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FINAL REPORT

THE GREATER CAPITAL REGION INTEGRATED PORT DEVELOPMENT STUDY IN THE REPUBLIC OF THE PHILIPPINES

VOL.3

PRELIMINARY EVALUATION OF MASTER PLAN COMPONENTS AND APPENDIXES

OCTOBER 1994

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ABBREVIATIONS

ADB	Asian Development Bank
AG&P	Atlantic Gulf and Pacific Corp. Manila
BAECON	Bureau of Agricultural Economics
BAEX	Bureau of Agricultural Extension
BBTI	Batangas Bay Terminal Incorporation
BCGS	Bureau of Coast Geodetic Survey
BEU	Bureau of Energy Utilization
BFAR	Bureau of Fishery Aquatic Resources
BFD	Bureau of Forest Development
BM	Bench Mark
BMG	Bureau of Mining Group
BOC	Bureau of Customs
BOD	Biochemical Oxygen Demand
CALABARZON	Cavite, Laguna, Batangas, Rizal and Quezon
CB	Central Bank
CFC	Conversion Factor for Consumption
CFS	Container Freight Station
CPA	Cebu Port Authority
DENR	Department of Environment and Natural Resources
DHS	Department of Human Settlements
DOA	Department of Agriculture
DOE	Department of Energy
DOTC	Department of Transportation and Communications
DPWH	Department of Public Works and Highways
DTI	Department of Trade and Industry
DWT	Dead Weight Tonnage
EDSA	Epifanio Delos Santos Ave Extension
EIRR	Economic Internal Rate of Return
EMB	Environmental Management Bureau
EPZ	Export Processing Zone
FPA	Fertilizer and Pesticide Authority
GCR	Greater Capital Region
GDP	Gross Domestic Product

GPS	Global Positioning System
GNP	Gross National Product
GRDP	Gross Regional Domestic Product
GRT	Gross Tonnage
GT	Gross ton(s)
GVA	Gross Value Added
ICD	Inland Container Depot
ICTSI	International Container Terminal Service, Inc.
JETRO	Japan External Trade Recovery Organization
JICA	Japan International Cooperation Agency
JIS	Japan Industrial Standard
LOA	Length of Over All
LO/LO ship	Lift on Lift off ship
MARINA	Maritime Industry Authority
MICT	Manila International Container Terminal
MIRDP	Mindoro Integrated Rural Development Plan
MT	Metric Ton(s)
NEDA	National Economic and Development Authority
NCA	National Coal Authority
NCR	National Capital Region
NCSO	National Census and Statistics Office
NEPC	National Environmental Protection Council
NFA	National Food Authority
NHA	National Housing Authority
NIEP	Nationwide Industrial Estate Planning
NSC	National Steel Corporation
NSCB	National Statistic Cordination Board
NTPP	National Transportation Planning Project
O/D	Origin and Destination
OECF	Overseas Economic Cooperation Fund
PAGASA	Philippine Atmospheric Geographical and Astronomical Service Administration
PASTORA	Planning Assistance Service to Rural Areas
PCA	Philippine Coconut Authority
PCIA	Philippine Cement Industry Authority

PCU	Passenger Car Unit
PFDA	Philippine Fishery Development Authority
PFM	Pacific Flour Mills
PHILSUCOM	Philippine Sugar Commission
PMU	Port Management Unit
PNCC	Philippine National Construction Company
PNOC	Philippine National Oil Company
PPA	Philippine Ports Authority
REGION III	Central Luzon Region
REGION VI	Southern Tagalog Region
RO/RO ship	Roll on Roll off ship
SCF	Standard Conversion Factor
SME	Small & Medium scale Enterprises
SMB	Sverdrup, Munk and Bretschneider
SPT	Standard Penetration Test
TEU	Twenty-foot Equivalent Unit
UNICHEM	United Coconut Chemicals, Inc.

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VOL.3
PRELIMINARY EVALUATION
OF MASTER PLAN COMPONENTS AND APPENDIXES

TABLE OF CONTENTS

CHAPTER 5 PROJECT COST ESTIMATION AND SHORT-TERM IMPLEMENTATION SCHEDULE

CHAPTER 6 ECONOMIC ANALYSIS

CHAPTER 7 ENVIRONMENTAL CONSIDERATION

CHAPTER 8 MANAGEMENT AND OPERATION FROM SHORT-TERM PERSPECTIVE

CHAPTER 9 OVERALL EVALUATION

CONCLUSIONS AND RECOMMENDATIONS

List of Figures

Part III

List of Tables

Part III

PART III

PRELIMINARY EVALUATION OF MASTER PLAN COMPONENTS

CHAPTER 1 BASIC POLICY FOR SHORT TERM DEVELOPMENT PLAN

While the management improvement and physical planning for the short-term development plan, shall be generally in accordance with the overall concept and scenario of the long-term development and layout plan proposed in the master plan, the following policies are adopted for particular consideration in the short-term development plan.

(1) Short-term planning should be conducted on the basis that the present legal or juridical system for port administration will generally be maintained at least for the proposed planning term.

(2) On-gong and/or under planning expansion scheme for major ports in GCR will be mostly realized up to the target year.

(3) In order to secure the successful introduction of more efficient port management and operation system, a phased improvement scheme should be promoted.

(4) In determining the development site of a new container terminal, the maximum flexibility in selecting the sites for further development should be preserved so that possible future contingency can be allowed.

(5) The structural type of infrastructure of wharves should be selected on the basis not only of cost and engineering applicability but also of local material availability and easy maintenance of the structure.

(6) With a view to minimizing the initial investment cost of the project, only vital supporting facilities including access facility should be included.

(7) Alternative sites for the short-term development should be carefully selected considering the future availability of the Port of Manila and Batangas in particular, with a view to avoiding possible failure in securing the space for key facilities of the project.

(8) All projected facilities should be planned under careful consideration of environmental impact to minimize the marginal effect of the project.

CHAPTER 2 Demand Forecast for Short-Term Development Plan

2.1 Setting of Short-Term Socio-economic Framework

The present socio-economic trend started in 1991. Road network was not sufficient to support urban traffic and regional access. The power supply is not capable of meeting the demand and thus brown outs have been introduced. All influstructure necessary for economic activity remaines in insufficient supply. So, private investers often chose a light industry as a coming target.

In the industrial sector, several plans of EPZs have been launched smoothly. Light industry such as computer software and factories in EPZ is the industry of choice of the 1990s in the Philippines.

Traditional industry including agricultural based industry has an advantage in that it is able to employ labors at low wages. But these industries have failed to obtain high productivity.

When the socio-economic condition in 2000 is established, Medium-Term Development Plan in the Philippines determines basic policy of plan. After the year 2000, basic trend of investment will retain the same pattern.

Even if the value of GDP is succesfully increased, the volume of imports is twice that of exports. After 2000, correction of trade imbalance will be forced by foreign economies. So, growth rates of economic indicators will remain the same or drop slightly from their 1990s' level.

2.2 Forecast of Port Cargo Traffic

Port cargoes in 2000 and 2005 are estimated according to indicators described in chapter 2 of part II.

Tables 2-1 and 2-2 show cargo volumes in 1991, 1995, 2000, 2005 and 2010 respectively by type of cargo.

TABLE 2-1 TOTAL CARGO VOLUME BY STEP

(UNIT: ,000 TONS)

YEAR	TYPE	TOTAL			INWARD			OUTWARD		
		IN GCR	BATANGAS	MANILA	IN GCR	BATANGAS	MANILA	IN GCR	BATANGAS	MANILA
1991	TOTAL	18,173	1,000	17,174	11,308	613	10,695	6,865	386	6,479
1995	TOTAL	22,555	1,421	21,134	13,926	865	13,061	8,628	555	8,073
2000	TOTAL	32,954	1,894	31,060	20,031	1,139	18,892	12,923	755	12,168
2005	TOTAL	42,902	3,318	39,583	25,024	2,082	22,942	17,878	1,236	16,642
2010	TOTAL	56,715	4,700	52,015	31,809	2,921	28,888	24,905	1,779	23,127
1991	DOMESTIC	11,464	944	10,520	6,482	562	5,920	4,982	381	4,600
1995	DOMESTIC	13,461	1,210	12,251	7,473	699	6,774	5,987	511	5,477
2000	DOMESTIC	17,691	1,564	16,127	9,537	889	8,649	8,153	675	7,478
2005	DOMESTIC	23,239	2,488	20,752	12,188	1,504	10,684	11,052	984	10,068
2010	DOMESTIC	30,707	3,688	27,019	15,694	2,249	13,445	15,013	1,440	13,574
1991	FOREIGN	6,710	56	6,654	4,826	51	4,775	1,883	5	1,879
1995	FOREIGN	9,094	221	8,883	6,453	166	6,287	2,641	45	2,596
2000	FOREIGN	15,263	331	14,933	10,494	251	10,243	4,770	80	4,690
2005	FOREIGN	19,662	831	18,832	12,836	578	12,258	6,826	253	6,574
2010	FOREIGN	26,008	1,012	24,996	16,116	673	15,443	9,892	339	9,553

TABLE 2-2 CONTAINER CARGO VOLUME BY STEP

(UNIT: ,000 TONS)

YEAR	TYPE	TOTAL			INWARD			OUTWARD		
		IN GCR	BATANGAS	MANILA	IN GCR	BATANGAS	MANILA	IN GCR	BATANGAS	MANILA
1991	DOMESTIC	7,012	0	7,012	3,319	0	3,319	3,693	0	3,693
1995	DOMESTIC	8,780	124	8,656	4,151	50	4,101	4,629	74	4,555
2000	DOMESTIC	12,588	227	12,361	5,924	90	5,835	6,664	138	6,526
2005	DOMESTIC	17,754	891	16,863	8,264	482	7,783	9,489	410	9,080
2010	DOMESTIC	25,133	2,167	22,966	11,679	1,254	10,425	13,453	913	12,540
1991	FOREIGN	5,002	0	5,002	3,204	0	3,204	1,797	0	1,797
1995	FOREIGN	7,111	114	6,997	4,551	76	4,475	2,560	38	2,522
2000	FOREIGN	12,609	202	12,407	7,976	131	7,845	4,633	71	4,562
2005	FOREIGN	16,862	620	16,242	10,231	379	9,852	6,631	241	6,390
2010	FOREIGN	22,945	769	22,177	13,340	442	12,898	9,605	327	9,279

2.3 Forecast of Vessel Size and Number of Vessel Calls

2.3.1 Forecast Vessel Size in Short-term Stage

The forecast of foreign and domestic vessel size in the target year 2010 was already mentioned in Part I of chapter 11.6.

In this section, the forecast vessel size in the short-term stage, that is in the year 2000 and 2005, is described.

(1) Port of Manila

1) Container Vessel

The vessel size in the short-term stage is almost the same as the forecasted vessel size (30,000 DWT with draft 11.6m, 13,000 DWT with draft 8.4m, 12,500 DWT with draft 8.3m) in the year 2010 because the largest vessels presently calling the Port of Manila, are the same as the forecasted vessels.

On the other hand, it is assumed that the small domestic container vessel that is suitable for the existing berth depth (size is 3,300 DWT with 5.3m draft) will also call the North Harbor. But, it is assumed that these small container vessels shall gradually be replaced by larger sized vessels by the target year 2010 due to the adjustment of the new domestic container terminal in accordance with increasing container cargo.

2) RO/RO Vessel

The RO/RO vessel size in the short-term stage is almost the same as the forecasted vessel size (13,700 GRT, draft 7.5m)in the year 2010 for the above same reason. On the other hand, it is assumed that the small domestic RO/RO vessel that is suitable for the existing berth depth (size is 3,000 DWT with 4.9m draft) will also call the North Harbor.

3) Conventional Vessel

The conventional vessel size in the short-term stage is almost the same as the forecasted vessel size in the year 2010 (10,000 DWT with 8.5m draft and 4,100 DWT with 5.1m draft). These vessel will call the South Harbor and the North Harbor respectively due to the limitation of berth depth.

(2) Port of Batangas

It is assumed that the Phase I Project will be completed by 1997. Therefore, the foreign container and general cargo will transported by the conventional vessel which is same as the above at North Harbor, 4,100 DWT with 5.1m draft, before the Phase Project is completed. In addition, the domestic container and general cargo will also be transported by the standard RO/RO vessel (average vessel size, 500 GRT) which calls presently the Port of Batangas.

After the Phase I Project is completed, it is assumed that the container vessel shall become gradually larger while the RO/RO vessel size shall be increase only slightly because the route from/to the Port of Batangas is mainly short haul such as Mindanao. The projections of vessel size in the short-term are as follows:

	1994-1997,	1998-2000,	2001-2005,	2006-2010
a) Foreign				
Container	-------	5,000 DWT,	7,000 DWT,	13,000 DWT
Conventional	4,100 DWT,	10,000 DWT,	10,000 DWT,	10,000 DWT
b) Domestic				
Container	-------	1,800 DWT,	4,600 DWT,	8,500 DWT
RO/RO	500 GRT,	1,500 GRT,	1,500 GRT,	2,000 GRT

The above vessel dimensions are based on the CISO member's vessel list.

2.3.2 Number of Vessel Calls in the Short-term Stage

The projected the number of foreign and domestic vessel calls in the target year 2010 was already mentioned in Part I of chapter 11.6.

The projected vessel calls in the short-term stage, that is in the year 2000 and 2005, are determined by the relation between the productivity of cargo handling and the loaded/unloaded cargo volume per vessel.

Table 2-3 and 2-4 show the number of vessel calls in the short-term stage under the medium case scenario.

Table 2-3 Number of Vessel Calls in the year 2000 (Medium Case)

Number of Vessel in 2000 (Medium Case)

	Vessel Type	Port of Manila				Port of Batangas	Total
		South	MICT	North	Sub Total		
Foreign Container	30,000 DWT	0	1,588	0	1,588	0	1,588
Container	13,000 DWT	847	0	0	847	0	847
Container	7,000 DWT	0	0	0	0	0	0
Container	5,000 DWT	0	0	0	0	227	227
Convention	10,000 DWT	937	0	0	937	48	985
Sub Total		1,784	1,588	0	3,372	275	3,647
Present (1991)		1,116	1,111	---	2,227	43	2,270
Domestic Container	12,500 DWT	0	0	987	987	0	987
Container	8,500 DWT	0	0	0	0	0	0
Container	4,600 DWT	0	0	0	0	0	0
Container	3,300 DWT	0	0	143	143	0	143
Container	1,800 DWT	0	0	0	0	32	32
RO/RO	13,700 GRT	0	0	2,856	2,856	0	2,856
RO/RO	3,000 GRT	0	0	2,722	2,722	0	2,722
RO/RO	2,000 GRT	0	0	0	0	0	0
RO/RO	1,500 GRT	0	0	0	0	7,634	7,634
Convention	4,100 DWT	0	0	801	801	0	801
Sub Total		0	0	7,509	7,509	7,666	15,175
Present (1991)		---	---	5,481	5,481	5,591	11,072
Total		1,784	1,588	7,509	10,881	7,941	18,822
Present (1991)		1,116	1,111	5,481	7,708	5,634	13,342

Table 2-4 Number of Vessel Calls in the year 2005 (Medium Case)

Number of Vessel in 2005 (Medium Case)

	Vessel Type	Port of Manila				Port of Batangas	Total
		South	MICT	North	Sub Total		
Foreign Container	30,000 DWT	0	2,044	0	2,044	0	2,044
Container	13,000 DWT	1,092	0	0	1,092	0	1,092
Container	7,000 DWT	0	0	0	0	459	459
Container	5,000 DWT	0	0	0	0	0	0
Convention	10,000 DWT	959	0	0	959	78	1,037
Sub Total		2,051	2,044	0	4,095	537	4,632
Present (1991)		1,116	1,111	---	2,227	43	2,270
Domestic Container	12,500 DWT	0	0	1,356	1,356	0	1,356
Container	8,500 DWT	0	0	0	0	0	0
Container	4,600 DWT	0	0	0	0	146	146
Container	3,300 DWT	0	0	76	76	0	76
Container	1,800 DWT	0	0	0	0	0	0
RO/RO	13,700 GRT	0	0	3,822	3,822	0	3,822
RO/RO	3,000 GRT	0	0	3,154	3,154	0	3,154
RO/RO	2,000 GRT	0	0	0	0	0	0
RO/RO	1,500 GRT	0	0	0	0	9,851	9,851
Convention	4,100 DWT	0	0	608	608	0	608
Sub Total		0	0	9,016	9,016	9,997	19,013
Present (1991)		---	---	5,481	5,481	5,591	11,072
Total		2,051	2,044	9,016	13,111	10,534	23,645
Present (1991)		1,116	1,111	5,481	7,708	5,634	13,342

CHAPTER 3 SHORT-TERM DEVELOPMENT PLAN OF PORT FACILITIES

3.1 Short-term Development Plan of Container Berths

3.1.1 Short-term Berth Requirement

Necessary number of container berths in the year 2000 and 2005 is also determined using several factors such as berth occupancy rate, productivity, working time and days. Main assumptions related to the above factors are as follows:

Berth occupancy rate : 50%
Productivity : 25 Boxes per 1 Gantry Crane
: 10 Boxes per Ship Gear or Other Crane
Operation time and days
(Gantry Crane)
: 24 hrs. per day, 365 days per year
(Other Cargo Handling Equipment)
: 13 hrs. per day, 360 days per year

The operation days per year at the Port of Batangas are assumed to be reduced to 320 considering the natural conditions and the fact that there is no break water.

The details of other items are described in Part II of Chapter 4.1.

Table 3-1 to 3-4 show the foreign and domestic container cargo assignment to each port based on cargo demand in the years 2000 and 2005. Further-more, figures 3-1 to 3-3 show the relation between container cargo demand and berth requirement up to the year 2010 at the port of Manila. Each figure also shows the time by when each berth of the foreign container, domestic container and RO/RO terminal must be completed.

The basic data for short-term plan can be seen in Appendix D-6.

These berth requirements are based on the cargo demands of each year up to the 2010.

In addition, at the Port of Batangas, it is necessary to construct one(1) additional domestic container terminal by 2005 after the Phase I Project is completed.

Table 3-1 Berth Requirement in the Year 2000 (Medium Case)

Port of Manila

(1) Foreign Container Berths

	Present Cargo Vol.	Cargo Demand in 2000		Required Nos. Berth	Existing Nos. Berth	Additional Nos. Berth
South Harbor	1,119 (22%)	12,470	2,490 (20%)	2.5	4.0	0.0
MICT	3,883 (78%)		9,980 (80%)	4.0	4.0	0.0

(2) Domestic Container Berths (North Harbor)

Vessel Type	Present Cargo Vol.	Cargo Demand in 2000	Required Nos. Berth	Existing Nos. Berth	Additional Nos. Berth
	6,950	12,300			
Container (52%)		6,890 (56%)			
	Large Vessel(81%)	6,540 (95%)	3.2	0.0	3.0
	Small Vessel(19%)	350 (5%)	0.3	---	0.0
RO/RO (48%)		5,410 (44%)			
	Large Vessel(61%)	4,110 (76%)	2.9	3.0 (planned)	0.0
	Small Vessel(39%)	1,300 (24%)	1.0	--- (Existing)	0.0

Table 3-2 Berth Requirement in the Year 2000 (Medium Case)

Port of Batangas

(1) Foreign Container Berths

Present Cargo Vol.	Cargo Demand in 2000	Required Nos. Berth	Existing Nos. Berth	Additional Nos. Berth
0	200	0.6	1.0	0.0

(2) Domestic Container Berths

Present Cargo Vol.	Cargo Demand in 2000	Required Nos. Berth	Existing Nos. Berth	Additional Nos. Berth
0	230			
	20 Container (8%)	0.0	0.0	0.0
	210 RO/RO (92%)	0.8	3.0	0.0

Table 3-3 Berth Requirement in the Year 2005 (Medium Case)

Port of Manila

(1) Foreign Container Berths

	Present Cargo Vol.	Cargo Demand in 2005		Required Nos. Berth	Existing Nos. Berth	Additional Nos. Berth
South Harbor	1,119 (22%)	16,300	3,260 (20%)	3.2	4.0	0.0
MICT	3,883 (78%)		13,040 (80%)	5.2	4.0	1.2

(2) Domestic Container Berths (North Harbor)

Vessel Type	Present Cargo Vol.	Cargo Demand in 2005	Required Nos. Berth	Existing Nos. Berth	Additional Nos. Berth
	6,950	16,800			
Container	(52%)	9,740 (58%)			
	Large Vessel(81%)	9,550 (98%)	4.4	0.0	4.0
	Small Vessel(19%)	190 (2%)	0.2	---	0.0
RO/RO	(48%)	7,060 (42%)			
	Large Vessel(61%)	5,510 (78%)	3.9	3.0 (planned)	1.0
	Small Vessel(39%)	1,550 (22%)	1.2	--- (Existing)	0.0

Table 3-4 Berth Requirement in the Year 2005 (Medium Case)

Port of Batangas

(1) Foreign Container Berths

Present Cargo Vol.	Cargo Demand in 2005	Required Nos. Berth	Existing Nos. Berth	Additional Nos. Berth
0	620	1.1	1.0	0.0

(2) Domestic Container Berths

Present Cargo Vol.	Cargo Demand in 2005	Required Nos. Berth	Existing Nos. Berth	Additional Nos. Berth
0	1,000			
	500 (50%) Container	0.6	0.0	1.0
	500 (50%) RO/RO	1.9	3.0	0.0

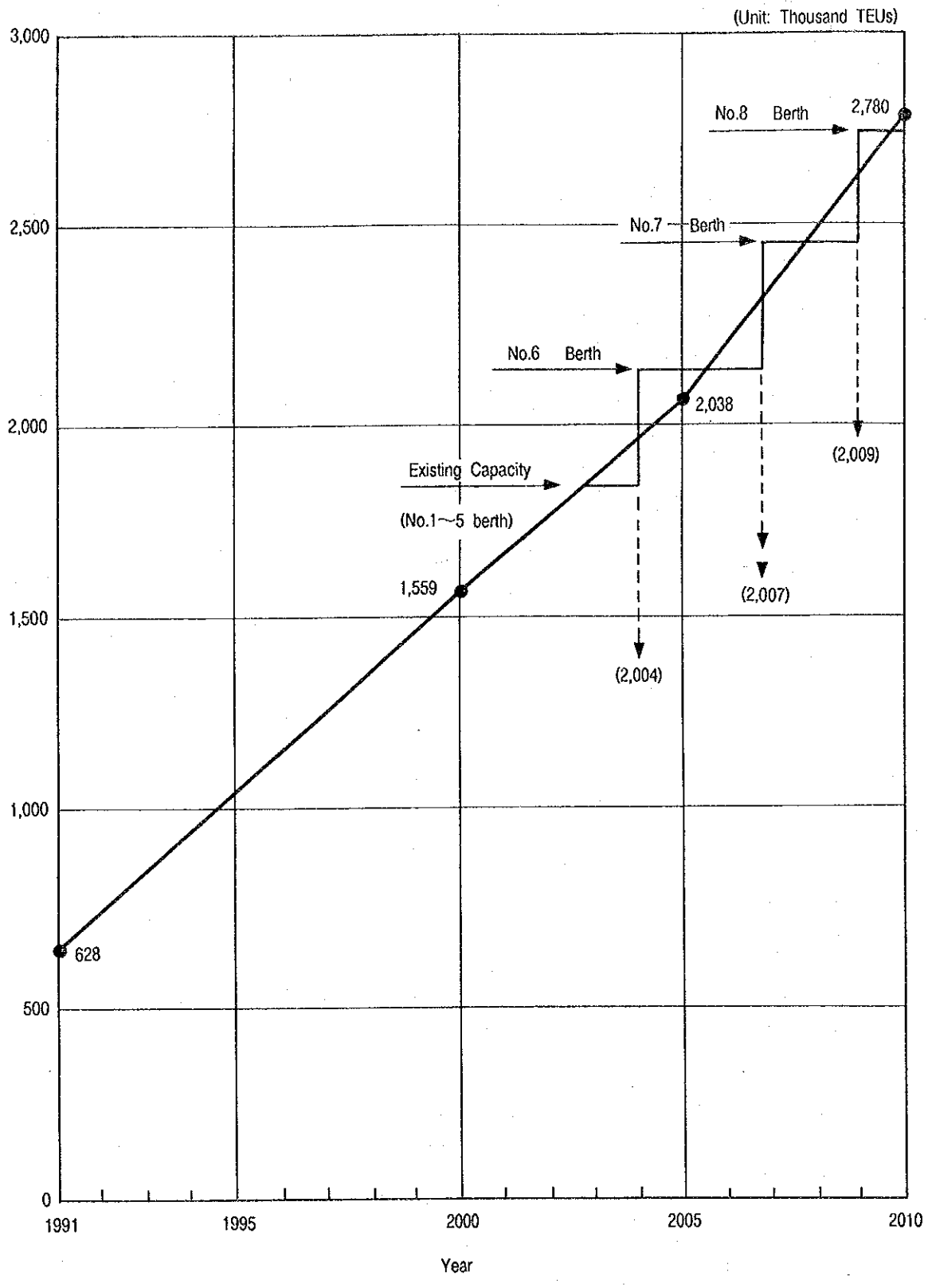


Figure 3-1 Stage Plan for Foreign Container Berth at MICT

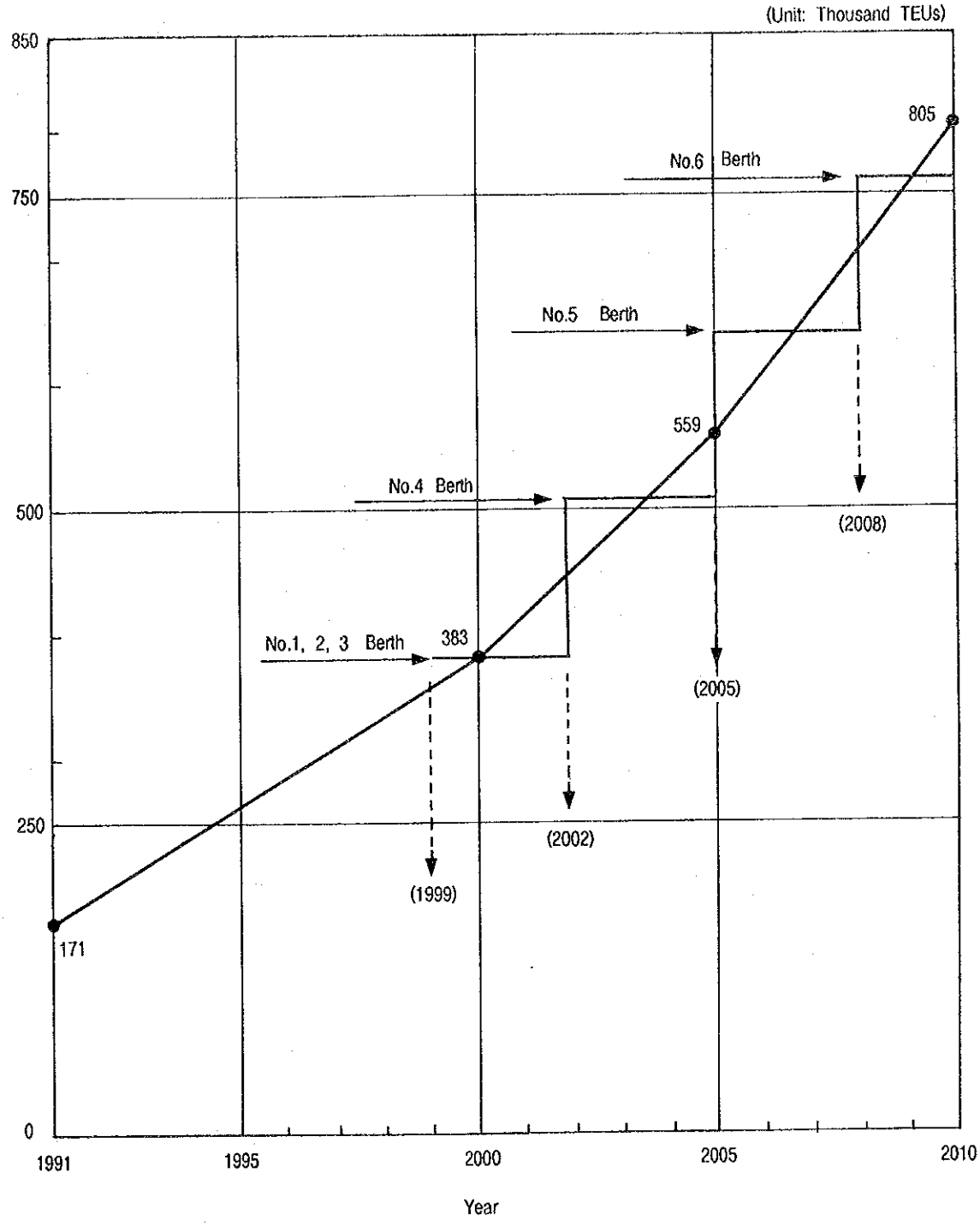


Figure 3-2 Stage Plan for Domestic Container Berth at North Harbor

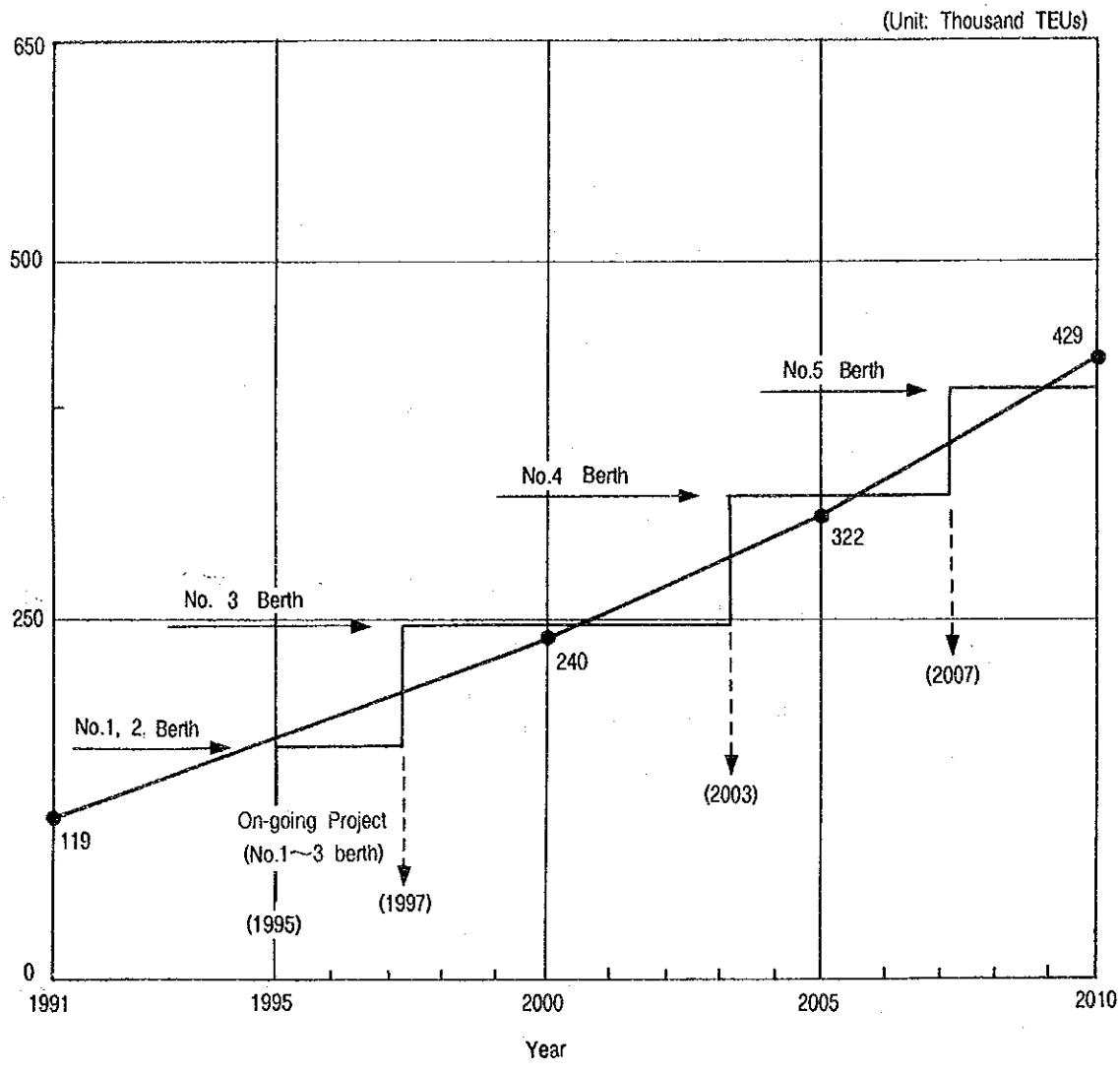


Figure 3-3 Stage Plan for Domestic RO/RO Berth at North Harbor

3.1.2 Implementation Schedule of Master Plan

According to the figures 3-1 to 3-3, it is required that the new berths completed by the target year 2010 are able to timely cope with the port cargo and passenger demand. Recommended implementation schedules under the medium case scenario at the Ports of Manila and Batangas is shown in Figure 3-4 and 3-5, respectively.

According to this figure, there are three(3) domestic container terminals, No 1, No 2, No 3, which should be completed and in full operation by 1999.

In addition, it is required that two more RO/RO berths and three more domestic container berths are constructed after the year 2000 in order to catch up with cargo and passenger demand up to the year 2010.

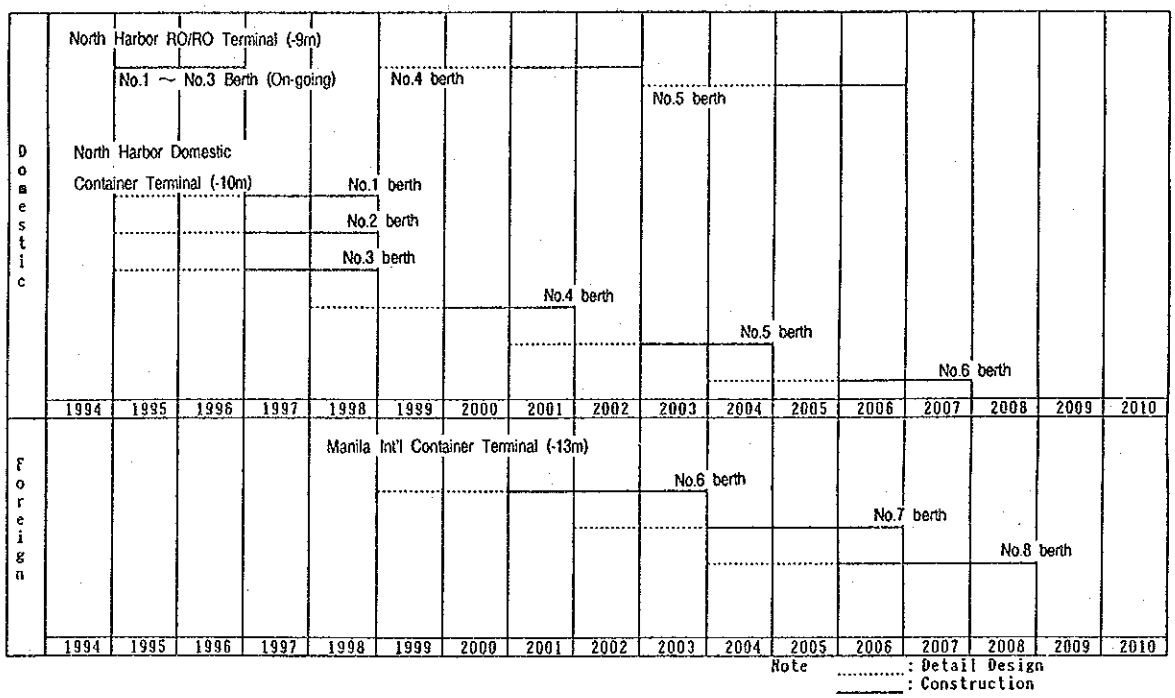


Figure 3-4 Implementation Schedule at Port of Manila (Medium Case)

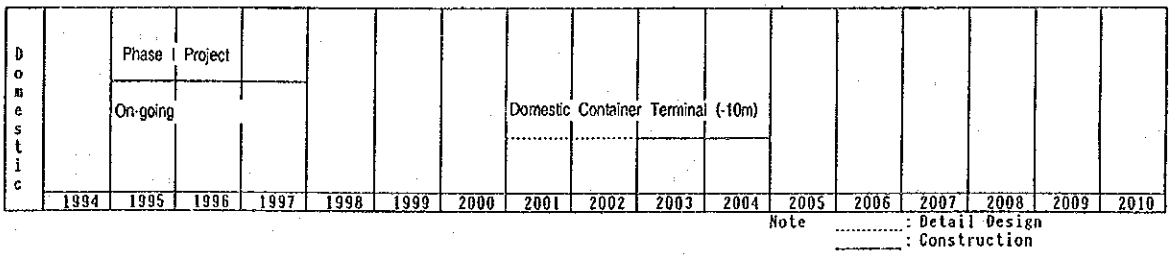


Figure 3-5 Implementation Schedule at Port of Batangas (Medium Case)

3.2 Short-term Development Plan of Non-Container Berth

3.2.1 Short-term Berth Requirement

Necessary number of non-container berths in the year 2000 and 2005 is also determined using several factors such as berth occupancy rate, productivity, working time and days. Major assumptions related to the above factors are as follows:

Berth occupancy rate : 50%
Productivity : 20 Metric Tons per Gang (Domestic)
: 25 Metric Tons per Gang (Foreign)
Operation time and days
(Ship Gear, Mobil Crane etc.)
: 13 hrs. per day, 360 days per year

The operation days per year at the Port of Batanagas are assumed to e reduced to 320 considering the natural conditions and the fact that there is no breakwater.

The details of other items are described in Part II of Chapter 5.1.

Table 3-5 to 3-8 show the foreign and domestic non-container cargo assignment to each port based on cargo demand in the years 2000 and 2005. According to these tables, the existing berths can sufficiently cope with non-container cargo. Therefore, there are no additional berths required at the ports of Manila and Batangas.

The basic data for short-term plan can be seen in Appendix D-6.

Table 3-5 Non-container Berth Requirement in the year 2000 (Medium Case) at Port of Manila

(1) Domestic Non-container Berths

Vessel Type	Present Cargo Vol.	Cargo Demand in 2000		Required Nos. Berth	Existing Nos. Berth	Additional Nos. Berth
	3,510	3,770				
RO/RO	Small Vessel(28%)		2,490 (66%)	14.1	36.0	0.0
Conventional	Small Vessel(72%)		1,280 (34%)	9.4		0.0

(2) International Non-container Berths (South Harbor)

	Present Cargo Vol.	Cargo Demand in 2000	Required Nos. Berth	Existing Nos. Berth	Additional Nos. Berth
South Harbor	1,646	2,530	9.1	14.0	0.0

Table 3-6 Non-container Berth Requirement in the year 2000 (Medium Case)

Port of Batangas

(1) Domestic Non-container Berths

Present Cargo Vol.	Cargo Demand in 2000		Required Nos. Berth	Existing Nos. Berth	Additional Nos. Berth
944	1,330 RO/RO Small Vessel	1,330 (100%)	5.0	5.0	0.0

(2) International Non-container Berths

Present Cargo Vol.	Cargo Demand in 2000	Required Nos. Berth	Existing Nos. Berth	Additional Nos. Berth
54	130	1.6	1.0	0.0

Remarks: Using multi-purpose berth

Table 3-7 Non-container Berth Requirement in the year 2005 (Medium Case)

at Port of Batangas

(1) Domestic Non-container Berths (North Harbor)

Vessel Type	Present Cargo Vol.	Cargo Demand in 2000		Required Nos. Berth	Existing Nos. Berth	Additional Nos. Berth
	3,510	3,890				
RO/RO	Small Vessel(28%)		2,920 (75%)	16.5	36.0	0.0
Conventio-nal	Small Vessel(72%)		970 (25%)	7.1		0.0

(2) International Non-container Berths (South Harbor)

	Present Cargo Vol.	Cargo Demand in 2000	Required Nos. Berth	Existing Nos. Berth	Additional Nos. Berth
South Harbor	1,646	2,590	9.3	14.0	0.0

Table 3-8 Non-container Berth Requirement in the year 2005 (Medium Case) at Port of Batangas

(1) Domestic Non-container Berths

Present Cargo Vol.	Cargo Demand in 2000	Required Nos. Berth	Existing Nos. Berth	Additional Nos. Berth
944	1,490 RO/RO	5.6	5.0	0.0

(2) International Non-container Berths

Present Cargo Vol.	Cargo Demand in 2000	Required Nos. Berth	Existing Nos. Berth	Additional Nos. Berth
54	210	0.8	1.0	0.0

3.3 Cargo Handling System

The cargo handling system for the short term container terminal is basically the same as that for the long term container terminal. Required number of container cargo handling equipment is shown in Table 3-9.

Table 3-9 Required Number of Cargo Handling Equipment

Port	Project	Berth	Container Crane	Transfer Crane	Straddle Carrier
Port of Manila	MICT's Int'l Container Terminal	On-going Berth 4(-13m)	Panamax 1	7	
		" 5	" 2		
		New Berth 1(-13m)	Over Panamax 2	5	
		2	Panamax 2	5	
		3	" 2	5	
	North Harbor's Domestic Container Terminal	New Berth 1(-10m)	Domestic Large 1		5
		2	" 1		5
		3	" 1		5
		4	" 1		5
		5	" 1		5
		6	" 1		5
Port of Batangas	Domestic Container Berth	On-going Berth 1(-10m)	Domestic Large 1		3
		New Berth 1(-10m)	" 1		5

CHAPTER 4 PRELIMINARY DESIGN OF SHORT-TERM DEVELOPMENT PLAN

4.1 Design Basis

Three berths of -10m domestic container terminal in Manila North Harbor will be selected as short-term development plan target year 1999.

The design approach has been based on internationally accepted codes, criteria and conformity with Philippine standards and conditions.

The design criteria are grouped into two sections, under "Marine Works" and "Inland Works".

Marine works refer to harbor facilities while Inland works are essentially those on land structures and facilities.

The following design standards will be used as reference and guidance.

a) National Structural Code of Philippines (NSCP)
b) ASEP Earthquake Resistant Design of Structures
c) Design Manual for Port and Harbour Facilities in the Philippine Ports Authority, JICA 1994.
d) National Fire Protection Association (NFPA)
e) National Electric Code (NEC)
f) Technical Standards for Ports and Harbours facilities in Japan, 1980.
g) British Standard Code of Practice for Marine Structure.
h) American Association of State Highway (AASHTO)
i) DPWH Design Guideline and Standards of Philippines
j) American National Standard Institute (ANSI)
k) Japanese Industrial Standards (JIS)

4.2 Structure Design Methods

All structures were designed for the largest stress resulting from the combination of all loads which may act on the structure.

All port structures were designed by the working stress design method.

The working stress design method has been based on the allowable stresses indicated in the appropriate codes.

Based on the site reconnaissance and the data from ongoing port development project in Manila North Harbor, following type of quay structures will be considered for comparison purpose: namely,

a. Open-Type Prestressed Concrete Pile Structure.
b. Open-Type Steel Pipe Pile Structure
c. Closed-Type Steel Sheet Pile Structure.
d. Gravity-Type Concrete Caisson Structure.

Type of Structure	a	b	c	d
Durability	○	○	○	◎
Cost	◎	○	○	○
Material	◎	○	○	◎
Working Period	◎	◎	○	○

Conclusively, open-type prestressed concrete pile structure was selected as the -10m container berth structure in Manila North Harbor taking into consideration of above comparison table.

4.3 Preliminary design of Wharf Structure

4.3.1 Maritime facilities

1) Objective Ship Size (Maximum)

Type	: Container vessel
Deadweight tonnage	: 12,500 DWT
Overall length	: 145m
Moulded breadth	: 21.6m
Full loaded draft	: 8.3m

2) External Forces by Ship

Tractive forces	: 70 ton Bitt capacity
Berthing force	: 0.10 m/sec Velocity
	: 10 degrees Angle
	: Contact on quarter point

3) Wind

Wind velocity	: 175 kph
Wind pressure (0-9m)	: 1,440 Pa
Wind pressure (9-30m)	: 1,920 Pa
Wind pressure (more than 30m)	: 2,400 Pa

4) Wave

Design wave in offshore are as follows:

10 Year Return Period	: 1.84 H1/3(m)
30 Year Return Period	: 2.43 H1/3(m)
50 Year Return Period	: 2.69 H1/3(m)

5) Current

Maximum design velocity : 0.2 m/sec

6) Tide

H.H.W.L	: +1.77
H.W.L	: +1.26
M.T.L	: +0.49
M.L.L.W	: ±0.00
D.L.T	: -0.35

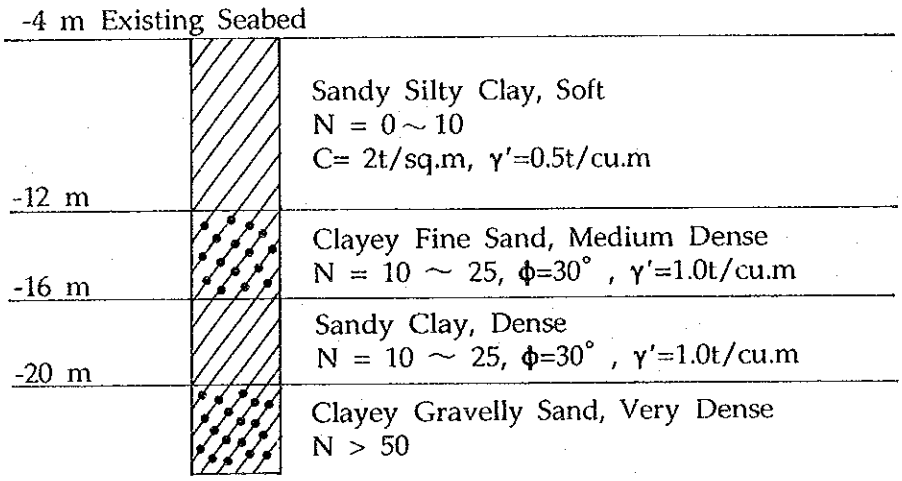
7) Soil Condition

Based on the results of the soil investigation at nearest position in North Harbor, the design soil condition is determined, however it is recommended

to undertake further detailed borehole exploration in the future stage.

(Refer to Borehole MN-03 in Appendix A-21)

Soil Conditions at Proposed New Berth



8) Load Conditon

a. Dead Load

Reinforced concrete	: 2.45 t/m^3
Plane concrete	: 2.30 t/m^3
Steel	: 7.85 t/m^3

b. Live Load

i) Uniform Live Loads

Normal Condition	: 2.5 tf/m^2
Seismic Condition	: 1.25 tf/m^2

ii) Wheel Loads

Mobile Crane 35 ton	: Max.Reaction	40 tf/Outrigger
Forklift Truck 25 ton	: Max.Load	27 tf/Wheel In front
Tractor Trailer 40 ton	: Max.Load	20 tf/Axial
Straddle Carrier 35 ton	: Max.Load	11 tf/Wheel
Container Crane 30.5 ton (rated capacity)	: Max.Load	48 tf/Wheel

iii) Fill Sand and Fill Rock

	Sand	Rock
Unit Weight (in Air) t/m^3	1.8	1.8

Unit Weight (in Water) t/m^3	1.0	1.0
Angle of internal friction ϕ	30°	40°

9) Seismic factor

Kh (horizontal) = 0.15

Factor for Subsoil Condition = 1.2

Coefficient of Importance = 1.2

S.F = 0.15 × 1.2 × 1.2 = 0.21

10) Service Life

New Berth 30 years

11) Concrete and Steel Materials

i) Concrete

Grade A: Precast Prestressed members.
Cylinder Strength (28 days) : 350 kgf/cm^2

Grade B: Marine Structure
Cylinder Strength (28 days) : 240 kgf/cm^2

Grade C: Reinforced Concrete
Cylinder Strength (28 days) : 160 kgf/cm^2

Grade D: Block Concrete of Breakwater
Cylinder Strength (28 days) : 180 kgf/cm^2

ii) Reinforcement

Grade 40 reinforcement : Marine Structure
2,800 kgf/cm^2

12) Concrete Protective Covers

i) For marine structure

Slabs (cm)	Beams (cm)	Columns (cm)
7.5	7.5	7.5

ii) For inland structure

Deck slaab (cm)	Exposed earth (cm)	Stirrups (cm)
2.5 - 5.0	7.5	4.0

4.3.2 Major Facilities of Container Terminal

1) -10m Container Berth

Berth Length : 180m x 3 berth = 540m

Terminal Width : 280m (40m Apron included)

Crane Rail : Gauge 18m, Length 540m x 2

Rubber fender : V-800H x 1500L
Fitting Interval 10m
Bollard : 70 ton
Spacing of Mooring 25m

2) Buildings

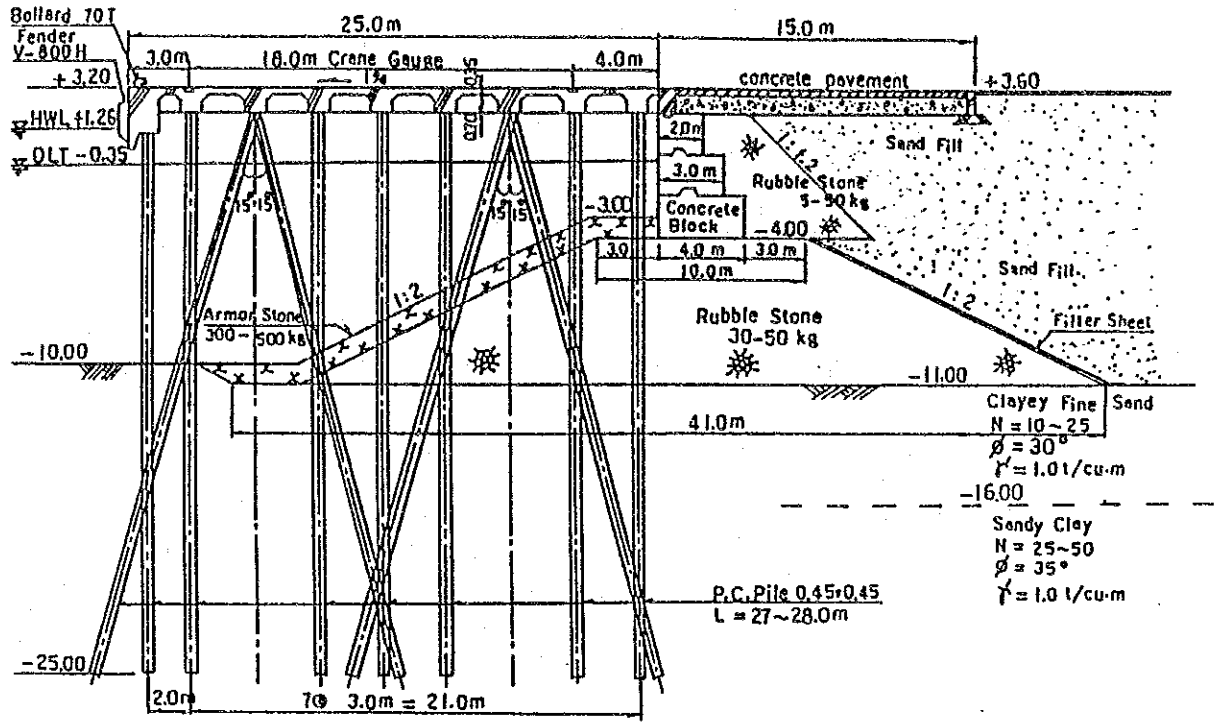
Container Freight Station (C.F.S) : Steel Frame Structure
Maintenance Shop : Steel Frame Structure
Administration Building : R.C. Structure

3) Pavement

Container Yard : P.C Panel
Port Road : Asphalt

Standard Cross Section of -10m Container Berth is shown in Figure 4-3-1.

MANILA NORTH HARBOR
-10M CONTAINER BERTH



PORT OF BATANGAS
-10M CONTAINER BERTH

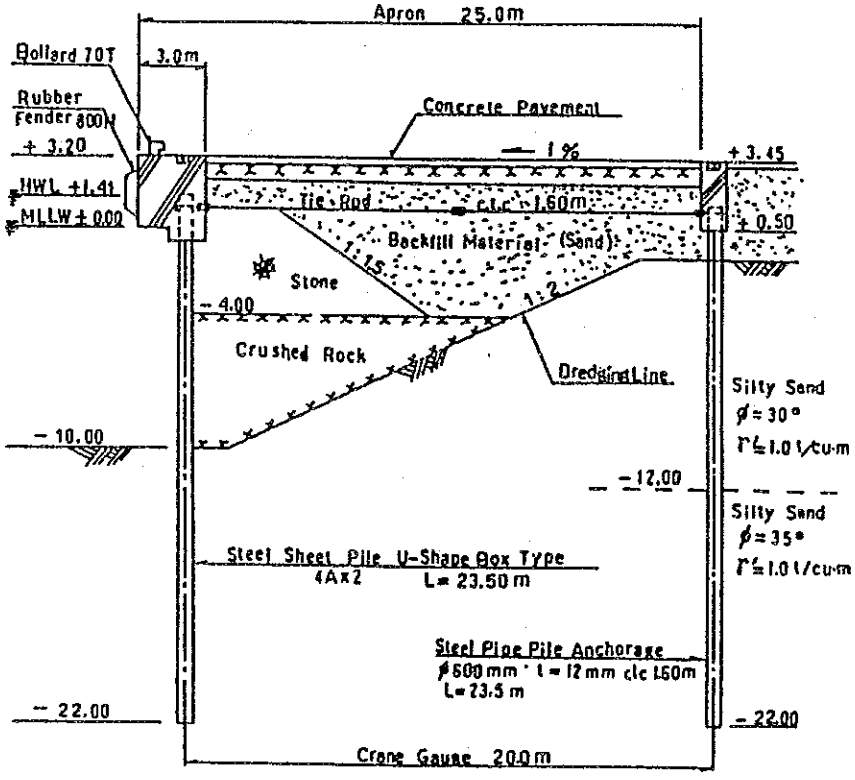


Figure 4-3-1 Standard Cross Section of -10m Container Berth

CHAPTER 5 PROJECT COST ESTIMATION AND SHORT-TERM IMPLEMENTATION SCHEDULE

5.1 General

According to the short-term development plan of port facilities, three(3) domestic container berth at North Harbor will be required for the short-term development project by year 1998. Project cost of North Harbor by year 2010 for Master Plan is 8,661 Million Peso and the breakdown of it is shown below.

Description	Unit	Quantity	Unit Price (Peso)	Amount ('000 Peso)
1. CONSTRUCTION WORKS				**4,687,462**
(1). Marine Works	-	-	-	**2,615,290**
1). Dredging	cu.m	4,200,000	133	558,600
2). Filling	cu.m	2,620,000	190	497,800
3). -10m container berth	l.m	1,080	1,000,000	1,080,000
4). -9m new ro/ro berth	l.m	220	670,000	147,400
5). -9m existing ro/ro berth	l.m	180	568,000	102,240
6). Revetment	l.m	600	128,750	77,250
7). Access road offshore	l.m	1,520	100,000	152,000
(2). Civil Works	-	-	-	**1,935,672**
1). Pavement of yard	sq.m	389,000	1,600	622,400
2). Access road on land	l.m	950	91,100	86,545
3). Buildings	sq.m	59,400	10,955	650,727
4). Truck scale	unit	6	5,180,000	31,000
5). Utilities/Other civil works	Ha	35	7,000,000	245,000
6). Bridge at Pasig River	l.m	200	1,500,000	300,000
(3). General Expenses	sum	1		**136,500**
2. EQUIPMENT	-	-	-	**2,129,500**
1). Container crane	unit	6	180,000,000	1,080,000
2). Straddle Carrier	unit	21	26,000,000	546,000
3). Forklift 40 ton	unit	2	22,000,000	44,000
4). Forklift 25 ton	unit	5	11,000,000	55,000
5). Forklift 7.5 ton	unit	3	2,750,000	8,250
6). Forklift 5 ton	unit	25	1,750,000	43,750
7). Tractor Trailer	unit	60	3,250,000	195,000
8). Chassis	unit	90	1,750,000	157,500
3. INDIRECT COST	-	-	-	**1,843,988**
1). Physical Contingency	sum	1	-	681,696
2). Engineering Services Fee	sum	1	-	374,933
3). Value Added Tax	sum	1	-	787,359
TOTAL OF PROJECT COST				**8,660,950**

5.2 Cost Estimation of Short-term Development Plan

The project of short-term development plan is to construct three(3) marginal wharves of 540 meters in total berth length and container yards of 12.96 Ha (540m X 240m) at the North harbor side along the breakwater of North Harbor. The project also includes the construction of access road offshore and -10 m channel & basin, the procurement of cargo handling equipment.

Since the construction of No.4 container terminal and No.5 Ro/Ro berth will start taking interval with a certain idling time after completion of No.3 container terminal, temporary revetments at both extremities of yard to prevent reclamation area and structures on it breaking out shall be constructed. However, considering the sequence of filling works, fill material will be extended by 10 meters at the formation level and prepared slope of 1 by 3 gradient without any stone structure which may make obstruction in future. The quantity of fill material is included in the volume of reclamation (filling).

Access channel will be dredged at -10 meters with a width of 200 meters by this stage. The rest of 100 meters width of the channel (300 m - 200 m) will be dredged at the same time of the completion of No.6 container terminal. Dredging area in this stage is approximate 114 ha (Access channel 80 Ha, turning & mooring basin 34 Ha), and dredging volume is 2.6 million cubic meters (access channel 1.6 million cu.m, basin 1.0 million cu.m). Filling sand material for reclamation shall be obtained from coastal area of Cavaite-Ternate offshore elsewhere suitable fill for reclamation are available considering environmental effect and future development plan of the area.

Two(2) lanes of access road (half width of master plan) will be prepared in this term. Fill material for sub-grade will be transported by dump trucks from on land.

Table 5-1 shows the project cost of short-term development plan.

Table 5-1 Project Cost of Short-term Development Plan

Unit: 000 Peso

Description	Unit	Quantity	Unit Price	Amount
1. Construction Works				**1,909,853**
1) General Expenses	sum	1		58,146
2) Dredging	cu.m	2,600,000	133	345,800
3) Filling	cu.m	1,050,000	190	199,500
4) -10m container berth	l.m	540	1,000,000	540,000
5) Access road offshore	l.m	1,020	52,850	53,907
6) Access road on land	l.m	950	55,000	52,250
7) Pavement of yard	sq.m	129,600	16,000	207,360
8) Container freight station	sq.m	22,500	9,500	213,750
9) Maintenance shop	sq.m	2,400	12,500	30,000
10) Administration building	sq.m	4,800	17,000	81,600
11) Truck scale	unit	3	5,180,000	15,540
12) Utilities/Others	Ha	16	7,000,000	112,000
2. Equipment				**1,067,250**
1) Container crane	unit	3	180,000,000	540,000
2) Straddle carrier	unit	11	26,000,000	286,000
3) Forklift 40 ton	unit	1	22,000,000	22,000
4) Forklift 25 ton	unit	2	11,000,000	22,000
5) Forklift 5 ton	unit	12	1,750,000	21,000
6) Tractor trailer	unit	30	3,250,000	97,500
7) Chassis	unit	45	1,750,000	78,750
3. Indirect Cost				**805,306**
1) Physical contingency	%	10	2,977,103	297,710
2) Engineering fee	%	5	3,274,813	163,741
3) Value Added Tax	%	10	3,438,554	343,855
TOTAL COST				**3,782,409**

5.3 Short-term Implementation Schedule

The completion of the construction works will be expected by the end of year 1998 because the operation of 3 container terminals will start in the initial term of 1999 year at the same time.

Prior to the construction works, Detailed Design Study and preparation of Tender Document for two(2) years will be required. Therefore, subject to the start of the project in early stage of 1995 year, 1995 and 1996 will be the term of engineering services for Detailed Design and Tender Documents, and year 1997 and 1998 will be the term of construction works.

To complete the construction works for 2 years, the construction schedule may be rather tight. Therefore, suitable selection and use of construction machinery and equipment shall be very important.

Execution quantity per day and adequate construction machinery and equipment are shown below.

Quantity of execution		machinery & equipment	
Dredging	4,500 cu.m/day	Trailing dredger (trailer)	1 unit
Reclamation	2,500 cu.m/day	Sand pump dredger	1 unit
-		Sand barge 500 cu.m	3 unit
-		Reclaimer pontoon	1 unit
Piling works	2.5 nos/day	Piling pontoon 60ton/50m	1 unit
Concrete	45 cu.m/day	Batching plant pontoon 20cu.m/h	1 unit
Stone	150 cu.m/day	Stone barge with grab bucket	2 unit
Common marine works		Working flat barge av. 300 ton	5 unit
-		Crane barge 20 - 50 ton/lift.	3 unit
-		Tug boat/pilot boat etc.	1 sum
Pavement	500 sq.m/day	Asphalt finisher/roller etc.	1 sum
Common civil works		Crane/dozer/truck etc.	1 sum

Figure 5-1 shows Short-term Implementation Schedule.

Amount : Million Peso

Description	Quantity	Amount	1995	1996	1997	1998
1. Port Facilities		1,910			952	958
1). General Expenses	1 sum	58			28	30
2). Dredging	2,600,000 cu.m	346			173	173
3). Filling	1,050,000 cu.m	200			100	100
4). -10m contaier berth	3B. 540 m	540			270	270
5). Access road	1,970 m	106			52	54
6). Pavement	129,600 sq.m	207			103	104
7). Buildings	29,700 sq.m	325			162	163
8). Utilities/Other works	1 sum	128			64	64
2. Equipment	-	1,067	-	-	534	533
1). Container crane	3 unit	540			350	190
2). Straddle carrier	11 unit	286			184	102
3). Forklift/Tractor etc,.	90 unit	241			-	241
3. Indirect Cost		805	45	45	357	358
TOTAL COST		3,782	45	45	1,843	1,849

Figure 5-1 Short-Term Implementation Schedule at North Harbor Project

5.4 Short-Term Development Plan at Batangas Port

Table 5-2 shows the project cost of Batangas port by year 2004.

Table 5-2 Project cost of Batangas Port

Description	Unit	Quantity	Unit Price	Amount Million
1. Port Facilities	-	-	-	461.3
(1).General Expenses	sum	1	-	13.4
(2).Marine Works	-	-	-	346.8
1).Dredging	cu.m	365,000	110	40.2
2).Reclamation	cu.m	74,000	164	12.1
3).-10m container berth	l.m	150	609,000	91.4
4).-10 seawall	l.m	300	549,000	164.7
5).Revetment seaside	l.m	200	90,000	18.0
6).Revetment sidewall	l.m	85	60,00	5.1
7).Artificial concrete block	cu.m	3,600	4,250	15.3
(3).Civil Works	-	-	-	101.1
1).Pavement of yard	sq.m	27,380	1,600	43.8
2).Port road W=22m	sq.m	13,200	1,075	14.2
3).Outdoor lighting	berth	1	15,750,000	15.8
4).Utilities	sum	1	-	14.7
5).Other civil works	sum	1	-	2.6
6).Warehouse	sq.m	800	12,500	10.0
2. Equipment	-	-	-	355.0
1).Container crane	unit	1	180,000,000	180.0
2).Straddle carrier	unit	4	26,000,000	104.0
3).Forklift 40 ton	unit	1	22,000,000	22.0
4).Forklift 5 ton	unit	4	1,750,000	7.0
5).Tractor	unit	7	3,250,000	22.8
6).Chassis	unit	11	1,750,000	19.2
3. Indirect Cost				220.8
TOTAL COST				1,037.1

Figure 5-2 shows the implementation schedule of Batangas Port. The project of construction shall be completed by the end of year 2004.

Figure 5-2 Implementation schedule of Batangas Port

Amount : Million Peso

Item	Quantity		Amount	2002	2003	2004
1. Port Facility			461.3		168.4	292.9
(Marine Works)						
1). Dredging	365,000	cu.m	40.2		40.2	
2). Reclamation	74,000	cu.m	12.1			12.1
3). -10 m seawall	300	m	164.7		82.3	82.4
4). -10 m container berth	150	m	91.4		30.4	61.0
5). Revetment	285	m	38.4			38.4
(Civil Works)						
6). Pavement of yard	27,380	sq.m	43.8			43.8
7). Port road	13,200	sq.m	14.2			14.2
8). Warehouse	800	s	10.0			10.0
(Common Works)						
2. Equipment			355.0		142.0	213.0
1). Container crane	1	unit	180.0		90.0	90.0
2). Straddle carrier	4	unit	104.0		52.0	52.0
3). Forklift/tractor, etc	23	unit	71.0			71.0
3. Indirect Cost			220.8	16.5	81.6	122.7
1). Engineering Services			44.9	15.0	14.9	15.0
2). Physical Contingency			81.6	0.0	31.0	50.6
3). Value Added TAx			94.3	1.5	35.7	57.1
TOTAL COST			1,037.1	16.5	392.0	628.6

CHAPTER 6 ECONOMIC ANALYSIS

6.1 Methodology

An economic evaluation will be conducted as a preliminary evaluation.

The economic 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.

JICA team has suggested the port development master plan in the Greater Capital Region(GCR) with the final target year being 2010. Most of applied data should be estimated by the team based on the Medium Term Development Plan authorized by the National Economic and Development Authority.

(1) EIRR

The economic evaluation of the master plan is identified as preliminary evaluation to clarify the justification of the project by the Economic Rate of Return(EIRR).

(2) "With" and "Without" analysis

The EIRR value is obtained from the annual economic benefit-cost value. The economic benefits are obtained from the difference between the "With the project" case (hereinafter referred to as the "With" case) and "Without the project" case (hereinafter referred to as the "Without" case).

(3) Measurement of Costs and Benefits

In estimating the costs and benefits of the project, "economic pricing" is applied. Economic pricing means that costs and benefits are appraised in terms of international prices(border prices).

The general procedure of the economic analysis is shown in Figure 6-1.

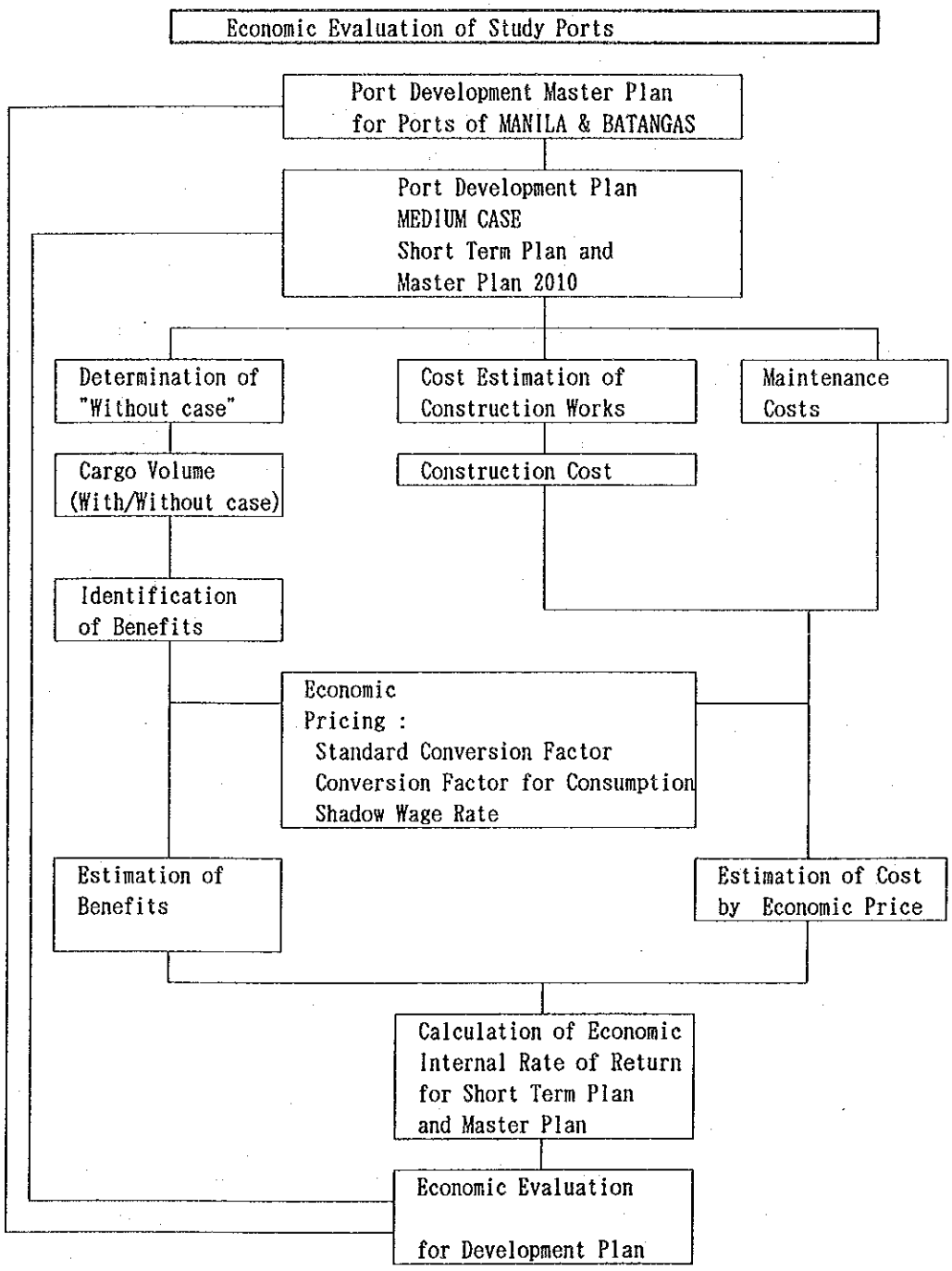


Figure 6-1 Flow Chart of Evaluation Study

6.2 Prerequisites of economic analysis

6.2.1 Base year

The base years of the master plan components are set as follows:

	Design	Construction	Operation
PROJECT-1 (Manila)			
Foreign Container	1999	2001	2004(NO6)
			2007(NO7)
			2009(NO8)
PROJECT-2 (Manila)			
Domestic Container	1995	1997	1999(NO1,2,3)
PROJECT-3 (Manila)			
Domestic Container	1997	2000	2002(NO4)
			2005(NO5)
			2008(NO6)
Domestic RoRo	1999	2001	2003(NO4)
			2007(NO5)
PROJECT-4 (Batangas)			
Domestic Container	2002	2003	2005

6.2.2 Project life

Taking into consideration the depreciation period of the main facilities (30 years) and the construction period, the period of calculation(project life) in the economic analysis is assumed to be thirty-five years for PROJECT-1, thirty-four years for PROJECT-2, thirty-five years for PROJECT-3 and thirty-three years for PROJECT-4 from the beginning of design (i.e., from 1999 to 2033 for PROJECT-1, from 1995 to 2028 for PROJECT-2, from 1997 to 2031 for PROJECT-3 and 2002 to 2034 for PROJECT-4).

6.2.3 "With" Case

In an economic analysis, benefits are mainly brought about by improvements in

productivity. The "With" case scenario includes all improvements in productivity for each stage.

6.2.4 "Without" Case

A cost-benefit analysis is conducted on the difference between the "With" and "Without" investment cases.

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

(for PROJECT-1)

1) No investment is made for the port(from 2001 to 2008).
2) The sizes of vessels and the working efficiency of cargo handling is the same as "With" case.
3) Five Container berths of MICT and four container berths of the South Harbor are available.
4) Same number and different size of vessels call at MICT and the South Harbor.

(for PROJECT-2)

1) No investment is made for the port(from 1997 to 1998).
2) The size of vessels is the same as "With" case.
3) Container cargoes are handled by vessel crane at the existing domestic berths.
4) Loading capacity of large size container vessel is set at 75 % of full capacity.
5) Three groups utilize three existing berths as container berths independently.

(for PROJECT-3)

1) No investment is made for the port(from 2000 to 2007).
2) The size of vessels and the working efficiency of cargo handling are the same as "With" case.
3) Loading capacity of large size container and RoRo vessels is set at 75 % of full capacity.
4) Three groups utilize three new berths (NO1,2,3) as container berths independently for large size container vessel.

(for PROJECT-4)

1) No investment is made for the port(from 2003 to 2004).
2) Domestic container vessels are assigned to the foreign container berth and the foreign conventional berth so as to count same berth occupancy rate.

3) Container cargoes are handled by gantry crane at the foreign container berth and vessel crane at the foreign conventional berth.

6.3 Economic Pricing

6.3.1 Methodology

The purpose of the economic analysis is to examine the value of a project, that is, to see if it represents an efficient allocation of resources in the national economy. The values of goods quoted at a market price do not always represent the true value of those goods from the viewpoint of the national economy. The local currency portion of the goods and materials at a market price often includes customs duties. The labor cost at market prices is often influenced by a minimum wage system. Therefore, "economic pricing" should be conducted for the economic analysis.

In this study, the prices of domestic goods and services are revised to border prices in an effort to determine a more rational valuation. In general, these border prices are intended to represent the international market value, or the world prices, of these goods and services.

The market prices are changed to border prices by various conversion factors such as "Standard Conversion Factor", "Conversion Factor for Consumption" and so forth.

Import duties, other taxes and subsidies are merely transfer items which do not actually reflect any consumption of national resources. Therefore, these transfer items should be excluded in the calculation of the costs and benefits of the project for the economic analysis.

6.3.2 Standard Conversion Factor(SCF)

Import duties and export subsidies cause a price differential between the domestic market and the international market. The Standard Conversion Factor(SCF) is used to determine the economic prices of certain non-traded goods and services which cannot be directly valued at border prices.

SCF is the reciprocal of the Shadow Exchange Rate, and is expressed by the following equation:

$$SCF = \frac{1}{\text{Shadow Exchange Rate}}$$

(1) Shadow Exchange Rate

For the economic analysis, labor costs should be measured in terms of their opportunity costs, that is, the value of lost marginal production which the employment of the laborers for a given project would create for other purposes.

In this study, the shadow exchange rate is set as 1.20 because DOTC recommends the application of a shadow price of 1.20.

(2) Standard Conversion Factor

SCF = 1 / 1.20 = 0.833

6.3.3 Conversion Factor for Consumption(CFC)

The CFC is used for converting the prices of consumer goods from domestic market prices to border prices. This is particularly required in converting domestic labor costs to the corresponding border prices.

In this study, CFC is set as equivalent to SCF.

CFC = SCF = 0.833

(1) Conversion Factor for Skilled Labor

The cost of skilled labor is calculated based on actual market wages, assuming that the market mechanism is functioning properly. However, since these are domestic costs, they should be converted to border prices by multiplying the local wage by the CFC.

Conversion Factor for Skilled Labor

= Nominal Wage Rate * CFC

= 1 * 0.833

= 0.833

(2) Conversion Factor for Unskilled Labor

Although minimum wages are set in the Philippines, some of the actual wages are lower than the official minimum wages due to the high unemployment level.

Accordingly, unskilled labor wages should be adjusted by the shadow rate. According to the guideline provided by DOTC, this shadow wage rate is 60% of the nominal wage rate.

Conversion Factor for Unskilled Labor

= Nominal Wage Rate * Shadow Wage Rate * CFC

= 1 * 0.6 * 0.833

= 0.5

6.4 Benefits

6.4.1 Benefit Items

As benefits brought about by the master plan of ports, the following items are identified:

1) Savings in waiting costs of vessels
2) Savings in water transportation cost by enlargement of vessel size
3) Savings in time costs of cargoes
4) Savings of cost in cargo handling
5) Savings in land transportation costs
6) Promotion of regional development in GCR
7) Increase in employment opportunities/incomes

Of the above, items 1), 2), 3) and 4) are considered as the benefits suitable for the cost-benefit analysis in this Study. Item 5) is applicable to the new port. Items 6) and 7) are difficult to evaluate in strictly monetary terms.

6.4.2 Savings in waiting costs of vessels.

If the new berths are not constructed, the increased cargo volume would have to be handled at the existing berths only and the waiting time of calling vessels would increase in accordance with the port congestion.

Implementing the project will prevent this problem. Investment in the new berths will reduce the waiting time of calling vessels and this cost reduction is one of the major benefits of the project.

Benefits that will accrue to the Philippines from the project can be calculated by comparing the "With" case to the "Without" case.

The formula used to calculate this benefit is as follows:

Savings in vessels' waiting costs
= Difference in waiting time between "With" and "Without" cases
*Vessel cost(unit cost)
*Share of benefits accruing to Philippines

Tables 6-1, 6-2, 6-3, 6-5, 6-8, 6-11, 6-12, 6-13, 6-14 and 6-16 show details.

6.4.3 Savings in water transportation cost by enlargement of vessel size

When the size of calling vessels becomes changed larger corresponding to request of mass transportation, large vessel can call at deep berths but can not call at existing shallow berths. A number of required vessel to meet the demand increases by reduced capacity due to shallow berths.

This benefit will accrue to the Philippines in transportation with domestic cargo and imported cargo.

The formula used to calculate this benefit is as follows:

Savings in water transportation cost by enlargement of vessel size
= (No. of vessel by existing berths
- No. of vessel by planning berths)
* Average required days to transportation
* Vessel cost(unit cost)

Tables 6-5 and 6-10 show details.

6.4.4 Savings in time costs of cargoes

The reduction of vessels' waiting time due to the construction of the new berths brings about a reduction in the time required for transportation.

This will bring about a reduction in usance interest because invested funds will be called in faster. Converted into monetary terms, this reduced time can be estimated by the following equation:

Savings in time costs of cargoes
= Volumes of cargo(tons/year)
*Reduction of vessels' waiting time(days)
*Average cargo value(pesos/ton)
*Interest rate(/day)

Interest rate is set at 15% based on recent rate of commercial banks (refer to KEY INDICATOR by ADB).

Tables 6-4, 6-6, 6-9, 6-15 and 6-17 show details.

6.4.5 Savings of cost in cargo handling

Number of labors and equipments engaged in cargo handling works will be reduced by modernization of port facilities. Benefit by reduction of labors and equipments is counted as follows:

Savings of cost in cargo handling
= (Cost in cargo handling at existing berth
- Cost in cargo handling at new berth)

Table 6-7 shows details.

Table 6-1 FLAG OF VESSEL ON FOREIGN TRADE (1992)

-PROJECT-1-

	EXPORT (%)	IMPORT (%)	ACCURING RATIO
PHILIPPINE ①	28.0	9.0	1.0
FOREIGN ②	72.0	91.0	0.5
TOTAL ③	64.0	54.5	-

③ = ① + 0.5 * ②

Table 6-2 ACCRUING TO PHILIPPINE ECONOMY (2001-2010)

-PROJECT-1-

YEAR	VOLUME OF EXPORT	VOLUME OF IMPORT	SHARE OF EXPORT	SHARE OF IMPORT	ACCURING RATIO
2001	4920	10391	0.32	0.68	0.58
2010	9553	15443	0.38	0.62	0.58

Table 6-3 VESSEL WAITING COST

-PROJECT-1-

(UNIT: MILLION PESO/YEAR)

YEAR	① NO. OF VESSEL WITHOUT	CARGO HANDLING TIME(Hr)	WAITING TIME FOR BERTH(Hr)	② TOTAL SERVICE TIME(Hr)	③ LARGE VESSEL W.COST*	④ MEDIUM VESSEL W.COST**	③+④ TOTAL VESSEL W.COST
2004	1650	12.7	1.7	14.4	29	16	45
2005	1741	13.4	2.9	16.3	58	32	89
2006	1839	14.2	5.5	19.7	109	60	169
2007	1957	15.0	12.1	27.1	228	125	353
2008	2066	16.2	61.8	78.0	1059	580	1639
2009	2066	16.2	61.8	78.0	1059	580	1639
2010	2066	16.2	61.8	78.0	1059	580	1639

(NOTE) ③W.COST*
= DAYLY VESSEL COST (11,506$*28) (PESOS/DAY/VESSEL)
* (②-12.1) * ① * 0.58 / 10**6
④W.COST**
= DAYLY VESSEL COST (6,295$*28) (PESOS/DAY/VESSEL)
* (②-12.1) * ① * 0.58 / 10**6

Table 6-4 SAVINGS IN TIME COST OF CONTAINER CARGOES

-PROJECT-1-

	① VOLUME OF CARGO (,000TONS)	② TOTAL SERVICE TIME(Hr)	③ WAITING TIME(Hr) ②-12.1	④ SAVINGS TIME COST(MN.P)
2004	15,455	14.4	2.3	34.1
2005	16,304	16.3	4.2	67.6
2006	17,352	19.7	7.6	129.4
2007	18,464	27.1	15.0	270.2
2008	19,645	78.0	65.9	1262.6
2009	19,645	78.0	65.9	1262.6
2010	19,645	78.0	65.9	1262.6

(NOTE) ④ = 57,000*①*③/24*0.15/365/10**6 (MN.PESOS)

Table 6-5 LARGE VESSEL WAITING COST AFTER ENLARGEMENT

-PROJECT-2- (UNIT: MILLION PESOS/YEAR)

YEAR	① NO. OF VESSEL WITHOUT	② VESSEL WAITING TIME (Hr)	③ NO. OF ADDITIONAL VESSEL	④ ADD.VESSEL ADDITIONAL TIME(Hr)	⑤ LARGE VESSEL W.COST*
1999	935	5.3	300	74.8	139
2000	987	9.8	316	79.3	176
2001	1039	18.2	333	87.7	244
2002	1088	42.4	348	111.9	431
2003	1110	61.8	355	131.3	583
2004	1110	61.8	355	131.3	583
2005	1110	61.8	355	131.3	583
2006	1110	61.8	355	131.3	583
2007	1110	61.8	355	131.3	583
2008	1110	61.8	355	131.3	583

(NOTE) ⑤W.COST*
= (①*②+③*④)/24*4339*28/10**6

Table 6-6 SAVINGS IN TIME COST OF CARGOES

-PROJECT-2-

	① VOLUME OF CARGO ('000TONS)	② TOTAL SERVICE TIME(Hr)	③ WAITING TIME(Hr) ②-15.2	④ SAVINGS TIME COST(MN.P)
1999	6,025	20.5	5.3	23.5
2000	6,544	25.0	9.8	47.2
2001	7,100	33.4	18.2	95.1
2002	7,662	57.6	42.4	239.2
2003	7,817	77.0	61.8	355.7

(NOTE) ④ = 43,000*①*③/24*0.15/365/10**6 (MN.PESOS)

Table 6-7 HANDLING COST BY ADDITIONAL EQUIPMENT

-PROJECT-2-

YEAR	NO. OF STRADDLE CARRIER	NO. OF TRAILER	NO. OF CHASSIS	NO. OF FORKLIFT	TOTAL EQUIP.COST (MN.PESOS)
1999	4	13	20	6	25
2000	7	25	37	14	49
2001	10	34	51	19	68
2002	12	41	61	25	84
2003	12	41	61	25	84

Table 6-8 WAITING COST OF DOMESTIC CONTAINER VESSEL

-PROJECT-3- (UNIT: MILLION PESOS/YEAR)

YEAR	① NO. OF VESSELS 3 BERTHS	② NO. OF VESSELS 1 BERTH	③ BERTH OCCUPANCY RATE	④ WAITING TIME(Hr)	⑤ VESSEL W.COST (MN.PESOS)
2002	1088	363	0.63	8.1	44.4
2003	1173	392	0.68	9.3	55.1
2004	1259	420	0.73	10.5	66.8
2005	1356	453	0.79	12.3	84.5
2006	1470	491	0.85	15.2	113.1
2007	1582	528	0.92	17.9	143.6
2008	1644	549	0.95	51.0	424.4
2009	1644	549	0.95	51.0	424.4
2010	1644	549	0.95	51.0	424.4

(NOTE) ⑤W.COST = ①*④/24*4339US$*28/10**6

Table 6-9 SAVINGS IN TIME COST OF CONTAINER CARGOES

-PROJECT-3-

YEAR	① CARGO VOLUME	② WAITING TIME(Hr)	③ SAVINGS (MN.PESOS)
2002	7662	8.1	45.4
2003	8266	9.3	56.4
2004	8867	10.5	68.5
2005	9549	12.3	86.6
2006	10355	15.2	115.9
2007	11147	17.9	147.2
2008	11991	51.0	450.3
2009	11991	51.0	450.3
2010	11991	51.0	450.3

(NOTE) ③ = 43,000*①*②/24*0.15/365/10**6

Table 6-10 ADDITIONAL COST BY INCREASING NUMBER OF RORO VESSEL

-PROJECT-3- (75%LOADING)

YEAR	① NO.OF VESSEL INCREASED	② COST BY RORO
2002	82	56.0
2003	143	97.6
2004	213	145.4
2005	289	197.2
2006	353	240.9
2007	433	295.5
2008	517	352.8
2009	613	418.3
2010	711	485.2

(NOTE) ② ADDITIONAL COST 3DAYS PER VESSEL
VESSEL COST: 8,124US$/DAY

Table 6-11 NUMBER OF CALLING VESSEL

-PROJECT-4(BATANGAS)-

YEAR	FOREIGN CONTAINER BERTH				FOREIGN CONVENTIONAL BERTH			REMARKS
	FOREIGN CONT-13000	CONT-7000	DOMESTIC CONT-8500	AVERAGE SERV. TIME	FOREIGN CONV-10000	DOMESTIC CONT-8500	AVERAGE SERV. TIME	
	11.8 (294) 16	4.4 (133) 16	8.8 (220) 16		29 2700T/V 16	11 (220). 16		HANDL'G HR BOXES/VSL WORK'G HR
2005	-	459	66	7.0	78	80	23.2	
2006	215	-	89	12.9	80	108	22.2	
2007	225	-	100	12.9	82	122	21.8	
2008	233	-	111	12.8	84	135	21.5	
2009	243	-	122	12.8	87	149	21.2	
2010	252	-	125	12.8	89	152	21.3	

Table 6-12 WAITING TIME AT FOREIGN CONTAINER BERTH

-PROJECT-4(BATANGAS)-

YEAR	WITHOUT CASE					
	FOREIGN CONTAINER		DOMESTIC CONTAINER	BERTH OCCUPANCY RATE	WAITING TIME FACTOR	WAITING TIME
	DWT13000	DWT7000	DWT8500			
2005	-	459	66	0.71	1.80	13
2006	215	-	89	0.77	2.46	32
2007	225	-	100	0.82	3.45	44
2008	233	-	111	0.86	4.75	61
2009	243	-	122	0.91	7.10	91
2010	252	-	125	0.95	13.73	177

Table 6-13 WAITING TIME AT FOREIGN CONVENTIONAL BERTH

-PROJECT-4(BATANGAS)-

YEAR	WITHOUT CASE				
	FOREIGN CONVENTION DWT10000	DOMESTIC CONTAINER DWT8500	BERTH OCCUPANCY RATE	WAITING TIME FACTOR	WAITING TIME
2005	78	80	0.64	1.29	30
2006	80	108	0.73	1.99	44
2007	82	122	0.77	2.46	54
2008	84	135	0.82	3.45	74
2009	87	149	0.87	5.20	110
2010	90	152	0.90	6.60	140

Table 6-14 SAVINGS IN VESSEL WAITING COST AT FOREIGN CONTAINER BERTH

-PROJECT-4(BATANGAS)- (UNIT:MILLION PESOS)

YEAR	① NO OF FOREIGN CONTAINER	② NO OF DOMESTIC CONTAINER	③ WAITING TIME (Hr)	④ FOR. VESSEL WAITING COST(MN. P)	⑤ DOM. VESSEL WAITING COST(MN. P)	⑥ TOTAL VES. WAITING COST(MN. P)
2005	459	66	13	17	3	21
2006	215	89	32	29	11	41
2007	225	100	44	43	18	61
2008	233	111	61	60	27	88
2009	243	122	91	94	45	139
2010	252	125	177	190	90	279

(NOTE) ④=(YEAR2005)①*③*4,456*28/24/10**6*0.58
(YEAR2006-2010)②*③*6,295*28/24/10**6*0.58
⑤=②*③*3,476*28/24/10**6
⑥=④+⑤

Table 6-15 SAVINGS IN TIME COST OF CONTAINER CARGO AT FOREIGN CONTAINER BERTH

-PROJECT-4(BATANGAS)- (UNIT:MILLION PESOS)

YEAR	① VOLUME OF FOREIGN CONTAINER (000 TON)	② VOLUME OF DOMESTIC CONTAINER (000 TON)	③ WAITING TIME (Hr)	④ FOR. CARGO WAITING COST(MN. P)	⑤ DOM. CARGO WAITING COST(MN. P)	⑥ TOTAL CAR. WAITING COST(MN. P)
2005	620	225	13	4	2	6
2006	647	309	32	12	7	19
2007	676	361	44	17	12	29
2008	706	421	61	24	19	43
2009	737	497	91	38	33	71
2010	770	586	177	77	76	153

(NOTE) ④=①*③*57,000/24*0.15/365/10**3
⑤=②*③*43,000/24*0.15/365/10**3
⑥=④+⑤

Table 6-16 SAVINGS IN VESSEL WAITING COST AT FOREIGN CONVENTIONAL BERTH

-PROJECT-4(BATANGAS)- (UNIT:MILLION PESOS)

YEAR	① NO OF FOREIGN CONVENTION VESSEL	② NO OF DOMESTIC CONTAINER VESSEL	③ WAITING TIME (Hr)	④ FOR. VESSEL WAITING COST(MN. P)	⑤ DOM. VESSEL WAITING COST(MN. P)	⑥ TOTAL VES. WAITING COST(MN. P)
2005	78	80	30	7	10	17
2006	80	108	44	15	19	34
2007	82	122	54	19	27	45
2008	84	135	74	27	41	67
2009	87	149	110	41	67	108
2010	90	152	140	54	86	140

(NOTE) ④=①*③*4,456*28/24/10**6*0.58
⑤=②*③*3,476*28/24/10**6
⑥=④+⑤

Table 6-17 SAVINGS IN TIME COST OF CONVENTIONAL AND CONTAINER CARGOES

-PROJECT-4(BATANGAS)- (UNIT:MILLION PESOS)

YEAR	① VOLUME OF FOREIGN CONVENTION (000 TON)	② VOLUME OF DOMESTIC CONTAINER (000 TON)	③ WAITING TIME (Hr)	④ FOR. CARGO WAITING COST(MN. P)	⑤ DOM. CARGO WAITING COST(MN. P)	⑥ TOTAL CAR. WAITING COST(MN. P)
2005	210	275	30	1	6	7
2006	216	377	44	1	12	14
2007	222	441	54	2	17	19
2008	228	514	74	2	28	30
2009	234	608	110	4	49	53
2010	240	716	140	5	74	79

(NOTE) ④=①*③*57,000/4/24*0.15/365/10**3
⑤=②*③*43,000/24*0.15/365/10**3
⑥=④+⑤

Table 6-18 VESSELS COST

(UNIT:US$/DAY)

DWT GRT	COST	FUEL	TOTAL (FOREIGN)	0.7*COST	TOTAL (DOMESTIC)	REMARKS
CONTAINER VESSEL						
30,000	11,296	210	11,506	7,907	8,117	MICT-LARGE
13,000	6,160	135	6,295	4,312	4,447	MICT-MEDIUM
7,000	4,348	108	4,456	3,044	3,152	BATANGAS-FOREIGN
12,500	6,010	132	6,142	4,207	4,339	MANILA-DOMESTIC
8,500	4,801	115	4,916	3,361	3,476	BATANGAS-DOMESTIC
RORO VESSEL						
13,700	11,409	138	11,547	7,986	8,124	MANILA-DOMESTIC
CONVENTIONAL VESSEL						
10,000	4,795	300	5,095	3,357	3,657	BATANGAS-FOREIGN

Table 6-19 AVERAGE VALUE OF CONTAINER CARGOES (MICT 1991)

ITEM	EXPORT	IMPORT	TOTAL
FOREIGN			
VALUE(MN.US$)	3,106	3,534	6,640
VOLUME(,000TONS)	1,525	2,418	3,943
UNIT VALUE(US$/TON)	2,040	1,460	1,680
YEAR 1993(ANNAL INF.RATE=1.1)	2,470	1,770	2,030
CARGO VALUE 1993(PESOS/TON)	69,000	50,000	57,000
DOMESTIC			
75% of FOREIGN			43,000

6.5 Costs

The items that should be considered as costs of the projects are:construction costs, maintenance costs, and renewal investment costs.

6.5.1 Construction costs

Construction costs are divided into such categories as foreign currency portion, local currency portion, skilled labor, unskilled labor and others.

The costs of foreign currency portion at financial prices are changed to economic prices by subtracting customs duty, development surcharge, sales tax, import permission fee and advanced income tax from the financial price.

The costs of local currency portion and others at financial prices are changed to economic prices by multiplying by the standard conversion factor(SCF).

The costs of skilled labor and unskilled labor at financial prices are changed to economic prices by multiplying by the conversion factor for skilled labor and the conversion factor for unskilled labor, respectively.

6.5.2 Maintenance costs

The costs of maintaining the port facilities are estimated as a fixed proportion (1% for structures, 4% for handling equipment) of the original construction costs excluding the costs of dredging and reclamation costs.

6.5.3 Renewal investment costs

If the depreciation period of a construction item is shorter than the project life, the construction cost includes renewal investment cost. Economic prices are calculated by multiplying the respective overall conversion factors.

6.6 Evaluation

6.6.1 Calculation of EIRR

The economic profitability of the project is evaluated in terms of the economic internal rate of return (EIRR). EIRR is a discount ratio satisfying the following equation:

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

Where, Bi : Benefit at i-th year
Ci : Cost at i-th year
r : Rate of discount
n : Period of economic calculation

The calculations for EIRRs are shown in Tables 6-20, 6-21, 6-22 and 6-23.

6.6.2 Sensitivity Analysis

To see if the project is still feasible when some factors vary, alternate cases are examined as follows.

Case-A : The costs increase by 10 %
Case-B : The benefits decrease by 10 %
Case-C : Combination of the above A and B cases

The results of the sensitivity analysis are shown in Table 6-24.

Table 6-20 CALCULATION OF EIRR FOR INTERNATIONAL CONTAINER TERMINAL

-PROJECT-1(MANILA)- (UNIT : MILLION PESOS)

YEAR	COST			BENEFIT			BALANCE	NET PRESENT VALUE		
	CONSTRUCTION & RENEWAL	MAINTENANCE	TOTAL	VESSEL WAITING COST	TIME COST OF CARGO	TOTAL		COST TOTAL	BENEFIT TOTAL	BALANCE
1999	99		99				-99	99		-99
2000	99		99				-99	82		-82
2001	576		576				-576	399		-399
2002	1,006		1,006				-1,006	581		-581
2003	1,171		1,171				-1,171	563		-563
2004	925	72	997	45	34	79	-918	399	32	-367
2005	974	91	1,065	89	68	157	-908	355	52	-303
2006	1,513	119	1,632	169	129	298	-1,334	453	83	-370
2007	972	138	1,110	353	270	623	-487	257	144	-113
2008	974	156	1,130	1,639	1,263	2,902	1,772	217	558	341
2009		156	156	1,639	1,263	2,902	2,746	25	465	440
2010		156	156	1,639	1,263	2,902	2,746	21	387	366
2011		156	156	1,639	1,263	2,902	2,746	17	322	305
2012		156	156	1,639	1,263	2,902	2,746	14	268	254
2013		156	156	1,639	1,263	2,902	2,746	12	224	212
2014		156	156	1,639	1,263	2,902	2,746	10	186	176
2015		156	156	1,639	1,263	2,902	2,746	8	155	147
2016		156	156	1,639	1,263	2,902	2,746	7	129	122
2017	370	156	526	1,639	1,263	2,902	2,376	19	107	88
2018	520	156	676	1,639	1,263	2,902	2,226	21	89	69
2019	370	156	526	1,639	1,263	2,902	2,376	14	75	61
2020	370	156	526	1,639	1,263	2,902	2,376	11	62	51
2021	520	156	676	1,639	1,263	2,902	2,226	12	52	40
2022	370	156	526	1,639	1,263	2,902	2,376	8	43	35
2023	370	156	526	1,639	1,263	2,902	2,376	6	36	29
2024		156	156	1,639	1,263	2,902	2,746	2	30	28
2025		156	156	1,639	1,263	2,902	2,746	1	25	24
2026		156	156	1,639	1,263	2,902	2,746	1	21	20
2027		156	156	1,639	1,263	2,902	2,746	1	17	16
2028		156	156	1,639	1,263	2,902	2,746	1	14	14
2029		156	156	1,639	1,263	2,902	2,746	1	12	11
2030		156	156	1,639	1,263	2,902	2,746	1	10	9
2031		156	156	1,639	1,263	2,902	2,746	0	8	8
2032		156	156	1,639	1,263	2,902	2,746	0	7	7
2033		156	156	1,639	1,263	2,902	2,746	0	6	5
TOTAL	11,199	4,476	15,675	43,270	33,339	76,609	60,934	3,620	3,620	-0

Table 6-21 CALCULATION OF EIRR FOR DOMESTIC CONTAINER BERTH

-PROJECT-2(MANILA)-　　(UNIT : MILLION PESOS)

YEAR	COST			BENEFIT				BALANCE	NET PRESENT VALUE		
	CONSTRUCTION & RENEWAL	MAINTENANCE	TOTAL	VESSEL WAITING & ENLARGEMENT	TIME COST OF CARGO	COST OF CARGO HANDLING	TOTAL		COST TOTAL	BENEFIT TOTAL	BALANCE
1995	38		38					-38	38		-38
1996	38		38					-38	32		-32
1997	1,568		1,568					-1,568	1,132		-1,132
1998	1,574		1,574					-1,574	966		-966
1999		60	60	139	24	25	188	128	31	98	67
2000		60	60	176	47	49	272	212	27	121	94
2001		60	60	244	95	68	407	347	23	153	131
2002		60	60	431	239	84	754	694	19	241	222
2003		60	60	583	356	84	1,023	963	16	278	262
2004		60	60	583	356	84	1,023	963	14	236	222
2005		60	60	583	356	84	1,023	963	12	201	189
2006		60	60	583	356	84	1,023	963	10	171	161
2007		60	60	583	356	84	1,023	963	9	145	136
2008		60	60	583	356	84	1,023	963	7	123	116
2009		60	60	583	356	84	1,023	963	6	105	99
2010		60	60	583	356	84	1,023	963	5	89	84
2011		60	60	583	356	84	1,023	963	4	76	71
2012	534	60	594	583	356	84	1,023	429	37	64	27
2013	534	60	594	583	356	84	1,023	429	32	55	23
2014		60	60	583	356	84	1,023	963	3	46	44
2015		60	60	583	356	84	1,023	963	2	39	37
2016		60	60	583	356	84	1,023	963	2	33	32
2017		60	60	583	356	84	1,023	963	2	28	27
2018		60	60	583	356	84	1,023	963	1	24	23
2019		60	60	583	356	84	1,023	963	1	21	19
2020		60	60	583	356	84	1,023	963	1	17	16
2021		60	60	583	356	84	1,023	963	1	15	14
2022		60	60	583	356	84	1,023	963	1	13	12
2023		60	60	583	356	84	1,023	963	1	11	10
2024		60	60	583	356	84	1,023	963	1	9	9
2025		60	60	583	356	84	1,023	963	0	8	7
2026		60	60	583	356	84	1,023	963	0	7	6
2027		60	60	583	356	84	1,023	963	0	6	5
2028		60	60	583	356	84	1,023	963	0	5	4
TOTAL	4,286	1,800	6,086	16,148	9,661	2,410	28,219	22,133	2,437	2,437	-0

Table 6-22 CALCULATION OF EIRR FOR DOMESTIC CONTAINER AND RO/RO BERTHS

-PROJECT-3(MANILA)- (UNIT : MILLION PESOS)

YEAR	COST			BENEFIT				BALANCE	NET PRESENT VALUE		
	CONSTRUCTION & RENEWAL	MAINTENANCE	TOTAL	CONTAINER VESSEL WAITING	RO-RO VESSEL WAITING	CONTAINER TIME COST OF CARGO	TOTAL		COST TOTAL	BENEFIT TOTAL	BALANCE
1997	93		93					-93	93		-93
1998	133		133					-133	114		-114
1999	395		395					-395	288		-288
2000	697		697					-697	435		-435
2001	532		532					-532	283		-283
2002	191	69	260	44	56	45	145	-115	118	66	-52
2003	516	69	585	55	98	56	209	-376	228	81	-146
2004	466	69	535	67	145	69	281	-254	178	93	-84
2005	113	69	182	85	197	87	369	187	52	105	53
2006	562	69	631	113	241	116	470	-161	153	114	-39
2007	414	69	483	144	296	147	587	104	100	122	22
2008		69	69	424	353	450	1,227	1,158	12	217	205
2009		69	69	424	418	450	1,292	1,223	10	195	185
2010		69	69	424	485	450	1,359	1,290	9	176	167
2011		69	69	424	485	450	1,359	1,290	8	150	142
2012		69	69	424	485	450	1,359	1,290	7	128	122
2013		69	69	424	485	450	1,359	1,290	6	110	104
2014		69	69	424	485	450	1,359	1,290	5	94	89
2015	178	69	247	424	485	450	1,359	1,112	15	80	65
2016	177	69	246	424	485	450	1,359	1,113	12	68	56
2017		69	69	424	485	450	1,359	1,290	3	58	55
2018	178	69	247	424	485	450	1,359	1,112	9	50	41
2019	177	69	246	424	485	450	1,359	1,113	8	43	35
2020		69	69	424	485	450	1,359	1,290	2	36	35
2021	176	69	245	424	485	450	1,359	1,114	6	31	26
2022	177	69	246	424	485	450	1,359	1,113	5	27	22
2023		69	69	424	485	450	1,359	1,290	1	23	22
2024		69	69	424	485	450	1,359	1,290	1	19	18
2025		69	69	424	485	450	1,359	1,290	1	17	16
2026		69	69	424	485	450	1,359	1,290	1	14	13
2027		69	69	424	485	450	1,359	1,290	1	12	11
2028		69	69	424	485	450	1,359	1,290	1	10	10
2029		69	69	424	485	450	1,359	1,290	0	9	8
2030		69	69	424	485	450	1,359	1,290	0	8	7
2031		69	69	424	485	450	1,359	1,290	0	6	6
TOTAL	4,949	2,070	7,019	10,684	12,474	11,320	34,478	27,459	2,163	2,163	-0

Table 6-23 CALCULATION OF EIRR FOR CONTAINER TERMINAL

-PROJECT-4(BATANGAS)- (UNIT : MILLION PESOS)

YEAR	COST			BENEFIT			BALANCE	NET PRESENT VALUE		
	CONSTRUCTION AND RENEWAL	MAINTENANCE	TOTAL	VESSEL WAITING	TIME COST OF CARGO	TOTAL		COST TOTAL	BENEFIT TOTAL	BALANCE
2002	14		14				-14	14		-14
2003	337		337				-337	264		-264
2004	538		538				-538	330		-330
2005		18	18	37	13	50	32	9	24	15
2006		18	18	75	32	107	89	7	40	33
2007		18	18	106	48	154	136	5	45	40
2008		18	18	155	74	229	211	4	53	49
2009		18	18	247	124	371	353	3	67	64
2010		18	18	420	232	652	634	3	92	90
2011		18	18	420	232	652	634	2	72	70
2012		18	18	420	232	652	634	2	57	55
2013		18	18	420	232	652	634	1	44	43
2014		18	18	420	232	652	634	1	35	34
2015		18	18	420	232	652	634	1	27	26
2016		18	18	420	232	652	634	1	21	21
2017		18	18	420	232	652	634	0	17	16
2018	142	18	160	420	232	652	492	3	13	10
2019	213	18	231	420	232	652	421	4	10	7
2020		18	18	420	232	652	634	0	8	8
2021		18	18	420	232	652	634	0	6	6
2022		18	18	420	232	652	634	0	5	5
2023		18	18	420	232	652	634	0	4	4
2024		18	18	420	232	652	634	0	3	3
2025		18	18	420	232	652	634	0	2	2
2026		18	18	420	232	652	634	0	2	2
2027		18	18	420	232	652	634	0	1	1
2028		18	18	420	232	652	634	0	1	1
2029		18	18	420	232	652	634	0	1	1
2030		18	18	420	232	652	634	0	1	1
2031		18	18	420	232	652	634	0	1	1
2032		18	18	420	232	652	634	0	0	0
2033		18	18	420	232	652	634	0	0	0
2034		18	18	420	232	652	634	0	0	0
TOTAL	1,244	540	1,784	11,120	6,091	17,211	15,427	654	654	0

Table 6-24 Sensitivity Analysis for EIRR

Case	PROJECT-1	PROJECT-2	PROJECT-3	PROJECT-4
Base	20 %	18 %	17 %	28 %
Case-A	19 %	16 %	16 %	26 %
Case-B	18 %	16 %	16 %	26 %
Case-C	17 %	15 %	14 %	24 %

6.7 Economic Feasibility

The leading view is that a project is feasible if EIRR exceeds the opportunity cost of capital. The opportunity cost of capital in the Philippines is 15%.

Proposed projects are truly feasible for the following reasons.

(1) Although contribution to GDP or GRDP is difficult to quantitatively determine, and thus not treated here, it is thought to be high.

(2) Project-3 follows Project-2, so EIRR of Project-2 should be evaluated together with Project-3.

CHAPTER 7 ENVIRONMENTAL CONSIDERATION

In the short-term plan by the year 2000, three(3) domestic container terminals are planned along the existing breakwater at North Harbor, Port of Manila. Therefore, in this chapter, qualitative evaluation related to the above area can be applied for the major environmental items based on the Team's observations as well as various experiences in developed countries including Japan.

7.1 Review of Present Environmental Condition

There is very little environmental data available for the Study. The only data on water quality is the Dissolved Oxygen (DO) and PH conducted by the Study Team. According to the data, the water quality concerned with the DO and PH satisfy the water quality criteria at the port of Manila.

In addition, according to the Annual Report (Air Quality Monitoring Section, DENR Region Office IV), air quality in Metro Manila also satisfies the standards.

Therefore, the water and air quality of above items seems to be fairly good.

On the other hand, sea water turbidity (especially SS: Suspended Solids) seems to be bad, especially near the mouth of Passig River because the river flows into the Port of Manila with the sewage from houses, offices and factories which contributes to water pollution.

Further-more, there is a strong odor around the Smokey Mountain near North Harbor which is a disposal site for Metro Manila's waste. This strong odor affects not only the area around the settlers but also a northern section of the port area.

Behind the port area of the North Harbor where the Marcos Road runs along the wharf, many settlers live on one side of the road. This area is always very crowded with cars, cargo trucks, container trucks, jeepneys and people including passenger near the entrance of the wharf gate.

Many settlers also live in the port area such as the existing breakwater at North Harbor and South Harbor.

Considering the above present environmental condition, the degree of impacts on environment such as water and air quality around the port area may depend on not

only port development but also on the delay of adjusting social infra-structure.

7.2 Impact on Major Environmental Items

In the proposed project in the short-term plan, three(3) domestic container terminals should be constructed by the year 2000. The major components of this project are construction of the revetment, dredging for the turning basin and deepening of the channel, and reclamation behind the revetment and so on.

Therefore, the impact on major environmental items at each stage, including the actual construction stage of this project are as follows:

(1) Planning Stage

a) Resettlement

The existing breakwater is planned to serve as part of the port access road. It is assumed that this breakwater will also be used as the passage for incoming and outgoing construction equipment during construction.

However many settlers live along the existing breakwater and in the port area. Therefore, in an early stage of this project, it is necessary that suitable and concrete countermeasures for these settlers should be carefully taken into consideration.

For example, it is considered that the countermeasures for the relocation problem should be incorporated with the on-going Smokey Mountain Development and Relocation Project.

(2) Construction Stage

a) Water Quality

Water quality is the item which should be sufficiently taken into consideration because the project includes dredging and reclamation works. During the works, water quality, especially turbidity, will worsen. Therefore, it is very important to determine by how much and how widespread the effect will be. These examinations will be conducted at the detail design stage. But, if the environmental deterioration is expected to be very severe, it will be necessary to examine possible countermeasures in advance.

According to the short-term implementation schedule, the dredging volume per annum of this project is approximately estimated as 1.3 million cubic meters every year until 1998 and is the about two(2) times of the maintenance dredging volume which is conducted by PPA at the North Harbor every year.

As this project's dredging area covers the area of channel and turning basin to be deepened, the maintenance dredging volume shall be small or nil during the construction. So, it is considered that the total volume of the dredging is almost the same as the this project's dredging volume every year until 1998.

The dredging method to be used is the hopper suction type pumping dredger and this method may cause additional turbidity, especially around the hopper when cutting the earth.

So, one of the effective countermeasures is to surround the dredging area with a silt protector in order to lessen the SS burden. Further-more, enclosing the reclaimed area would be another effective measure in confining the turbidity generated by discharging. In addition, a sluice should be made on the landward side and excess water overflow the sluice. Thus, less turbid water at the upper layer should flow out to the open sea. Through these measures, the SS burden on the surrounding water could be further lessened.

b) Air Quality

As well as the water quality, it is considered that the effect on air quality is caused by construction machines such as dredgers and pile driving barges and so on. The degree of effect on air quality will be also examined at the detail design stage.

Generally speaking, the effect on air quality from construction machines is judged to be small.

c) Noise and Vibration

Works of heavy construction machines, the trucks and trailers going in and out for materials and equipment are the possible sources of noise and vibration produced during the construction period. Among heavy construction machines, the main possible sources of noise and vibration are driving piles.

In this short-term project, many PC piles are planned to be used. So, to minimize the noise and vibration, the Water Jet Pile Driving Method which has no noise or vibration problem is being considered. However, as PPA only has experience in using

the normal driving pile method which has been already used in RO/RO terminal construction works at North Harbor, in case of adoption the method, it is necessary to sufficiently examine the degree of the effects around the environment.

But, as the construction site is a fair distance from the residential area, the noise and vibration produced by heavy construction machines as well as trucks and trailers inside the port will cause no serious problem.

d) Ecosystem

As for the impact on benthos by the dredging as well as reclamation works, there is no serious problem foreseen. Every year, PPA has been conducting maintenance dredging works near the proposed project site. The average dredging volume per annum is approximately 600 thousand cubic meters at the North Harbor area, however, no environmental problems have so far materialized. Therefore, impact of dredging/reclamation works on benthos is expected to be minimal and no countermeasure is so far required.

(3) Operation Stage

With the emergence of additional port facilities in accordance with cargo demand, the volume of port traffic increases as well as the amount of cargo handling equipment which acts as an additional burden on the environment. However, with the exception of impact on the traffic congestion which has always occurred behind the port area, the impact on environment such as water and air quality, ecosystem and so on from port activities is judged to be small.

The reason is that the proposed project site has already been developed as port facilities over a long period of time and further-more, the growth rate of the number of calling vessels falls substantially under the increasing rate of port cargo demands due to the larger-sized vessels.

Also, according to the OD survey which was conducted last year by the Study Team, the impact from the port activities on urban traffic in Metro Manila is very small. However, the traffic volume outside the port shall increase in future. Therefore, in order to mitigate the traffic congestion behind the port area, it is important to complete the road infra-structure related to port development, that is, the road net-work behind the port area and the Inland Container Depot (ICD) Project.

(4) Other Environmental Issues

In the proposed project site, there are neither historical and prehistoric spots nor cultural assets in/around the port and, thus, no impact is foreseen. There is also no special environment which must be preserved. Therefore, there is no impact by the project on other items.

7.3 Overall Evaluation of Environmental Impact

Present environmental conditions and impact on major environmental items in the short-term project have already been mentioned in chapter 7-1 and 2. The overall evaluation of environmental impact is summarized as follows.

(1) Resettlement

Along the existing breakwater where the domestic container terminals is planned, many settlers live. In order to realize this project success-fully, first of all, it is necessary that these settlers are moved to another area, but it is also necessary to have their agreement for the resettlement. As one of the countermeasures for the resettlement, it is an effective means that the place where they remove should be incorporated with the on-going Smokey Mountain Development and Relocation Project. And, through these countermeasure, their agreement for the resettlement shall also be formed.

(2) Environmental Consideration around the Port Area

This proposed project site has already been developed as port facilities over a long period of time. The works for the extension of the existing breakwater is under construction. The works for the dredging to deepen/maintain the channel or the turning basin is regularly conducted.

Considering the above conditions, impact on environment from the construction of new port facilities and the port activities is judged to be small.

But, in order to keep the port and the area around the port in good condition, it is also necessary to continuously conduct monitoring, expand regulations on the environment and introduce the suitable counter-measures for preservation of the environment.

(3) Alleviation of Traffic Congestion

According to the result of the OD survey which was conducted last year by the Study Team, the impact from the port activities on urban traffic in Metro Manila is very small. However, there is serious traffic congestion at the intersection of the port access road.

Therefore, in order to alleviate the traffic congestion behind the port area and to keep the future port cargo stably and smoothly transported to consumers related to the development of the Port of Manila, it is necessary to timely construct the road network behind the port area and the Inland Container Depot(ICD) Project.

CHAPTER 8 Management and Operation from Short-term Perspective

8.1 Privatization Scheme

There is marked trend forwards privatization in ports throughout the world, and many port authorities have already adopted privatization or are considering its adoption. However, it is very difficult to define and evaluate this so-called "privatization" because of peculiarities among individual ports and countries. In addition, each port authority has its own jurisdiction and duties. In Table 8-1 the range of duties of several representative port authorities is presented. It can be seen that there are many differences among them. And thus it should be recognized that the definition of "privatization" is a relative matter. The privatization scheme to be adopted depends upon the degree of remaining duties in the public sector.

The following privatization schemes can be taken as examples even though the responsibilities of port authorities may differ from one another.

(1) Lease & Concession

The public sector constructs a terminal and leases it to the private sector on a contract. The private sector manages and operates it and turns over a percentage of the revenue. There are several types of leases used by the port authorities: flat rate, mini-max or shared revenue etc.. There is no best type: it depends on the nature of the port and its targets.

(2) BOT

The private sector constructs a terminal and operates it for a certain period. During that period, the private sector recovers its initial investment and transfers the terminal to the public sector.

(3) Private

The private sector constructs a terminal and operates it by itself.

This scheme is only adopted in the case of a special terminal, for instance, an exclusive terminal for coal, iron ore and so on.

Table 8-1 Port Authorities' Duties in the World

port country	Manila Philippine	Yokohama Japan	New York U.S.A.	London England	Rotterdam Netherlands	Dalian China	Bangkok Thailand
1 Management of Port Facilities	O	O	O	O	O	O	O
2 Berth Allocation	O	O	O	O	O	O	O
3 Levy of the Fee	O	O	O	O	O	O	O
4 Port Statistics	O	O	O	O	O	O	O
5 Vessel Entrance and Departure	?				O		O
6 Customs Clearance					O		
7 Quarantine							
8 Immigration							
9 Traffic Safety							
10 Police			O	O	O	O	O
11 Fire Fighting				O	?	O	O
12 CY Operation				O	?	O	O
13 CFS Operation				?		O	O
14 Stevedoring				O		O	
15 Arrastre				O		O	O
16 Lighter cargo handling						O	
17 Warehouse				O		O	O
18 Truck				O			
19 Railway				O			
20 Towage				O		O	O
21 Line Handling				O		O	O
22 Lubrication & Water Supply							O
23 Pilotage					O	O	
24 Tally services				?		O	O
25 Welfare Program	O	O	O	O	O	O	O

(Source: OCDI Survey Report)

Among the above mentioned schemes, many authorities in the U.S.A. and European countries have adopted 1) Lease & Concession scheme. Main container berths and ferry wharves in Japan are also operated by the same scheme.

However, a port & harbor, as strategic infrastructure, is so important to a nation that exclusive usage by a single company should be avoided if possible other than in special cases. Ports not only bring about direct benefits, but they contribute to the development of hinterland cities and to their economies.

8.2 Privatization of the Public Ports in the GCR

8.2.1 If the privatized area is confined to cargo handling, it can be said that Philippine public ports have been privatized from the beginning. Therefore 'Privatization' in the Philippines means the promotion of private sector participation in the public port operations in consideration of the following:

(1) Lightening the burden of government capital expenditure for newly constructed terminals and/or expansion of existing berths
(2) Rapid decision making of the private sector
(3) Eliminating bureaucratic system and promoting efficiency
(4) Easy fund acquisition and no budget restraints

The problem confronting a public port's management and operation from the short-term prospective is how to decide priorities on the adoption of privatized schemes that harmonize with a long-term economic target.

An additional problem is how the PPA, which is the entity not only as a regulator of Philippine Ports but also as an owner of the public ports and an operator, would be placed in relation to the development of privatization.

8.2.2 The PPA is a public trust and a business enterprise simultaneously. The Board of PPA adopted a privatization strategy in 1987.

The privatization of small and medium sized public ports of the PPA which are not suitable for comprehensive privatization will be confined to the cargo handling as at the present. But comprehensive privatization of the main ports of the PPA should be promoted though the public interests must be maintained.

Therefore, privatization of the main ports in the GCR such as the Port of Manila and the Port of Batangas should be promoted aggressively judging from the urgent needs of modernization and the cargo demand forecast.

The required number container berths and Ro/Ro berths in the GCR by the year 2010 is shown below (including on-going projects).

(The Port of Manila)

RORO	DOMESTIC CONTAINER	INT'L CONTAINER
5	6	3

(The Port of Batangas)

RORO	DOMESTIC CONTAINER	INT'L CONTAINER
3	1	1

The above berths should be completed by the target year. Compared to conventional terminals, a container terminal differs in the following respects.

(1) Construction costs are higher
(2) Efficient operation is needed to keep the scheduled time of container vessels
(3) A large amount of compensation for damages is required in case of an operating accident

In order to construct and operate the container terminal considering the above mentioned points, it is hoped that the suitable privatization scheme will be adopted to maximize the private sector's efficiency, mobility and flexibility while lightening the governmental capital expenditure.

The container terminal can be run most efficiently when operated entirely by one shipping company. It is mentioned in Part II that because of the low number of container berths in the GCR at present these berths should be used openly.

However preferential usage and/or exclusive usage should be considered in order to raise efficiency when the above mentioned container terminals are completed. And apprehensions of monopolistic usage will be reduced because each container terminal can compete with one another. The PPA has to organize their construction and should be the owner of them. Then the PPA can switch to the above mentioned usage giving

priority to public use.

It is thought best that these terminals that be managed and operated through the 'Lease & Concession Scheme'.

MICT was the pilot project privatized under this scheme and it is managed and operated by ICTSI which was selected by the public bidding.

ICTSI has attained modernized management and high productivity. In consequence, second largest revenue of the PPA is fee from ICTSI and it has been growing rapidly year by year as container handling volume in MICT increases. The revenue from ICTSI contributes to the financial statement of the PPA.

Liners can be allotted preferentially at MICT by 'Window Berthing System' as mentioned in Part II. And EDP(Electronic Data Processing) System is adopted in order to manage and operate efficiently. This system consists of 'Yard and Vessel Operation System', 'Inventory System', 'Container Freight Station System' and 'Vehicle and Equipment Maintenance'. ICTSI is trying hard to rationalize its system to keep on schedule for container vessels.

Details of ICTSI's selection are shown the following briefly.

8.2.3 Details of ICTSI's Selection

The following procedures had been arranged when managing and operating body of MICT was decided.

First public bidding was announced at home as well as abroad in 1987. Seven consortiums were formed from the 24 domestic and foreign companies which entered the bidding.

A bidding committee was organized and the committee made evaluation criteria which were composed of 40% financial points and 60% technical points. The details are as follows:

(Financial Points)

Fixed Fee	65%
Variable Fee	35%
TOTAL	100% * 0.4 = 40%

(Technical Points)

Cargo Handling System	45%
Port Development Plan	25%
Organization, Management System	20%
Port Maintenance Plan	10%
TOTAL	100% * 0.6 = 60%

As a result of the evaluation, ICTSI(International Container Terminal Services, INC.) a consortium composed of Sea-Land Orient Ltd., Anscor Container Corp. and E.Razon, INC., was selected to manage, operate and develop the MICT monopolistically under the supervision of the PPA.

The lease charge of MICT is composed of a 25 year fixed fee (5% increase a year) and variable fee. The variable fee agreement was concluded as follows:

1989 - 1990	12% of gross revenue
1991 - 1993	15% of gross revenue
1994 - 1996	17.55% of gross revenue
1997 - 2012	20% of gross revenue

In this contract, the lessee ICTSI is required to maintain the volume of foreign transshipment cargoes proposed in the bidding and the PPA can cancel the contract if the contractor falls short of the proposed cargo volume by 20% for the first five years from the beginning and after that duration, every 3 years.

In the case of canceling the contract, all facilities within MICT will revert to the PPA automatically. The renewal of the contract needs the approval of the board of PPA and the President.

8.2.4 PPA Privatizing Scheme

The PPA has the following four privatizing schemes including MICT scheme.

(SCHEME)	(PLACE)	(CONTENTS)
MICT SCHEME	MICT	- Public bidding in 1988 - Vested rights to manage, operate and develop the port for 25 years - Facilities revert to the PPA in case of the expiration of the lease or canceling the contract - Investment for port facilities and equipment by the contractor - Requisitions to keep the most suitable and efficient operations, management and maintenance - levying port charge for consideration of services - Payment for fixed fee and variable fee based on the revenue
MANAGEMENT CONTRACT SCHEME	SOUTH HARBOR	- The contract not involving infrastructure development but involving only the management and operation of cargo handling services and the provision of all necessary cargo handling equipment
BOT SCHEME	BULK GRAIN TERMINAL	- Awarded through public bidding - A given infrastructure is built by a contractor - The infrastructure is operated for a specified period of time and its ownership transferred to the government
PORT ESTATE PROJECT SCHEME	NORTH HARBOR	- Conceptualized by PPA in 1987 - Areas leased to the shipping companies - The shipping companies are responsible for the provision of cargo handling and other supplementary services - Rent is paid to PPA on a monthly basis

8.3 Primary Tasks in Privatization of GCR Public Ports

(1) Functional allotment among the container terminals

Generally speaking, a usage of a terminal can be divided into two types, 'general use' and 'exclusive use'. The former can be also divided into 'open use' and 'preferential use'. Once adopted a type, it will often make a difference of a scale of the terminal or cargo handling capacity.

Therefore each container terminal of the GCR should be classified based on their functional allotments and their usage style should be decided, namely 'open use', 'preferential use' or 'exclusive use'.

(2) Profitability of Grain Bulk Terminal privatized under BOT Scheme

It depends on its profitability whether the private sector can recover the initial investment for the specified period of time and this is the main problem. The key for the success of a project under the BOT scheme depends on the investment conditions which are provided by the government.

For example, the government should clarify the fundamental preparations by itself and the government should try to promote the preparations as early as possible.

(3) The government should prioritize the privatization of the public ports in the GCR and establish its criteria for privatizing and evaluating. In order to do so, further cooperation and adjustments between the authorities concerned (DOTC, PPA, NEDA, DTI etc.) will be needed.

8.4 PPA Organization

Privatization of Government-owned and Controlled Corporations (GOCCs), deregulation and preparation of transport infrastructure by utilizing the private sector are now being promoted aggressively in the Medium-term Philippine Development Plan. The PPA formed a Management Audit Task Force in September, 1992 and has been re-examining privatized-options for the ports.

On the above mentioned back-ground, the PPA is not only faced with reexamining its organization, but reconsidering the PPA Charter in addition to the decentralization of authority.

The PPA has currently about 500 personnel in its Headquarters Office and 1800 personnel in the PDO. The PPA's revenue is increasing year by year, but the number of personnel has not increased. In consequence, the rate of personal services to Port revenue is decreasing.

When it comes to the application of 'Early Retirement System, the brain drain of excellent staffs from the PPA must be prevented. At the same time, the supernumeraries coming from the streamlining of the organization must be coped with deliberately and be adjusted on the whole. In order to do so, it is important for the PPA to enrich the staff training and upgrade job specifications.

8.5 PPA Finance from the Short-term Perspective

The finance indicators of the PPA from 1988 to 1993 are shown in Part I. Both the operating ratio and the working ratio reach the preferable level. On the other hand, the rate of return on net fixed assets does not reach the preferable level.

A two-step increase of the tariff was approved in March, 1994. The last time the PPA increased its port charges was in 1983. Since then, prices have increased an average of 230%. The increase at this time is considered necessary.

In addition, the PPA's financial position has taken a turn for the better owing to Executive Order 159 dated February 23, 1994, directing all agencies of government to revise their fees & charges at just and reasonable rates sufficient to recover at least the full cost of services rendered.

The problem is that although the PPA controls currently more than a hundred of the public ports in the Philippines, most of them are not independent financially. Consequently, the main ports of PPA in the GCR support the others.

8.6 Conclusion and Recommendations in Management and Operation

(1) Monopolistic cargo handling services should be abolished in the GCR public ports and their services should be procured by public bidding.

(2) i) There is no general method for privatization of public ports owing to each

ports' peculiarities.

ii) In the selection of the privatization schemes, demarcation of preparation should be clarified between the public sector and the private sector. And the PPA's assets must be made use of effectively in order to maximize the economic benefits and introduce the private sector's investment aggressively.

iii) Some of the following schemes of privatization in the GCR public ports have been adopted. They should also be applied for the newly constructed terminals.

a) MICT Scheme b) Management Contract Scheme c) BOT Schemed

d) Port Estate Project Scheme

iv) The first urgent task for promoting privatization is to make a Terms of Reference of public bidding for safeguarding public interests. The next is to make the criteria for evaluation of each privatization scheme. A related task is to prepare and clarify the claim procedures from a company or consortium which can not be awarded the bidding.

v) Accurate, prompt and reliable data for vessels, cargoes, their demand forecast and so on are indispensable in the contract between the public sector and the private sector. Computerized network system is very effective for that. A network system which links the bodies concerned should be considered from the beginning.

(3) Container terminal demands efficiency of transportation. From the viewpoint of efficiency, preferential usage or exclusive usage is desirable. However it must be deliberately considered to maintain public interests by the contract when their forms are adopted while not dampening the private sector's incentive.

(4) The following functions must be retained by the public sector to maintain the public interests and safety.

i) Dredging of channels

ii) navigational aids

iii) navigational regulations

iv) ownership of land in a terminal including infrastructure

(5) The functions of each public port in the GCR should be adjusted in order to avoid redundant investment.

(6) The public sector should clarify the demarcation of preparation of infrastructure and participate in the project actively while trying to introduce the soft loan for that preparation.

(7) Small sized ports are not suitable for comprehensive privatization. In the initial stages, a highly competitive environment is not necessarily effective for small sized ports

because the market to be tapped is also small. In effect, the privatized area is limited to cargo handling services. However it is necessary for the administrative body to keep an eye on their operations.

It is also necessary for the local government to take part in important decisions concerning port development, in particular, land acquisition and adjustment of city planning.

CHAPTER 9 OVERALL EVALUATION

Viability of the Short-Term Plan was evaluated from various points of view which mentioned in the preceding chapters.

9.1 Engineering Soundness

(1) The North Harbor development project is now on-going near existing Pier 16 for the modernization and extension of RO/RO berths.

For the protection of new RO/RO berths from strong waves by WSW, W and WNW direction, North Breakwater extension works of 500 m is now under-construction.

The basic structure of existing finger piers is now beat-up condition due to long-term use of more than 50 years.

They need rehabilitation works for further use of these facilities.

(2) The proposed construction site for -10m container terminals in the North Harbor is offshore with water depth of -1.5 ~ -5.5m.

Bathymetric condition is suitable for constructing a container berth by reclamation.

There is no serious current or sedimentation which affects maintenance of channels and basins.

Only normal maintenance dredging will be required periodicary.

Water area in front of the construction site is well sheltered from strong waves by the existing North Breakwater.

There is no need to construct breakwater or jetty to protect container berths from waves in order to secure smooth cargo handling operation.

9.2 Economic Feasibility

(1) Purpose

The economic evaluation of the master plan is identified as a preliminary evaluation to clarify the justification of the project by the Economic Internal Rate of Return(EIRR).

(2) Benefits

As benefits brought about by the master plan of ports, the following items are counted:

1) Savings in ships staying costs.

2) Savings in ocean transport costs by means of improvements of ship operation schedule.

3) Savings in time costs of cargoes

4) Savings in additional equipment costs.

(3) Costs

The items that should be considered as costs of the projects are construction costs, maintenance costs and renewal investment costs.

(4) EIRR

The leading view is that a project is feasible if EIRR exceeds the pportunity cost of capital. The opportunity cost of capital in the Philippines is 15%, and EIRR of the master plan components are 20, 18, 17 and 28% respectively. So, proposed projects are truly feasible.

Project	Cost	Benefit	EIRR
Manila International Container Terminal(3B)	15.7 billion pesos	76.6 billion pesos	20 %
Manila Domestic Container Terminal(3B)	6.1 billion pesos	28.2 billion pesos	18 %
Manila Domestic Container-T(3B) RoRo-T(2B)	7.0 billion pesos	34.5 billion pesos	17 %
Batangas Domestic Container-T(1B)	1.8 billion pesos	17.2 billion pesos	28 %

9.3 Port Traffic Impact on Urban Road System

(1) Cargo Traffic

Estimated cargo traffic in 2010 is 40,657 PCU's/day. Urban traffic volume in 2010 is computed as 4,920,000 PCU's/day.

(2) Passenger Traffic

Three main access modes from/to North Harbor are implied, that is, public transportation(Bus and PUJ), Taxi and Car/Jeep. Estimated passenger traffic in 2010 is 8,783 PCU's/day.

(3) Impact on Urban Road Traffic

1) The ratio of port traffic to urban traffic is only 2-3%.

2) In 2010, average traffic speed decelerates from 45.9 km/h to 39.4 km/h on 12% of links in Metro Manila due to port traffic. Most congested area is limited to port area and several points.

(4) Recommendation

Direct path from port to highway will reduce road congestion.

9.4 Environmental Impact

Impact on major environmental items in the short-term project is already mentioned in chapter 7. So, the overall evaluation of environmental impact related to the short-term project is summarized as follows.

(1) Socio-economic impact

The first issue is the resettlement problem. For the settlers who live along the existing breakwater, this is a very important matter. At the same time, in order to complete the short-term project successfully, it is very important that they are relocated; their agreement for the relocation is also sought.

The second is impact on employment. A large number of employment opportunities are expected to be created through the construction and operation of the project.

The last is impact on traffic congestion. The impact of the port activities on urban traffic in Metro Manila is considered to be small. However, there still remains serious traffic congestion at the intersection of port access roads. Therefore, it is necessary to construct the road and rail infrastructure and so on, in accordance with the development of the Port of Manila.

(2) Impact on Major Environmental items

Impact on major environmental items such as water and air qualities and so on caused by the construction of new port facilities and port activities under operation, is judged to be small.

Also, in the proposed project site, there is no special environment which must be preserved because these port sites have already been developed over a long period of time.

But, in order to keep the port and area around the port in good condition, it is also necessary to continuously conduct monitoring, to expand regulations on the environment and to introduce suitable countermeasures for preservation of the environment.

9.5 Overall Evaluation

Overall evaluation shows that the port master plan at the Port of Manila and Batangas (Medium Economic Growth Case; GDP 5.5%) is feasible from the view point of (1) engineering soundness, (2) economic feasibility, (3) port traffic impact on urban road system in Metro Manila, and (4) environmental impact.

Table 9-1 Result of Overall Evaluation

Item	Result	Remarks
Engineering Soundness	Good	Existing major structures are technically sound. There is soft clay foundation at the project sites, but introduction of soil improvement technique can accomplish technically feasible port construction.
Economic Feasibility	Good	Project greatly contribute to a national economy in the Philippines.
Port Traffic Impact on Urban Road System	Good	Project has no signification impact on urban road system. However, it is recommended to introduce truck-ban and rail-served container transport to/from the hinterland in order to alleviate the road congestion, expected in future.
Environmental Impact	Good	Project has no significant environmental impact, but continuous monitoring of environment quality is recommendable.

CONCLUSIONS AND RECOMMENDATIONS

1 Conclusions

1.1 Port Development Strategies

In order to catch up with the rapidly increasing seaborne cargo and passenger demand, together with the remarkable tendency in enlargement of calling vessels, it is urgently needed to accelerate port development at major ports in the Greater Capital Region.

Based on plural scenarios of future economic growth and land transportation network development in the hinterland and economic impact of infrastructure investment and environmental consideration, port development strategies for the Port of Manila, Batangas, Sangley Point, Naic/Cavite, Subic, Lucena/Pagbilao and Infanta/Real have been formulated. The essence of port development strategies is summarized as shown in Table 1-1.

Table 1-1 Port Development Strategies in the Greater Capital Region

Port	Present Situation	Port Development Strategy
Subic	· Broad calm water area. Former US Naval Base. · American President Lines (APL) has already started international container service but frequency is low, thus a small amount of container cargo is handled at the port. · Industrialization at Subic has been realized by Taiwan group at first. · Free port project has been announced and port authority has begun duty-free sale on a small scale. · Possible project for marine recreation development. Beach is now open for public. · Distant location from Metro Manila, especially poor road link between San Fernando and Olongapo. · Cargo handling system is not modernized, in addition further improvement of port facilities is still needed for efficient cargo handling operation.	· Base port whose hinterland covers the North-west Luzon Island. · In order to develop the Port, road investment connecting with major commercial or industrial centers should have the first priority. · From the very long-term point of view, international container transshipment port is possible. · Industrial port in accordance with industrial development in backward area is also possible. · The Port should play a role as free trade zone, shelter port during storm and other urgent use until the port and road links are fully developed.
Manila	· The busiest port in the Philippines. · Super-hub port connecting with all major islands. · Increasing seaborne cargo recently, in particular container and roll on/roll off cargo. · Obvious trend of vessel-size enlargement · Successful privatization at the Manila International Container Terminal (MICT) · Rail-served Inland Container Depot Project by MICT · Definite limitation of land space for port extension. · Possible impact of port traffic upon urban highway system in Metro Manila without any countermeasure in future.	· The Port of Manila remains unshakable as super-hub port of the Philippines · In accordance with de-centralization of Metro Manila's urban function together with highway improvement extension in surrounding areas, diversion of the port role and function at Manila will be promoted. · The provision of further port facilities for rapidly increasing domestic container and roll on/roll off cargo is very urgent. Countermeasure for vessel-size enlargement is also needed. · Regarding international container cargo, Mict'S NO.5 container terminal and Rail-served Inland Container Depot (both are now projected), can catch up with increasing container demand up to the year 2000. After that, offshore port extension for new container terminals is required. · Further port improvement (Port facilities and cargo handling system) for coping with growing international container cargo, especially in high economic case scenario, at the South Harbor should be accelerated. · In order to decrease the impact of port traffic on urban highway system, a port bridge across the Pasig River is needed. In addition, R-10 elevated highway project should be implemented.
Sangley Point	· Broad calm water area. Close to the South Channel in the Manila Bay. · Located in the neighborhood of Cavite Export Processing Zone (EPZ) and Metro Manila as well. · Relocation of the Naval Base is difficult. · Capacity of the access road to the proposed port site is not enough, in addition, widening of the road is infeasible due to fully developed urban district.	· Conversion plan of the Naval Base into an international commercial port is possible if relocation of the Base is achieved. · Wide discussion about the Naval Vase relocation is recommendable, from the national economic point of view. · From the long-term point of view, a construction plan of an international container port surrounding Sangley Point will mature, in spite of unsuccessful relocation of the Naval Base. · Further development of Cavite's EPZ and highway extension to Rosario will accelerate a new port construction.
Naic/ Cavite	· Natural sand beach, very shallow water area. · Small scale fishing activity, and seasonal beach recreation. · Sandy solid foundation at sea bottom. (Good natural condition for port construction) · Poor access road link to the port to cope with heavy container cargo transport. · Distance from commercial or industrial centers in GCR is also in question (Super highway construction is needed)	· High potential to construct a large scale commercial port along the Naic coast according to natural and social conditions. · The port construction plan of a few number of container berths is not recommendable for economic reasons. · Countermeasure for strong wave attack from the north direction should be carefully taken into account, during project implementation. · Countermeasure for drift sand into a port should be also taken into account.
Batangas	· Base port for trade with the Mindoro Island. · Roll on/roll off vessel's cargo and passenger are rapidly increasing. · A deep-sea port is possible without breakwaters. · Super-highway between the Port and the South Super Expressway is necessary. · Increasing demand of port cargo related to progress of the CALABARZON Regional Development Project.	· Base port for trade with the Mindoro Island is strengthened. · Provision of further port facilities for growing container cargo is accelerated after the completion of Phase-I project. Further port extension is not urgent until the target year 2010. · Improvement of cargo handling system to cope with modern container and roll on/roll off vessel arrival at the port. · The most promising port to assist the CALABARZON Regional Development Project.
Lucena/ Pagbilao	· Location is 13~15 km away from the city of Lucena. · 2 x 350 MW power plant project is on-going in the Pagbilao Grande Island. · There is a development plan of a large scale commercial port by using loading/unloading facilities at the power plant. · Trunk road from Metro Manila has been implemented, accordingly a short road to Pagbilao remains undeveloped. · Broad undeveloped areas in terms of water and land.	· High potential to construct a large scale commercial port at Pagbilao from the viewpoint port at Pagbilao from the viewpoint of land acquisition and provision of broad calm water area. · Sea water is shallow, -5 m more or less. Dredging volume for access channel and turning basin will be on a large scale. · A large scale port bridge must be constructed toward the Pagbilao Grande Island. · Development Plan of a large scale commercial port will not mature for the time being, as contrasted to Phase-I project implementation at Batangas in near future. · Conservation of water resources must be carefully taken into account.
Infanta/ Real	· Small local port for trade with the Polillo Island. · Greater function as a fishing port. · Promising location near to Japan and other regions in the Pacific Ocean. · Sand beach coast and shallow sea water. · Roads to Metro Manila and Lucena have not been developed yet. Accordingly, totally isolated.	· A huge amount of road investment is needed, but priority of road development is still low at present, consequently the construction of a commercial port at Infanta/Real will not be possible from the short or medium term point of view. · Base port along the Easter Luzon coast will mature from the long-term Point of view.

1.2 Master Plan

Based on the above-mentioned port development strategies, the port master plans (Long-term port facility's plan and introduction of necessary cargo handling equipment) for the Port of Manila (South Harbor, Manila International Container Terminal and North Harbor), Batangas, Sangley Point and Naic/Cavite have been formulated, as shown in Table 1-2. The map of the port master plan for the Port of Manila and Batangas in the medium economic growth case, is also shown in Fig. 1-1 to Fig. 1-2.

Table 1-2 GCR Port Master Plan (1)

Port	Project	Low Economic Growth Case (GDP 4%)		Medium Economic Growth Case (GDP 5.5 %)		High Economic Growth (I) Case (GDP 7~7.5%)		High Economic Growth (II) Case (GDP 7~7.5%)		High Economic Growth (III) Case (GDP 7~7.5%)		Assumptions of Scenario
		Cargo Through put	Requirement	Cargo Though put	Requirement	Cargo Through put	Requirement	Cargo Through put	Requirement	Cargo Through put	Requirement	
MANILA	South Harbor Int'l Container Terminal	4,210 (Thousand Tons)	<Facility> Int'l container yard: 7.5 ha	4,440 (Thousand Tons)	<Facility> Int'l container yard: 7.5 ha	10,430 (Thousand Tons)	<Facility> Int'l container terminal: 3 berths (Depth -13 m; Length 300 m) and container yard: 35.4 ha Int'l container yard: 7.5 ha Dredging for access channel and turning basin: 5.3 Mil m^3 Port access road: 1,850 m <Equipment> Container Crane: 6 Nos. Transfer Crane: 15 Nos.	4,200 (Thousand Tons)	<Facility> Int'l container yard: 7.5 ha	4,200 (Thousand Tons)	<Facility> Int'l container yard: 7.5 ha	· All Surface and elevated highway projects are timely implemented according to DPWH's Highway Development Program.
	Manila Int'l Container Terminal (MICT)	12,090 (Thousand Tons)	<Facility> Int'l container Terminal: 1 berth (Depth -13 m; Length 300 m) Int'l container yard: 10 ha Dredging for access channel and turning basin: 1.98 Mil m^3 <Equipment> Container Crane: 2 Nos. Transfer Crane: 5 Nos.	17,800 (Thousand Tons)	<Facility> Int'l container Terminal: 3 berths (Depth -13 m; Length: 300 m) Int'l Container yard: 30.2 ha Dredging for access channel and turning basin: 3.48 Mil m^3 <Equipment> Container Crane: 6 Nos. Transfer Crane: 15 Nos.	20,570 (Thousand Tons)	<Facility> Int'l container Terminal: 4 berths (Depth -13 m; Length 300 m) Int'l container yard: 39.5 ha Breakwater extension: 400 m Dredging for access channel and turning basin: 5.02 Mil m^3 <Equipment> Container Crane: 8 Nos. Transfer Crane: 20 Nos.	20,570 (Thousand Tons)	<Facility> Int'l container Terminal: 4 berth (Depth -13 m; Length 300 m) Int'l container yard: 39.5 ha Breakwater extension: 400 m Dredging for access channel and turning basin: 5.02 Mil m^3 <Equipment> Container Crane: 8 Nos. Transfer Crane: 20 Nos.	20,570 (Thousand Tons)	<Facility> Int'l container Terminal: 4 berths (Depth -13 m; Length 300 m) Int'l container yard: 39.5 ha Breakwater extension : 400 m Dredging for access channel and turning basin: 5.02 Mil m^3 <Equipment> Container Crane: 8 Nos. Transfer Crane: 20 Nos.	· MICT's NO.5 int'l container terminal project will have been completed by the year 2000. · MICT's rail-served inland container depot project will have been compled without delay.
	North Harbor Dom'c Container Terminal	10,140 (Thousand Tons)	<Facility> Dom'c container terminal: 5 berths (Depth -10 m; Length 180 m) Dom'c container yard: 21 ha Dredging for access channel and turning basin: 3.7 Mil m^3 Port access road: 1,340 m Port bridge: 6 lanes <Equipment> Container crane: 5 Nos. Straddle carrier: 15 Nos.	13,750 (Thousand Tons)	<Facility> Dom'c container terminal: 6 berths (Depth -10 m; Length 180 m) Dom'c container yard: 26 ha Dredging for access channel and turning basin: 3.96 Mil m^3 Port access road: 1,520 m Port bridge: 6 lanes <Equipment> Container crane: 6 Nos. Straddle carrier: 18 Nos.	13,000 (Thousand Tons)	<Facility> Dom'c container terminal: 6 berth (Depth -10 m; Length 180 m) Dom'c container yard: 26 ha Dredging for access channel and turning basin: 3.96 Mil m^3 Port access road: 1,520 m Port bridge: 6 lanes <Equipment> Container crane: 6 Nos. Straddle carrier: 18 Nos.	13,000 (Thousand Tons)	<Facility> Dom'c container terminal: 6 berths (Depth -10 m ; Length 180 m) Dom'c container yard: 26 ha Dredging for access channel and turning basin; 3.96 Mil m^3 Port access road: 1,520 m Port bridge: 6 lanes <Equipment> Container crane: 6 Nos. Straddle carrier: 18 Nos.	13,000 (Thousand Tons)	<Facility> Dom'c container terminal: 6 berths (Depth -10 m; Length 180 m) Dom'c container yard: 26 ha Dredging for access channel and turning basin; 3.96 Mil m^3 Port access road: 1,520 m Port bridge: 6 lanes <Equipment> Container crane: 6 Nos. Straddle carrier: 18 Nos.	· NHA's reclamation project is for mixed use, not for port facility only.
	Smokey Mount'n Dom'c Container Terminal					8,440 (Thousand Tons)	<Facility> Dom'c container terminal: 4 berths (Depth -10; Length -180 m) Dom'c container yard: 17 ha Dredging for access channel and turning basin: 4.2 Mil m^3 Port access road: 3,500 m <Equipment> Container crane: 4 Nos. Straddle carrier: 12 Nos.	8,440 (Thousand Tons)	<Facility> Dom'c container terminal: 4 berths (Depth -10 m; Length -180 m) Dom'c container yard: 17 ha Dredging for access channel and turning basin: 4.2 Mil m^3 Port access road: 3,500 m <Equipment> Container crane: 4 Nos. Straddle carrier: 12 Nos.	8,440 (Thousand Tons)	<Facility> Dom'c container terminal: 4 berths (Depth -10 m; Length -180 m) Dom'c container yard: 17 ha Dredging for access channel and turning basin: 4.2 Mil m^3 Port access road: 3,500 m <Equipment> Container crane: 4 Nos. Straddle carrier: 12 Nos.	· Smokey Mount'n Development and Reclamation Project will have been completed by the year 2010.
	North Harbor Dom'c RO/RO Terminal	9,160 (Thousand Tons)	<Facility> Dom'c RO/RO terminal: 1 berth (Depth -9 m ; Length 220 m) Dom'c RO/RO yard: 14.6 ha Dredging for access channel and turning basin: 0.04 Mil m^3	12,400 (Thousand Tons)	<Facility> Dom'c RO/RO terminal: 2 berths (Depth -9 m; Length 220 m) Dom'c RO/RO yard: 14.6 ha Dredging for access channel and turning basin: 0.24 Mil m^3	15,040 (Thousand Tons)	<Facility> Dom'c RO/RO terminal: 3 berths (Depth -9 m; Length 220 m) Dom'c RO/RO yard: 14.6 ha Dredging for access channel and turning basin: 0.47 Mil m^3	15,040 (Thousand Tons)	<Facility> Dom'c RO/RO terminal: 3 berths (Depth -9 m ; Length 220 m) Dom'c RO/RO yard: 14.6 ha Dredging for access channel and turning basin: 0.47 Mil m^3	15,040 (Thousand Tons)	<Facility> Dom'c RO/RO terminal: 3 berths (Depth -9 m; Length 220 m) Dom'c RO/RO yard: 14.6 ha Dredging for access channel and turning basin: 0.47 Mil m^3	· NO.1 and NO.2 dom'c RO/RO terminals (both are on-going projects) will have been constructed by the year 1995. · NO.3 dom'c RO/RO terminal project will have been completed by the year 1997.

Table 1-2 GCR Port Master Plan (2)

Port	Project	Low Economic Growth Case (GDP 4%)		Medium Economic Growth Case (GDP 5.5 %)		High Economic Growth (I) Case (GDP 7~7.5%)		High Economic Growth (II) Case (GDP 7~7.5%)		High Economic Growth (III) Case (GDP 7~7.5%)		Assumptions of Scenario
		Cargo Through put	Requirement	Cargo Though put	Requirement	Cargo Through put	Requirement	Cargo Through put	Requirement	Cargo Through put	Requirement	
SANGLEY POINT	Int'l Container Terminal									6,230 (Thousand Tons)	<Facility> Int'l container terminal: 3 berths (Depth -13 m; Length 300 m) Int'l container yard: 27.9 ha Dredging for access channel and turning basin: 8.5 Mil m^3 Port access road: 4,300 m <Equipment> Container crane: 6 Nos. Transfer crane: 15 Nos.	· Cost for the Naval Base relocation is not borne by the port sector. · Manila-Cavite highway project will have been completed by the year 2010
NAIC/ CAVITE	Int'l Container Terminal							6,230 (Thousand Tons)	<Facility> Int'l container terminal: 3 berths (Depth -13 m; Length 300 m) Int'l container yard: 27.9 ha Breakwater : 2,020 m Dredging for access channel and turning basin: 5.65 Mil m^3 Port access road: 3,300 m <Equipment> Container crane: 6 Nos. Transfer crane: 15 Nos.			· Both DPWH's urban highway development projects and MICT's rail-served inland container depot project will not have been completed by the year 2010. · Relocation of the Naval Base at Sangley Point will not have been achieved.
BATANGAS	Int'l Terminal					1,200 (Thousand Tons)	<Facility> Int'l container terminal: 1 berth (Depth -10 m; Length 180 m) Int'l container yard: 2 ha Dredging for access channel and turning basin: 0.35 Mil m^3 Port access road 490m <Equipment> Container crane: 1 No. Straddle carrier: 3 Nos.	1,200 (Thousand Tons)	<Facility> Int'l container terminal: 1 berth (Depth -10 m; Length 180) Int'l container yard: 2 ha Dredging for access channel and turning basin: 0.35 Mil m^3 Port access read 490 m <Equipment> Container crane: 1 No. Straddle carrier: 3 Nos.	1,200 (Thousand Tons)	<Facility> Int'l container terminal: 1 berth (Depth -10 m; Length 180 m) Int'l container yard: 2 ha Dredging for access channel and turning basin: 0.35 Mil m^3 Port access road: 490 m <Equipment> Container crane: 1 No. Straddle carrier: 3 Nos.	· Phase-I project will have been completed without delay. · South Super Expressway's extension to Batangas will have been implemented by the year 2000.
						400 (Thousand Tons)	<Facility> Int'l conventional terminal: 1 berth (Depth -10 m; Length 170 m)	400 (Thousand Tons)	<Facility> Int'l conventional terminal: 1 berth (Depth -10 m; Length 170 m)	400 (Thousand Tons)	<Facility> Int'l conventional terminal: 1 berth (Depth -10 m; Length 170 m)	
	Dom'c Terminal	1,300 (Thousand Tons)	<Facility> Dom'c container terminal: 1 berth (Depth -10 m; Length 150 m) Dom'c container yard: 2.6 ha Dredging for access channel and turning basin: 0.4 Mil m^3 <Equipment> Container Crane: 1 No. Straddle Carrier: 3 Nos.	2,170 (Thousand Tons)	<Facility> Dom'c container terminal: 1 berth (Depth -10 m; Length 150 m) Dom'c container yard: 2.6 ha Dredging for access channel and turning basin: 0.4 Mil m^3 <Equipment> Container crane: 1 No. Straddle carrier: 3 Nos.	3,300 (Thousand Tons)	<Facility> Dom'c container terminal: 1 berth (Depth -10 m; Length 150 m) Dom'c container yard: 2.6 ha Dredging for access channel and turning basin: 0.4 Mil m^3 <Equipment> Container crane: 1 No. Straddle carrier: 3 Nos.	3,300 (Thousand Tons)	<Facility> Dom'c container terminal: 1 berth (Depth -10 m; Length 150 m) Dom'c container yard: 2.6 ha Dredging for access channel and turning basin: 0.4 Mil m^3 <Equipment> Container crane: 1 No. Straddle carrier: 3 Nos.	3,300 (Thousand Tons)	<Facility> Dom'c container terminal: 1 berth (Depth -10 m; Length 150 m) Dom'c container yard: 2.6 ha Dredging for access channel and turning basin: 0.4 Mil m^3 <Equipment> Container crane: 1 No. Straddle carrier: 3 Nos.	· Phase-I project will have been completed without delay. · South Super Expressway's extension to Batangas will have will have been implemented by the year 2000.
						2,400 (Thousand Tons)	Dom's RO/RO terminal: 1 berth (Depth -5.5 m; Length 120 m) Dredging for access channel and turning basin: 0.05 Mil m^3	2,400 (Thousand Tons)	Dom'c RO/RO terminal: 1 berth (Depth -5.5 m; Length 120 m) Dredging for access channel and turning basin: 0.05 Mil m^3	2,400 (Thousand Tons)	Dom'c RO/RO terminal: 1 berth (Depth -5.5 m; Length 120 m) Dredging for access channel and turning basin: 0.05 Mil m^3	

Figure 4-1-1 Master Plan of Port of Manila (Medium Economic Growth Case)

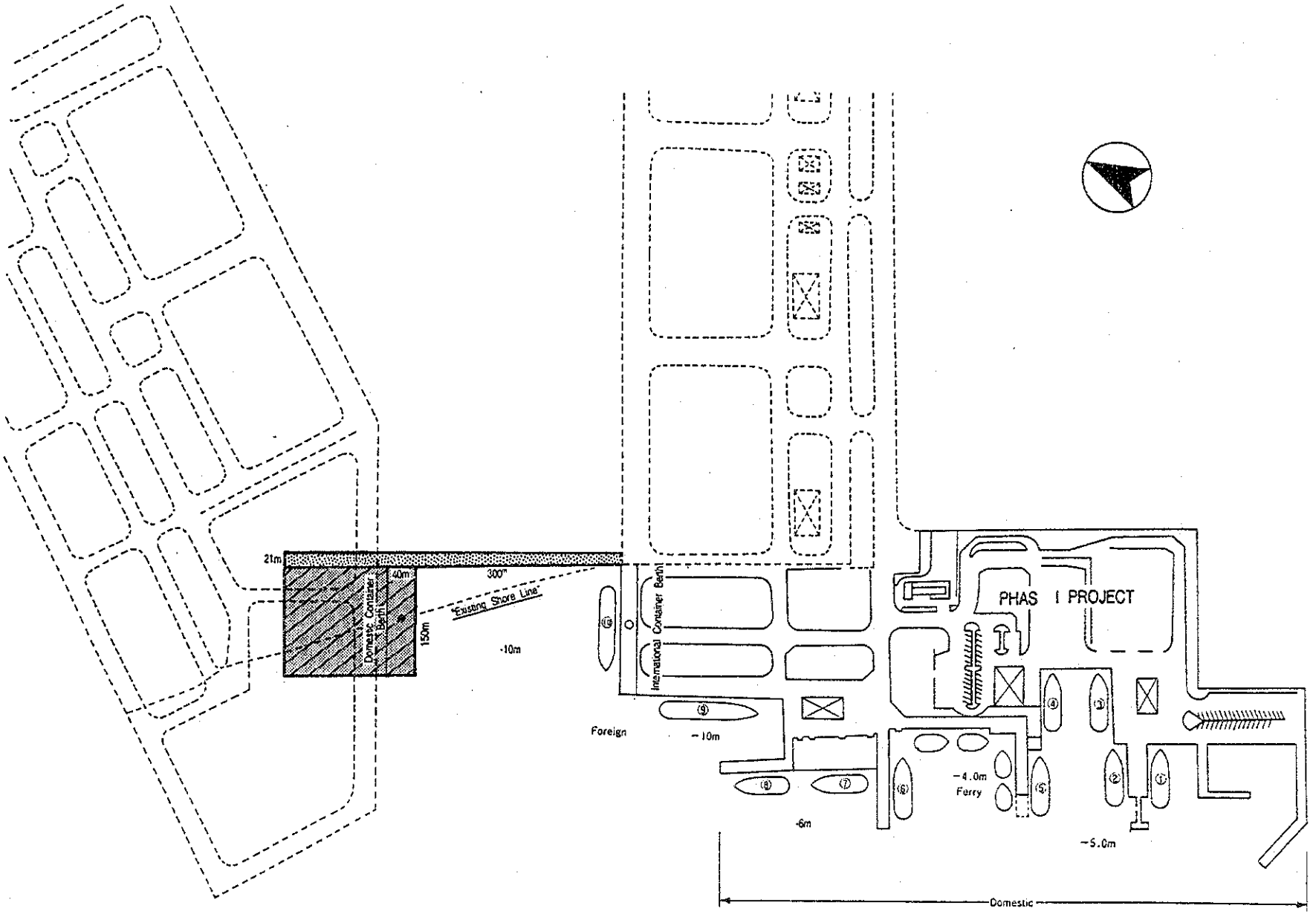


Figure 1-2 Master Plan of Port of Port of Batangas (Medium Economic Growth Case)

1.3 Staged Construction Planning

The project implementation schedule must be formulated in order not to stop or effect port activity, in addition to catching up with increasing cargo and passenger demand year after year. Fig. 1-3 and Fig. 1-4 Show the summary of the project implementation schedule resulting from master plan components of the base case scenario (Medium economic growth case).

According to Fig. 1-1, first three (3) domestic container terminals must be urgently implemented by the year 1999, and the remaining three (3) domestic container terminals must be constructed separately during the period between the year 2000 and 2008 to meet the cargo demand in 2010.

Fig. 1-1 also shows the implementation schedule of two (2) domestic roll on/roll off terminals (NO.4 and NO.5 terminal), which drops in the period between the year 2001 and 2006. Regarding the international container terminal, three (3) MICT's international container terminals (NO.6 to NO.8 terminal) must be constructed separately during the period between the year 2001 and 2008.

According to Fig. 1-2, the new domestic container berth (depth -10 m; Length 150 m) must be implemented by the year 2005.

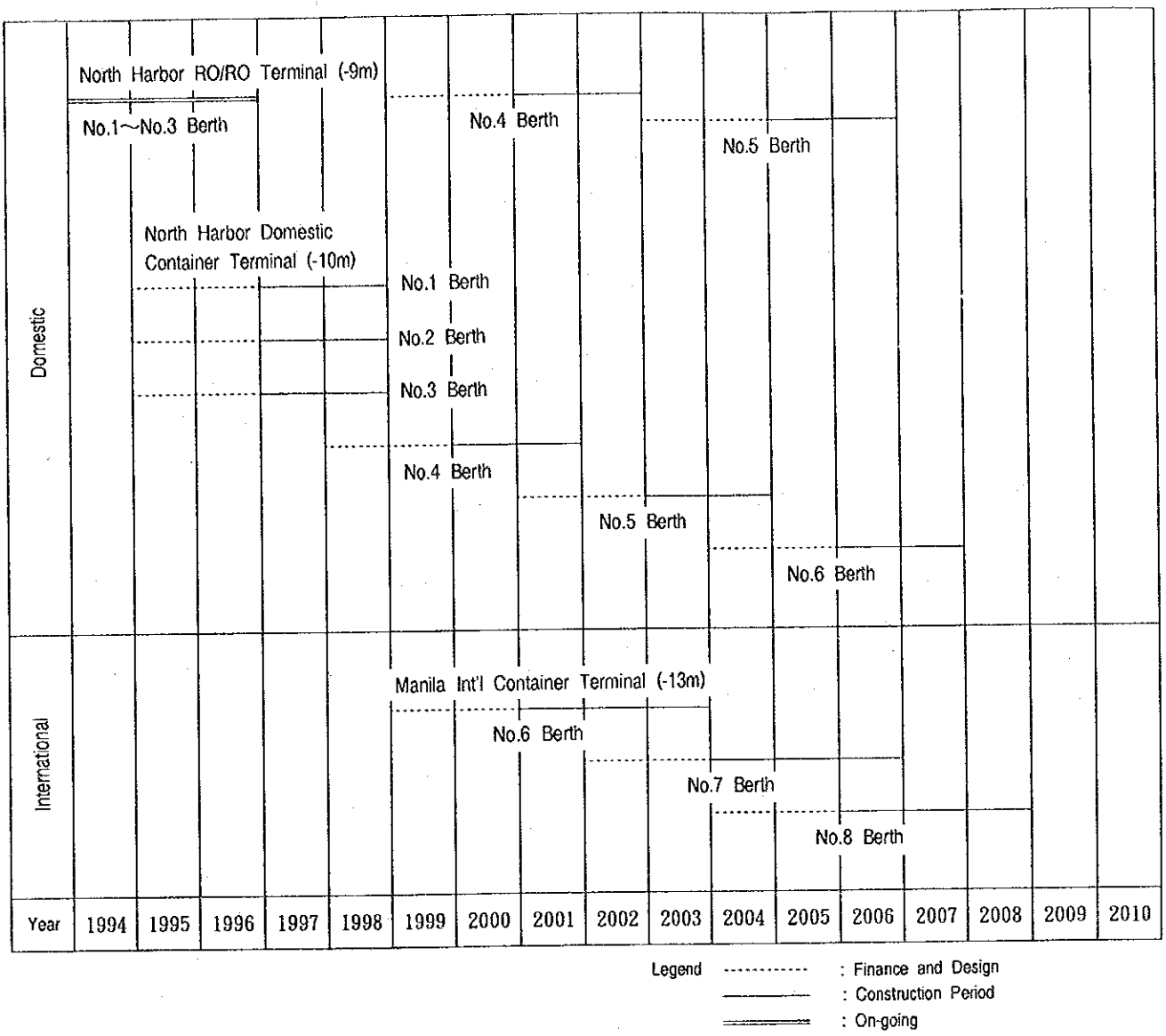


Figure 1-3 Project Implementation Schedule at Port of Manila
(Medium Economic Growth Case)

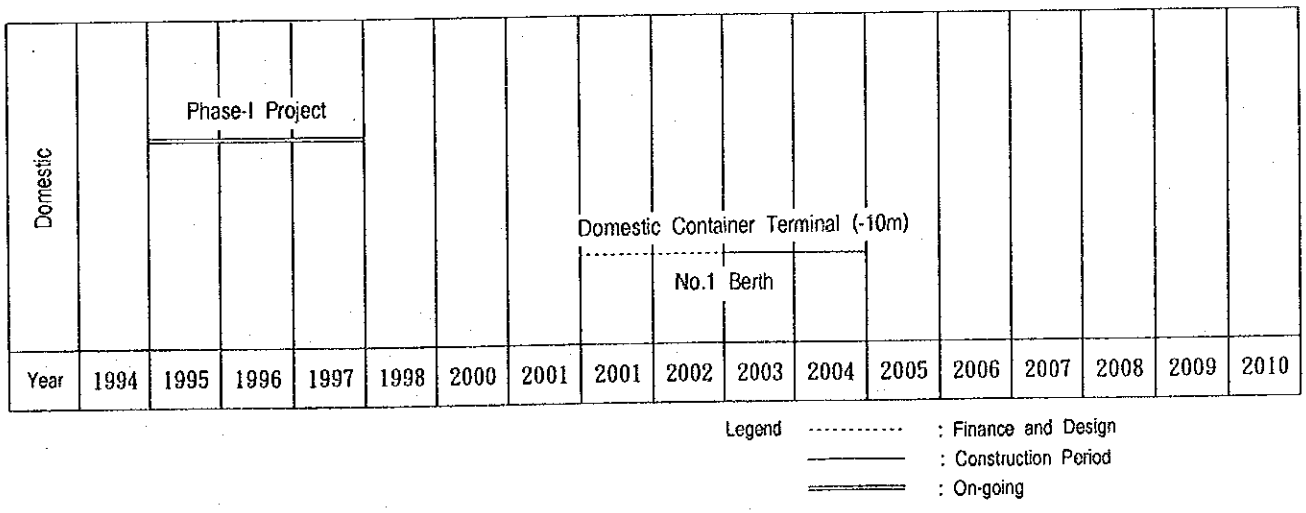


Figure 1-4 Project Implementation Schedule at Port of Batangas
(Medium Economic Growth Case)

1.4 Project Cost

The Project cost for master plan components based on each economic growth case, is shown in Table 1-3 to Table 1-6. According to Table 1-3, the project cost for base case master plan components at the Port of Manila and Batangas amounts to 19.8 billion pesos and 1.0 billion pesos, respectively.

Among the above master plan components based on the medium economic growth case, first three (3) domestic container terminals at the Port of Manila must be urgently constructed by the year 1999. The project cost for Manila's first three domestic container terminals amounts to 3.8 billion pesos.

On the other hand, there are three (3) kinds of project cost in accordance with the high economic growth case. The amount of the project cost for each high economic growth scenario ranges from 43.3 billion pesos to 49.0 billion pesos, as shown in Table 1-4 to Table 1-6.

Table 1-3 Project Cost for Master Plan Components
(Medium Economic Growth Case; GDP 5.5 %)

[Unit: Million Peso]

Port	Project	Port Facility	Cargo Handling Equipment	Design and Contingency	Total
Manila	South Harbor Int'l Container Terminal	353	768	303	1,424
	Manila Int'l Container Terminal (MICT)	4,783	2,890	2,075	9,748
	North Harbor Dom'c Container Terminal	3,998	2,130	1,658	7,786
	(Urgent project: NO.1~NO.3 Terminal)	(1,910)	(1,067)	(805)	(3,782)
	North Harbor RO/RO Terminal	689	-	186	875
	Sub total	9,823	5,788	4,222	19,833
Batangas	Dom'c Container Terminal	461	355	221	1,037
Total		10,284	6,143	4,443	20,870

Table 1-4 Project Cost for Master Plan Components

(High Economic Growth (I) Case; GDP 7~7.5 %)

[Unit: Million Peso]

Port	Project	Port Facility	Cargo Handling Equipment	Design, Land Acquisition and Contingency	Total
Manila	South Harbor Int'l Container Teminal	5,120	3,658	2,767	11,545
	Manila Int's Container Taerminal (MICT)	6,458	3,720	2,753	12,931
	North Harbor Dom'c Container Terminal	3,969	2,130	1,650	7,749
	(Urgent Project: NO.1~NO.3 Terminal)	(1,910)	(1,067)	(805)	(3,782)
	Smokey Mount'n Dom'c Container Terminal	2,561	1,720	3,328	7,609
	North Harbor RO/RO Terminal	899	-	242	1,141
	Sub total	19,007	11,228	10,740	40,975
Sangley Point	Int'l Container Terminal				
Naic/ Cavite	Int'l Container Taerminal				
Batangas	Int'l Terminal	417	530	256	1,203
	Dom'c Terminal	537	355	241	1,133
	Sub total	954	885	497	2,336
Total		19,961	12,113	11,237	43,311

Table 1-5 Project Cost for Master Plan Components

(High Economic Growth (II) Case; GDP 7~7.5 %)

[Unit: Million Peso]

Port	Project	Port Facility	Cargo Handling Equipment	Design, Land Acquisition and Contingency	Total
Manila	South Harbor Int'l Container Teminal	353	768	303	1,424
	Manila Int's Container Taerminal (MICT)	6,458	3,720	2,753	12,931
	North Harbor Dom'c Container Terminal	3,969	2,130	1,650	7,749
	(Urgent Project: NO.1~NO.3 Terminal)	(1,910)	(1,067)	(805)	(3,782)
	Smokey Mount'n Dom'c Container Terminal	2,561	1,720	3,328	7,609
	North Harbor RO/RO Terminal	899	-	242	1,141
	Sub total	14,240	8,338	8,276	30,854
Sangley Point	Int'l Container Terminal				
Naic/ Cavite	Int'l Container Taerminal	4,747	3,040	3,564	11,351
Batangas	Int'l Terminal	417	530	256	1,203
	Dom'c Terminal	537	355	241	1,133
	Sub total	954	885	497	2,336
Total		19,941	12,263	12,337	44,541

Table 1-6 Project Cost for Master Plan Components

(High Economic Growth (III) Case; GDP 7~7.5 %)

[Unit: Million Peso]

Port	Project	Port Facility	Cargo Handling Equipment	Design, Land Acquisition and Contingency	Total
Manila	South Harbor Int'l Container Teminal	353	768	303	1,424
	Manila Int's Container Taerminal (MICT)	6,458	3,720	2,753	12,931
	North Harbor Dom'c Container Terminal	3,969	2,130	1,650	7,749
	(Urgent Project: NO.1~NO.3 Terminal)	(1,910)	(1,067)	(805)	(3,782)
	Smokey Mount'n Dom'c Container Terminal	2,561	1,720	3,328	7,609
	North Harbor RO/RO Terminal	899	-	242	1,141
	Sub total	14,240	8,338	8,276	30,854
Sangley Point	Int'l Container Terminal	4,753	3,040	8,032	15,825
Naic/ Cavite	Int'l Container Taerminal				
Batangas	Int'l Terminal	417	530	256	1,203
	Dom'c Terminal	537	355	241	1,133
	Sub total	954	885	497	2,336
Total		19,947	12,263	16,805	49,015

1.5 Preliminary Evaluation

(1) Preliminary Economic Analysis

The purpose of the economic analysis is to appraise the economic feasibility of master plan components for the Port of Manila and Batangas, based on the medium economic growth case (GDP 5.5 %), from the viewpoint of the national economy of the Philippines.

The economic internal rate of return (EIRR) based on cost-benefit analysis is used in this study in order to appraise the feasibility of the projects. EIRR value is obtained from the annual economic benefit-cost value. Economic benefits are estimated through the difference between the so-called "With" case and "Without" case. In estimating costs and benefits of the projects, economic pricing is also applied.

As shown below, the calculated EIRR of each master plan component ranges from 16 % to 28 %, which exceeds the general criterion to assess whether a project is economically feasible.

1) Preliminary Economic Analysis for the Port of Manila in the Medium Economic Growth Case

Three kinds of port development projects at the Port of Manila for the period up to the year 2010 are evaluated from the view point of national economy.

(a) Additional three (3) international container berths at the Manila International Container Terminal (MICT).
(b) First three (3) additional domestic container berths at the North Harbor, which should be constructed urgently by the year 1999.
(c) Three (3) more domestic container berths and additional two (2) roll on/roll off (RO/RO) berths at the North Harbor.

As for benefits from the projects, four kinds of economic benefits are estimated through the so-called "With" and "Without" comparison.

① Savings in vessel waiting cost.
② Savings in ocean transport costs by means of improvements of ship operation schedule.

③ Savings in time cost of cargoes.

④ Savings in additional cargo handling equipment costs.

The economic internal rate of return (EIRR) of each project is calculated as 17 to 20 %. It exceeds the criterion of 15 %, which is generally adopted to assess the economic justifiability of a project in the Philippines. Accordingly, the above three project at the Port of Marila are considered economically feasible.

Table 1-7 Economic Internal Rate of Return (EIRR) of at the Port of Manila (Medium Economic Growth Case; GDP 5.5 %)

Project	Costs (Billion Peso)	Benefits (Billion Peso)	EIRR (%)
International Container Terminal at MICT (3 Berths)	15.7	76.6	20
Domestic Container Terminal at North Harbor (First 3 Berths)	6.1	28.2	18
Domestic Container Terminal (3 Berths) and RO/RO Terminal (2 Berths)	7.0	34.5	17

2) Preliminary Economic Analysis for the Port of Batangas in the Medium Economic Growth Case

A port development project at the Port of Batangas for the period up to the year 2010 is evaluated from the view point of national economy.

(a) Domestic container berth (Depth -10 m; Length 150 m; 1 Container crane and 3 straddle Carriers)

As for benefits from the project, two kinds of economic benefits shown below, are estimated through the so-called "With" and "Without" comparison.

① Savings in ships staying costs.

② Savings in time cost of cargoes.

The economic internal rate of return (EIRR) of the project is calculated as 28 %. This exceeds the criterion of 15 %, which is generally adopted to assess the economic justiciability of a project in the Philippines. Accordingly, the above project at the Port of Batangas is considered economically feasible.

Table 1-8 *Economic Internal Rate of Return (EIRR) of at the Port of Batangas*
(Medium Economic Growth Case; GDP 5.5 %)

Project	Costs (Billion Peso)	Benefits (Billion Peso)	EIRR (%)
Domestic Container Terminal (1 Berth)	1.8	17.2	28

(2) *Environmental Consideration*

Project sites are located in water areas surrounded by existing breakwaters, where the extension of breakwaters, and dredging for channel deepening and maintenance are carried out throughout the year; the environment is duly considered and necessary countermeasures are taken concerning the above activities. Accordingly, construction of additional port facilities within the port will hardly make an impact the on environment surrounding the port.

How ever, the possible increase of economic activities as a result of port development may cause a general increase in the basic load on the environment system. PPA should establish an environmental conservation policy in respect to port development and take necessary measures such as careful selection of port construction machines and constant monitoring of port environment.

2 Recommendations

It is recommended that all projects at major ports in the Greater Capital Region formulated on the basis of the master plan for the period up to the year 2010, be implemented in accordance with a staged construction schedule in order to achieve economical, efficient, safe and reliable management and operations for the port. When implementing projects, it is proposed to take the following measures:

(1) Port development projects proposed at both the Port of Manila and the Port of Batangan resulting from the medium economic growth case (GDP 5.5%), should be implemented timely and with first priority in order to catch up with rapidly increasing seaborne cargo and passenger demand in future.

(2) Initial three (3) domestic container terminals proposed at the North Harbor of Manila, should be urgently implemented by the year 1999.

(3) It is concluded that PPA's privatization policy is sound and successful at present from the viewpoint of port management and operation. Accordingly, privatization can be extended to newly-constructed terminals at major ports in GCR.
At the same time, PPA should recognize the importance of public port's role in terms of efficient port management and operation. In this respect, PPA should fully enhance its port administrative function when promoting further privatization.

(4) Land and water area as well as basic port facilities necessary to PPA's port administration should be managed by PPA.

(5) PPA should take the initiative in utilizing some foreign soft loans with low interest rates in order to secure better financial soundness as the official executing agency of port development projects.

(6) In order to alleviate the port traffic impact on urban highway system in Metro Manila, and to secure the stable port-related cargo and passenger transport to/from the hinterland, both urban transport network development projects, especially the R-10 elevated highway project behind the North Harbor, and the ICTSI's rail-served inland container depot project, should be constructed timely and in accordance with project implementation schedule, in addition to implementation of a port bridge

project across the Pasig River.

(7) In view of further port development in the Greater Capital Region beyond the target year 2010, it is recommended that Sangley Point and the Naic/Cavite New Port be considered the most promising project sites for a newly-constructed international container port instead of the further port extension of Manila.
In this connection, further port development study at Sangley Point and Naic/Cavite New Port should be conducted without delay, when the extent of the rapidly growing economic activities and seaborne cargo and passenger demand, is clearly grasped.

APPENDIX

APPENDIX CONTENTS

PART I

APPENDIX A Origin and Destination Survey

PART II

APPENDIX A Natural Conditions Survey at Port of Manila and Naic/Cavite

APPENDIX B Impact of Port Traffic on Urban Road System