Semarang Port"	518
Dredging Office	96
Harbour Master	46
Traffic	25
Coast Guard	83
Navigation	74
Customs	481
YUKA	11
Immigration	3
Quarantine	24
Total	1,361

Source: ADPEL Semarang

8-3-2 Cargo Handling Companies

The cargo handling work at Semarang Port is carried out by private companies. Companies engaged in this work are required to obtain licenses from the relevant harbour management office. At present, such licenses have been granted to 55 companies. The volume of the cargo handled by each company will become too small if the number of cargo handling companies becomes too large in relation to the total cargo throughput. On the other hand, an excessively small number of cargo handling companies will lead to the emergence of oligopolistic conditions. Both situations would be detrimental.

It is only natural that mechanization will be promoted henceforth at Semarang Port to carry out cargo handling works, making it necessary to invest in large-scale cargo handling equipment. Thus, efforts should be made to ensure that the operation of these works will be performed by an appropriate number of companies which have capable members as well as sufficient financial resources.

8-3-3 Documents

Table 8-3-4 lists documents which should be prepared and submitted (or information to be reported) upon ship arrival and departure.

8-3-4 Effect of INPRES No. 4 on Harbour Activities

INPRES No. 4 was issued in April of 1985. This INPRES was aimed at promoting economic activities on the basis of such measures as simplification of customs procedures and establishment of low tariffs common to all ports throughout the nation. The new tariffs were fixed at a rather low level as compared to those in the past. As a result, the burdens on harbour users have been greatly decreased, allowing the initially intended objective to be achieved. On the other hand, a heavy burden is consequently being imposed on the financial affairs of "Semarang Port".

The drastic simplification of the customs procedures has permitted the time required for office work to be reduced greatly. This appears to be making a considerable contribution to the smoothing of cargo flow in port areas. In fact, the decrease in the time required for office work has resulted in shorter berthing time and reduced costs.

Table 8-3-4 Major Documents to be Submitted upon Ship Arrival and Departure

Organization or company	Items to be checked or information
Port administration/ Harbour master	Certificate of nationality/ships registry International freeboard/Loadline certificate Safety radio telegraphy certificate Derating (exemption) certificate Safety equipment certificate Ship tonnage certificate Certificate of seaworthiness Safety construction certificate Port clearance, clearance in/out Crew list, passenger list Harbour report
"Semarang Port"	Request for pilot, water supply, berthing, transit shed, cargo handling equipment and open storage
Customs	Cargo manifest Crew list, passenger list Store list List of crew's private property Narcotics list Ammunition list (Arms)
Immigration	Passport, crew list, passenter list
Quarantine	International health book/certificate of free pratique.
Labour foundation	Report to labour.
Forwarding/stevedoring company (shipping agency)	Request for cargo handling.

Source: ADPEL

8-4 Proposals

This section deals with possible problems which are expected to emerge in the future as Semarang Port is developed further. In addition, some measures are proposed which are considered to be necessary for carrying out management and operations of the port as effectively as possible.

8-4-1 Port Deliberative Council (Port Liaison Conference)

In such ports as Semarang, which is expected to grow rapidly henceforth, it is of great importance to consider the opinions of all persons concerned and representatives from various fields related to port and harbour activities. Their desires and requests should be grasped correctly so that they can be taken into account in future measures. A council should be formed including representatives from the central Government and local offices in charge of the port, persons of learning and experience, user companies located in the port area, shipping companies, cargo handling companies, potential and actual consignors (namely, representatives from the industrial world), labour representative and officials in charge of road and railroad management.

It is certain that the meeting of such a council at regular intervals or on appropriate occasions will help to prevent mistakes in the operation of the port. The council will play a significant role in deepening mutual understanding among these sectors.

8-4-2 Establishment of a Land Use Plan and Management System

As described in Section 7 of Chapter 4, utilization of newly reclaimed lands will take place as the harbour improvement work progresses. Furthermore, the number of companies which will desire to expand their business into the port area is expected to increase gradually as new harbour facilities are constructed. These lands, which are adjacent to the waterfront, are resources of great importance for Semarang Port. Therefore, they should be utilized carefully, on the basis of adequate considerations.

Some measures which appear to be necessary in relation to land use are listed below.

1. Introduction of a Land Use Section

It seems advisable to establish a new land use section in "Semarang Port", and allow it to push ahead with the land development plan. Furthermore, it is desirable that the organization belong to the Technique Division or the Service Division, serve as a tool for performing outside liaison, work on coordination and adjustment within the system and assume all the authority and responsibilities related to land use.

2. Formulation of a Land Use Plan

The first task of the above-mentioned section is to draw up a land use plan, which will serve as a basis for the land development. This task should include establishing criteria to decide which types of companies should be invited to the area, and formulation of annual schedules for the location of these businesses.

3. Measures in Favor of Companies to be Invited

The invitation of these companies can be accomplished smoothly if there are economic incentives including some tax reduction or financial support systems in favor of such companies. Considering this, it is advisable to examine such systems and introduce them as appropriate.

4. Positive Publicity Activities

All possible media should be used to generate positive publicity towards companies which are considered to be desirable for the future prosperity of Semarang Industrial Port.

Specifically, holding of explanation meetings with representatives from the industrial fields concerned, wide distribution of pamphlets describing such measures as advantageous systems in favour of these companies, door-to-door visits to hopeful companies, and insertion of advertisements in newspapers and magazines should take place.

5. Proper Management of the Port Area

According to the survey by the study team, there currently exist a large number of buildings which are unlawfully occupying portions of the area under the management of the "Semarang Port". It is feared that such buildings may be serious obstacles to the systematic implementation of the land use plan if they are left as they are. Appropriate measures should be taken as early as possible to remove the buildings unlawfully constructed in the area.

8-4-3 Team of Experts

In such ports as Semarang, which has a great number of staff members, it is effective to set up a small team consisting of talented efficiency experts who are released from routine miscellaneous duties to use all their time for the observation of the flow of transportation. They can discover defects, examine the breakdown of working hours, test alternative methods, and propose improvements plans. These experts will make a close survey of complaints and requests from the staff members as well as from the users of the port and, at the same time, make an accurate analysis of the operation statistics.

Careful and detailed examination of every stage of port management should be carried out in order to spot weak points in the operation systems and to set up measures for removing them. Considerable effects can be expected if the experts' suggestions are incorporated into routine port works.

8-4-4 Utilization of Computers

Computers have already been introducted at Semarang Port. This positive attitude toward new technology should be highly evaluated. So far, computers have been put to practical use for three purposes as described below:

(1) Calculation of allowances;
(2) Information concerning individual members;
(3) Calculation of port fees for ships.

Regarding the use of computers, the study team would like to offer the following three proposals.

(1) Limitation of number of Personnel

Computers should be given important functions in carrying out tasks assigned to the port management staff, which will gradually increase with the expansion of Semarang Port. As described above, the increase in the number of staff members should be limited as much as possible and computers should be actively utilized. It is obvious in view of past experiences that the reduction in the size of a once swollen staff is extremely difficult. Furthermore, an increase in personnel expenses will impose a heavy burden on the financial affairs of "Semarang Port".

(2) Expansion of Computer Use

Computers can be applied in many areas in the operation of the port management offices. As the next step of computer utilization at "Semarang Port", it seems advisable to introduce computers in the field of port statistics. If this is realized, computers can be used for long-term storage of a large volume of statistical port data in a small space, accurate and rapid readout of required information, and execution of various analyses and investigations. Moreover, computers can make it possible to carry out extremely complicated and minute works which cannot be accomplished by human power. Accordingly, the range of computer utilization should be successively expanded in the future in such areas as overall data processing and simulations concerning outgoing and incoming vessels as well for various technical calculations.

(3) Training of Specialists

In carrying out tasks (1) and (2), it is indispensable to cultivate capable staff specializing in computers. Training of staff who are deeply versed in port business and, at the same time, able to make free use of computers cannot be accomplished in a short time. Invitation of computer experts from outside may be considered. No matter what method is chosen, it is not too much to say that the success of computer utilization depends on whether or not appropriate engineers can be obtained.

8-4-5 Port Statistics

In order to operate Semarang Port efficiently on a long-term basis, it is indispensable for "Semarang Port" to be constantly and correctly informed of all aspects of the harbour works including cargo volume. Such data should be based on reliable and timely sources.

A sharp increase in the volume of a particular type of cargo may necessitate rapid expansion of shed space or urgent improvement of equipment and facilities. On the other hand, a rapid decrease might be an indication of a shift of the destination of such cargoes to rival ports because of unsatisfactory service or higher costs in this harbour.

The port statistics can be roughly divided into two categories. One comprises statistics concerning the number and volume of vessels, cargo and passengers in the harbour, and the other comprises statistics concerning the port management. The former statistics can be used to show the scale of construction to be carried out in the future, while the latter serve to indicate the

efficiency rates of important works as well as the coefficient of utilization of the facilities. Relations between these statistics are summarized below:

(1) Statistics of volume and number at the port (related to the scale of the port)
   (a) Vessels
   (b) Cargo volume
   (c) Passengers

(2) Statistics concerning port management (related to the efficiency of the port)
   (a) Number of vessels received per unit period (average demurrage time, time loss)
   (b) Cargo handling efficiency (flow rate of cargo)
   (c) Utilization coefficients of port facilities (berth occupancy rate, utilization coefficient of sheds).

In Semarang Port, records in all of the above-mentioned statistical categories have been kept by "Semarang Port", though data in some categories is insufficient. As described above, it is hoped that the record keeping at the port will be further improved by using computers.

8-4-6 Port Sales

If port management is to be conducted as a business activity based on a self-supporting accounting system, port sales will emerge as an important element which should not be neglected. In more concrete words, port sales promotion activities have to be carried out positively. Port managers should not sit back and wait for cargo to come, but rather they should make every possible effort to invite vessels and cargoes. If reasonable publicity is given and contact is maintained with shipping companies, port transportation companies and agencies, commercial and industrial bodies (both local and international) as well as all potential and actual port users, port sales efforts will considerably improve the image of the port and promote a steady growth of cargo throughput.

A similar proposal is presented above in the section dealing with land use. However, publicity works should not be limited to land use but should be widely performed for all area of the port activities.

8-4-7 Privatization of Port Operation

One of the most important items in port operation is the introduction of private capital into the field of port activities.

It is not always clear which parts of port operations should be carried out by the private sector.

However, if there are companies that are capable of executive operation works and if free competition among these companies could probably result in an improvement of port services, it is recommendable that port operations such as cargo handling especially for exclusive use berths, trucking and warehousing should be carried out by the private sector as much as possible.

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