Based on the simplified commodity classification, the sampling rate was recomputed as shown in Table 10-7, 10-8 and 10-9 for the Port of Manila.

Ultimately, OD matrices are processed to present the movement of cargo by the volume of commodities by province of the Philippines and places outside the country. These are shown in Appendix A-4.

Likewise, the OD matrices for the vehicle OD (those carrying the sampled commodities) are presented in Appendix A-5.

10.6 Result of Port Passenger OD Survey

The passenger Origin-Destination survey was carried out for the North Harbor. The total number of passengers interviewed for the passenger OD is 11,293 which is approximately 7% of total number of vessel passengers counted (cumulatively at 158,728 passengers for all piers for the entire survey duration). Table 10-10 gives the actual number of samples interviewed for the passenger OD. As for the passenger OD matrix, only the North Harbor afforded such information is shown in Appendix A-6, and Table 10-11 shows a movement of passengers in the Greater Capital Region.

Table 10-7 Sampling Rate of the Cargo OD Survey at North Harbor
(based on the volume of the eight commodity types)

Group	Commodity Classification	1991 Volume (MT)	Survey Volume (kgs)	Sampling Rate (Year)	1991 Weekly Ave.(kgs)	Sampling Rate (Weekly)
I	Agricultural-based & Aquacultural-based	870507	9032283	1.0	16740519	54.0
II	Manufactures of Food, Beverage & Tobacco	415451	4398573	1.1	7989442	55.1
III	Metal, Metal Products, Machineries & Equipt.	777462	8437987	1.1	14951192	56.4
IV	Wood & Wood Products	699778	5289134	0.8	13457269	39.3
V	Fuels, Chemicals & Related Products	256506	4071490	1.6	4932808	82.5
VI	Non-metallic Mineral Products	111420	1334115	1.2	2142692	62.3
VII	Textile & Textile Manufactures	28563	726540	2.5	549288	132.3
VIII	Other Cargo	1166165	13172917	1.1	22426250	58.7
	Total	4325852	46463039	1.1	83189462	55.9

Table 10-8 Sampling Rate of the Cargo OD Survey at Sorth Harbor

(based on the volume of the eight commodity types)

Group	Commodity Classification	1991 Volume (MT)	Survey Volume (kgs)	Sampling Rate (Year)	1991 Weekly Ave.(kgs)	Sampling Rate (Weekly)
I	Agricultural-based & Aquacultural-based	330183	2636519	0.8	6349673	41.5
II	Manufactures of Food, Beverage & Tobacco	61698	897420	1.5	1186500	75.6
III	Metal, Metal Products, Machineries & Equipt.	962733	9801043	1.0	18514096	52.9
IV	Wood & Wood Products	249948	8582738	3.4	4806692	178.6
V	Fuels, Chemicals & Related Products	322317	4748678	1.5	6198404	76.6
VI	Non-metallic Mineral Products	354903	2863325	0.8	6825058	42.0
VII	Textile & Textile Manufactures	122129	2817305	2.3	2348635	120.0
VIII	Other Cargo	360962	6653566	1.8	6941577	95.9
	Total	2764873	39000594	1.4	53170635	73.3

Table 10-9 Sampling Rate of the Cargo OD Survey at MICT

(based on the volume of the eight commodity types)

Group	Commodity Classification	1991 Volume (MT)	Survey Volume (kgs)	Sampling Rate (Year)	1991 Weekly Ave.(kgs)	Sampling Rate (Weekly)
I	Agricultural-based & Aquacultural-based	307646	6394570	2.1	5916269	108.1
II	Manufactures of Food, Beverage & Tobacco	63391	2344940	3.7	1219058	192.4
III	Metal, Metal Products, Machineries & Equipt.	609979	7345985	1.2	11730365	62.6
IV	Wood & Wood Products	317184	4655100	1.5	6099692	76.3
V	Fuels, Chemicals & Related Products	488602	5458550	1.1	9396192	58.1
VI	Non-metallic Mineral Products	41482	544900	1.3	797731	68.3
VII	Textile & Textile Manufactures	470929	5766570	1.2	9056327	63.7
VIII	Other Cargo	350897	13390190	3.8	6740819	198.4
	Total	2650110	45900805	1.7	50963654	90.1

Table 10-10 Number of Vessel Passengers Interviewed
(North Harbor)

PIER NO.	DAY 1	DAY 2	DAY 3	DAY 4	DAY 5	DAY 6	DAY 7	TOTALS
2	154	230	236	219	408	246	357	1850
4	156	144	415	180	364	472	84	1815
8	391	12	418	78	30	419	60	1408
10	0	170	0	60	220	0	0	450
12	139	468	204	446	267	88	68	1680
14	564	399	867	597	598	378	692	4090
TOTAL	1404	1423	2140	1580	1882	1603	1261	11293

10.7 Findings from OD Survey

(1) Cargo Volume to the Greater Capital Region

Based on the cargo OD table in Appendix A-4, cargo volume transported to/from the Greater Capital Region are computed by Table 10-12. When the greater Capital Region is divided into three zones, namely, Central Luzon, Metro Manila and Southern Luzon, cargo volumes related to each zone are calculated in Table 10-13. In this table, Central Luzon includes Bataan, Bulakan and Pampanga. Other provinces except Metro Manila belong to Southern Luzon.

With regards to International cargo, 18% of export cargoes and 12% of import cargoes handled at the Port of Manila are generated in Southern Luzon. And in case of domestic cargo, 7% of outbound cargoes and 10% of inbound cargoes handled at the North Harbor are generated in Southern Luzon.

(2) Cargo Volume to FTI and EPZ

FTI(Food Terminal Inc.) is one of the distributing centers and is located at the southern part of Metro Manila. Inside EPZ(Export Processing Zone) only international cargoes are carried in/out. Ratios of cargoes related to these places to total international cargoes were expected to be high. But according to Table 10-14(based on Appendix A-7), the highest ratio was 1.4% and the lowest was 0.1%.

(3) Passenger Related to Batangas

If passenger movement is checked by the same comparison as cargo movement,

number of passenger whose final origin/destination place is Southern Luzon is countable. Table 10-15 shows number and ratio of these passengers through the North Harbor to all passengers. Eleven percent (11%) of departing passengers and 9% of arriving ones came to/from Southern Luzon.

(4) Conclusion of OD Survey

As the results of surveys, the majority of foreign cargoes handled at the port of Manila come to/from Metro Manila with a few transshipment. Objective locations of O/D of domestic cargoes were almost all in Metro Manila, this city obviously functions as a distribution center. The share of cargo related to Central Luzon or Southern Luzon is just over 10% of all cargoes handled at the port of Manila (refer to Table 10-16).

Table 10-11 Passenger OD in the Greater Capital Region

NORTH HARBOR (UNIT: NUMBER)

ORIGIN \ DESTINATION	BATAAN	BULACAN	PAMPANGA	BATANGAS	CAVITE	LAGUNA	QUEZON	RIZAL	MET.MNL	FOREIGN	OTHERS	TOTAL
BATAAN	0	0	0	0	0	0	0	0	0	0	26	26
BULACAN	0	0	0	0	0	0	0	0	0	0	250	250
PAMPANGA	0	0	0	0	0	0	0	0	0	0	96	96
BATANGAS	0	0	0	0	0	0	0	0	0	0	107	107
CAVITE	0	0	0	0	0	0	0	0	0	0	277	277
LAGUNA	0	0	0	0	0	0	0	0	0	0	187	187
QUEZON	0	0	0	0	0	0	0	0	0	0	22	22
RIZAL	0	0	0	0	0	0	0	0	0	0	226	226
MET.MNL	0	0	0	0	0	0	0	0	3	0	6,167	6,170
FOREIGN	0	0	0	0	0	0	0	0	0	0	0	0
OTHERS	11	105	16	16	111	118	13	91	3,089	0	362	3,932
TOTAL	11	105	16	16	111	118	13	91	3,092	0	7,720	11,293

Table 10-12 Cargo OD in the Greater Capital Region

NORTH HARBOR

DESTINATION

(UNIT: KG)

	BATAAN	BULACAN	PAMPANGA	BATANGAS	CAVITE	LAGUNA	QUEZON	RIZAL	MET.MNL	FOREIGN	OTHERS	TOTAL
BATAAN	0	0	0	0	0	0	0	0	0	0	22,400	22,400
BULACAN	0	0	0	0	0	0	0	0	70,200	0	894,612	964,812
PAMPANGA	0	0	0	0	0	0	0	0	13,350	0	288,395	301,745
BATANGAS	0	5,000	0	0	0	0	0	0	0	0	104,440	109,440
CAVITE	0	0	0	0	0	0	0	0	0	0	294,050	294,050
LAGUNA	0	0	0	0	0	0	0	0	0	0	934,564	934,564
QUEZON	0	0	0	0	0	0	0	0	0	0	20,000	20,000
RIZAL	0	0	0	0	0	0	0	1,950	0	0	622,683	624,633
MET.MNL	0	0	21,000	0	0	27,613	21,000	0	326,470	0	23,982,408	24,378,491
FOREIGN	0	0	0	0	0	0	0	0	0	0	10,000	10,000
OTHERS	3,490	1,079,155	719,914	93,100	196,740	543,818	0	1,063,290	14,072,439	0	1,282,299	19,054,245
TOTAL	3,490	1,084,155	740,914	93,100	196,740	571,431	21,000	1,065,240	14,482,459	0	28,455,851	46,714,380

SOUTH HARBOR

	BATAAN	BULACAN	PAMPANGA	BATANGAS	CAVITE	LAGUNA	QUEZON	RIZAL	MET.MNL	FOREIGN	OTHERS	TOTAL
BATAAN	0	0	0	0	5,750	0	0	0	59,990	20,000	0	85,740
BULACAN	0	0	0	0	0	0	0	0	25,800	193,066	0	218,866
PAMPANGA	0	0	0	0	0	0	0	0	0	74,000	20,000	94,000
BATANGAS	0	0	0	0	0	0	0	0	15,000	21,000	0	36,000
CAVITE	0	0	0	0	0	0	0	0	103,250	105,900	0	209,150
LAGUNA	0	0	0	0	0	0	0	0	72,500	186,500	0	259,000
QUEZON	0	0	0	0	0	0	0	0	0	38,000	0	38,000
RIZAL	0	0	0	0	0	0	0	0	0	80,000	0	80,000
MET.MNL	22,000	65,500	30,000	2,360	148,000	81,180	0	56,980	2,264,552	2,432,282	181,800	5,284,654
FOREIGN	544,488	5,144,455	265,543	231,280	560,495	1,691,615	0	654,540	22,887,150	0	306,150	32,285,716
OTHERS	0	0	0	0	21,000	0	0	0	268,450	266,000	158,000	713,450
TOTAL	566,488	5,209,955	295,543	233,640	735,245	1,772,795	0	711,520	25,696,692	3,416,748	665,950	39,304,576

MICT

	BATAAN	BULACAN	PAMPANGA	BATANGAS	CAVITE	LAGUNA	QUEZON	RIZAL	MET.MNL	FOREIGN	OTHERS	TOTAL
BATAAN	0	0	0	0	0	0	0	0	0	188,320	0	188,320
BULACAN	0	0	0	0	0	0	0	0	0	772,000	0	772,000
PAMPANGA	0	0	0	0	0	0	0	0	42,000	772,500	0	814,500
BATANGAS	0	0	0	0	0	0	0	0	0	126,000	0	126,000
CAVITE	0	0	0	0	0	0	0	0	0	1,060,000	0	1,060,000
LAGUNA	0	0	0	0	0	0	0	0	6,000	1,512,320	0	1,518,320
QUEZON	0	0	0	0	0	0	0	0	0	788,500	0	788,500
RIZAL	0	0	0	0	0	0	0	0	21,000	711,000	0	732,000
MET.MNL	20,750	251,000	80,000	30,000	92,400	203,400	0	101,000	1,654,400	13,220,200	105,000	15,758,150
FOREIGN	229,000	1,621,000	248,000	54,000	861,440	709,550	44,000	1,496,980	17,149,875	0	0	22,413,845
OTHERS	0	0	0	0	0	0	0	0	66,000	1,753,970	4,200	1,824,170
TOTAL	249,750	1,872,000	328,000	84,000	953,840	912,950	44,000	1,597,980	18,939,275	20,904,810	109,200	45,995,805

Table 10-13 Cargo OD of Three Zones in GCR (Domestic & International Cargo)

NORTH HARBOR

UPPER: TON
LOWER: %

ORIGIN \ DESTINATION	BATAAN BULACAN PAMPANGA	BATANGAS CAVITE LAGUNA QUEZON RIZAL	MET.MNL	FOREIGN	OTHERS	TOTAL
BATAAN BULACAN PAMPANGA	0	0	0	0	1,289 4	1,289
BATANGAS CAVITE LAGUNA QUEZON RIZAL	5	2	0	0	1,976 7	1,983
MET.MNL	0	0	0	0	24,146 84	24,146
FOREIGN	0	0	0	0	10 0	10
OTHERS	1,824 9	1,946 10	14,236 74	0 0	1,282	19,287 100
TOTAL	1,829	1,948	14,236	0	28,703 100	46,714

INT'L TRADE (SOUTH+MICT)

UPPER: TON
LOWER: %

ORIGIN \ DESTINATION	BATAAN BULACAN PAMPANGA	BATANGAS CAVITE LAGUNA QUEZON RIZAL	MET.MNL	FOREIGN	OTHERS	TOTAL
BATAAN BULACAN PAMPANGA	0	6	0	2,148 8	20	2,173
BATANGAS CAVITE LAGUNA QUEZON RIZAL	0	0	0	4,847 18	0	4,847
MET.MNL	0	0	0	17,612 65	0	17,612
FOREIGN	8,522 15	7,019 12	41,997 72	0	593 1	58,130 100
OTHERS	0	21	0	2,354 9	162	2,538
TOTAL	8,522	7,046	41,997	26,961 100	775	85,300

Table 10-14 Volume Ratio of Cargo Based on FTI and EPZ

FTI		SOUTH	MICT
	in	551 TON 1.4%	111 TON 0.2%
	out	43 TON 0.1%	432 TON 0.9%

EPZ		SOUTH	MICT
	in	93 TON 0.2%	250 TON 0.5%
	out	62 TON 0.2%	105 TON 0.2%

Table 10-15 Passenger OD in GCR

NORTH HARBOR

UPPER: NUMBER
LOWER: %

ORIGIN \ DESTINATION	BATAAN BULACAN PAMPANGA	BATANGAS CAVITE LAGUNA QUEZON RIZAL	MET.MNL	FOREIGN	OTHERS	TOTAL
BATAAN BULACAN PAMPANGA	0	0	0	0	372 5	372
BATANGAS CAVITE LAGUNA QUEZON RIZAL	0	0	0	0	819 11	819
MET.MNL	0	0	3	0	6,167 80	6,170
FOREIGN	0	0	0	0	0 0	0
OTHERS	132 3	349 9	3,089 79	0 0	362	3,932 100
TOTAL	132	349	3,092	0	7,720 100	11,293

Table 10-16 Characteristics of Cargo and Passenger

AREA	DOMESTIC CARGO	FOREIGN CARGO	TOTAL CARGO	TOTAL PASSENGER
REGION III	3,100 Ton 7 %	10,700 Ton 13 %	13,800 Ton 11 %	500 4 %
NCR	39,700 Ton 85 %	62,500 Ton 73 %	102,200 Ton 77 %	9,700 85 %
REGION IV	3,900 Ton 8 %	11,900 Ton 14 %	15,800 Ton 12 %	1,200 11 %
TOTAL	46,700 Ton 100 %	85,100 Ton 100 %	131,800 Ton 100 %	11,400 100 %

CHAPTER 11 DEMAND FORECAST OF PORT TRAFFIC AND REQUIRED NUMBER OF BERTHS IN THE TARGET YEAR

Demand Forecast will be conducted on port cargo volumes and passenger numbers in 2010 for Master Plan.

11.1 Historical Trend of Socio-economic Framework in GCR

The population of the Philippines has increased according to the censuses as follows:

	1948	1960	1970	1975	1980	1990
	x1,000					
Population	19,234	27,088	36,684	42,071	48,098	60,685
Growth Rate (%)		3.057	3.012	2.796	2.714	2.352

Source: National Statistics Office

The growth rate described in the above table is the average annual rate of increase over the previous date. Population of the Philippines in 1990 is 60,685,000 and the average growth rate of population for the period of 1980-1990 was 2.35%.

Table 11-1 Population by Region Census Years 1980 and 1990

Region	Actual Population 1980	Population 1990	Averaged Growth Rate per annum
Metro Manila	5,926	7,929	2.95
CAR	914	1,146	2.29
Region I	2,924	3,551	1.96
Region II	1,919	2,341	2.01
Region III	4,803	6,199	2.58
Region IV	6,119	8,266	3.05
Region V	3,477	3,910	1.18
Region VI	4,526	5,392	1.77
Region VII	3,787	4,593	1.95
Region VIII	2,800	3,055	0.88
Region IX	2,529	3,159	2.25
Region X	2,759	3,510	2.44
Region XI	3,347	4,457	2.91
Region XII	2,271	3,171	3.39
Philippines	48,098	60,685	2.35

Source: 1992 Philippine Statistical Yearbook, NSCB

Table 11-1 shows the population by Region based on the censuses. The population of Region IV in 1990 is 8.266 million persons which is larger than that of NCR (Metro Manila) and accounts for 13.6% of the Philippine population. Region XII has experienced the highest growth rate of population, 3.39% per annum in the Philippines for the period of 1980-1990, followed by Region IV with 3.05%.

National Statistic Office has tentatively projected the population of the Philippines. Its annual growth rate of the Philippines is as follows:

Year	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Growth Rate	2.32	2.40	2.46	2.50	2.54	2.48	2.37	2.26	2.20	2.13
	x millions									
(Population)	60.1	63.6	65.1	66.8	68.5	70.2	71.8	73.5	75.1	76.7

According to the above projection, the population of the Philippines in 2000 will be 76.7 million.

Judging from the above tables, the growth rate of population of the Philippines between 2001 and 2010 may be assumed to have an average of 2.1% for the purpose of the demand forecast of the Study. (The population of the Philippines in 2010 will be 94.4 million with the above assumption of growth rate 2.1%.)

The changes in GNP, GDP, GRDP etc. in recent years are shown in Table 11-2 and 11-3. Although GDP recorded an annual average growth of 6.2% in the period 1975-80, a greatly reduced GDP growth rate was seen in the early 1980's followed by the crisis period of 1983-85, when GDP growth turned negative. The GDP growth rate started to recover in 1986 with 3.4% and attained 6.3% in 1988 and 6.1% in 1989. Per capita GNP peaked in 1982: 12,727 pesos at 1985 constant price. Since the economic crisis, Per Capita GNP has not yet recovered its 1982's level. (Per Capita GNP in 1991 is 11,392 pesos at 1985 constant price.)

Tables 11-4a)-d) shows GNP, GRDP by region and those projection in accordance with the Medium-Term Philippine Development Plan(MTPDP) 1993-1998. According to MTPDP, aggregate targets are as follows:

a) The proportion of families living in poverty is expected to decline from 40.7% in 1991 to 30% by the end of the Plan period.

b) GNP in real terms shall grow at an average of 7.5% over the Plan period, with growth accelerating from 4.5% in 1993 to 10.0% by 1998 (Table 11-4a). The major sources of growth shall be investments and exports, which are targeted to grow at double-digit rates.

c) Real per capita income will increase at an average annual rate of 4.9% from the estimated P11,407 in 1993 to P14,926 by 1998. The historical peak per capita income of P12,725 achieved in 1982 will be regained by 1996. Per capita income in constant dollars should reach $1,270 by 1998.

d) GDP is to increase from a rate of 4.0% in 1993 to 10.0% in 1998(Table 11-4b). Across regions, Region VII(Central Visayas) is expected to post the highest average annual GDP growth of 9.4%, followed by Region X(Northern Mindanao) and Region XI(Southern Mindanao). Production outside the NCR should correspondingly increase from 68.7% of GDP in 1993 to 71.3% in 1998(Table 11-4c)).

e) Inflation shall not average more than 6.2% annually, declining from 7.5% in 1993 to 5.0% by 1998.

f) Investment shall rise from 22.0% of GNP in 1993 to 33.3% by 1998(Table 11-4d)) with the private sector providing the bulk. Base investments will average 7.1% of GNP. To finance these investments, domestic savings shall increase from 18.8% of GNP in 1993 to 31.5% in 1998. The share of public savings in GNP will grow from 5.2% in 1993 to 7.7% by 1998. The required foreign savings shall be limited to 1.8% by 1998.

According to the Plan, growth rate of GRDP of NCR (6.1%) is smaller than that of GDP. On the other hand, growth rate of GRDP of Region IV is higher than that of GDP.

Table 11-5 shows GDP Projection by industrial origin in the Plan(Shares and Growth Rates). According to the Plan, GDP will rapidly grow in the industrial sector, especially manufacturing subsector.

Table 11-2 GROSS DOMESTIC PRODUCT BY REGION : 1980-1990

(In million pesos at constant 1985 prices)

	REGION/YEAR	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	Share in Phili
													in 1990 %
	PHILIPPIES	609,769	630,646	653,470	665,718	616,964	571,885	591,423	619,708	658,464	697,817	712,682	100,00
NCR.	Metro Manila	183,012	187,541	196,736	206,244	186,144	169,192	175,182	187,201	204,307	222,869	225,446	31.6
I.	Ilocos Region	24,416	25,217	26,142	26,199	25,204	25,282	27,228	27,108	28,144	29,970	30,172	4.2
II.	Cagayan Valley	17,417	18,234	18,251	18,178	16,507	14,783	15,092	15,519	16,128	16,544	16,671	2.3
III.	Central Luzon	52,944	57,691	60,572	60,383	56,370	53,159	54,200	57,248	61,495	63,854	68,392	9.6
IV.	Southern Tagalog	86,893	89,943	93,427	92,868	86,820	79,554	82,913	87,881	92,581	99,170	101,346	14.2
V.	Bicol Region	18,368	19,041	19,620	20,321	19,265	18,288	18,363	18,062	19,144	20,300	20,516	2.9
VI.	Western Visayas	45,691	48,646	51,075	51,128	46,473	42,645	43,828	45,284	47,103	49,150	50,071	7.0
VII.	Central Visayas	37,624	39,172	40,640	42,050	39,736	35,656	37,511	39,736	43,044	44,893	46,624	6.5
VIII.	Eastern Visayas	15,193	15,619	16,257	16,717	17,514	16,226	16,041	16,213	17,283	17,789	18,052	2.5
IX.	Western Mindanao	19,424	20,420	20,732	21,135	20,162	18,721	19,357	19,357	19,767	20,533	21,198	3.0
X.	Northern Mindanao	37,013	37,121	37,227	37,280	33,353	32,300	33,014	34,281	36,110	37,476	38,060	5.3
XI.	Southern Mindanao	45,544	48,257	48,629	48,409	46,193	44,102	45,696	48,704	49,610	50,784	50,836	7.1
XII.	Central Mindanao	23,227	23,744	24,161	24,804	23,224	21,977	22,997	23,115	23,748	24,485	25,299	3.5

Table 11-3 GDP BY INDUSTRY ORIGIN, GNP and Per Capita GNP: 1980 to 1991

(In billion pesos excepting per catita GNP at constant prices of 1985)

	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
Gross Domestic Product	609.8	630.6	653.5	665.7	617.0	571.9	591.4	619.7	658.5	698.4	715.3	708.2
Growth rate (%)		3.4	3.6	1.9	-7.3	-7.3	3.4	4.8	6.3	6.1	2.4	-1.0
Agri. Fishery, Forestry	143.3	148.5	149.6	144.6	143.2	140.6	145.7	150.4	155.3	160.0	160.8	161.9
Growth rate (%)		3.6	0.7	-3.3	-1.0	-1.8	3.6	3.2	3.3	3.0	0.5	0.7
Industry	247.1	258.5	265.0	269.0	238.0	200.5	205.2	216.2	232.5	251.6	256.1	247.8
Growth rate (%)	-	4.6	2.5	1.5	-11.5	-15.8	2.3	5.4	7.5	8.2	1.8	-3.2
Manufacturing	168.3	171.6	174.3	173.8	156.2	143.9	146.5	154.6	167.7	178.4	181.4	180.5
Growth rate (%)	-	2.0	1.6	-0.3	-10.1	-7.9	1.8	5.5	8.5	6.4	1.7	-0.5
Mining and quarrying	9.1	9.4	9.2	9.2	9.0	11.9	12.3	11.2	11.7	11.4	11.1	10.8
Growth rate (%)	-	3.3	-2.1	0.0	-2.2	32.2	3.4	-8.9	4.5	-2.6	-2.6	-2.7
Construction	57.3	63.4	64.1	70.2	56.0	29.0	28.5	31.7	33.2	41.4	42.6	35.9
Growth rate (%)	-	10.6	1.1	9.5	-20.2	-48.2	-1.7	11.2	4.7	24.7	2.9	-15.7
Electricity, gas and water	12.4	14.2	17.4	15.8	16.9	15.8	17.9	18.6	19.9	20.4	20.4	20.6
Growth rate (%)		14.5	22.5	-9.2	7.0	-6.5	13.3	3.9	7.0	2.5	0.0	1.0
Service	219.4	223.6	238.9	252.1	235.7	230.8	240.5	253.1	270.7	286.8	298.4	298.6
Growth rate (%)		1.9	6.8	5.5	-6.5	-2.1	4.2	5.2	7.0	5.9	4.0	0.1
Net Factor income from abroad	-1,168	-2,317	-7,281	-10,234	-18,622	-15,809	-12,248	-10,978	-6,170	-8,689	1,655	7,989
Gross National Product	608,600	628,325	646,186	655,483	598,340	556,074	579,175	608,729	652,293	689,693	716,964	716,216
Population (million Persons)	48.32	49.54	50.78	52.06	58.35	54.67	56.00	57.36	58.72	60.10	61.48	62.87
Per Capita GNP (pesos)	12,595	12,683	12,725	12,591	10,254	10,171	10,342	10,612	11,109	11,476	11,662	11,392

source) 1992 Philippine Statistical Yearbook, NSCB

Tabel 11-4a) Gross National Product and Per Capita GNP, 1991-1998

	Annual Ave. 1987-1992	Actual 1991	Estimate 1992	Targets						Annual Ave. 1991-1998
				1993	1994	1995	1996	1997	1998	
Cross National Product (in PB, at constant 1985 prices)		722.6	727.1	759.8	809.2	869.9	939.5	1019.4	1121.3	
Growth Rate (%)	3.9	0.2	0.6	4.5	6.5	7.5	8.0	8.5	10.0	7.5
Inflation Rate (%)	11.0	18.7	8.9	7.5	7.0	6.5	6.0	5.5	5.0	6.2
Per Capita GNP (in pesos, at constant 1985 prices)	11230	11381	11184	11407	11852	12425	13094	13878	14926	
Growth Rate (%)	1.4	-2.0	-1.7	2.0	3.9	4.8	5.4	6.0	7.6	4.9
Per Capita GNP (in pesos, at current prices)	16498	19871	21073	23105	25687	28680	32037	35823	40454	
Per Capita GNP (in US$, at constant prices)	963	964964	826	871	922	989	1065	1154	1270	

Source: NSCB, NEDA and NSO

Table 11-4b) Real Gross Domestic Product Projection, 1993-1998

REGION	Annual Ave. Growth Rates 1987-91	Estimate 1992	Targets						Annual Ave. Growth Rate 1993-98
			1993	1994	1995	1996	1997	1998	
PHILIPPINES	3.8	0.0	4.0	6.7	7.7	8.2	8.8	10.0	7.6
NCR	4.9	0.2	4.2	6.8	6.7	6.2	6.5	6.1	6.1
CAR	4.1	0.3	2.4	5.3	6.1	5.5	7.9	9.5	6.1
REGION I	2.4	-0.1	3.7	5.9	8.8	9.4	9.5	11.9	8.2
REGION II	2.8	0.2	2.0	4.5	5.1	6.7	8.2	9.1	5.9
REGION III	5.0	-3.6	4.3	6.8	8.4	9.6	10.6	12.3	8.7
REGION IV	4.5	0.9	4.4	7.5	8.8	9.9	11.2	12.9	9.1
REGION V	3.0	0.3	2.7	3.6	6.6	6.9	7.4	7.8	5.8
REGION VI	3.0	-0.1	2.8	6.7	7.1	7.7	8.1	9.6	7.0
REGION VII	4.3	0.8	5.1	7.6	9.8	10.6	10.9	12.8	9.4
REGION VIII	2.5	-0.1	3.2	4.2	4.9	6.7	6.8	8.0	5.6
REGION IX	1.8	0.2	3.7	5.9	7.1	7.8	8.3	9.8	7.1
REGION X	2.1	0.4	4.3	7.2	8.9	10.0	10.2	14.9	9.2
REGION XI	2.3	0.0	4.3	7.5	9.6	10.2	10.7	12.8	9.2
REGION XII	1.4	0.1	3.4	6.0	6.6	8.2	8.0	5.2	6.2

Source: NEDA, NSCB

Table 11-4c) Gross Regional Domestic Product

(Percentage Distribution)

Region	Actual		Targets	
	Average 1987-91	1991	Average 1993-98	1998
Philippines	100.0	100.0	100.0	100.0
NCR	31.2	31.2	30.4	28.7
Rest of the Country	68.8	68.8	69.6	71.3
Luzon (w/o NCR)	33.5	33.9	34.1	35.0
Visayas	16.1	16.2	16.3	16.5
Mindanao	19.1	18.8	19.1	19.7

Source: NEDA

Table 11-4d) Saving and Investiment (as a Percent of GNP)

	Annual Average 1987-92	Estimate 1992	Targets						Annual Average 1993-98
			1993	1994	1995	1996	1997	1998	
Foreign Savings	2.5	1	3.2	3.7	3.7	3.6	2.6	1.8	3.1
Investiments	20.3	20.7	22	23.7	25.6	27.7	30.2	33.3	27.1
Private	15.9	15.5	14.7	17.1	18.7	20.8	23	25.8	20
Public	4.4	5.2	7.3	6.6	6.9	6.9	7.2	7.5	7.1
Savings	17.7	19.7	18.8	20	21.9	24	27.5	31.5	24
Private	15.8	15.7	13.6	15.7	17.5	16.8	19.3	23.8	17.8
Public	2	4	5.2	4.3	4.4	7.2	8.2	7.7	6.2

Sources: NEDA, DOF, DBM, GCMCC, CB, BLGF

Table 11-5 Real Gross Domestic Product Projection by Industrial Origin

(Shares and Growth Rates in Percent)

GDP	1987-72	1992	1993	1994	1995	1996	1997	1998	Ave. 93-98
Cross Domestic Product	-	-	-	-	-	-	-	-	-
Growth rate (%)	3.2	0.0	4.0	6.7	7.7	8.2	8.8	10.0	7.6
Agri. Fishery, Forestry	-	-	-	-	-	-	-	-	-
Growth rate (%)	1.3	-0.8	4.0	3.4	3.9	4.1	4.3	4.6	4.0
Share	23.1	22.6	22.6	21.9	21.1	20.3	19.5	18.5	20.6
Industry	-	-	-	-	-	-	-	-	-
Growth rate (%)	3.4	-0.5	3.8	7.7	10.2	10.6	11.1	12.4	9.3
Share	35.4	35.0	34.9	35.2	36.0	36.8	37.6	38.5	36.5
Manufacturing	-	-	-	-	-	-	-	-	-
Growth rate (%)	3.7	-1.0	3.2	7.8	10.8	11.2	11.6	13.0	9.6
Share	25.5	25.5	25.3	25.5	26.3	27.0	27.7	28.4	26.7
Miniing and quarrying	-	-	-	-	-	-	-	-	-
Growth rate (%)	-1.3	5.1	6.0	6.8	7.5	8.2	8.9	10.0	7.9
Share	1.7	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6
Constructon	-	-	-	-	-	-	-	-	-
Growth rate (%)	4.7	1.0	6.2	8.8	9.8	10.2	10.8	11.3	9.5
Share	5.4	5.1	5.2	5.3	5.4	5.5	5.6	5.6	5.4
Utilities	-	-	-	-	-	-	-	-	-
Growth rate (%)	2.2	-1.3	4.0	5.0	6.8	7.4	8.6	10.0	7.0
Share	2.9	2.9	2.9	2.8	2.8	2.8	2.8	2.8	2.8
Service	-	-	-	-	-	-	-	-	-
Growth rate (%)	3.9	0.8	4.2	7.6	7.6	8.2	8.2	10.4	7.8
Share	41.5	42.5	42.5	42.9	42.9	42.9	42.9	43.0	42.9

source) Medium-Term Philippine Development Plan 1993-1998

11.2 Socio-economic Framework for the Target Year

The three alternatives, that is high, medium and low projections on GDP and GRDP will be prepared based upon different assumptions.

The high projection corresponds to the Medium-Term Philippine Development Plan. The term of the Development Plan is from 1993 to 1998 and the Plan gives no information on GDP and GRDP for the further future periods, from 1999 to 2010. On the other hand, "The Master Plan Study on the Project CALABARZON" projected an average growth rate of 8.8% per annum up to 2010 for the Alternative III which has been applied for study as the best and most practicable alternative. Based on two Plan mentioned above, annual average growth rate per annum for the period of 2000-2010 may be assumed to be nearly 8.5% in Region IV.

Considering that annual average growth rates of GDP in 1987-91 was 3.8, average growth rate 4% may be applied for the case of low projection.

The Case of medium projection. Table 11-6a) shows the socio-economic framework for demand forecast.

Table 11-6a) Socio-economic Frame for Demand Forecast Growth Rate(%) of GDP, GRDP and Population

Case	Term	GDP	GRDP		Population
			NCR	Region IV	
High	1993-2000	7.5	6.0	9.0	2.3
	2001-2010	7.0	5.5	8.5	2.1
Medium	1993-2000	5.5	5.0	6.5	2.3
	2001-2010	5.5	5.0	6.5	2.1
Low	1993-2000	4.0	4.0	4.0	2.3
	2001-2010	4.0	4.0	4.0	2.1

Table 11-6b) Projected GDP and Per Capita GDP in 2000 and 2010 at constant 1985 prices

	Actual	Projection					
	1990	2000			2010		
		High	Medium	Low	High	Medium	Low
Gross Domestic Product (billion pesos)	715	1,260	1,090	970	2,480	1,860	1,430
Population (million persons)	61.5		76.7			94.4	
Per Capita GDP (pesos)	11,662	16,400	14,200	12,600	26,300	19,700	15,100

11.3 Methodology of Demand Forecast

Two methods are applied to forecast cargo volumes through ports from/to Metro Manila and CALABARZON in this Study. One is a macroscopic forecast which is a method to estimate the total cargo volume as a whole including many commodities, regardless of the volume of each commodities which are handled now at Ports of Manila and Batangas.

11.3.1 Macroscopic Forecast

Figure 11-1 shows a flowchart explaining the macroscopic forecast on cargo/passenger volume applied in this study.

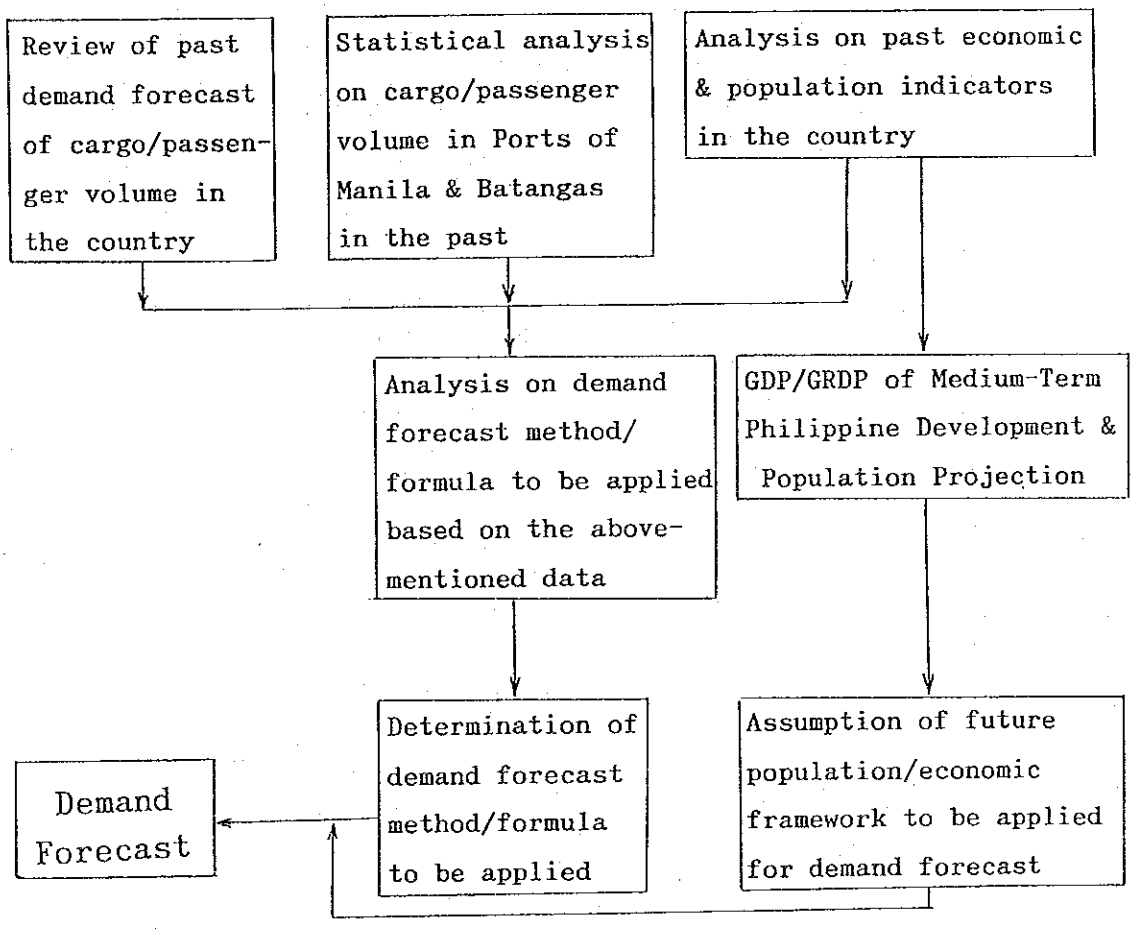

Figure 11-1 Flowchart of Macroscopic Demand Forecast

11.4 Setting of Hinterland

A second look at the results of the OD study provides a good grasp of the harbor handling conditions of the cargo in Metro Manila and its periphery. Table 11-7 shows the OD Study results of the cargo of Port of Manila. According to this data, Metro Manila, Pampanga, Bulacan and Rizal CALABARZON can be set as the hinterland of the Port of Manila, and with the exception of Rizal, the Calabarzon region is the hinterland of Batangas Harbor and the New Naic Harbor. Bataan of Central Luzon can be appropriately assessed as the hinterland of Port of Port of Subic.

Table 11-7 Hinterlands of ports and harbors in the Greater Capital Region

Port Harbor	Hinterland	Area (km^2)	Population (,000) 1990	Distance from Port of Manila	Distance from Objective Port
Manila	Metro Manila	636	7,948		
	Bulacan	2,625	1,505	44 (Malolos)	44 (Malolos)
	Pampanga	2,181	1,533	67 (San Fer)	67 (San Fer)
	Rizal	1,309	977	11 (Pasig)	11 (Pasig)
	Total	6,751	11,963		
Batangas	Metro Manila				106 (Rizal Park)
	Cavite	1,288	1,153	46 (Teres M)	87 (Teres M)
	Laguna	1,760	1,370	93 (Sta Cruz)	87 (Sta Cruz)
	Batangas	3,166	1,477	106 (Batangas)	
	Quezon	8,707	1,372	130 (Lucena)	61 (Lucena)
	Total	14,921	5,372		
Naic	Metro Manila				47 (Rizal Park)
	Cavite	1,288	1,153	46 (Teres M)	
	Laguna	1,760	1,370	93 (Sta Cruz)	85 (Sta Cruz)
	Total	3,048	2,523		
Subic	Metro Manila				139 (Rizal Park)
	Bataan	1,373	426	124 (Balanga)	40 (Balanga)
	Total	1,373	426		

Source: Population - 1992 Philippine Yearbook

11.5 Demand Forecast of Port Traffic

(1) Cargo

In general, three methods shall be applied for cargo demand forecast:

1) Correlation between port cargo volume V and G(GRDP or GDP) of hinterland related to the cargo origin/destination based on actual data at Manila Port, Batangas Port:

$$V=aG+b \qquad (11.1)$$

where; a, b are coefficients determined based on the historical trends of port cargo volume and GDP(or GRDP)

2) Extrapolation of historical trend of cargo volume

$$V=cY+d \qquad (11.2)$$

where; Y is the Christian year and c, d are coefficients determined base on the historical trend of port cargo volume

3) Elasticity of (cargo growth rate)/(GDP or GRDP growth rate)

$$\Delta V/\Delta t=E(\Delta G/\Delta t)$$

where; E is elasticity and t is time. (11.3)

4) Relationship of E with coefficients of Eq.(11.1)

$$E=aG/(aG+b) \qquad (11.4)$$

where, in the case of b being negative, E of Eq.(11.4) is always greater than one.

The economic indices used for the demand forecast for port cargo volume handled at the Ports of Manila and Batangas using Equations of (11.1) and (11.3) are as follows:

Port of Manila (domestic and international cargo) : GDP
Port of Batangas (") : GRDP of Region IV

The origin or destination of domestic cargo handled at the Port of Manila spreads over almost all main islands of the country and the cargo volumeis affected by nationwide economic activity, therefore GDP is applied as an economic index for demand

forecast of the domestic cargo handled at the Port of Manila.

As shown in Table 6-5, 93% of international containers handled in the country were at the Port of Manila and GDP will be able to be applied as an economic index for demand forecast of the international cargo handled at the Port of Manila. The Master Plan Study on the Project CALABARZON assumed 20% spill over of value added of manufacturing sector from Metro Manila. In case factories which exist now in Metro Manila, produce commodities handled at the Port of Manila and spill over to CALABARZON, these commodities are projected to pass through the Port of Manila. Some modification will be made in the microscopic forecast.

"Provincial Profile, Batangas"(National Statics Office) shows that the majority of the domestic cargoes handled at the Pubic Port of Batangas are from/to Occidental Mindoro & Oriental Mindoro Provinces (Mindoro Island), Marinduque Province and Romblon Province. (These provinces belong to Region IV.) Therefore, GRDP of Region IV will be used as an economic index for demand forecast of domestic cargoes handled at the Base Port of Batangas. The Imported cargo volume in 1991 was about 50,000 tons with fertilizer as the main commodity and its share was 90% of the total cargo volume imported to the Base Port of Batangas. Generally speaking, in the Philippines, fertilizer is imported directly to the nearest base port or terminal port from each consumption area. The fertilizer imported to the Port of Batangas will be consumed in Region IV. The exported cargo volume in 1991 was only 5,000 tons with tobacco as the main commodity and its share was about 90% of the total cargo volume exported from the Base Port of Batangas. It is produced in Region IV. Therefore, GRDP of Region IV will be used as an economic index for demand forecast of international cargoes handled at the Base Port of Batangas.

The volume of imports is sensitive to domestic economic conditions. On the other hand, exports, which depend on international market conditions, are less sensitive to domestic economic conditions than imports. Therefore some modifications shall be required on the demand forecast of export, referring to the current international trade trend of related commodities, which would be analyzed in the microscopic forecast.

Figure 11-2 shows the relation of GDP vs domestic cargo volume handled at the Port of Manila. Excluding data in 1984, two regression lines will be related to cargo volume of the Port of Manila with GDP: one is from 1980-1983 and the other is from

1985-1990. It means that it is impossible to express the relationship based on the Eq.(11.1) with only one line. The regression line (1) in the Figure will give a very small projection of cargo volume in 2000 & 2010. The regression line (2) in the Figure is shown in the next expression:

$$V=32.6G-12,230,000 \quad (11.5)$$

$$R=0.97(\text{Correction Coefficient}) \quad (11.6)$$

where; V:Metallic Tonnage, G:Million Pesos at constant 1985 prices

The elasticity E_0 in 1991 by Eq.(11.5) is Calculated to be $E_0=2.13$ by (11.4). In Medium case, cargo volumes in 2000 and 2010 are calculated as follows:

$V_1=23,000,000$ton, $V_1/V0=2.2$, $E_1=1.53$

$V_2=48,000,000$ton, $V_2/V0=4.6$, $E_2=1.25$

V_1 and V_2 are projected cargo volumes in 2000 and in 2010, V_0 is actual cargo volume in 1991. The Elasticities E_0 E_1 E_2 seem to be too large to use for the future projection of cargo volumes in 2000 and 2010.

Figure 11-3 shows the relation of GDP vs domestic cargo volume handled at the Base Port of Batangas. Excluding data from 1983-1984, two regression lines will be related to cargo volume of the Port of Batangas with GRDP; one is from 1980-1982 and the other is from 1985-1990. The regression line (2) in the Figure is shown in the next expression:

$$V=20.6G-1,230,000 \quad (11.7)$$

$$R=0.86 \quad (11.8)$$

The elasticity E_0 in 1991 by Eq.(11.7) is calculated to be $E_0=2.44$ by (11.4). In Medium case, cargo volume in 2000 and 2010 are calculated as follows:

$V_1=2,200,000$, $V_1/V_0=2.4$, $E_1=1.55$

$V_2=5,300,000$, $V_2/V_0=5.6$, $E_2=1.23$

V_1 and V_2 are the projected cargo volumes in 2000 and in 2010, V_0 is the actual cargo volume in 1991. The Elasticities E_0, E_1, E_2 seem to be too large to use for the future projection and cargo volumes in 2000 and 2010.

A historical trend analysis method by Eq.(11.2) is used for the domestic cargo handled at the Port of Batangas. The result is shown in Figure 11-4 and its regression line is as follows:

$$V=69,400Y-1.37\times10^8$$

R=0.96

The average growth rate of GRDP from 1987-91 was shown in Table 11-4, wherein growth rate of Region IV showed 4.5%. Assuming G(GRDP) as being 4.5%, projection has been conducted with the three cases, E=1.0, 1.2 and 1.5 in Eq.(11.3) and results are shown in Figure 11-4. It shows that demand forecast curve with E=1.2 is best fit to the regression line of historical trend analysis. Figure 11-5 shows the actual data on domestic cargo volume at the Port of Manila, in which three projected curves with E=1.0, 1.2 and 1.5 in Eq.(11.3) are shown, assuming G(GDP) as being 3.8%.

Historical trend analysis cannot project future demand forecasts including several alternatives like on the difference of GDP or GRDP(low case, medium case and high case). Therefore, Eq.(11.3) is applied for macroscopic demand forecast utilizing the above-mentioned historical trend analysis, that is, assuming E=1.2 and referring to Table 11-6 on GDP or GRDP.

The results are shown in Tables 11-8 and 11-9.

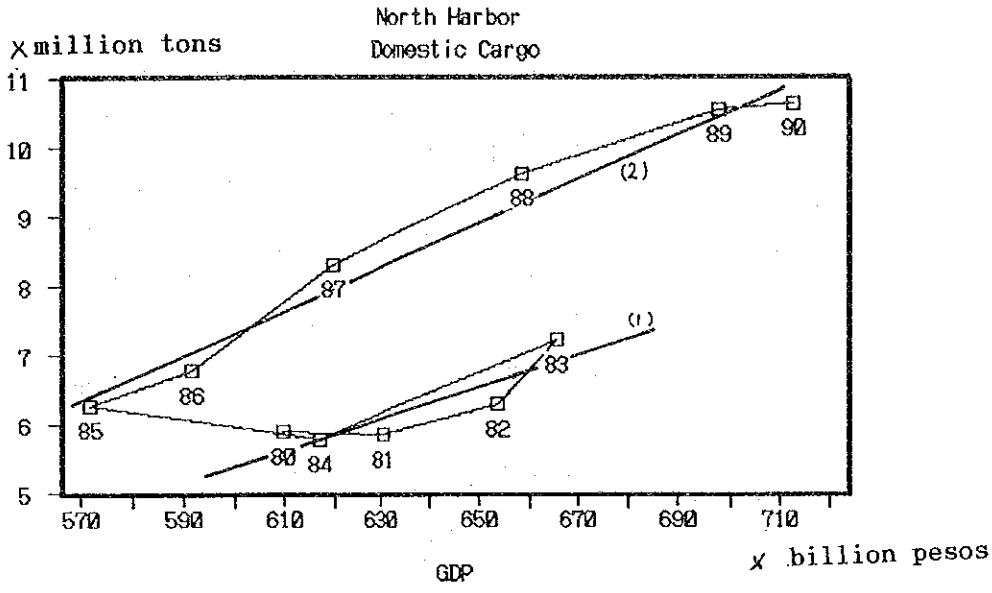

Figure 11-2 Relation of GDP vs Domestic Cargo Volume at Port of Manila

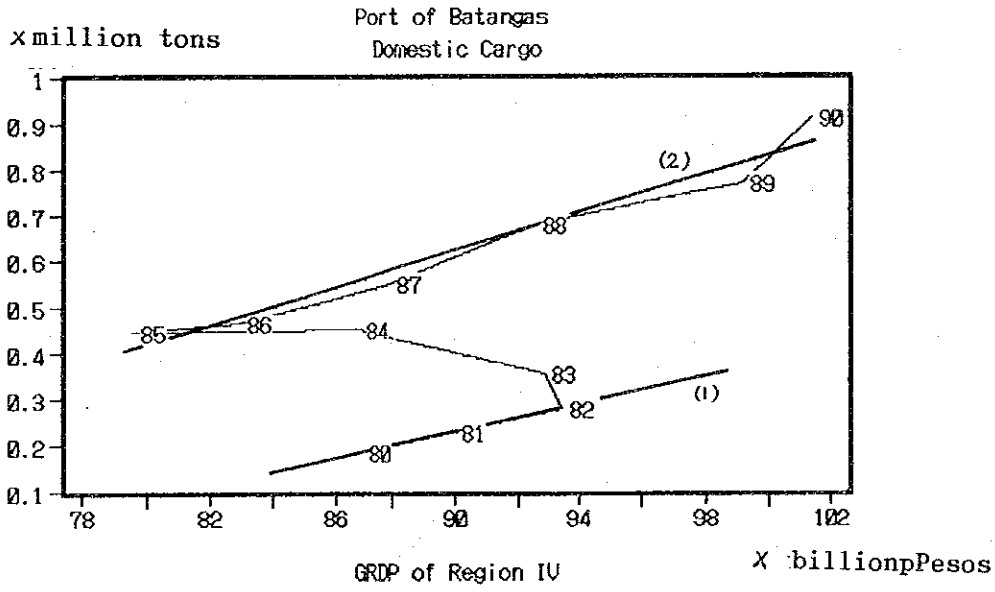

Figure 11-3 Relation of GRDP vs Domestic Cargo Volume at Port of Batangas

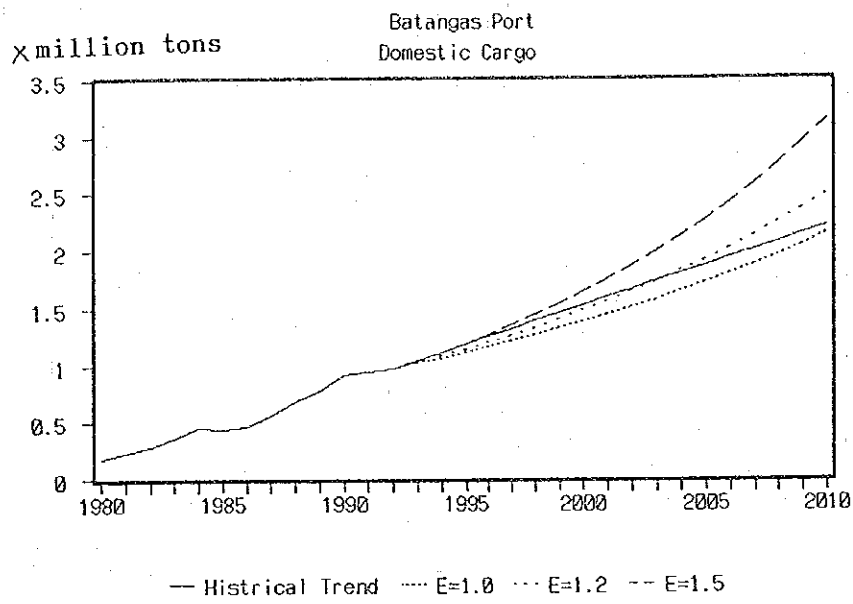

Figure 11-4 Histrical Trend Analysis and Projection with E=1.0, 1.2, 1.5 at Port of Batangas

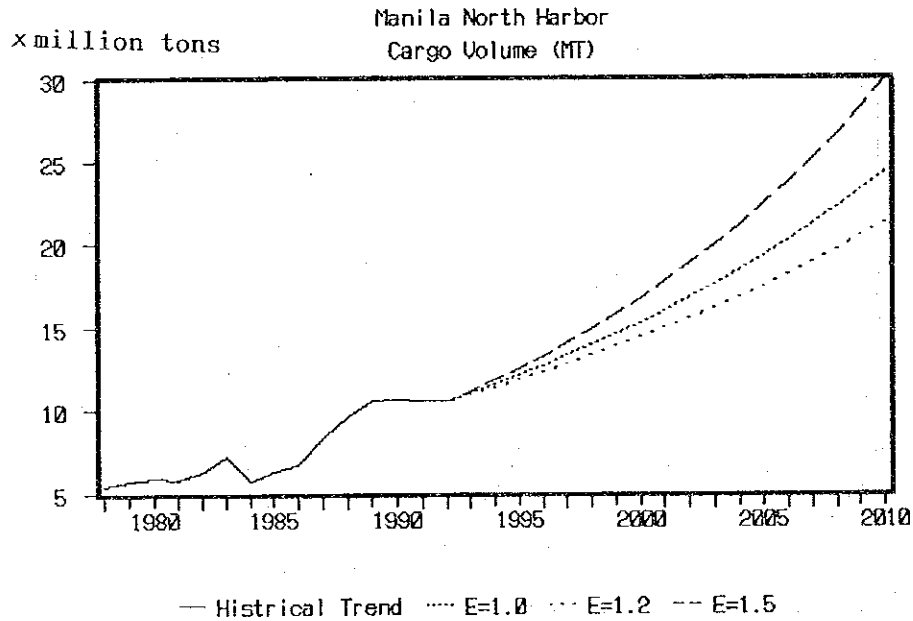

Figure 11-5 Histrical Trend and Projection with E=1.0, 1.2, 1.5 at Manila North Habour

Table 11-8 Projected Growth Ratios of Domestic and International Cargo Volume at Ports of Manila and Batangas

	High Case		Medium Case		Low Case	
	2000/ 1991	2010/ 1991	2000/ 1991	2010/ 1991	2000/ 1991	2010/ 1991
Port of Manila	1.99	4.46	1.67	3.16	1.46	2.33
Port of Batangas	2.27	6.00	1.82	3.86	1.46	2.33

Table 11-9 Projected Domestic and International Cargo Volume (x1,000 tons) at Ports of Manila and Batangas

	High Case		Medium Case		Low Case	
	2000	2010	2000	2010	2000	2010
Port of Manila						
Domestic						
Inward	11,700	26,100	9,800	18,500	8,600	13,700
Outward	9,200	20,500	7,700	14,500	6,700	10,700
International						
Import	9,500	21,300	8,000	15,100	7,000	11,100
Export	3,700	8,400	3,100	5,900	2,700	4,400
Port of Batangas						
Domestic						
Inward	1,300	3,400	1,000	2,200	800	1,300
Outward	870	2,300	700	1,500	600	900
International						
Import	120	310	90	200	70	120
Export	10	30	9	19	7	12

(2) Passenger

The number of passengers in target years mentioned earlier will be projected using the relationship Eq.(11.5) between the number of passengers and GRDP/population. Eq.(11.5) was presented in Highway Planning Manual by DPWH.

$$\Delta V/\Delta t=(1+E^{*}\Delta PG/\Delta t)(1+\Delta P/\Delta t)-1 \qquad (11.5)$$

where, $\Delta PG/\Delta t$; growth rate of Per Capita GDP/GRDP

$\Delta P/\Delta t$; growth rate of Population

Figures 11-6, and 11-7 show the historical trend of embarked/disembarked passenger numbers at Ports of Manila and Batangas. At the Port of Manila, after recording a peak passenger volume of 2,800,000 persons in 1983, the number of passengers sharply declined due to the negative economic growth in 1984 and 1985(-7.3%). The lowest passenger number, 1,220,000 in these ten years was recorded in 1986. Since then, it has increased rapidly and the numbers of passengers in 1990 and 1991 were 3,100,000 and 3,200,000 respectively. The averaged growth rate per annum of passengers' number between 1980 and 1983 was 6.8% and that between 1986 and 1991 was 18.9%. At the Port of Batangas, the average growth rate per annum between 1980 and 1983 was 5.3% and that between 1986 and 1991 was 13.9%. Based on the above analysis and Figures 11-6 and 11-7, it is difficult to determine the elasticity of Eq.(11.5) for projection of passenger numbers at the Ports of Manila and Batangas. "Nationwide Roll-on Roll-off Transport System development Study in the Republic of the Philippines, August, 1992"(JICA) conducted passenger volume projection by Eq.(11.5) assuming E=1.5. Therefore, the same value of E=1.5 will be used in this study. The result is shown in Table 11-10 and Table 11-11.

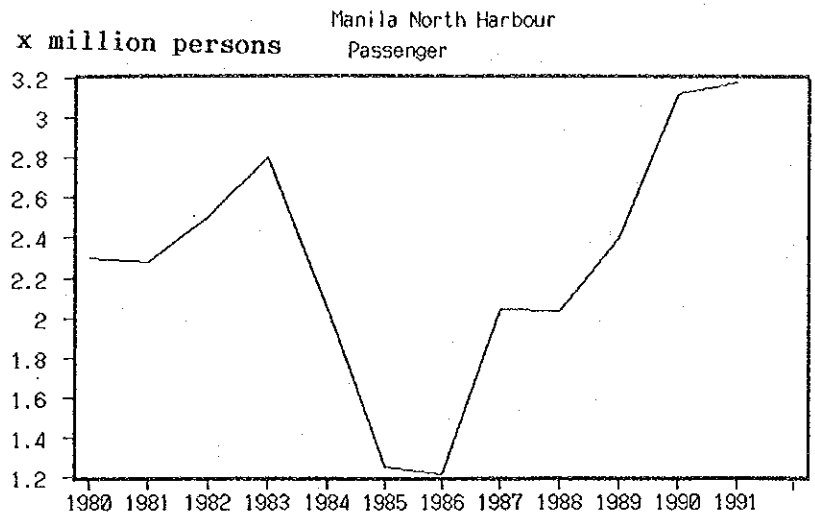

Figure 11-6 Historical Trend at Manila North Harbour

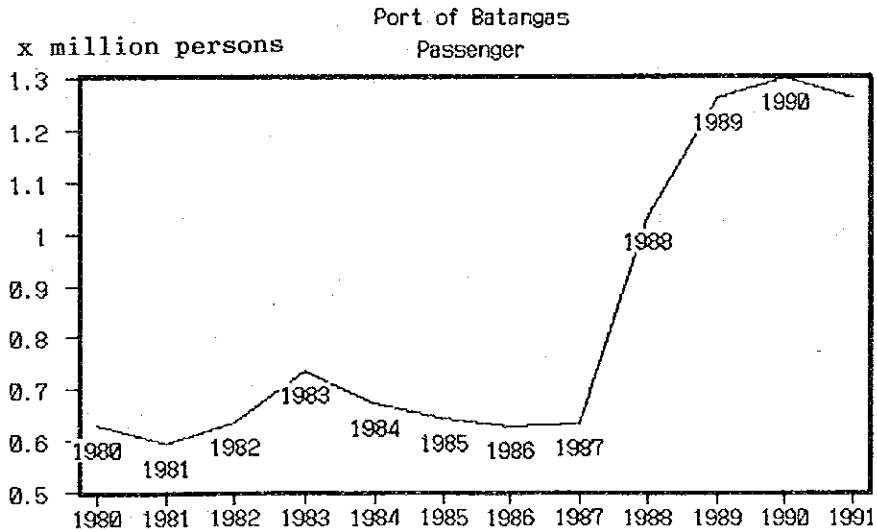

Figure 11-7 Historical Trend at Port of Batangas

Table 11-10 Projected Growth Rates of Domestic Passenger at the Ports of Manila and Batangas

	High Case		Medium Case		Low Case	
	2000/ 1991	2010/ 1991	2000/ 1991	2010/ 1991	2000/ 1991	2010/ 1991
Port of Manila	2.16	5.33	1.73	3.37	1.46	2.30
Port of Batangas	2.54	7.68	1.93	4.33	1.46	2.30

Table 11-11 Projected Domestic Passenger (x1000 person) at the Ports of Manila and Batangas

	High Case		Medium Case		Low Case	
	2000	2010	2000	2010	2000	2010
Port of Manila						
Disemberkment	3,650	9,000	2,900	5,700	2,500	3,900
Embarkment	3,200	7,900	2,600	5,000	2,200	3,400
Port of Batangas						
Diembarkment	1,500	4,600	1,150	2,500	900	1,400
Embarkment	1,500	4,600	1,150	2,600	900	1,400

11.6 Forecast of Calling Vessels at Port

In this study, as mentioned in the chapter 6.6, vessel calls at the Port of Manila and Batangas are divided into three types: container vessel, conventional vessel and passenger vessel (including RO/RO and car ferry type). As the passenger vessel handles not only passenger but also container or general cargo and that vessel's cargo handling system is almost the same in a as Roll on Roll off system, the passenger vessel is classified herein as a RO/RO vessel. Thus, the Study Team forecasts the vessel size for three(3) types, container vessel, namely conventional vessel and RO/RO vessel.

The distributions of ship size by type per month in 1992 at the Port of Manila are shown in Figures 11-8 to 11-13.(detailed in Appendix C-1)

11.6.1 Forecast of Vessel Size

(1) Foreign Vessel

1) MICT and South Harbor

a) Container Vessel

According to Figure 11-8, the range of container vessel size has a wide dispersion. But the ratio of the number of vessels more than 15,000 DWT is about 48%. On the other hand, at the South Harbor (see Figure 11-9), the ratio of the number of vessels more than 15,000 DWT is about 9%, and about 26% of the total is more than 10,000 DWT.

In addition, according to the latest data from ICTSI (see Appendix C-3), the share of large container vessel over 35,000 DWT is less than one percent.

The progress of container vessels can be classified into four generations(see Table 11-12). At present, the average size (14,700 DWT) of container vessels calling at MICT represents first generation container vessels. Considering the tendency of large size container vessels calling at MICT and the increasing container cargo demands, second generation container vessels, with capacity of about 1,800 TEUs (approximately 30,000 DWT), will call at the MICT in the planning period of this project.

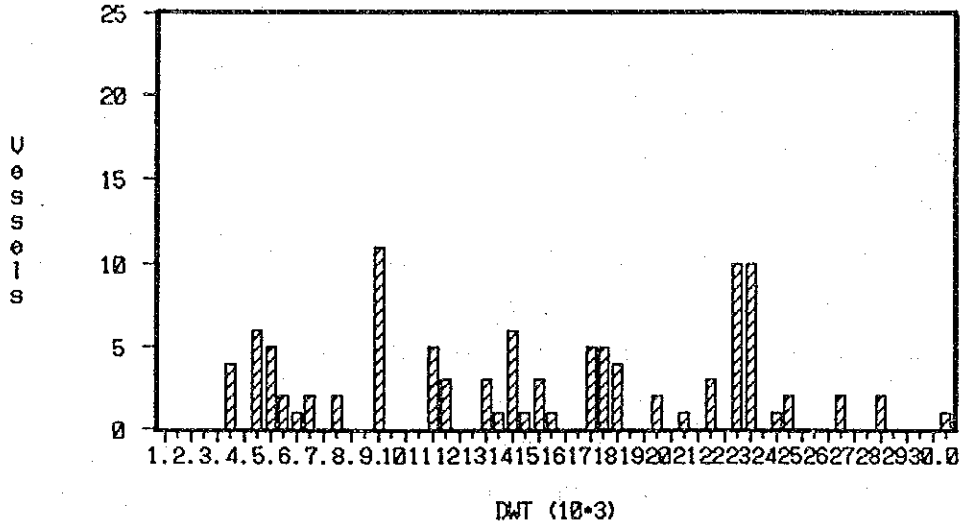

Figure 11-8 Container Ship Calls at MICT Dec. 1992

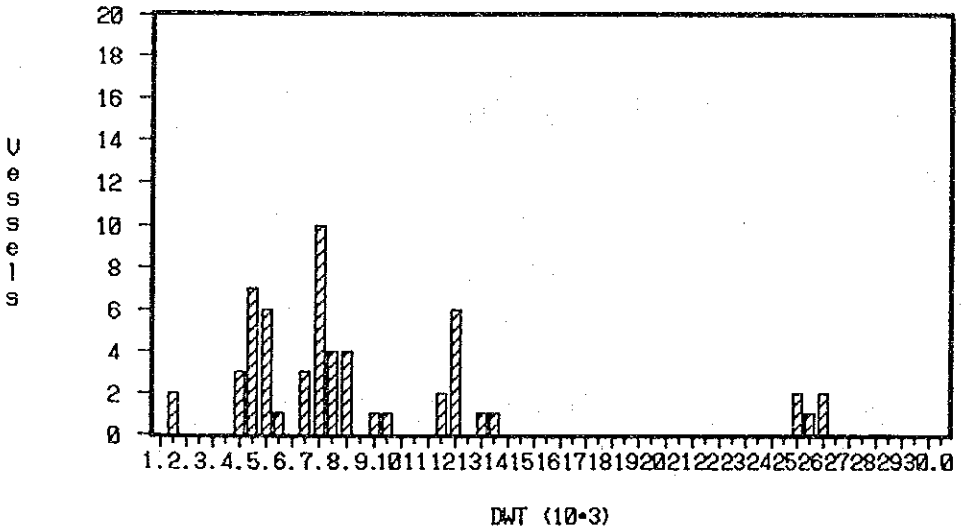

Figure 11-9 Container Ship Calls at South Harbor (Pier 3 - Pier 15) Dec. 1992

Table 11-12 Progress of Container Vessels

Generation	First Generation	Second Generation	Third Generation	Fourth Generation
Container Vessel	Mainly, Converted ships with on-board cranes.	Purpose-built ships 700-1,500 TEU capacity.	Purpose-built ships over 2,000 TEU Capacity.	Purpose-built ships over 3,000 TEU Capacity.
	Up to about 15,000DWT.	15,000DWT-35,000DWT	35,000DWT-45,000DWT	45,000DWT-55,000DWT

On the other hand, the average vessel size calling at South Harbor is 8,500 DWT. For the same reason as above, the average vessel size is expected to reach 13,000 DWT, which falls between the first and second generation container vessels.

Based on the above, the average container vessel size calling at the Port of Manila during the planning period of this project is assumed to be of the following dimensions:

	DWT	LOA(m)	Draught(m)	Beam(m)
MICT	:30,000	237	11.6	30.7
South Harbor	:13,000	153	8.4	23

Note: LOA, Draught and Beam depend on Technical Standard of Japan.

b) Conventional Vessel

According to Figure 11-10, the ratio of conventional vessels more than 10,000 DWT is around 27% and average vessel size is 8,400 DWT.

Considering the present depth condition(-10m), the average conventional vessel size calling at South Harbor during the planning period of this project is assumed to be of the following dimensions:

	DWT	LOA(m)	Draught(m)	Beam(m)
South Harbor	:10,000	137	8.5	19.9

Note: LOA, Draught and Beam depend on Technical Standard of Japan.

2) Port of Batangas

a) Container Vessel

At present, foreign container cargo is not handled. But, based on forecast container cargo demand in target year, the size of vessel calling at the Port of Batangas shall be assumed to be the same as South Harbor.

b) Conventional Vessel

As with container vessel, the size of vessel calling at the Port of Batangas shall be assumed to be the same as South Harbor due to berth's depth (-10.0m) which is planned for Phase I.

(2) Domestic Vessel

1) North Harbor

The distribution of domestic vessels is shown in Figure 11-12 and 11-13. The average vessel size of conventional vessel and passenger vessel calling at North Harbor is 3,200 DWT and 4,300 GRT respectively. According to the List of CISO member's vessels, the average size of container, RO/RO and conventional vessel is 5,300 DWT, 5,600 GRT and 3,400 DWT respectively (see Appendix C-2). Considering the present berth's depth of six(6) meters, the vessel size suitable for this water depth is assumed to be 2,500 DWT for conventional vessel and 3,000 GRT for RO/RO vessel type according to Technical Standard of Japan. It is noted, however, that the berth of North Harbor generally accommodates larger vessels than the standards specify.

a) RO/RO Vessel

It is considered that long haul vessel, such as from/to Cebu, and/or Mindanao island, shall be mainly large in accordance with increasing cargo demands.

Considering above conditions and the present vessel size, the average size of RO/RO vessel in target year shall be assumed to be 13.700 GRT which is almost the same as the CISO member's largest vessels.

On the other hand, the vessel size using the existing berths (Pier 2 ~ 16) shall be assumed to be 3,000 GRT due to limitation of berth's depth.

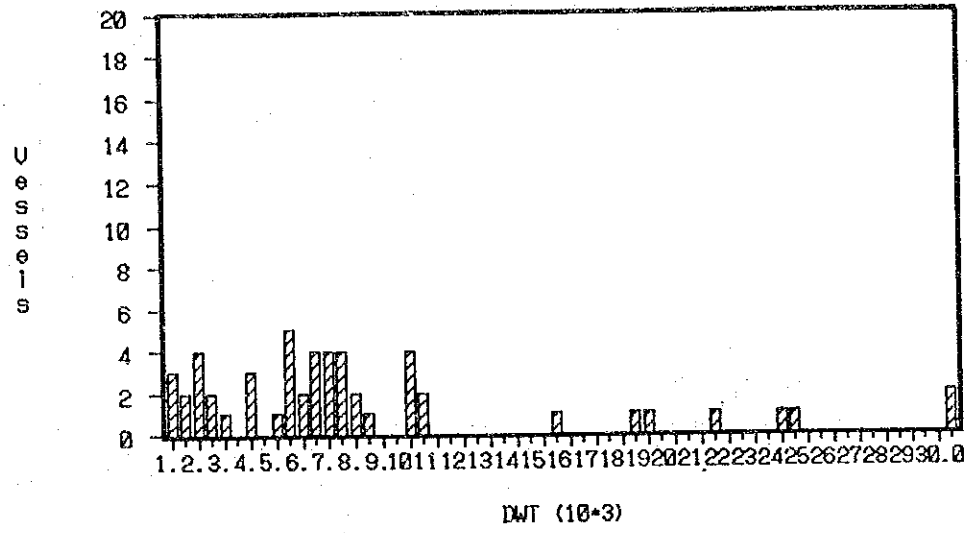

Figure 11-10 Conventional Ship Calls at South Harbor (Pier 3 - Pier 15) Dec. 1992

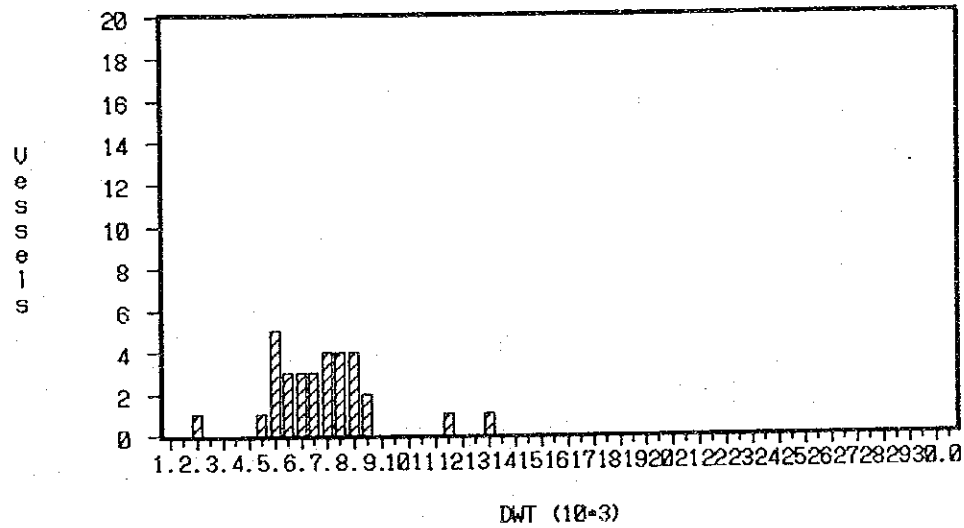

Figure 11-11 Combo Ship Calls at South Harbor (Pier 3 - Pier 15) Dec. 1992

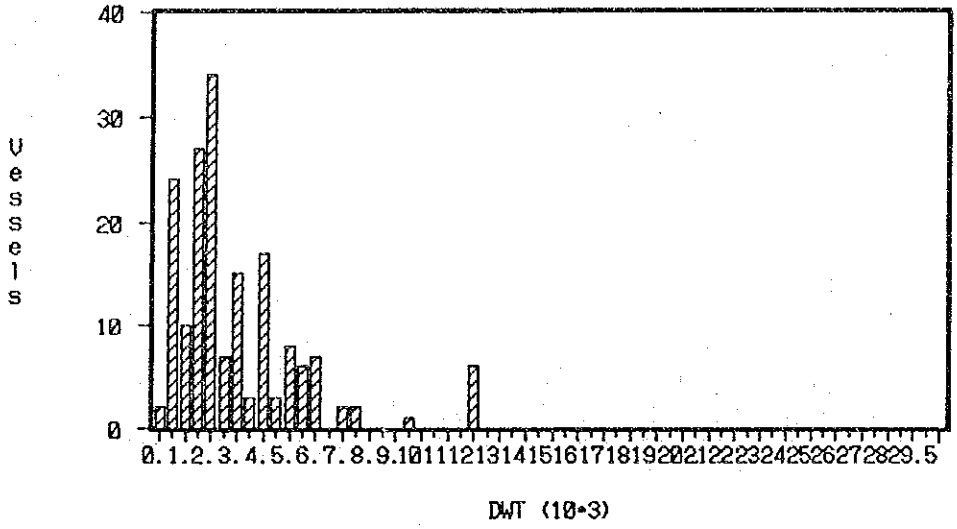

Figure 11-12 Conventional Ship Calls at North Harbor
(Pier 2 - Pier 16), Dec. 1992

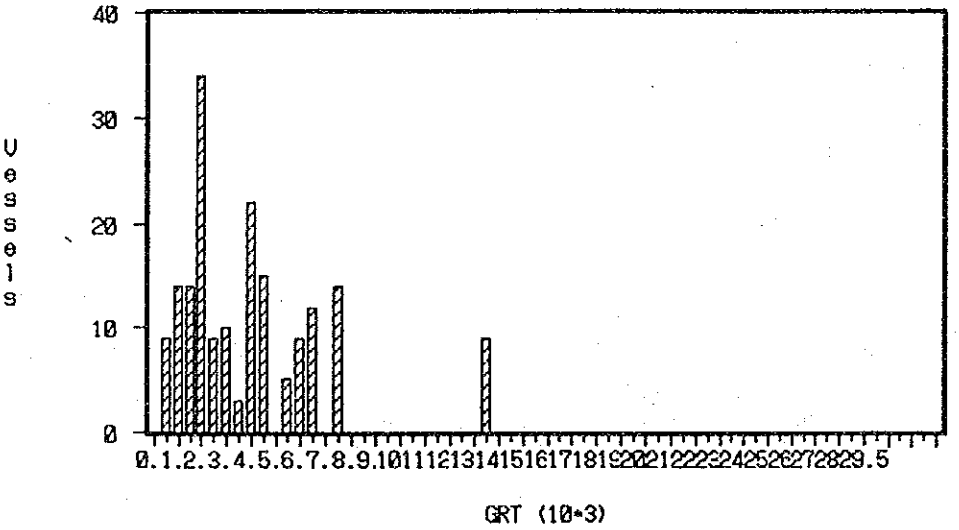

Figure 11-13 Passenger Ship Calls at North Harbor
(Pier 2 - Pier 16) Passenger, Dec. 1992

The dimensions of RO/RO vessel are as follows:

	GRT	LOA(m)	Draught(m)	Beam(m)
Large RO/RO:	13,700	195	7.5	24
Small RO/RO:	3,000	113	4.9	18.9

Note: LOA, Draught and Beam are based on Technical Standard of Japan.

b) Container Vessel

In accordance with increasing container cargo demands, the size of container vessel on main routes such as from/to Cebu, Mindanao island etc. is assumed to be 12,500 DWT, which is almost the largest vessel of the CISO fleet.

On the other hand, the vessel size using the existing berths (Pier 2 ~ 16) shall be assumed to be 3,300 DWT of which dimensions are decided from CISO member's vessel suitable for existing depth (-6.0m).

The dimensions of container vessel are as follows:

	DWT	LOA(m)	Draught(m)	Beam(m)
Large Container	: 12,500	145	8.3	21.6
Small Container	: 3,300	107	5.3	16

Note: DWT, LOA, Draught and Beam are based on the List of CISO member's vessel

c) Conventional Vessel

It is considered that the size of domestic conventional vessel will not be as large as that of container vessel.

So, the vessel size using the existing berths (Pier 2 ~ 16) shall be assumed to be 4,100 DWT of which dimensions are decided from CISO member's vessel suitable for existing depth (-6.0m)

The dimensions of conventional vessel are as follows:

	GRT	LOA(m)	Draught(m)	Beam(m)
Conventional	: 4,100	88.3	5.1	14.2

Note: LOA, Draught and Beam are based on the List of CISO member's vessel

2) Port of Batangas

a) RO/RO Vessel

According to the Nationwide Roll-on Roll-off Transport System Development Study in the Republic of the Philippines(1992) (hereinafter referred to as "RO/RO report"), it is reported that all general cargoes shall be transported by RO/RO vessels in 2010 except rice, sugar and bottled cargoes.

So in the target year, the Study Team considers that the majority of ship calls for domestic trade will be by RO/RO type vessels instead of conventional vessels. It is also considered that the size of RO/RO vessel shall be large in mainly long haul such as Mindanao, Cebu etc. It is also assumed to be large up to planned berth's depth (-5.0m or -5.5m) mainly in short haul such as Calapan.

Based on the above, the average vessel size for berths planned for Phase I shall be assumed to be 2,000 GRT of which dimensions are decided from Technical Standards of Japan suitable for berth's depth of -5.5m.

The dimensions of RO/RO vessel are as follows:

	GRT	LOA(m)	Draught(m)	Beam(m)
RO/RO	: 2,000	96	4.4	17.1m

Note: LOA, Draught and Beam are based on Technical Standard of Japan.

b) Container Vessel

In accordance with increasing container cargo demands, the size of container vessel on main routes such as from/to Cebu, Mindanao island etc. shall be large, the same as

for North Harbor.

The dimensions of container vessel are as follows:

	DWT	LOA(m)	Draught(m)	Beam(m)
Container :	8,500	113	9.0	19

Note: LOA, Draught and Beam are based on the List of CISO member's vessel

Results of forecasted vessel size at the Port of Manila and Batangas are summarized in Table 11-13 and 11-14.

Table 11-13 Vessel Size at Port of Manila in Target Year

		1991	2010	Remarks
Foreign Container Vessel	Large Vessel	Av. 14,700 DWT	Av. 30,000 DWT	Second Generation Ship
		LOA 154.0 m	LOA 237.0 m	
		Draft 8.5 m	Draft 11.6 m	
		Beam 24.0 m	Beam 30.7 m	
	Small Vessel	Av. 8,500 DWT	Av. 13,000 DWT	Largest Calling Vessel
		LOA 120.0 m	LOA 153.0 m	
		Draft 7.0 m	Draft 8.4 m	
		Beam 20.0 m	Beam 23.0 m	
Domestic Container Vessel	Large Vessel	Av. 5,300 DWT	Av. 12,500 DWT	Largest Calling Vessel
		LOA 97.0 m	LOA 145.0 m	
		Draft 6.0 m	Draft 8.3 m	
		Beam 17.0 m	Beam 21.6 m	
Domestic RO/RO Vessel	Large Vessel	Av. 5,590 GRT	Av. 13,700 GRT	Largest Calling Vessel
		LOA 121.0 m	LOA 195.0 m	
		Draft 7.0 m	Draft 7.5 m	
		Beam 19.0 m	Beam 24.0 m	
	Small Vessel	Av. 3,000 GRT	Av. 3,000 GRT	Suitable for berth depth
		LOA 113.0 m	LOA 113.0 m	
		Draft 4.9 m	Draft 4.9 m	
		Beam 18.9 m	Beam 18.9 m	
Conventional Vessel	Foreign	Av. 8,400 DWT	Av. 10,000 DWT	Largest Calling Vessel
		LOA 108.0 m	LOA 137.0 m	
		Draft 8.1 m	Draft 8.5 m	
		Beam 19.0 m	Beam 19.9 m	
	Domestic	Av. 3,400 DWT	Av. 4,100 DWT	Largest Calling Vessel
		LOA 82.0 m	LOA 88.3 m	
		Draft 5.0 m	Draft 5.1 m	
		Beam 13.0 m	Beam 14.2 m	

Table 11-14 Vessel Size at Port of Batangas in Target Year

		1991	2010	Remarks
Foreign Container Vessel	Small Vessel	---	Av. 13,000 DWT	Same as South Harbor, Manila
		---	LOA 153.0 m	
		---	Draft 8.4 m	
		---	Beam 23.0 m	
Domestic Container Vessel	Large Vessel	---	Av. 8,500 DWT	Same as North Harbor, Manila
		---	LOA 113.0 m	
		---	Draft 9.0 m	
		---	Beam 19.0 m	
Domestic RO/RO Vessel	Small Vessel	Av. 500 GRT	Av. 2,000 GRT	Same as Phase I Project
		LOA 56.1 m	LOA 96.0 m	
		Draft 3.0 m	Draft 4.4 m	
		Beam 12.3 m	Beam 17.1 m	
Conventional Vessel	Foreign	---	Av. 10,000 DWT	Same as South Harbor, Manila
		---	LOA 137.0 m	
		---	Draft 8.5 m	
		---	Beam 19.9 m	

11.6.2 Projection of Vessel Calls

The number of vessel calls is determined by the relation of the productivity of cargo handling and the loaded/unloaded cargo volume per vessel. Other important factors related to vessel calls are berth occupancy rate and working days etc. Details of these factors are mentioned in Part II of Chapter 4.1.

Tables 11-15 and 11-16 show the number of vessel calls in the medium case scenario and high case scenario respectively in the target year. According to these Tables, the number of vessels calling at the Port of Manila in the medium case is 16,300, an increase of 2.1 times over the current level. In the high case, 21,600 vessels will call at the Port of Manila, an increase of 2.8 times over the current level. At the Port of Batangas, the number of calling vessels in the medium case is 8,600, an increase of 1.5 times over the current level. In the high case, 11,800 vessels will call, an increase of 2.1 times the current level.

Table 11-15 Number of Vessel in 2010 (Medium Case)

	Vessel Type	Port of Manila				Port of Batangas	Total
		South	MICT	North	Sub Total		
Foreign Container	30,000 DWT	0	2,727	0	2,727	0	2,727
Container	13,000 DWT	1,454	0	0	1,454	252	1,706
Convention	10,000 DWT	1,044	0	0	1,044	89	1,133
Sub Total		2,498	2,727	0	5,225	341	5,566
	Present (1991)	1,116	1,111	----	2,227	43	2,270
Domestic Container	12,500 DWT	0	0	1,951	1,951	0	1,951
Container	8,500 DWT	0	0	0	0	277	277
Container	3,300 DWT	0	0	0	0	0	0
RO/RO	13,700 GRT	0	0	5,091	5,091	0	5,091
RO/RO	3,000 GRT	0	0	3,565	3,565	0	3,565
RO/RO	2,000 GRT	0	0	0	0	7,370	7,370
Convention	4,100 DWT	0	0	506	506	0	506
Sub Total		0	0	11,113	11,113	7,647	18,760
	Present (1991)	----	----	5,481	5,481	5,591	11,072
Total		2,498	2,727	11,113	16,338	7,988	24,326
	Present (1991)	1,116	1,111	5,481	7,708	5,634	13,342

Table 11-16 Number of Vessel in 2010 (High Case)

	Vessel Type	Port of Manila				Port of Batangas	Total
		South	MICT	North	Sub Total		
Foreign Container	30,000 DWT	0	3,799	0	3,799	0	3,799
Container	13,000 DWT	2,030	0	0	2,030	393	2,423
Convention	10,000 DWT	1,481	0	0	1,481	148	1,629
Sub Total		3,511	3,799	0	7,310	541	7,851
	Present (1991)	1,116	1,111	----	2,227	43	2,270
Domestic Container	12,500 DWT	0	0	3,044	3,044	0	3,044
Container	8,500 DWT	0	0	0	0	471	471
Container	3,300 DWT	0	0	0	0	0	0
RO/RO	13,700 GRT	0	0	5,868	5,868	0	5,868
RO/RO	3,000 GRT	0	0	4,682	4,682	0	4,682
RO/RO	2,000 GRT	0	0	0	0	10,768	10,768
Convention	4,100 DWT	0	0	700	700	0	700
Sub Total		0	0	14,294	14,294	11,239	25,533
	Present (1991)	----	----	5,481	5,481	5,591	11,072
Total		3,511	3,799	14,294	21,604	11,780	33,384
	Present (1991)	1,116	1,111	5,481	7,708	5,634	13,342

CHAPTER 12 PRELIMINARY TECHNICAL STUDY OF PORT FACILITIES AND COST ESTIMATION

12.1 General

During the first survey period from 12th April to 25th June, 1993 field trip to major ports in GCR have been performed for observation and reconnaissance of existing port facilities and structures, namely port of Manila, Batangas, Subic, Lucena, Mariveles, Infanta-Real and the coastline of Cavite.

During the second survey period from 1st November to 30th November, 1993 site investigation to major ports in GCR have been performed for opinion exchange and discussion of long-term development, namely North and South Harbor of Manila, MICT, Sangley Point, Naic and Ternate and Batangas.

Data collection have been conducted simultaneously with the agencies and private companies concerned. The data for preliminary design and cost estimation are collected mainly in Manila Bay and in Batangas Bay for the preliminary technical study of major port facilities.

For the preliminary technical study of major port facilities, natural condition survey has been conducted for Naic/Cavite New Port Area, South Harbor and North Harbor of Port of Manila. These data will be applied for the preliminary design and cost estimation of above mentioned ports.

For the purpose of construction plan, maximum use of local products in encouraged in order to minimize importing material and plant and to stimulate local industries, if local products are applicable.

Regarding construction workers, skilled and unskilled workers are available in GCR but the crew and operator for heavy duty floating equipment may not be readily available.

12.2 Design Standards and Design Criteria

12.2.1 Standards

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

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 Port and Harbour Facilities, Japan
g) British Standard Code of Practice for Marine Structures
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)

The preliminary design of major port facilities shall be basically in accordance with references C and F listed above.

PPA Design Manual

PPA Design Manual consists of topics compiled from 1991 to 1993 as listed below.

	TITLE
No. 1	Regarding pile driving formulas
2	Regarding the strength of concrete for Marine Structures
3	Regarding Concrete cover to reinforcement for Marine Structures
4	Regarding Reinforcement which is used in Marine Structures

5	Regarding Allowable Stress of Concrete and Reinforcement
6	Regarding Lap Splices of Deformed Bar in Marine Structure
7	Corrosion rate of steel
8	Approximate Estimation of Design Wave Height
9	Weight of Armour Stones and Blocks
10	Earthquake and Seismic Force
11	Summary of Calculation sheet
12	HWL, LWL and DLT
13	Bearing Capacity of Pile Foundation
14	Open Type Pier with coupled batter piles
15	Standard size of ships and standard Dimension of Berths
16	Rubber fenders system

Note: PPA Design Manual has been published in 1994 as new book titled "Design Manual for Port and Harbour Facilities in the Philippine Ports Authority, JICA 1994"

12.2.2 Design Criteria

The purpose of design criteria is to provide a firm technical basis for required engineering design of the major port facilities. The criteria will show the scale and size of facilities, loading conditions, design parameters based on the expected functions of each port facilities and relating natural conditions which is described in Chapter 2.

Table 12-1 Design Criteria

	Port of Manila	Port of Batangas	Sangley Point Naic/Cavite
1. Tides			
H.W.L	+1.26	+1.41	+1.26 m
M.T.L	+0.49	+0.52	+0.49 m
M.L.L.W	±0.00	±0.00	±0.00 m
D.L.T	-0.35	-0.40	-0.35 m
2. Waves			
Height (1/3) 50-Years	2.69 m	3.24 m	2.69 m
3. Seismic Force			
Coefficient (kh)	0.15	0.15	0.15
S.F	0.21	0.18	0.18
4. Surcharge Load			
Ordinary tf/m^2	2.5	2.5	2.5
Extraordinary tf/m^2	1.25	1.25	1.25
5. Berthing Velocity			
Berthing Velocity	0.1 m/sec	0.1 m/sec	0.1 m/sec
6. Objective Ship Size			
Container Ship (DWT)	30,000	-	30,000
Ditto (DWT)	13,000	13,000	
Ro/Ro Ship (DWT)	13,000	2,000	
7. Crown Height			
Crown Height	+4.00 m	+3.20 m	+4.00 m
8. Wind			
Wind Velocity (kph)	175	175	175

12.3 Basic Condition of Cost Estimation

12.3.1 Preconditions of cost estimation

(1) Rate of currencies are fixed as follows;

US$1.0 = Peso 28.0 = ¥ 112.0, (Peso 1.0 = ¥ 4.0)

(2) Physical contingency is estimated at 10 %.

(3) Value added tax is estimated at 10 %.

(4) Inflation factor is excluded from the estimation.

(5) Compensation for fishing activities is excluded.

(6) The costs of all works are estimated by the international tender projects bases.

12.3.2 Basic Composition of Project Cost

Project cost is composed of construction cost, land acquisition cost at the Project area, relocation cost in the Project site, expense for consulting services (basic & detailed design and preparation of tender documents), expense for project management, and contingency. Table 12-2 shows the composition of Project cost.

Table 12-2 Composition of Project Cost

A. Construction Cost	
1. General expenses and preparatory works	(3% of Marine and Civil Works)
2. Marine works	Dredging/Reclamation, Quay Wall, Breakwater, Revetment, etc.
3. Civil works	Road, Pavement, Building, Utilities, etc.
4. Procurement	Cargo Handling Equipment, Tug boat, etc.
5. Total of A	
B. Indirect Cost	
1. Physical Contingency	(10% of A-5)
2. Engineering Fee	(5% of A-5 + B-1)
3. Value added tax	(10% of A-5 + B-1,2)
4. Land acquisition cost	(Not included)
5. Relocation/Compensation	(Not included)
6. Total of B	
C. Project Cost	(A-5 + B-6)

12.3.3 List of Unit Costs

Various kinds of cost survey was performed from November to December, 1993.

Applied prices include 25 % of overhead costs for indirect and general management cost.

(1) Labor Rates

Labor Rates as shown on Surveyed price in Table 12-3-3-1 are based on the hourly rate which is including 33.38 % of social factors. The contents of social factors are as follows;

a. Legal holiday, 10 days / year,	2.74 %
b. Overtime payment, 2 hours / day	7.50 %
c. Social security	6.48 %
d. Thirteen month pay, 1 month / year,	8.22 %
e. Paid leaves, 15 day sick	
15 day vacation	8.33 %
Total	33.38 %

Labor rates is shown in Table 12-3.

Table 12-3 Labor Rates Used in Cost Estimation

Peso/hours

Items	Surveyed Price	Applied Price
Construction Foreman	37	46
Leadman	28	35
Carpenter	21	26
Mason	21	26
Steelman	21	26
Painter	21	26
Pipe fitter/ Plumber	21	26
Welder	22	28
Electrician	22	28
Diver	22	28
Rigger	22	28
Common Laborer	19	24
Operator	26	33
Barge Captain	33	41
Barge Crew	19	24
Tug Master	42	53
Tug Mechanic	22	28
Tug Electrician	22	28
Radio Operator	22	28
Tug Crew	19	24
Dredge Master	60	75
Engineer	42	53
Pump/Dredge Tender	22	28
Electrician	22	28
Mechanic	22	28
Welder	22	28
Oiler	20	25

(2) Price of major construction material

Table 12-4 shows the price of major construction material. The price in the table includes material itself, transportation cost to the site and tax & duty.

Table 12-4 Price of Major Construction Material (Year 1993)

Peso

Items	Unit	Surveyed Price	Applied Price
Fuel			
Bunker	L	2.7	3.4
Gasoline (regular)	L	9.5	11.9
Diesel	L	6.5	8.1
Rock / Sand			
Sand (washed)	cu.m	360	450
Sand (white)	cu.m	280	350
Base course	cu.m	260	325
Aggregate 20mm	cu.m	480	600
Aggregate 10mm	cu.m	420	525
Gravel 25 - 150mm	cu.m	425	530
Quarry spall	cu.m	260	325
Rubble stone 5-50kg	cu.m	580	725
Armor stone 300-500kg	cu.m	420	525
Armor stone 3 - 5ton	cu.m	480	600
Armor stone 5 - 8ton	cu.m	500	650
Cement / Asphalt etc,			
Cement portland	ton	2,400	3,000
Asphalt	ton	9,200	115,00
Concrete hollow block			
4" X 8" X 16"	pcs	5.5	6.9
6" X 8" X 16"	pcs	5.5	8.1
Steel			
Steel bar (Deform) >13mm	ton	13,580	16,980
Steel bar (Deform) <13mm	ton	12,350	15,440
Steel bar (Plain) >13mm	ton	19,950	24,940
Steel bar (Plain) <13mm	ton	15,500	19,400
Structural steel	ton	15,300	19,120
Others			
Plywood 12 mm	sq.m	250	315
Plywood 16 mm	sq.m	380	475
Concrete pipe	L.m	200	250
R.C. Concrete pipe 600 mm	L.m	520	650
R.C. Concrete pipe 900 mm	L.m	1,400	1,750
PVC pipe 50 mm	L.m	60	75
PVC pipe 100 mm	L.m	150	190
Steel pipe	ton	35,000	43,750
Fabric sheet	sq.m	65	81

(3) Rental rates of major construction equipment

Table 12-5 shows rental rates of construction equipment used in construction cost estimation.

Hourly Rental Rates are based on The Rental Rates of Equipment Guidebook (Nov.,1992 - Edition 20 - by Associated Construction Equipment Lessors INC.)

The surveyed rates as shown in Table 12-5 is including additional cost of operator with equipment rental cost assumed by following calculation;

a. Standby or waiting time (5 days per month)
   5/30 days X 1 hour rate X 100 = 16.67 %
b. Ratio of maintenance and repairs cost
   10% maintenance + 7% repairs cost = 17.00 %

Total 33.67 %

Table 12-5 Rental Rates of Major Construction Equipment

Peso

Description	Capacity	Surveyed Price	Applied Price
Pump Dredger	2,600 Hp	11,000 P/Hr	14,700 P/Hr
Dredger	500 cum/h	13,000	17,380
Hopper Barge	550 cu.m	555	742
Flat Barge	500 tons	370	495
Flat Barge	300 tons	270	360
Tugboat	260 Hp	700	935
Crane Barge	60 t.lift	1,450	1,940
Crawler Crane	60 ton	1,546	2,067
Crawler Crane	40 ton	1,139	1,523
Crawler Crane	25 ton	762	1,019
Truck mounted crane	20 ton	775	1,036
Truck mounted crane	10 ton	368	492
Pile Driver	13.5 t.m	1,088	1,454
Pile Driver	10.5 t.m	899	1,202
Bulldozer	335 Hp	4,798	6,410
Bulldozer	215 Hp	3,356	4,486
Bulldozer LGP	165 Hp	2,451	3,276
Bulldozer	165 Hp	2,176	2,909
Loader	3.0 cu.m	1,818	2,430
Loader	1.5 cu.m	907	1,212
Grader	200 Hp	2,862	3,826
Vibratory Roller	12 ton	1,074	1,426
Tandem Roller	12 ton	507	678
Pneumatic Roller	14 ton	361	483
Tamping Foot Roller	19 ton	2,132	2,850
Sheepsfoot Roller	* *	56	75
Plate Compactor	7 Hp	98	130
Backhoe	0.8 cu.m	1,662	2,222
Water Truck	11 cu.m	703	940
Asphalt Distributor	3 cu.m	555	742
Asphalt Paver	10 '	2,296	3,069
Dump Truck	10 cu.m	704	941
Dump Truck	8 cu.m	543	726
High bed trailer	20 ton	300	400
High bed trailer	30 ton	344	460
Conc.Batching Plant	40 cu.m/hr	696	930
Concrete Pump	95 Hp	822	1,100
Transit Mixer	5 cu.m	908	1,213
Concrete Mixer	1 bagger	65	87
Concrete Vibrator	2 "	58	78
Asphalt Plant	60 t/hrs	572	765
Generator Set Bare	250 kw	580	775
Generator	100 kw	249	333
Welding machine	500 amp	314	420
Air Compressor	150 cfm	282	377

12.4 Required Cost of Port Facilities and Cargo Handling Equipment

12.4.1 Combined unit cost

Combined unit cost is based on the cost which the applied prices shown on the Table 12-3 to 12-5 or prices analyzed market prices for no listed item are accumulated by itemed construction works. Table 12-6 shows the combined unit cost.

The unit cost of Local currency and Foreign currency shown on Table 12-6 is divided by an adequate ratio from Total unit cost, which is depending on the tender documents of various similar port projects. However ,following matters regarding to the breakdown by portion are, in principal, considered.

(Basic consideration of portion)

1. Material	sand, soil, rock, cement, other basic material	100% Local
	imported material	100% Foreign
Material at site (Transport & Handling cost)		
	Depreciation of equipment	100% Foreign
	Fuel cost	100% Local
	Driver, skilled & unskilled labor	100% Local
Setting up or placing material		
	Depreciation of equipment	100% Foreign
	Fuel cost	100% Local
	Driver, skilled & unskilled labor	100% Local
	Diver with mason, welding works	100% Foreign (example)
Secondary production of material		Depending on procedure of production
2. Fuel	100% Local	
3. Labor cost	100% Local in principal	
4. Depreciation of construction machinery & floating equipment		100% Foreign
5. Fee of sub-contractor	Not fixed, depending on cost portion	
6. Field expenses, overhead etc. Ratio of above 1 - 5	No fixed	

Table 12-6 Combined Unit Cost

Peso

ITEM	UNIT	L/C	F/C	TOTAL
1. Dredging & Reclamation				
1) Dredging & disposed off unsuitable material	cu.m	18	30	48
2) Dredging & Reclamation	cu.m	27	45	72
3) Trench excavation	cu.m	18	30	48
4) Dredging & Reclamation				
hard soil 50> N>30	cu.m	40	68	108
" " N> 50	cu.m	60	100	160
2. Earth works				
1) Excavation & Dispose soil	cu.m	35	55	90
2) Embarkment for filling	cu.m	25	45	70
3) Compaction of ground	sq.m	4	5	9
4) Grading of compaction	sq.m	12	10	22
5) Excavation	cu.m	26	19	45
6) Backfill included grading/ compaction	cu.m	62	18	80
3. Concrete work				
1) Concrete 240 kg/cm	m	1,700	800	2,500
2) " 210 kg/cm	m	1,600	700	2,300
3) " 190 kg/cm	m	1,400	600	2,000
4) leveling concrete	m	1,200	480	1,680
5) place concrete (easy)	m	110	30	140
6) " " (Caisson etc)	m	160	40	200
7) Form work wall/block	sq.m	100	40	140
8) " " High wall	sq.m	140	50	190
9) Sliding Form, etc.	sq.m	350	150	500
10) Scaffolding for vertical wall or easy works	sq.m	100	40	140
11) Ditto, for staging offshore	sq.m	350	150	500
4. Pavement, Road				
1) Preparation sub grade	sq.m	4	8	12
2) Sub base course	cu.m	280	140	420
3) Base course	cu.m	300	150	450
4) Ditto, high grade	cu.m	650	150	800
5) Cement treated base	cu.m	750	500	1,250
6) Prime coat	sq.m	6	15	21
7) Edge block, sign marking	sq.m	50	20	70
8) Precast concrete block pavement t=250 mm	sq.m	830	420	1,250
9) Curb and Cutter	l.m	650	300	950
10) Asphalt surface t=50 mm	sq.m	250	100	350
5. Stone works				
1) Rubble stone foundation	cu.m	1,040	18	1,058
2) Rubble backing 0-50 kg	cu.m	426	14	440
3) Rubble mound 30-300 kg	cu.m	676	18	694
4) Armor stone works	sq.m	600	62	662
5) Placing stone	cu.m	93	150	243
6. Concrete production				
6.1 Concrete caisson				
1) Caisson concrete	cu.m	3,170	6,470	9,640
2) Steel bar works	ton	20,000		20,000
3) Installation caisson	unit	82,000	36,000	118,000
4) Filling gravel	cu.m	460	26	486
5) Cover concrete	cu.m	1,800	700	2,500
6.2 Concrete block				
1) Production of block	cu.m	2,400	880	3,280
2) Transport/install block	unit	12,000	3,800	15,500
6.3 Coping concrete	cu.m	3,300	960	4,260
6.4 Wall concrete non re-bar	cu.m	2,600	960	3,560
7. Piling works including material				
1) P.C. pile 450X450	l.m	2,200	1,800	4,000
2) R.C. pile 400X400	l.m	1,300	1,700	3,000
3) S.P.P D=600-700	ton	6,000	27,000	33,000
4) U-type sheet pile 4A	sq.m	1,000	10,000	11,000
5) Z-type sheet pile	sq.m	1,000	8,000	9,000
6) Tie rod/steel walling	set	5,000	49,000	54,000
7) R.C. sheet pile 600X400	l.m	1,500	3,000	4,500

12.4.2 Unit Cost of Equipment

Description	Capacity	Price
1. Quayside Crane		Peso
Container gantry crane	post panamax	280,000,000
Container gantry crane	panamax	230,000,000
Container gantry crane	domestic type	180,000,000
2. Cargo handling Equipment		
Transfer crane		55,000,000
Straddle carrier		26,000,000
Forklift	40 ton	22,000,000
Forklift	25 ton	11,000,000
Forklift	7.5 ton	2,750,000
Forklift	5 ton	1,750,000
Tractor trailer		3,250,000
Chassis		1,750,000
3. Tug boat		
Tug boat	2000 ps	150,000,000

Applied price described above is based on the standard price in Japan. The price includes the transportation cost to Manila or Batangas. However, detailed design fee for quayside crane and import taxes and duties are not included.

CHAPTER 13 PORT DEVELOPMENT STRATEGIES

13.1 Expected Roles and Functions of GCR Ports

On the basis of future economic and maritime business trends in the Philippines, it is considered that basic needs for further development and improvement of GCR ports in container handling activities in particular, should be emphasized even in the long term. These general observations can be supported by the various background factors and its future prospects as described here below;

(1) Steadily increasing trend of the economic growth in the Philippines can be expected at least another five or ten years, in accordance with the Government's Medium Term Economic Development Program.

(2) The maritime container traffic to/from the Philippines will increase due to export drive and expansion of consumers' market.

(3) Substantial growth of the container cargo flow in and out of the CALABARZON area is predicted according to the on-going expansion scheme of the Export Processing Zone.

(4) The Government policy for commercialization of public sector's activities will substantially contribute to improving port management and operation.

(5) Land transport systems including the South Super Expressway and the rail-served inland container depot project are now in the process of extension and rehabilitation, and full scale improvement of the systems can be expected, though it will take some more time.

All these things being taken into account, expected roles and functions of each major port in GCR can be stated as follows.

13.1.1 Port of Manila

The Port of Manila is the most important international and domestic trade port of the Philippines, with sole international container port as well. The Port of Manila consists of three harbors which have their own roles. They are the South Harbor, the Manila International Container Terminal (MICT) and the North Harbor. In 1991, the Port of Manila handled about 17.2 million tons of cargoes and 3.2 million passengers. Cargo throughputs at the Port of Manila reach about 56 % of the nation's total. In order to cope with increasing cargo and passenger demand in accordance with Philippine economic growth in these days, rehabilitation of port facilities and improvement of cargo handling system have been carried out at the Port of Manila. As a result, the Port of Manila is now able to meet rapidly growing seaborne cargo, although the Port is always busy and crowded, and needs further rehabilitation and extension all the time.

Firstly, as mentioned previously, one of the most significant problems at the Port of Manila is absolute lack of cargo handling space within the port area. The Port of Manila is just close to the central business district of Metro Manila. In addition, a considerable part of port area has been occupied by unauthorised setllers since a long time ago. Therefore, the Port of Manila is always obliged to expand its port functions toward offshore. In this connection, reclamation and dredging are indispensable in order to increase port facilities.

Secondly, the impact of port traffic upon the urban traffic in Metro Manila must be also taken into account. It has been a very strong requirement to alleviate the heavy congestion of urban traffic in this region. From this point of view, it has been proposed that the role of the Port of Manila should be reduced step by step and that the Port of Batangas, Sangley Point and Subic should increase the port role and function within GCR in order to complement the Port of Manila.

However, there are still plenty of possibilities for the Port of Manila to expand its port capacity by means of further rehabilitation and improvement, together with offshore reclamation and dredging for additional port facilities. The scale of the Manila Port's expansion depends uopn the cargo demand in future. According to the cargo demand forecast in the medium economic growth case, it is expected that cargo throughput at the Port of Manila will become three times in the year 2010 as much as the present cargo throughput and that the major component of future cargo demand is container. A large amount of container cargo requires a lot of additional berths and sophisticated cargo handling equipment. The magnitude of possible port space will play a very important role in order to expand this port. In late chapters, a future port

master plan at the Port of Manila will be discussed. Basically, the role and function of the Port of Manila is expected to be accelerated to a great extent in future. But, any solution to cope with increasing seaborne cargo must be derived from the economic point of view.

13.1.2 Port of Batangas

The Port of Batangas is situated 106 km south of Metro Manila. Total cargo handled at this port in 1991 is 1.0 million tons, together with 1.2 million passengers. The leading role of the Port of Batangas is a base port of Roll on/Roll off (RO/RO) transport from/to the Mindoro Island, so called "short haul", and the Visayas Islands, so called "long haul". There are several oil refineries with deep-sea port facilities along the Batangas Bay in addition to plenty of private berths, mainly along the north and west part of the Bay. Basically, the role of these private ports is out of range of the Study. However, a certain extent of studies on these private berths along the Batangas Bay are conducted in order to assist and complement the role of the Port of Batangas in the target year 2010.

The JICA Study in 1985 forecast 3.0 million tons of seaborne cargo at the port in the year 2000. According to this JICA Study, 13 berths for RO/RO and conventional cargo were required, but there was no container cargo in the year 2000. After the JICA Study, the detailed design study of the Port of Batangas was conducted in connection with OECF loan, and the Phase I Project at Batangas has been granted by OECF, but construction has not been started yet. Due to the long economic stagnation in the Philippines during the 1980s, cargo and passenger demand has not increased as expected by the JICA Study, thus the rapid port extension plan at the Port of Batangas has been obliged to slow down. However, the recent economic growth of the Philippines has begun to call on the Port of Batangas for further port extension again. In particular, the Port of Batangas is located close to the core of the CALABARZON area whose development project has already been started by the central and local governments together with foreign and domestic private investers. Therefore, the Port of Batangas should play a very important role as a key port for the CALABARZON industrial development. In addition, it is also required for the Port of Batangas to fulfill the role of the gateway to Mindoro and Visayas as well as complementary role of the Port of Manila, which has been experiencing port congestion for a long time.

According to the Government's Midium Term Economic Development Program up to the year 1998, the South Super Expressway will be extended to the place near

Batangas. This expressway will have enough road capacity including port-oriented traffic, and can also connect Batangas to Manila within 1.5 hours. The Phase I Project at Batangas will have also completed by the year 2000, and the Phase II Project will be followed later. From this point of view, the Port of Batangas is a promising port and it should accomplish a greater role than at present as a strategic base port in the Southern Tagalog.

13.1.3 Sangley Point

Sangley Point is located about 10 km southwest from Metro Manila, and used to be the U.S. Naval Base. Since the U.S. Navy left the place in late 1970s, Sangley Point has been retained for the Philippine military reservation. Present utilization at Sangley Point is the Philippine Naval Base. Several naval units, including the Philippine Coast Guard, the Naval Supply Command, the Naval Construction Brigades and the 15th Strike Wing, are occupying the base at Sangley Point. There exist port and air facilities, but those are out-of-date and need thoroughgoing rehabilitation for modern transport demand. In fact, the approaching channel is only 6.0 meters in depth. In addition, there are not berthing facilities, cargo handling equipment and warehouses. The base also has a concrete runway, but the length is rather short, only 229 meters. Moreover, port access roads are poor and there is no possibility to widen the roads due to densely hahited human settlement.

However, Sangley Point is having a great advantage when the conversion plan into international commercial port is considered to complement the role of the Port of Manila, because Sangley Point is the closest port to the Export Processing Zone (EPZ) in the Cavite Province which has been needing a modern container port near there for exporting industrial products to the world market. Because of Sangley Point's geographical reason, breakwaters and large scale reclamation are not necessarily indispensable to a new container port at Sangley Point. Therefore, the amount of capital investment for a new port's construction at this place is expected to be a good match for port extension cost at the Port of Manila. All these factors being taken into account, Sangley Point might be one of the most advantageous sites for a new international commercial port.

Unfortunately to the Study Team, the Philippine Government has been holding over its decision to permit the Study Team to conduct natural conditions survey at Sangley Point. Accordingly, the conversion plan of Sangley Point into an international commercial port has not experienced scientific arguments yet. For the purpose of

proposing a technically viable alternative port plan, the Study Team conducted a site selection survey along the Cavite coast and natural conditions survey for an alternative port to Sangley Point, and found out the Naic/Cavite coast as the most recommendable new port site for increasing international container demand in the CALABARZON area. The possibility of the Naic/Cavite New Port is stated below.

13.1.4 Naic/Cavite New Port

There have been a number of new port plans along the coast of the Cavite Province. The idea of a new port in the Cavite Province derived from growing demand for import/export container cargo generated by rapid industrialization in CALABARZON area, as seen in EPZ and other industrial estate. One of the most influential proposals on this is the Sangley Point conversion plan into an international commercial port.

However, the conversion plan at Sangley Point has proved to be most expensive if relocation cost for the Philippine Naval Base is born by a project promoter. According to the estimation by the Department of National Defense, total cost of relocation including reclamation for a substitutive base site, amounts to 4.2 billion pesoes. This huge amount cannot be reimbursable to the Philippine Ports Authority (PPA) or any other developer of a new port. Thus, the Study Team began studying the possibility of an alternate port to Sangley Point along the Cavite coast, ranging from Novelta/Rosario to Naic/Ternate. By the Team's visual observation at sites and natural conditions survey at Naic shore, Naic/Ternate was found out to be the most suitable site for a new international container port. The result of site choice discussion is summarized below.

(1) The Naic/Ternate coast is closest to the South Channel of the Manila Bay. It is expected that dredging cost for construction of an access channel is most inexpensive.
(2) The Naic/Ternate coast possesses easy land acquisition at the site. Land utilization is mostly fish pond and rice fields.
(3) Access roads to a new port are possibly widened.
(4) Soil condition of the seabed in front of the Naic/Ternate coast has proved to be quite sustainable to heavy port structure. Economic construction of a new port will be justified by natural conditions survey.
(5) Relocation of residents along the coast is expected to be very little.

All these being taken into account, the Naic/Cavite New Port development plan will be promising on condition that trunk road development between the port and

will be promising on condition that trunk road development between the port and industrial center in CALABARZON area is accelerated and completed by the target year 2010. The Naic/Cavite New Port will contribute to further acceleration of industrialization in CALABARZON area, especially in the Cavite Province. It will also contribute to normalization of container cargo movement, which has been giving rise to a serious impact on the urban traffic within Metro Manila.

13.1.5 Port of Subic

The Port of Subic is situated about 90 km northwest from Metro Manila. The former U.S. Naval Base was returned to the Philippines in 1992, and is now open to public use. The Port of Subic posesses a great advantage as a commercial port in terms of capital investment for the port. Because the port has been already furnished with thirty one modern berths, almost all of which are deeper than 12 meters. This port capacity can be said to be what is actually next to the Port of Manila, although the port is now not in operation. On the other hand, the critical disadvantage is distance from the capital region of the Philippines. There is also no effective road network between Subic and Metro Manila. The government's policy right now is to make maximum use of the existing port facilities and to accept the demand on "First come, first served" basis. Therefore, there are plenty of port utilization plans proposed for Subic, ranging from a super industrial port to a large scale of coastal recreational spot. In fact, the Taiwanese private investors have already acquired severeal hundred hectors of land for industrial production just behind the Port of Subic. One of the major foreign shipping companies, APL, offered a special interest in the Port of Subic in order to make frequent use of this port as a container feeder port in the Philippines, and has already begun a test operaration since 1993. It is also reported that the Malaysian private investors have started business negotiation with the Subic Bay Metropolitan Authority (SBMA) recently for establishing a huge leisure land. In addition, 2,744 m Subic airport will give a good opportunity for the tourism purpose to be fulfilled in future. Moreover, Subic Free Port Project is calling on substantial discussion in connection with the monopolistic use of the port as a whole. In this manner, positive proposals for effective utilization of the port will be followed again and again. SBMA is now formulating a master plan of the Subic Bay integrated port development.

Accordingly, there are still plenty of possibilities with regard to maximum utilization of the Port of Subic. However, it is very necessary to have in mind the fact

port-related development in future, in spite of long distance from Metro Manila and poor road links within the hinterland. In other words, it can be said that the Port of Subic should take advantage of the existing deep port as soon as possible. All these things being taken into account, the Study Team expects that the Port of Subic should play the following role and function in the target year 2010.

(1) A base port of industrial development in Mid-west part of the Luzon Island.
(2) Manufacturing plants having its own wharves.
(3) An international container port for complementing the present role of the Port of Manila.
(4) An extraordinary port for the purpose of shelter during storm and typhoon.
(5) Other urgent use.

13.2 Port Development Strategies

Based on the macro demand forecast for the target year 2010, and taking expected roles and functions of major GCR ports into account, port development strategies are described as shown in Table 13-1 ~ Table 13-5.

As shown in the giant Table 13-5, in case of high economic growth up to the year 2010, at least three (3) port development strategies will be possible. If the urban highway network development proceeds exactly as scheduled, the concentration of port development at the Port of Manila and Batangas is again advantageous to the national economy of the Philippines. If not, the need for port development at Sangley Point or Naic/Cavite is enhanced, rather than the full-scale development at the Port of Manila.

With respect to Subic, the port is now distant from Metro Manila or commercial centers of the Luzon Island. But, the former U.S. Naval Base still has great potential for future development. In order to take advantage of the port, road investment connecting with major commercial or industrial centers should have the first priority for the time being. In the long term, Subic is expected to become an international container transshipment port.

Table 13-1 GCR Ports Development Scenario

Year	Predicted Scenario		
PRESENT (1991)	Cargo Throughput	- 18.2 Million Tons	
		- 12.0 Million Tons (Container)	
	No. of Passengers	- 4.9 Million	
	No. of Berths	- 127 Berths	
	Present Situation	- Growing need for port extension and improvement of cargo handling operation at Port of MNL.	
		- Critical situation of road congestion within Metro Manila.	
		- Industrialization and containerization are booming up in Calabarzon as well as Metro Manila.	
		- Subic is open for public use, but S. Poing remains as Naval Base.	
		- Promising natural conditions data discovered at Naic/Cavite New Port	
MEDIUM FUTURE (2010)	GDP Growth	- Annually 5.5%	[2.8 Times]
	Cargo Throughput	- 56.4 Million Tons	[3.1 Times]
		- 47.7 Million Tons (Container)	[4.0 Times]
	No. of Passengers	- 15.9 Million	[3.2 Times]
	Addt'l Berth Requirement	- 3 Int'l Container Berths (-13m)	
		- 7 Domestic Container Berths (-10m)	
		- 2 Domestic RO/RO Berths (-9m)	
		- 12 in Total Berth Requirement	
	Major Equipment Requirement	- 6 Panamax Gantry Cranes	
		- 7 Domestic Gantry Cranes	
	Major Premises in Future	- Urban highway network improved, but traffic congestion still remains.	
		- South expressway extended to Batangas.	
		- Rail-served Inland Container Depot Project hopefully completed.	
HIGH (I) FUTURE (2010)	GDP Growth	- Annually 7.5% up to 2000	[3.8 Times]
		7.0% up to 2010	-
	Cargo Throughput	- 79.9 Million Tons	[4.4 Times]
		- 67.5 Million Tons (Container)	[5.6 Times]
	No. of Passengers	- 26.1 Million	[5.3 Times]
	Addt'l Berth Requirement	- 7 Int'l Container Berths (-13m)	
		- 1 Int'l Conventional Berths (-10m)	
		- 11 Domestic Container Berths (-10m)	
		- 4 Domestic RO/RO Berths (-9m,-5.5m)	
		- 23 in Total Berth Requirement	
	Major Equipment Requirement	- 14 Panamax Gantry Cranes	
		- 11 Domestic Gantry Cranes	
	Major Premises in Future	- Urban highway network thoroughly improved	
		- South expressway extended to Batangas	
		- Rail-served Inland Container Depot effectively utilized.	
		- Conversion plan of S. Point into int'l commercial port still suspended,due to administrative difficulty to promote the project.	
		- Land acquisition at MNL Port nicely accomplished.	

Table 13-2 Port of Manila Development Scenario

Year	Predicted Scenario		
PRESENT (1991)	Cargo Throughput	- 17.2 Million Tons - 12.0 Million Tons (Container)	
	No. of Passengers	- 3.2 Million	
	No. of Berths	- 83 Berths	
	Present Situation	- Gate way to Capital City. - Most important int'l port in Philippines - Sole int'l. container port - Super hub port of the Philippines. - Growing demand for int'l containerization and domestic RO/RO transport. - Careful consideration for port development is needed in order not to affect an impact on severe road traffic congestion within Metro Manila.	
MEDIUM FUTURE (2010)	Hinterland's GDP Growth	- Annually 5.5%	[2.8 Times]
	Cargo Throughput	- 51.65 Million Tons	[3.0 Times]
		- 44.85 Million Tons (Container)	[3.7 Times]
	No. of Passengers	- 10.7 Million	[3.3 Times]
	Addt'l Berth Requirement	- 3 Int'l Container Berths (-13m) - 6 Domestic Container Berth (-10m) - 2 Domestic RO/RO Berth (-9m)	
	Major Equipment Requirement	- 6 Panamax Gantry Cranes - 6 Domestic Gantry Cranes - 15 Transfer Cranes - 18 Straddle carriers	
	Major Premises in Future	- Number one port role increased. - Port rehabilitation and extension needed to a great extent. - Reclamation needed at South Harbor. - Land acquisition be speeded up, especially at South Harbor. - Port access roads (Including port bridge) upgraded and/or newly constructed. - Environmental impact and urban traffic congestion be taken into account.	
HIGH (I) FUTURE (2010)	Hinterland's GDP Growth	- Annually 7.5% up to 2000 7.0% up to 2010	[3.8 Times] -
	Cargo Throughput	- 72.6 Million Tons	[4.2 Times]
		- 63.0 Million Tons (Container)	[5.3 Times]
	No. of Passengers	- 16.9 Million	[5.3 Times]
	Addt'l Berth Requirement	- 7 Int'l Container Berths (-13m) - 10 Domestic Container Berths (-10m) - 3 Domestic RO/RO Berths (-9m)	
	Major Equipment Requirement	- 14 Panamax Gantry Cranes - 10 Domestic Gantry Cranes - 35 Transfer Cranes - 30 Straddle Carriers	
	Major Premises in Future	- Number-one port role accelerated. - Port rehabilitation and extension needed on a large scale. - Especially, large-scale reclamation needed to the utmost extent at South, MICT. - Land acquisition be speeded up at South and North Harbor (Including Smokey Mountain Reclamation Area) - Port access roads (Including port bridge) upgraded and/or newly constructed. - R-10 elevated expressway project completed and duly connected with port roads at North Harbor and MICT. - Environmental impact and urban traffic congestion be carefully taken into account.	

Table 13-3 Port of Batangas Development Scenario

Year	Predicted Scenario		
PRESENT (1991)	Cargo Throughput	- 1.0 Million Tons	
	No. of Passengers	- 1.2 Million	
	No. of Berths	- 13 Berths	
	Present Situation	- Base port in Southern Tagalog.	
		- Port extension near at hand (Phase I Project).	
		- Integration of private ports within Batangas Bay.	
		- South Super Expressway expected to be extended to Batangas in near future.	
		- Diversion road (Access road) almost completed.	
		- Deep sea port feasible.	
MEDIUM FUTURE (2010)	Hinterland's GDP Growth	- Annually 5.5%	[2.8 Times]
	Cargo Throughput	- 4.7 Million Tons	[4.7 Times]
		- 2.9 Million Tons (Container)	[-]
	No. of Passengers	- 5.2 Million	[4.3 Times]
	Addt'l Berth	- 1 Domestic Container Berth (-10m)	
	Requirement	-	
	Major Equipment	- 1 Domestic Gantry Cranes	
	Requirement	- 3 Straddlele Carriers	
	Major Premises in Future	- Role as base port in Southern Tagalog increased.	
		- Additional port role for contributing to industrialization and containerization in Calabarzon has come up gradually on condition that phase I project be completed.	
		- Phase II project desired.	
HIGH (I) FUTURE (2010)	Hinterland's GDP Growth	- Annually 7.5% up to 2000	[3.8 Times]
		7.0% up to 2010	-
	Cargo Throughput	- 7.3 Million Tons	[7.3 Times]
		- 4.5 Million Tons (Container)	[-]
	No. of Passengers	- 9.2 Million	[7.7 Times]
	Addt'l Berth	- 1 Int'l Container Berth (-10m)	
	Requirement	- 1 Int'l Conventional Berth (-10m)	
		- 1 Domestic Container Berths (-10m)	
		- 1 Domestic RO/RO Berths	
	Major Equipment	- 2 Gantry Cranes	
	Requirement	- 6 Straddle Carriers	
	Major Premises in Future	- Role as base port in Southern Tagalong accelerated.	
		- Additional port role for contributing to industrialization and containerization in Calabarzon, strengthened on condition that phase I project be completed.	
		- Phase II project required.	

Table 13-4 Naic/Cavite, Sangley Point Development Scenario

YEAR \ PORT	NAIC/CAVITE	SANGLEY POINT
PRESENT (1991)	Port Facility - Natural sand beach and shallow water area along Cavite/Naic coast but nearest to South Main Channel Present Situation - Changing tendency from agriculture to industrialization (EPZ) - Fishing activity and beach resort along coast. - Poor road links to Hinterland, but possible road widening, if invested. - Possible land acquisition because of very few residents along shoreline. - Vast investment for a new port construction from the beginning.	Port Facility - Naval base existing, including port facilities (water depth of roughly 6m), short aircraft runway and shipyard. Present Situation - Advantageous location for complementary int'l commercial port to Manila Port (About 10km from Metro Manila, and nearest to Carabarzon industrial area.) - Existing port facilities are usable, although rehabilitation/improvement of facilities needed for int'l container port. - Various development options of aircraft runway, for future transport demand. - Poor road links to Hinterland. Moreover, road widening not possible due to narrow land corridor.
HIGH (II) OR HIGH (III) FUTURE (2010)	Hinterland's GDP Growth - Annually 7.5% up to 2000 7.0% up to 2010 [3.8 Times] Cargo Throughput - 6.2 Million Tons (All Containers) Berth Requirement - 3 Int'l Container Berths (-13m) Equipment Requirement - 6 Panamax Gantry Cranes - 15 Transfer Cranes Major Premises in Future - New int'l commercial port complementing the role of MNL Port - Breakwater, dredging for channel and long port access roads, needed on a large scale, but relatively good natural conditions around the port site. - Relocation of coastal residents - Total cost comparison with MNL Port extension project be vital importance, taking into account shipper's transportation cost, vast road investment in hinterland etc.	Hinterland's GDP Growth - Annually 7.5% up to 2000 7.0% up to 2010 [3.8 Times] Cargo Throughput - 6.2 Million Tons (All Containers) Berth Requirement - 3 Int'l Container Berths (-13m) Equipment Requirement - 6 panamax Gantry Cranes +6 - 15 Transfer Cranes Major Premises in Future - Lots of unknown factors contained in the scenario. - Little exact data on natural conditions gives rise to uncertainty about master plan. - 4.2 Billion peso relocation cost remains new hurdles on road to port development. - Cavite coastal expressway extended to Rosario. - Road investment to access S.Point on a large scale. - Great contribution to industrialization in hinterland.

Table 13-5 Port Development Strategies in the Greater Capital Region

Port	Present Situation	Medium and Low Economic Growth Case GDP: 4 ~ 5.5% Urban Highway Network in Metro Manila: Progressed	High Economic Growth (I) Case GDP: 7 ~ 7.5% Urban Highway Network in Metro Manila: Full Implemented	High Economic Growth (II)/(III) Case GDP: 7 ~ 7.5% Urban Highway Network in Metro Manila: Delayed
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. · 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.	· 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. · Industrialization at Subic has been realized by Taiwan group at first. · From the very long-term point of view, an 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.	· 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, an international container transshipment port is possible. · Increase of an alternative port function to the Port of Manila, in accordance with gradually improved trunk road to Metro Manila. · 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 is being realized. · 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 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 MICT's new container terminals is required. · Promotion of measures for further containerization at the South Harbor, especially in terms of cargo handling operation, is required. · 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.	· 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 MICT's new container terminals is required. · Offshore port extension for the South Harbor new container terminals is required. · 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 urgently implemented.	· 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 should be strongly 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 Depto (both are now projected), can catch up with increasing container demand up to the year 2000. After that, offshore port extension for MICT's new container terminals is required. · Promotion of comprehensive measures for further containerization at the South Harbor, especially in terms of cargo handling operation, should be carried out. · 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. · Further development of Cavite's EPZ and highway extension to Rosario would accelerate a new port construction.	· 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. · 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.	· 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. · Further development of Cavite's EPZ and highway extension to Rosario would 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.	· High potential to construct a large scale commercial port along the Naic coast according to natural and social conditions. · Potential for an international container port will increase when highway extension from Rosario/Cavite to Naic is implemented.	· 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 small number of container berths is not recommendable for economic reason. · 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. · Highway extension from Rosario/Cavite to Naic is urgently required.
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 agricultural and industrial production due 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.	· 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.	· 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 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.	· High potential to construct a large scale commercial port at Pagbilao from the viewpoint of land acquisition and provision of broad calm water area. · Sea water is shallow, -5m 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.	· High potential to construct a large scale commercial 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. · Small local port for the time being.	· 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 Eastern Luzon coast will mature from the long-term point of view.	· 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 Eastern Luzon coast will mature from the long-term point of view.