Chapter 6 Maritime Transport

6.1 Maritime Transport in the World

It can be said that we have entered the era of mass transportation and high operations /efficiency due to the introduction of large scaled container carriers, dry bulk carriers, liquid bulk carriers and quicker transportation.

Assuming that the current trend of vessel size enlargement will continue in the future, the projection of the future vessel size and loading ratio, the design size to be used for the Long Term Plan and Short Term Plan is shown in the Table 6.1.1.

Table 6.1.1 Future Average Vessel Size and Loading Ratio (DWT)

Commodity	Loading %	2009	2024
Foreign Trade / Container Vessel			
Container Carrier	80%	35,000	48,000
Foreign Trade / Conventional Cargo Vessel			
Rice	70%	20,000	20,000
Cement	70%	10,000	10,000
Bulk / Fertilizer	70%	10,000	10,000
Soya Bean	70%	38,000	45,000
Heavy Equipment Lo/Lo and Ro/Ro	20%	7,000	7,000
Construction Material	70%	7,000	7,000
Petroleum Product	60%	45,000	45,000
General Cargo	70%	7,000	7,000
Domestic Trade / Conventional Cargo Vessel			
Fertilizer	70%	3,000	3,000
Heavy Equipment	70%	2,500	2,500
Petroleum Product	90%	1,000	1,000

Source: Ocean Consultant Ltd

6.1.1 Container Transport

After more than decades of dynamic expansion, the world container port market shows no signs of slowing down. Prospects for the coming decade continue to be buoyant. Having turned the corner of the Asian crisis, world container port demand increased by a healthy 10% in 2000, led by ports in the South East Asia region and North East Asia region, where throughput increased by 15%.

Table 6.1.2 World Container Movements

Year	Total Movement	Growth %
1995	134,999,519 TEUs	---
1996	150,752,556 TEUs	+ 11.67 %
1997	160,744,214 TEUs	+ 6.62 %
1998	188,243,755 TEUs	+ 17.10 %
1999	203,206,998 TEUs	+ 7.95 %
2000	231,689,444 TEUs	+ 14.01 %
2001	243,093,406 TEUs	+ 4.92 %
2002	*252,817,984 TEUs	+ 4.00 %
2005	*298,990,000 TEUs	+ 9.40 %
2009	*343,838,000 TEUs	+ 14.99 %
2024	*554,342,000 TEUs	+ 61.22 %

Note: * Estimated figures include transshipment container

Source: Containerization International and JICA Study Team

(1) Transpacific Transport Container Flow

Traffic in the major East-West container trade has continued to grow in 2002, lending weight to the view that the overall global economy is on the road to recovery. However, the exceptional growth in the US during the first half of the year still needs to be treated with caution.

Table 6.1.3 Estimated Transpacific Container Throughput Flow by TEU

Year	Asia → US (Export)	US → Asia (Import)
2002	47,078,000	23,890,000
2005	51,435,000	28,932,000
2009	55,372,000	45,304,000
2024	105,183,000	50,237,000

Note: Includes transshipment container

Source: Japan Maritime Industry Institute & JICA Study Team

(2) North East / South East Asia to Europe Trade Container Flow

According to the Far East Freight Conference, which controls approximately 65% of the market between Asia and Europe, the world's second largest container trade service line, traffic in the

dominant west-bound (export) trade from Asia to Europe increased by roughly 6%. In the lesser east-bound (import) trade, FEFC (Far East Freight Conference) traffic from Europe increased by approximately 2.4%, thanks to a mammoth 17.5% increase from the Mediterranean. WEFA(West Europe Freight Agreement) is forecast to increase by 3.4%.

Table 6.1.4 Far East to Europe Continental Container Throughput by TEU

Year	Asia→Europe (Export)	Europe→Asia (Import)
2002	25,856,000	14,544,000
2005	30,741,000	18,054,000
2009	32,232,000	18,930,000
2024	52,791,000	32,356,000

Note: Includes transshipment container

Source: Japan Maritime Industry Institute & JICA Study Team

(3) Transshipment Container in the World

Shipping lines are making increasing use of transshipment containers to offer global service and increase service frequency. Transshipment refers to the movement of containers to main Hub ports or ports handling transshipment container and the subsequent transfer of the container to a feeder or direct call vessel.

Transshipment container covers the less frequently referred to patterns of relaying and cross feeder of which a brief explanation is required. The need for carriers to rationalize the number of port calls by vessels on given routes, and the deployment of increasingly larger vessels which makes a reduction in the number of port calls on a particular service possible, has led to a steep increase in the proportion of containers being transshipped via feeder service networks (see Table 6.1.5).

Therefore competition among mega container terminal operators has been getting severe (refer to Appendix Table A6.1.1 and A6.1.2).

The disadvantage of transshipment container is the cost and transit time. Shippers generally prefer to transport their cargo directly, especially where it is time sensitive. To offset the time loss, carriers have to minimize loading and discharging visits, thereby increasing throughput at the hubs that are called at.

The larger vessels that are used to maximize economies of scale represent very costly investment for container carriers. Revenue can be maximized and costs minimized by limiting the number of port

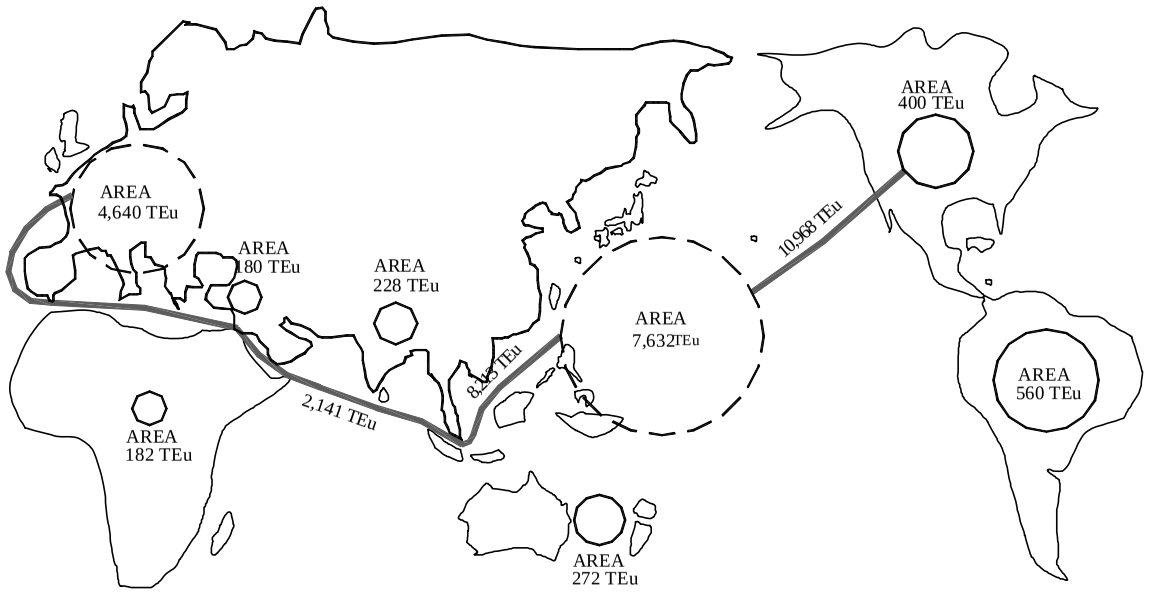
calls and maximizing the total number of sailings per year.

The main factor for a container carrier when selecting a hub port with respect to the main axial East West trades and either hinterland or feeder service connections is location. For effective global operations it is essential that feeder / hinterland services on the North and South container route are integrated with the East and West trades. To ensure that this happens, most of the larger container carriers operate their own feeder services, have access to business partners networks or establish long term contracts with third party feeder service providers.

Table 6.1.5 World Major Transshipment Container Handling by Port (2002 December)

Transshipment Ports	Throughput 2002	%	Transshipment Container
Singapore	16,800,000TEUs	83 %	13,944,000 TEUs
Busan (Korea)	9,436,307TEUs	38 %	3,585.790 TEUs
Dubai (UAE)	4,194,264TEUs	70 %	2,935,980 TEUs
Kaohsiung (Taiwan)	8,493,000TEUs	33 %	2,802,690 TEUs
Tanjung Pelepas	2,660,000TEUs	95 %	2,527,000 TEUs
Gioia Tauro (Italy)	2,954,571TEUs	85 %	2,511,380 TEUs
Rotterdam	6,500,000TEUs	32 %	2,080,000 TEUs
Algeciras (Spain)	2,229,141TEUs	78 %	1,738,730 TEUs
Manzanillo (Panama)	*2,170,526TEUs	74 %	1,606,000 TEUs
Colombo (Sri Lanka)	*1,730,000TEUs	80 %	1,384,000 TEUs
Salalah (Oman)	*1,187,753TEUs	97 %	1,152,000 TEUs
Marsaxlokk (Malta)	*1,165,070TEUs	75 %	873,000 TEUs

Source: JICA Study Team



LEGEND:

4,640 ~ 7,632 TEus

180 ~ 560 TEus

2002 main route movement(TEus)

EAST/WEST MAIN ROUTE MOVEMENT ('000 TEu)

	2002	2010	2024
ASIA-USA	10,968	22,452	56,724
ASIA-EUROPE	8,213	11,605	21,374
S.ASIA-EUROPE	2,141	21,374	5,559

Figure 6.1.1 Outline of Container Trade Movement 2002 (Source: JICA Study Team)

6.1.2 Dry Bulk Cargo Transport

Major items of dry bulk cargo are iron ore, coal and grain, and minor bulk cargo includes steel products, forest products and agricultural products including rice, oilseeds, sugar, etc.

The demand outlook for the short term is improving. Global steel production is expected to grow to the end of year. Although 2002 is likely to be down compared to 2001, the rate of growth in production will pick up by the second half of 2002. Inevitably this will effect on trade in iron ore. Whilst Chinese ore charters have been almost the only ones doing business over the last 6 to 12 months, the expectation is that Japan will start to import more ore as the year ends. The year 2003 will show the beginnings of sustained demand growth in this sector.

Total coal trade by sea transport in 2001 reached 561 million tons, up over 7% in 2000. In the coal trade volume, coking coal rose from half a million tons to 179.5 million tons and steam coal by almost 15 million tons to 381.8 million tons. Global coal consumption, according to the International Energy Outlook 2002, is projected to grow at an average annual rate of 1.7% to 2010. However there is considerable variation among regions. In particular China and India are projected to increase coal use substantially. Almost 65% of global coal consumption is used for power generation and this accounts for most of the projected growth. Coking and steam coal are handled separately because their quality is quite different.

Grain trade has been weak this year but again prospects are better in the medium term. At the end of July the International Grain council revised its forecast for grain trade for 2002 / 2003 season to 209 million tons. This is down from the 2001 / 2002 estimate of 214 million tons by 2.3%. Within the total figure, forecast wheat trade is 103.2 million tons, down from last season's estimate of 106.9 million tons. Total coarse grain trade is forecast at 105.8 million tons, down from last seasons estimate of 107.1 million tons.

Dry bulk cargo carried by sea transport by commodity is given in the following Table 6.1.6. And an outline of major dry bulk cargo commodities is described in the Appendix 6.1.3.

Table 6.1.6 Transport Dry Bulk Cargo Trade

(Unit: million tons)

Commodity	2002	2003	2004	2005	2006	2007	2009	2024
Grain	217.9	219.0	222.3	226.8	231.3	235.7	244.5	290.7
Rice	25.2	25.5	25.7	26.0	26.2	26.5	27.1	30.3
Soybean	34.9	35.9	36.9	37.9	38.3	38.7	39.5	41.6
Oilseed	14.9	15.4	15.8	16.2	16.4	16.6	17.0	19.1
Sugar	26.0	26.3	26.6	26.8	27.1	27.4	28.0	31.1
Tapioca	6.8	6.9	7.0	7.1	7.2	7.3	7.5	8.3
Forest Product	179.5	182.2	184.9	187.7	190.5	192.6	196.8	216.7
Fertilizer	53.5	54.3	55.1	56.0	56.5	57.1	55.9	65.4
Phosphate rock	27.9	27.8	27.3	27.1	26.8	26.5	26.9	29.0
Potash	14.5	14.6	14.8	14.9	15.0	15.2	15.8	16.0
Sulfur	11.1	11.3	11.4	11.5	11.6	11.7	11.9	13.0
Steam Coal	395.2	403.1	411.2	419.4	427.8	436.3	461.8	557.4
Coking Coal	180.4	181.3	182.2	183.1	184.0	185.0	187.4	200.0
Iron Ore	442.7	451.6	469.6	507.5	505.5	503.5	506.5	530.0
Manganese Ore	5.4	5.5	5.7	6.1	6.6	6.7	6.8	7.3
Nickel Ore	3.4	3.4	3.6	3.9	4.2	4.2	4.3	5.3
Chrome Ore	3.3	3.3	3.5	3.8	4.1	4.1	4.2	5.3
Metal Concentrate	8.6	8.7	9.1	9.8	10.6	10.7	11.0	13.3
Gypsum	11.8	11.9	12.0	12.1	12.3	12.4	12.6	13.7
Salt	21.6	22.0	22.5	22.9	23.4	25.5	29.7	31.2
Bauxite	29.1	29.7	30.9	33.4	33.7	34.1	34.3	87.8
Alumina	22.0	22.5	23.4	25.3	25.2	25.7	26.3	29.4
Scrap	30.1	30.7	31.6	33.0	32.9	33.6	35.0	42.4
Steel Product	186.0	190.0	195.5	203.9	203.3	207.4	215.6	258.7
Cement	38.3	39.3	40.0	40.8	41.7	42.5	44.1	52.5
Pet-coke	27.7	28.1	28.5	29.0	29.4	29.8	30.6	31.6
Miscellaneous	74.1	75.5	77.1	78.6	80.2	81.8	85.0	101.8
Total	2,091.8	2,125.6	2,174.1	2,250.5	2,271.7	2,298.5	2,366.1	2,729.2
Increased (%)	1.31%	1.62%	2.28%	3.51%	0.94%	1.18%	2.94%	15.30%

Source: Drewry Shipping Consultant Ltd and JICA Study Team

6.1.3 Liquid Bulk Cargo Transport (Crude oil and Products)

World oil consumption rose by 2.2% in 2000, with modest growth witnessed across North America (2.6%) and OECD Europe (1.3%). In contrast, oil demand across Latin America grew by just under

5%. Liquid bulk carrier by type of vessels is shown in Table 6.1.7.

Table 6.1.7 Liquid Bulk Carrier

Type of vessel	Vessel size
Ultra Large Crude oil Carrier= ULCC	GRT 240,000tons / DWT 485,000tons by Crude Oil
Very Large Crude oil Carrier= VLCC	GRT 160,000tons / DWT300,000 tons by Crude Oil (Malacca Max)
AFRA-max Type Tanker	GRT 58,000 tons / DWT 110,000 tons by Crude Oil
Suez Max Type Tanker	GRT 79,000 tons / DWT 150,000 tons by Crude Oil
Product Tanker	GRT 45,000 tons / DWT around 80,000 tons by products oil
Medium Size Product Tanker	GRT 30,000～35,000 tons / DWT around 40,000～5,000 tons products liquid cargo
Handy / Handy Max type Tanker	GRT 10,000～30,000 tons / DWT 20,000～40,000 tons products liquid cargo
Small Type Tanker (Domestic Coastal Tanker)	GRT 5,000～10,000 tons / DWT 8,000～20,000 tons Crude oil and products oil

Currently there are only a small number of oil refineries in South East Asia. Development sites for new refineries should take into consideration the need to reduce domestic transportation costs, as energy consumption is expected to grow in the near future.

As estimated transportation amount of crude oil is heavily influenced by politics, it is difficult to estimate the long-term amount. However, according to Oil and Energy Trade Report, the estimation within the Asian territory until 2024 is as follows.

Table 6.1.8 South & East Asia Crude Oil & Products Trade to 2024

(Unit: thousand barrel/day)

Mode / Year	Imports		Exports	
	Crude Oil	Products	Crude Oil	Products
2000	12,790	4,365	2,155	3,072
2005	15,585	6,043	1,670	3,175
2010	18,645	8,365	1,445	2,915
2015	21,705	10,687	1,220	2,655
2024	27,825	15,331	770	2,135

Source: Ocean Shipping Consultants Ltd and JICA Study Team

Table 6.1.9 South East Asia Demand of Crude Oil

(Unit: b/d= barrel/day)

Ports	Total Consumption			Volume Increase/Yr		Average Growth/Yr	
	1999	2005	2010	'99～'05	'05～'10	'99～'05	'05～'10
China	396	520	625	124	106	4.7%	3.8%
Hong Kong	29	33	37	4	4	2.3%	2.2%
Taiwan	96	106	117	10	12	1.6%	2.1%
Korea	213	247	277	34	30	2.5%	2.3%
Singapore	75	78	85	3	7	0.7%	1.7%
Brunei	1	1	1	0	0	2.8%	2.9%
Indonesia	94	118	142	23	24	3.7%	3.8%
Malaysia	38	52	65	14	14	5.2%	4.8%
Philippine	*36*	*52*	*65*	*14*	*14*	*5.2%*	*2.3%*
Thailand	66	70	83	4	14	1.0%	3.6%
Vietnam	15	22	30	6	9	5.9%	6.8%
Total	1,058	1,283	1,515	226	232	3.3%	3.4%

Source: International Energy Association / Oil and Energy Trends Report

6.2 Maritime Transport in the Philippines

6.2.1 Intra Asia Container Transport

Since the mid 1980s, intra Asia container trade has boomed. Trades between Japan and the rest of NIES countries were growing most rapidly during the latter 1980s, as Japan relocated its manufacturing capacity and imported the products of the relocated factories. By the late 1980s, intra south East Asian trade had become the major boom area, with nearly all the traffic carrying to/from Singapore and Taiwan ports.

The early 1990s saw the emergence of China as a significant presence in the East Asia container trades. There was extremely rapid growth in the China - Japan/Korea and the China - Hong Kong trades in particular. Since the mid 1990s, more direct services between and South East Asia been established, as well as between China and Taiwan.

Traffic between Japan and Korea has also increased substantially over the previous decade, as carriers have used Busan to transship Japan and North East China cargoes. As Korea has become a center of transshipment for North East China as well as emulating Japan in exporting manufacturing capacity to other East Asia countries with lower labor costs, so its shipping links to the whole region have also expanded.

As a consequence, intra Asia container shipping capacity rocked during the late 1980s and most of the 1990s. The Asia financial crisis brought about a rationalization of service and fleets, but trade and capacity have both continued to increase strongly overall, albeit at a somewhat less dramatic pace. During this time, a number of regional operators have emerged, some of them subsequently entering the world trades too. Recently, China Shipping has provided the most striking example of this expansion.

(1) Overview of Container Transport in the South East Asia

Recent container transportation can be called the era of mass transportation because of large scaled vessels and quicker transportation. Therefore more efficient operation is necessary for the calling ports.

Calling ports are limited based on the conditions set forth above. Generally, calling ports are classified into two categories; one is a port which can handle larger amount of containers in a short time as well as can be adaptable to reduced port stay time; the other is a rather small port which is dealing with feeder service routes.

In the case where shipper and consignee designates a certain port as a congeries port, the distance to the port should be close and the transportation fee on land should be inexpensive.

Container transportation in the South East Asia region is developing around the following International Mega container ports. These port development projects are carried out as national projects in order to respond to the era of mass transportation.

- Singapore (Singapore)
- Hong Kong (China)
- Shanghai (China)
- Kaoshiung (Taiwan)
- Tanjung Pelepas (Malaysia)
- Busan (Korea)

Table 6.2.1 Intra Asia Trades Forecast Container Shipping Supply and Demand to 2024

(Units: thousand TEUs)

Year	Slots Deployed	Trade Volume	Capacity Utilization %
2000	41,688.0	31,349.4	75.2 %
2001	45.572.8	33,632.7	73.8 %
2002	49,139.1	36,805.2	74.9 %
2005	60,868.2	46,746.8	76.8 %
2010	76,164.8	58,861.6	77.3 %
2015	88,402.1	70,976.4	80.3 %
2020	100,640.3	81,090.4	80.5 %
2024	107,983.5	85,147.3	78.9 %

Source: Ocean Shipping Consultant and JICA Study Team

(2) Demand of Container Transport in the South East Asia Region

In South East Asia, aggregate container port throughput is forecast to increase by 45.4%-66.7% to 35.72 -59.55 million TEUs over 2000 - 2005. All markets are expected to partake in the rapid expansion.

Singapore will remain the principal regional International Hub port, but with growth of 30% - 45% forecast until 2005, its share of the regional market is set to decline from 47.1% in 2000 to 38.7% - 39.1% in 2005. Further decreases in share to 34.3%-34.9% in 2010 and 24.9%-23.0% in 2024 are anticipated.

Import/Export growth and an emerging presence in the regional transshipment market, based on the new port at "Tanjung Pelepas", are the foundation for forecast growth of 146%-171% in Malaysia container throughput to 10.08-11.07 Million TEU over 2000-2005. As well as other traffic, Tanjung Pelelpas is expected to gain 2 million TEU/year, representing the transfer of Maersk Sealand's and Evergreen lines transshipment container from Singapore and West Port Kelang, by 2001-2002. Further increases are likely to follow the pace of capacity expansion. Indonesia could also enter the transshipment sector during the coming decade, if ambitions for a transshipment hub port are realized.

The forecasts presented here are based on GDP expansion producing continuing growth in import/export volumes and facilitated by investment and efficiency improvements flowing from the recent privatization of the principal container terminals. Over 2000-2005, expansion of 54.5%-79.1% to 7.91-9.17 million TEU is anticipated.

Despite typically lower GDP and export growth than the other South East Asia nations, **the**

Philippines is nevertheless expected to see container port throughput growth of 48.9%-66.6% over 2000-2005 to 5.30-5.93 million TEU. Its achievement will depend on the level of investment in port facilities, even if the country's ambitions for regional hub port development do not materialize.

The recovery of the Thailand economy is expected to herald renewed strong import/ export growth and a 5.92-6.44 million TEU over 2000-2005. Planned capacity increases are likely to be completely utilized within a short period. Other countries with growing container port demand include Vietnam, Myanmar and Brunei. Expansion is rather tentatively forecast at 115.6%-176.6% to 3.04-3.9 million TEU over 2000-2005.

Table 6.2.2 Forecast South East Asia Region Container Throughput (Unit: million TEU)

Year/Port	2000	2003	2005	2009	2015	2020	2024
Case-I (High Scenario)							
Singapore	16.82	19.86	23.05	29.48	35.89	43.67	48.56
Malaysia	5.28	8.70	11.07	16.46	22.36	30.36	38.86
Indonesia	5.12	7.26	9.17	13.08	18.67	24.26	28.73
Philippines	*3.56*	*4.83*	*5.93*	*9.35*	*14.76*	*20.17*	*24.50*
Thailand	3.54	5.07	6.44	11.00	16.67	22.32	25.49
Other Countries	1.41	2.61	3.90	6.69	9.84	14.41	19.42
Total	35.72	48.51	59.55	86.07	118.20	155.19	185.56
Case-II (Low Scenario)							
Singapore	16.82	18.60	20.68	25.63	30.21	35.58	40.20
Malaysia	5.28	8.34	10.08	14.45	18.89	24.68	30.71
Indonesia	5.12	6.64	7.91	10.83	14.80	20.21	26.27
Philippines	*3.56*	*4.52*	*5.30*	*7.83*	*11.57*	*17.20*	*23.43*
Thailand	3.54	4.83	5.92	9.87	14.57	19.27	23.51
Other Countries	1.41	2.23	3.04	4.91	6.81	9.51	12.42
Total	35.72	45.16	52.93	73.52	96.86	126.45	156.54

Source: Ocean shipping Consultant and JICA Study Team

6.2.2 Container Transport from/to Philippines

(1) General

While traffic in the world's largest trade route, from South East Asia including China to North America, is established to have grown by an astonishing 12% last year, more modest increase of 4.6% is predicted for the next three years respectively. As shown in the accompanying Table 6.2.3,

the brunt of this will come from North East Asia including China

Total container volume in the Asian region reached 78.9 million TEUs in 2002, and more and more container carriers are investing in larger capacity container vessels that will be employed on the East/West main container trade route and feeder trade routes (see Table 6.2.3).

Table 6.2.3 North America and South East Asia Trade in TEUs

Mode	Export	Import	Total
Year	SE Asia to N. America	N. America to SE Asia	TEUs
2001	1,171,000	640,000	1,811,000
2002	1,295,000	647,000	1,942,000
2003	1,338,000	677,000	2,015,000
2004	1,416,000	706,000	2,122,000
2005	1,486,000	737,000	2,223,000
2009	1,874,000	841,000	2,715,000
2024	3,116,000	2,417,000	5,533,000

Note: S/E Asia = Singapore, Philippine, Malaysia, Indonesia, Thailand, and Vietnam

Source: Containerization International & JICA Study Team

Among the containers for foreign trade to and from Philippines Port, approximately 40% are for trade within the Asian territory. It is estimated that trade within the Asian territory would become active and increase in the future if a free trade zone in the Asian territory is established.

Table 6.2.4 Future Demand Container in the Intra Asia Region from / to Philippines

(From 2001 to 2024 by TEU)

	2001	2005	2009	2015	2020	2024
Singapore	32,694	77,428	119,243	160,979	212,485	297,486
Taiwan	67,668	164,386	253,161	341,771	451,122	631,585
Hong Kong	58,722	135,797	209,133	283,332	372,666	521,744
China	31,498	167,223	243,630	324,903	462,564	647,603
Indonesia	27,242	65,516	100,898	136,213	179,795	251,719
Malaysia	31,900	72,663	111,905	151,073	199,409	279,179
Thailand	29,482	63,134	97,229	131,260	173,257	242,565
Vietnam	11,160	22,633	34,856	47,055	62,111	86,957
Japan	191,042	328,316	519,523	750,363	897,340	1,256,302
Korea	38,292	79,810	122,912	165,932	219,023	306,639
Other Countries	6,916	14,294	22,014	29,719	39,228	54,920
Total Throughput	526,616	1,191,200	1,834,504	2,522,600	3,269,000	4,576,699

Source: Basic Data IADA (Intra Asia Discussion Agreement) and JICA Study Team

It is estimated that about 526,600 TEUs moved in the Intra Asia Region from/to Philippines port. Top three trade partners of Philippines are; Japan, Taiwan and Hong Kong. The total trade container volume of the top three countries is 317,400 TEUs which represents about 60% of the Asian total.

(2) International Container Freight Rate

Pricing of international container freight rate is, in most cases, set based on not the distance of the transportation, but on the amount of cargoes for round trip. Current freight prices in the main ports in the Manila area are as follows.

1) International Container Freight rate in East / West Main Container Route

The freight rates mentioned below are all in other surcharges e.g. CAFs, BAFs, THC etc, plus inland haulage. Relevant details are shown in Table 6.2.5 and Appendix. THC (terminal Handling Charge) or CHC (Container Handling Charge) rates are given in Table A6.2.1.

Table 6.2.5 East and West Main Container Trade Route Standard Ocean Freight Rate by TEU (2003 March)

Main Service Route	2002 3rd Quarter	2002 4th Quarter
Asia – US East Bound	US $ 1,490.00	US $ 1,520.00
US – Asia West Bound	US $ 764.00	US $ 764.00
Europe – Asia East Bound	US $ 710.00	US $ 712.00
Asia – Europe West Bound	US $ 1,250.00	US $ 1,304.00

CAF=Currency Adjustment Factor / BAF=Bunker Adjustment Factor

THC=Terminal Handling Charge

Source: Selected Ocean Container Carrier by Hearing and JICA Study Term

2) General container freight rate per container, from Manila to surrounding international container port on July 2003, is shown in Table 6.2.6.

(3) Container Handling in the Philippines

International container accounted for 65.6 % of all container throughput at the port of Manila in 2002 and the port of Manila handled over 85 % of nationwide international container traffic, although other major domestic ports such as Cebu, Iloilo, Cagayan De Oro, Davao and General Santos ports are also served by feeder vessels. In the Philippines, the aggregate container port throughput increased by 32.4 % to 3.10 million TEUs in 1998 and over 3.80 million TEUs in 2002. All markets

are expected to partake in this rapid expansion.

Table 6.2.6 General Container Freight Rate per Container from / to Philippines = Manila

(Unit: US $)

Country	Port of Destination	Export From Philippines Port	
		20' Dry Box	40' Dry Box
Taiwan	Kaohsuing	60.00	120.00
	Keelung	80.00	160.00
China	Hong Kong	80.00	160.00
	Shanghai	350.00	550.00
Korea	Busan	200.00	350.00
Indonesia	Jakarta	200.00	350.00
Malaysia	Port Kelang	250.00	350.00
Singapore	Singapore	80.00	160.00
Thailand	Bangkok	150.00	350.00
Vietnam	Ho Chi Ming	300.00	600.00
Japan	Base Port	550.00	800.00

FAF = (Fuel Adjustment Factor) 20' x US$ 25 / 40' x US$50 per Box

Document Fee= US$ 20 per Bill of Lading

Source: Conference Members shipping Agent by Hearing

6.2.3 International Major Container Terminal in the South East Asia Region

(1) International Hub Port

Requirement of a transshipment hub port, the crux of the mega container carrier's twin strategies of transshipment and deploying over Panamax type vessel on the mainline trades is location. With respect to carrier operations the most favorable location for transshipment ports is close to trunk routes where deviation is kept to a minimum, allowing for as short a transit time as possible.

To be recognized as an international hub port upon east/west main service route, a port should be attractive for the over Panamax vessels whose capacity is more than 6,000 TEUs.

South East and North East Asia region container liner service network are shown in Figure: 6.2.1 and 6.2.2.

In choosing hubs, carriers have been presented with two options:

1) To Select Established Ports Already Handling Large Transshipment Volumes

Generally, the basic condition for container vessels to call at a port is to be able to get enough freight charges to offset the cost necessary for calling at a port.

Other criteria are listed below.

a) Enough cargo volume to offset the various cost incurred by calling at the port
b) Proximity to the container service route (The time and days necessary to call at the port must come within the scope of 1 trip in order to maintain the weekly service of the service route which the line is using.)
c) Attractive transit time for shipping
d) Maintaining standard service level even though competing with other lines
e) Efficient arrival and departure system to minimize vessel waiting off shore (24-hours service)
f) Frequent feeder service network (Completed land transportation and feeder vessel, barge and rail network)
g) Lower port service dues and container handling charge (Lower total cost)
h) Efficient terminal facilities and punctual vessel schedule
i) Completed computer system and EDI system etc.

The advantages and disadvantages of this option are summarized below.

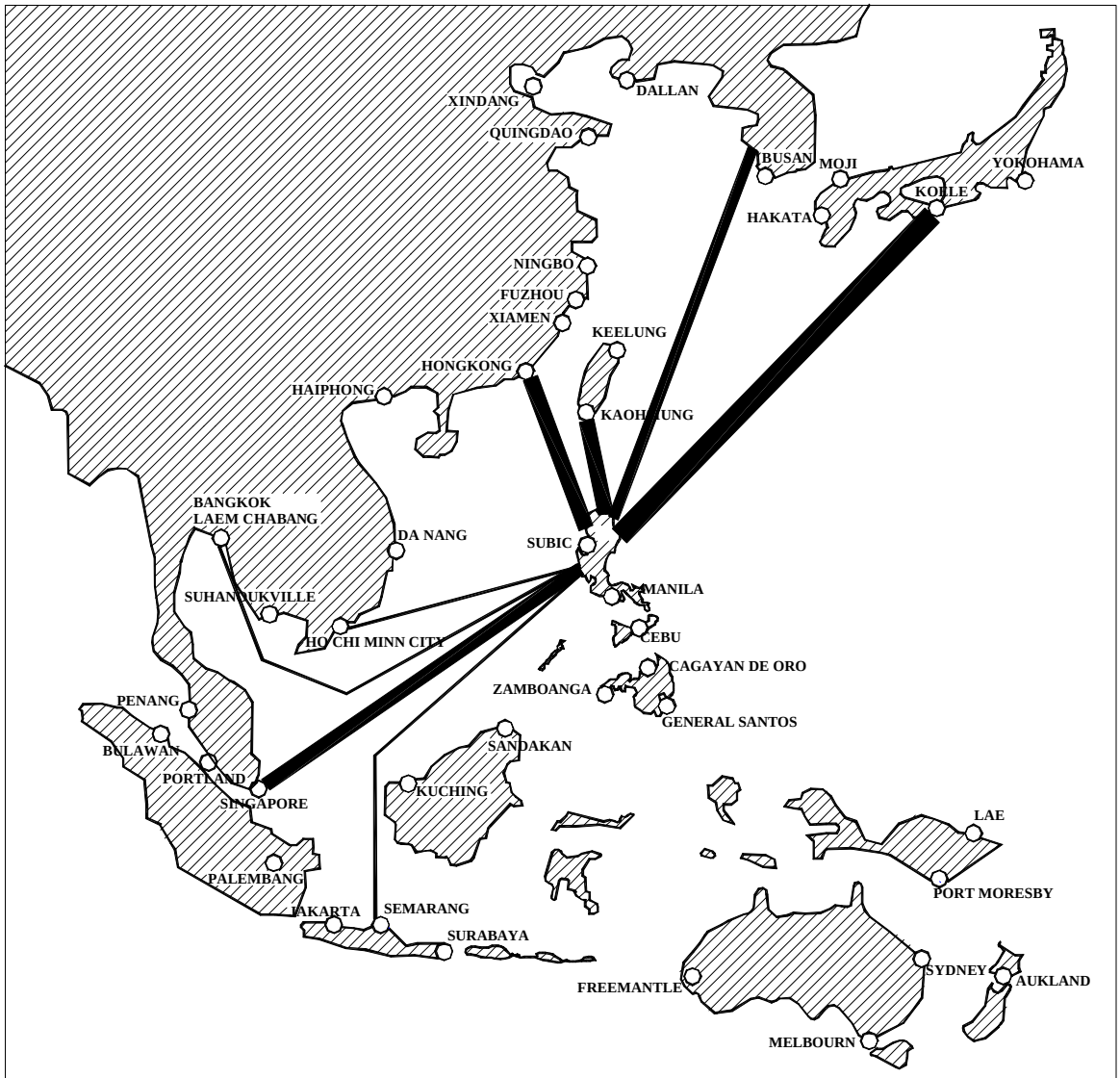
Advantages:

a) They are located near to large industrial/consumer markets, which account for large volumes of export and import traffic.
b) They are linked either directly to hinterland by an established road and/or network, as in the USA and Western Europe, or to other ports by a comprehensive feeder network, as in South East Asia.
c) They generally have the experience, efficiency and handling facilities to be able to handle transshipment containers

Disadvantages:

a) They may have widespread problem with over capacity arising from increasing container traffic levels and geographical constrictions; this in turn puts pressure on handling.
b) Port operations may be governed according to local customs and practices because labor arrangements usually have evolved over decades. This makes change difficult.
c) The waters in the approach channels and in the berths are generally not deep enough for over Panamax vessels with 14 meter drafts.
d) As most major established ports are on the continents, they sometimes deviate from the mainline trunk route.

SOUTH-EAST ASIA AND NORTH-EAST ASIA CONTAINER MOVEMENT (2001)



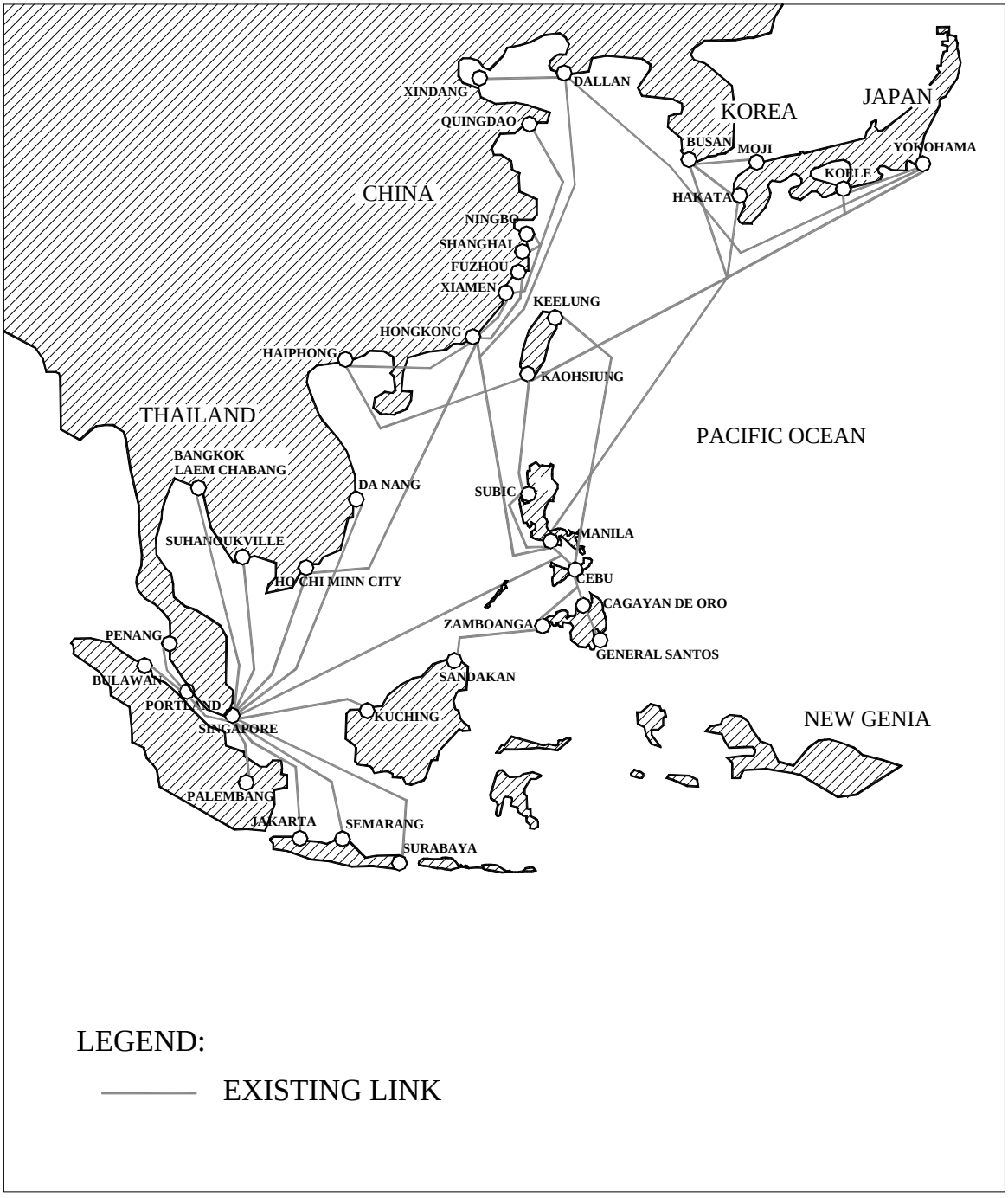
INT

COUNTRY	TEUs	%	COUNTRY	TEUs	%
JAPAN	191,042	36.3 %	MALAYSIA	31,900	6.1 %
CHINA/H.K	90,220	17.4 %	THAILAND	29,482	5.7 %
TAIWAN	67,668	13.1 %	INDONESIA	18,200	3.5 %
KOREA	38,292	7.4 %	VIETNAM	11,160	2.2 %
SINGAPORE	32,694	6.4 %	OTHER	6,916	1.4 %

FIGURE 6.2.1

Figure 6.2.1 South East and North East Asia Container Movement (2001)

SOUTH-EAST ASIA AND NORTH-EAST ASIA CONTAINER LINERSERVICE NETWORK



Source: JICA Study Team

FIGURE 6.2.2

Figure 6.2.2 Asian Container Transport Network

2) To Develop a New Port

The second approach is that carriers themselves, or terminal operating partners set up specialist hubs on principal routes, sometimes in conjunction with government bodies.

However, in the developing regions of Malaysia, South East Asia and South China, there are few

established ports which are suitable for hubs, principally due to disadvantageous locations. Some major carriers and global port management groups have attempted to develop hub ports but they have not succeeded since most projects were undertaken at small ports which handled little or no transshipment traffic.

3) Possibility of Manila Port as International Hub Port

Manila port is the largest port in the Philippines and it handles about 3 million TEUs per year. Is it possible for Manila port to be an international container hub port? The port of Manila has some problems such as shallow water depth and restriction of expansion area. However the largest problem is deviation from main container service routes. Deviations from east / west main service routes to Manila ports are rather large, as shown in Table 6.2.7. Almost one additional day is required for a container vessel going on a main service route to call at Manila port. This is a burden for shipping companies and thus it would be difficult for Manila port to be an international hub port.

Table 6.2.7 Comparison Distance with South East Asia Main Container Ports (Unit: Nautical mile)

Between Port and Port	Direct	*Via Manila*	Via Vietnam(s)
Kaohsiung / Singapore	1,611'	*1,877'*	1,749'
Deviation miles (differ)	0'	*138'*	266'
Hong Kong / Singapore	1,428'	*1,963'*	1,555'
Deviation miles (differ)	0'	*535'*	127'
Tokyo / Singapore	2,918'	*3,116'*	2,993'
Deviation miles (differ)	0'	*198'*	75'

Source: JICA Study Team

(2) International Container Gateway Ports

International container gateway ports are the main entrances for international container transport. In the Philippines, Manila port now plays this role and most of international containers are handled in Manila port. It is expected that not only Subic and Batangas but also Cebu, Cagayan de Oro and Davao will have the same role in the near future.

From the shipping company's point of view, fewer gateway ports are more desirable. But shippers want more gateway ports because it is more convenient for them. The number of international container gateway ports is decided based on the container volume, geographical distribution of ports, shipping company's intention, etc.

The conditions to be an international container gateway port are as follows:

a) Fast and smooth container maneuvering system at the container terminal, using EDI and automation.
b) Simple procedures upon arrival and departure in/from a port.
c) 24-hour operation throughout a year in a port.
d) Lower rate of cost and charges for cargo operation, and good service.
e) Efficient mutual system between container terminal and land transportation (including railway and inland barge transportation).
f) Convenient monitoring to the final destination.
g) Preparation of various institutions and facilities for the inspection of exporting / importing cargoes.
h) Smooth connection among port administrator, Customs bureau, and port client (including Immigration office and other Public Authorities).

6.2.4 Port-related Costs in the Intra Asia

(1) Logistic Costs for Export and Import.

Logistic costs for export and import are composed of truck-age, customs clearance, THC or CHC and miscellaneous charges. Comparison of logistic costs among main competing countries is shown in Table 6.2.8 and 6.2.9. In the Philippines, Arrastre charge is needed in addition to wharfage.

Philippine logistic cost is moderate. It is cheaper than that of Kaohsiung, Hong Kong, Jakarta and Tokyo/Yokohama but is more expensive than Singapore, Bangkok and Haiphong.

(2) Port Charge

Port charges in the Asian ports which are in competition with Philippine port are shown in the Appendix (Table A6.2.3/4/5). Philippine port charges are relatively competitive and are cheaper than most Asian ports. Only Hong Kong port is cheaper than Manila and Cebu ports.

Table 6.2.8 Logistic Cost for Export (Exchange Rate on July 31 2003)

Port (Country)	Transport Fee (30Km Round)	Customs Clearance Fee	THC or CHC	Miscellaneous Charge	Total Amount by Local Price	Exchange for US $
Kaohsiung (Taiwan)	20' x NT$5,500	NT$ 4,500 (Since 2nd NT$ 1,500)	20'xNT$ 5,600	*Document Fee NT$ 650 per B/L	20'=NT$ 16,250	US$ 465.70
	40' x NT$5,500		40'xNT$ 7,000		40'=NT$17,650	US$ 505.80
Hong Kong (China)	20' x HK$1,370	C/Broker Fee HK$ 200-300 Per B/L	20'xHK$ 1,800	Document Fee HK$ 115 per B/L *EDI Charge HK$ 12.90/Entry *FOB Shipm't Value 0.05% /Invo	20'=HK$ 3,697.90	US$ 470.50
	40'x HK$1,640		40'xHK$ 2,650		40'=HK$ 4,717.90	US$ 616.00
Singapore	20' x SP$ 150	SP$ 50.0 Per B/L	20'x SP$ 182	*Documentation Fee SP$ 30.0 Per B/L	20'=SP$ 412.00	US$ 239.30
	40' x SP$ 200		40'x SP$ 270		40'=SP$ 550.00	US$ 319.40
Bangkok (Thailand)	20'x Bht 5,000	20'-Bht 4,000-5,000	20'xBht 2,600	*Docu,/ Fee Bht 500 Per B/L	20'=Bht 14,100.00	US$ 345.60
	40'x Bht 7,000	40'-Bht 5,00-6,000	40'xBht 3,900	*B/L Issuance Fee 300-1,000Per B/L	40'=Bht 18,40.00	US$ 451.10
Jakarta (Indonesia)	20'x US$ 100	US$ 130/Cont	20' x US$ 150.0	*Document, Fee US$ 30 per B/L	20'=US$ 410.00	US$ 410.00
	40'x US$ 100	US$ 200/ Cont	40' x US$ 230.0		40'= US$ 560.00	US$ 560.00
Hai-phong (Vietnam)	20' x US$ 65.0	20'x 117.0/Box	20'x US$ 57.00	Document, Fee VND 100,000	20'=US$239.00 VND 100,000	US$ 245.50
	40' x US$ 95.0	40'x 129.0/Box	40'x US$ 85.00		40'=US$ 309.00 VND100,000	US$ 315.50
Tokyo/Yokohama (Japan)	20 'x ¥ 29,970	¥ 5,900 Per B/L	20'x ¥ 11,000	Document, Fee ¥ 1,000 Per B/L *Document Handling Charge ¥ 15,000 per B/L	20'=¥ 62,870.00	US$ 531.50
	40' x ¥ 42,720		40'x ¥ 16,500		40'=¥ 81,120.00	US$ 685.70
Manila	20'x Ps 5,800	CIF Value (Ps 200,000 x 0.00125) = Av, Ps 5,300.0	20'x Ps 4,080	*Document Fee US$ 20 / B/L *Handling Fee Ps 1,000 per B/L *Arrastre 20' xPs2,074.60 40'x Ps4,764.10	20'=Ps 18,254.60 US$ 20.00	US$ 384.20
	40' x Ps 6,200		40'x Ps 5,100		40'=Ps 22,364.10 US$ 20.00	US$ 466.10

Table 6.2.9 Logistic Cost for Import (Exchange Rate on July 31, 2003)

Country or Port	Transport Fee (30Km Round)	Customs Clearance Fee	THC or CHC	Miscellaneous Charge	Total Amount Local Price	Exchange For US $
Kaohsiung (Taiwan)	20' x NT$ 5,500	C/Broker Fee Per D/o NT$1,200-1,500	20'x NT$ 5,600	*Document Fee NT$ 650 Per D/O	20'=NT$ 13,250	US$ 112.00
	40' x NT$5,500		40'x NT$ 7,000		40'=NT$ 14,650	US$ 123.90
Hong Kong (China)	20' x HK$ 1,370	C/Broker Fee Per D/O HK$ 200-250	20'x HK$ 1,800	*Document Fee HK$ 115 Per D/O *CIF Value x 0.035%/Invoice*	20'=HK$ 3,538.00	US$ 462.30
	40' x HK$ 1,640		40'x HK$ 2,650		40'=HK$ 4,655.00	US$ 608.70
Singapore	20' x SP $ 150	SP $ 50.00 Per D/O	20'x SP$ 182	*Exchange B/L to D/o Issuance SP$ 30.0 per D/O *Customs Stamping Fee SP$ 6.50	20'=SP$ 418.50	US$ 243.00
	40' x SP$ 200		40'x SP$ 270		40'=SP$ 556.50	US$ 323.20
Bangkok (Thailand)	20' x Bht 5,000	20' x Bht 6,000	20' x Bht 2,600	*Exchange B/L to D/O Issuance Fee per Value 200 - 1,000 Per D/O	20'=Bht 14,600.00	US$ 357.90
	40' x Bht 7,500	40' x Bht 7,500	40' x Bht 3,900		40'=Bht 19,900.00	US$ 357.90
Jakarta (Indonesia)	20' x US$ 100	20’ x US$ 130	20' x US$ 150.0	Document Fee US$ 30 Per D/O	20'= US$ 410.00	US$ 410.00
	40' x US$ 100	40’ x US$ 200	40' x US$ 230.0		40'= US$ 560.00	US$ 560.00
Hai-phong (Vietnam)	20' x US$ 65.0	20' x US$ 10.0	20' x US$ 57.00	Document Fee VND 50,000 Per D/O	20'=US$ 132.00 VDN 50,000	US$ 135.20
	40' x US$ 95.0	40' x US$ 15.0	40' x US$ 85.00		40'=US$ 195.00 VDN 50,000	US$ 198.20
Tokyo/Yokohama (Japan)	20' x ¥ 29,970	¥ 11,800 Per D/O	20' x ¥ 11,000	Document Fee ¥ 1,000 Per D/O *Document Handling Fee ¥ 15,000 per D/O	20'=¥ 68,770.00	US$ 581.30
	40' x ¥ 42,720		40' x ¥ 16,500		40'=¥ 87,020.00	US$ 735.60
Manila	20' x Ps 5,800	CIF Value (Ps 200,000x0.00125)	20' x Ps 4,080	*Document Fee US$ 20 Per D/O *Doce Hand'g Fee Ps1,000+VAT 10% *Arrastre 20' Ps 2,074.60 40’ Ps 4,764.10	20'=Ps 18,254.60 + US$ 20.00	US$ 384.20
	40’ x Ps 6,200		40’ x Ps 5,100		40’ x 22,364.10 + US$ 20.00	US$ 466.10

6.2.5 Domestic Container Transport by Vessel Type

(1) General

The volume of domestic containers in future will depend on whether international container gateway ports in Visayas and Mindanao will be established or not. The domestic container volume will be higher if these gateway ports are not established (without case) and lower if they are (with case). The reason for this is that foreign containers have to be imported to/exported from Manila port and transported to/from Visayas and Mindanao as domestic containers in the without case. The Study Team proposes that international container gateway ports be established in Visayas and Mindanao.

Domestic containers between major ports are transported by long distance RO/RO ferry vessels and conventional (LO/LO) container vessels. “Long distance” stands for an over-12-hours voyage. The ratio of container volume carried by RO/RO ferry vessels to that by conventional vessels is now about 6 to 4. It is forecast that this ratio will be almost equal (5:5) in 2024 in the with case. (However, in the without case the ratio will change drastically to 3 to 7.)

Conventional container vessels in the Philippines usually use deck cranes because quay cranes such as gantry cranes and mobile cranes have not been installed at major ports. PPA has a plan to install quay cranes at major ports until 2006 in response to requests from shipping companies.

The future domestic container volume is obtained from the demand forecast. As far as the required number of vessels in the future is concerned, at first the number of long distance RO/RO ferry vessels is forecast using the relation between the number of passengers and the container transport volume. Then the volume of container transported by conventional container vessels is balanced by subtracting the volume carried by RO/RO vessels from the total container volume.

(2) Forecast of RO/RO Ferry Vessel Demand

1) Present Capacity of RO/RO Ferry Vessel

Frequency of RO/RO ferry service from Manila to other cities (obtained through Inter-Island Shipping Schedule published by The Manila Bulletin) is used to calculate the present capacity of RO/RO ferry vessel. Average capacity of container and passenger of a vessel are assumed to be 150 TEUs and 1,050 persons per vessel (Occupation ration is 70%) per vessel respectively.

As a result, total frequency of RO/RO ferry vessel is 31 services per week or 1,612 services per year. Annual container transport volume is 483,600 TEUs and the number of annual passenger embarkation is 6,609,200 persons (see Table A6.2.6).

2) Forecast of Passenger and Containers by RO/RO Ferry Vessel

Most RO/RO type ferry vessels carrying passenger and containers have been supplied by Japan. In Japan, however, RO/RO type ferry vessels are almost exclusively used for cargo transportation. It is expected that, in the near future, supply of the RO/RO type ferry vessels carrying passenger and containers from Japan to Philippines will be difficult. Therefore, it is inevitable that the Philippines will construct these vessels by itself, or will remodel the ferries exclusively for cargo into those carrying passenger and containers, or will change the transportation mode from passenger and cargo to only cargo.

It is forecast that the domestic passengers and containers in 2009 and 2024 would become about 1.9 times more and about 4.0 times more respectively compared to 2002. In the Study, it is assumed that long distance RO/RO ferry vessels will continue to increase until the upper limit of domestic passenger demand, because their operation is profitable if both passengers and containers use them. The numbers of passenger and container by long distance RO/RO ferry vessels are shown in Table 6.2.10.

Table 6.2.10 Forecast of Long Distance Ferry Servicing Passenger and Container

	Passenger Transport by Large RO/RO Vessel			Container Transport by Large RO/RO Vessel		
	NCR	Other Region	Total	NCR	Other Region	Total
2002	3,986,497	4,680,063	8,666,059	569,500	668,580	1,238,008
2009	4,768,820	5,598,494	10,367,314	681,260	799,785	1,481,045
2024	6,453,785	7,576,606	14,030,391	921,969	1,082,373	2,004,342

Source: JICA Study Team

3) Demand of Long Distance RO/RO Ferry Vessel

The number of future long distance RO/RO ferry vessels is calculated using the following assumptions:

a) Future vessel will have capacity and specifications as at present
b) Shipping schedule of July 2003 is applied
c) Proportion of trips to vessel on each service route
(Number of arrangement / Number of operating vessel) x 100 =Operating Ratio}
d) Applied service route is Manila to other Region Ports

The results of calculation are summarized in Table 6.2.11. As to calculation, see Appendix 6.2.4 (1).

Table 6.2.11 Future Large RO/RO Ferry Vessel (2009-2024)

Year	2002	2009	2024
Number of Operating Trips/week	31 Trips	52 Trips	70 Trips
Number of arrangement Vessel/week	28 Vessels	47 Vessels	63 Vessels
Number of Additional Vessels	Existing	**19 Vessels**	**35 Vessels**

Source: JICA Study Team

(3) Demand of future Conventional (LO/LO) Domestic Container Fleet

As to domestic container transport, conventional vessels will compete with RO/RO ferries. Transport volume by conventional vessels will increase owing to the growth of the future domestic container demand and introduction of fast conventional container vessels and cargo handling equipment.

Container volume transported by conventional container vessels is obtained by subtracting the volume carried by RO/RO vessels from the total forecast volume. The required number of conventional container vessels is calculated under the following conditions (See Table 6.2.12). The results are shown in Table 6.2.13. As to calculation, see Appendix 6.2.4 (2).

Table 6.2.12 Conditions of Conventional (LO/LO) Container Vessels

Conditions	2009	2024
Average conventional container vessel capacity	400 TEUs/300Boxes	600 TEUs/450Boxes
Average space occupation ration	75%	75%
Average container handling productivities	17 boxes/gang	20Boxes/gang
Average vessel speed	13 Knots	15Knots
Average distance of port to port	580 Nautical miles	580 Nautical miles
Average idling time (Berth occupancy and rough sea etc.)	1.0 day/trip	1.0 day/trip

(4) Demand of Future Domestic Conventional Break Bulk Cargo Vessel

Break bulk cargo volume transported by conventional cargo vessels, obtained by demand of forecast cargo volume carried by conventional cargo vessel from the total estimated cargo volume. The required number of conventional cargo vessels is calculated under the following condition. There -result are shown in Table 6.2.13. As to calculation, see Appendix 6.2.4 (3).

Table 6.2.13 Required Conventional (LO/LO) Container Vessel in Short Term and Long Term Plan

Mode	2002	2009	2024
Total Carried Container (TEU)	1,963,059 TEUs	3,351,201 TEUs	9,422,555 TEUs
Carried RO/RO Ferry Vessels	1,238,008 TEUs	1,481,045 TEUs	2,004,342 TEUs
Carried Conventional Vessel	724,979 TEUs	1,870,156 TEUs	7,418,213 TEUs
Standard Vessel Capacity	N / A	350 TEUs Type	500 TEUs Type
Require of Conventional Container Vessel Operating per Weekly Service			
		2009	2024
Number of Trips / Annual		4,676	12,364
Standard Service Frequency		Weekly Service	Weekly Service
Existing Conventional Vessel (2002)		27 Vessels	27 Vessels
Required Vessels		60 Vessels	159 Vessels
Number of Additional Vessels		**33 Vessels**	**132 Vessels**

Calculated by JICA Study Team

Table 6.2.14 Required Conventional Cargo Vessel in Short Term and Long Term Plan

Condition	2009	2024
Standard Vessel Tonnage (GRT)	500	700
Average Vessel Capacity (DWT)	1,300	2,000
Average Break Bulk Cargo Loading Factor	1,300 x 70 %= 910 tons	2,000 x 70 %= 1,400 tons
Average Cargo Handling Productivity	40 tons/Hour	40 tons/Hour
Average Vessel of Port Stay Time	1.0 day	1.5 day
Average Vessel Navigation Speed	12.0 Knots	12.0 Knots
Average Distance of Port to Port	700 Nautical Miles	700 Nautical Miles
Idling Time of per Trip (Rough and Gale etc)	1.0 day	1.5 day
Average Steaming time of per Trip	5.0 days	5.0 days
Total Term of per Trip	7.0 days	8.0 days
Required Number of Conventional Cargo Vessel	520 Vessels	533 Vessels

(5) Domestic Container Transport Network

It is recommended to designate domestic major ports within the country as the bases for large RO/RO vessels and to establish the network of large RO/RO vessel service. It is also recommended to reduce the time for passenger transportation by making convenient access routes to surrounding ports and by operating fast crafts on those service routes. In this case, it is advisable that connection

to the surrounding ports be within one hour or two hours at the maximum, thereby improving the passenger services.

As for domestic container vessel, twenty seven (27) vessels are now operated. Although large RO/RO ferry vessels have played major role for domestic container transport, container vessels will also play an important role from now on. Transportation efficiency of container vessels is improved with the help of quay cranes. Quay cranes are effective in handling many containers and expensive. Therefore it is necessary to select and develop principal ports for container vessels and to install quay cranes according to the number of containers.

6.2.6 Domestic Freight and Passenger Rate

(1) Freight Rate

Freight rates are influenced by the following factors;

- Economy of scale
- Size of operating vessels' capacity
- Volume of cargo trade
- Trade and transport practices
- Cost of vessel acquisition
- Port charges and container handling cost
- Port productivity
- Taxes, imports, duties, license and other fees imposed by the government.

Economy of scale is the most important factor in achieving a lower unit cost. Vessel owners try to provide services so that maximum benefit could be obtained on condition that they could respond to the transportation demand. In Philippine domestic trade, larger vessels are not always used. However port conditions such as shallow water depth and insufficient port facilities also limit vessel size.

When container freight costs for domestic transport are compared with that of a feeder service from/to the international hub port, such as Singapore, Tanjuong Pelepus, and Kaoshiung, the former is more expensive than the latter, because the capacity of cellular type container vessels in domestic trade seldom exceed 500 TEUs, while feeder vessels usually carry over 1,500 TEUs.

The problem is compounded by the fact that in some domestic service routes, operators must use RO/RO ferry vessels to carry both passenger and containers on the same vessel, even if the volume of containers is small.

Domestic Long Distance Ferry Strategic Developement Routes

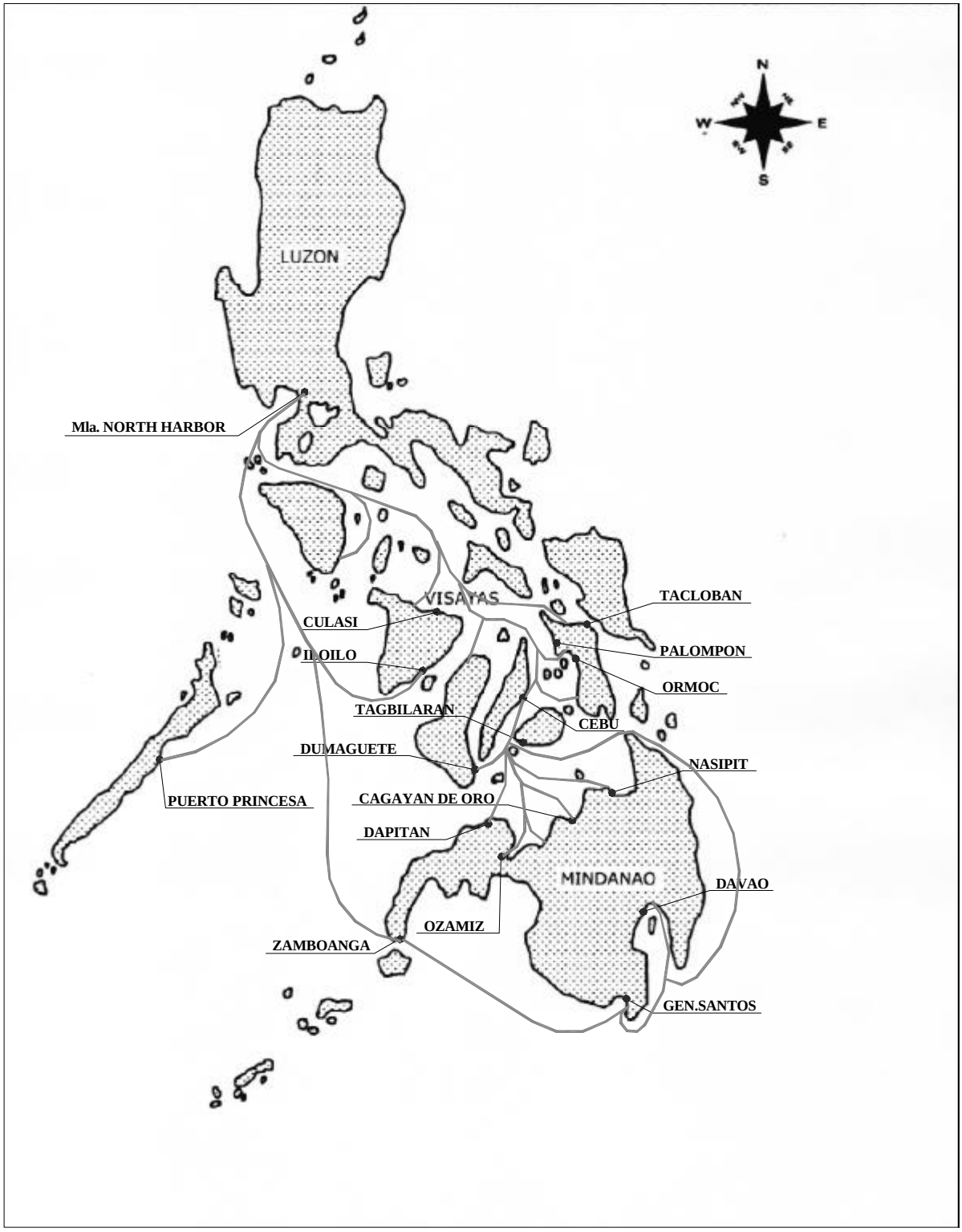


FIGURE 6.2.3

Figure 6.2.3 Major Domestic Long Distance Ferry Routes

Domestic Container Strategic Developement Ports and Route

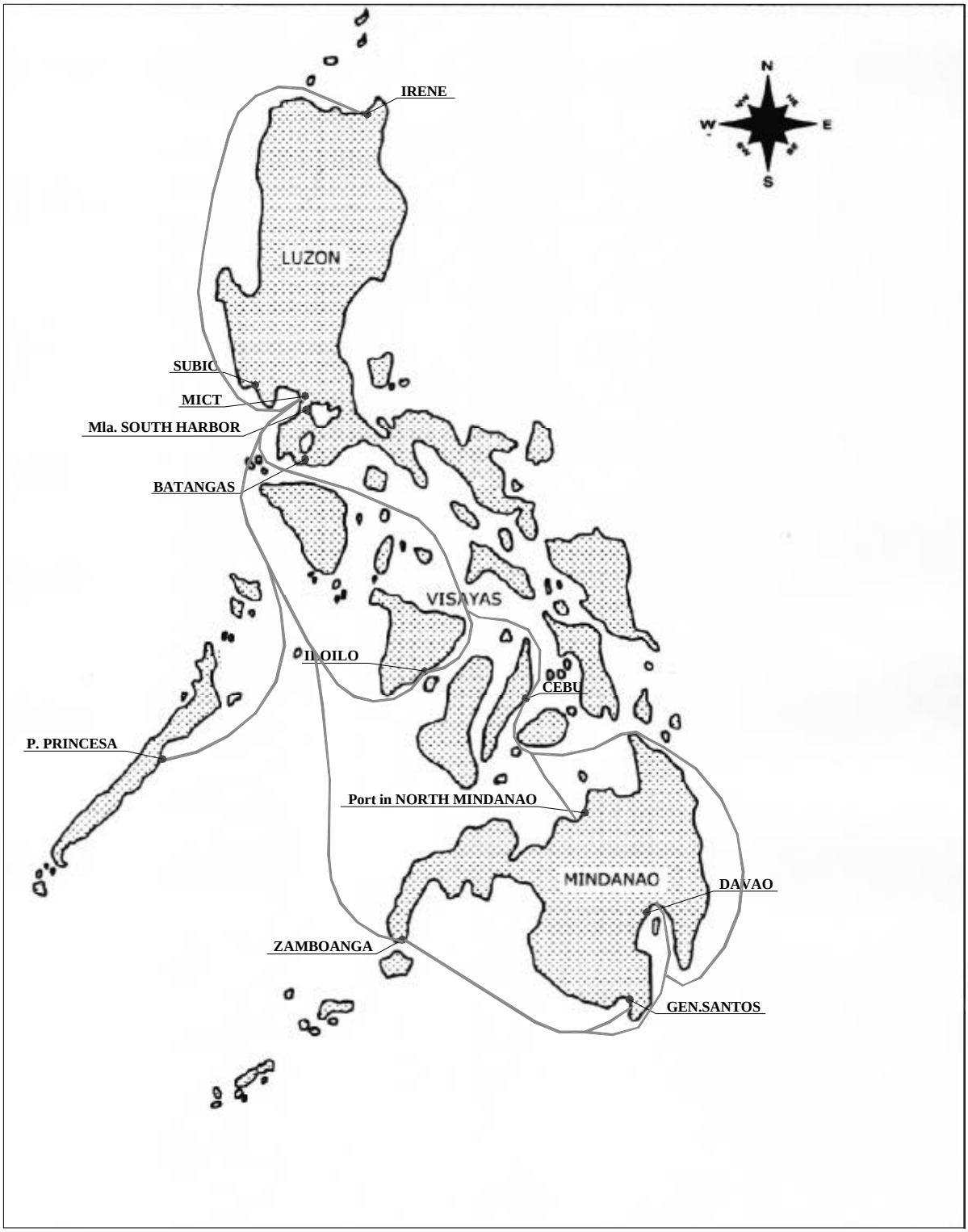


FIGURE 6.3.1

Figure 6.2.4 Major Domestic Container Port and Routes

(2) Domestic Container Freight by Transport Mode

Surface freight rates for domestic containers are different depending on the operation methods. As to the operation cost and efficiency, LO/LO method is cheaper than RO/RO, although LO/LO method

is less efficient than RO/RO method because LO/LO takes longer time for navigation and cargo handling. At present, RO/RO method occupies about 60% of the domestic container transportation.

(3) Present Condition of Domestic Container Freight Rate

In most cases, domestic container freight rates are set based on the transportation distance. Current prices between Manila and main domestic container handling ports are shown in Table 6.2.15. Discounts ranging from 5% to 20% are actually applied to large lot users. But such discounts are not considered in the Table.

Table 6.2.15 Domestic Container Freight Rate on 2003 June

Destination Port	Conventional Type Container Vessel			RO/RO Ferry Type Vessel		
	10'	20'	Remarks	10'	20'	Remarks
Cebu	Ps 8,000	Ps 16,000	Trucking charge includes inland transportation cost in the urban area of round trip	Ps 12,250	Ps 24,560	Trucking charge includes inland transportation cost in the urban area of round trip
Cagayan De Oro	Ps 9.600	Ps 19,170		Ps 14,730	Ps 29,464	
Iloilo	Ps 7,300	Ps 14,600		Ps 11,230	Ps 22,450	
Dumaguete	Ps 8,660	Ps 17,320		Ps 12,300	Ps 24,610	
Surigao	Ps 9,050	Ps 18,160		Ps 13,960	Ps 27,910	
Davao	Ps 13,100	Ps 26,200		Ps 20,590	Ps 41,180	
G, Santos	Ps 11,870	Ps 23,730		Ps 18,460	Ps 36,910	
Zamboanga	Ps 9,600	Ps 19,900		Ps 15,290	Ps 30,570	

Source: Domestic Shipping Company

Note: a) Transit time is also dependent on routing of vessel.

b) Standard tariff depends on commodity class (C-Class for lowest and A-Class for highest). A 10 footer is half the rate of a 20 footer rate while a 40 footer is twice the rate of a 20 footer.

c) Pricing of container trucking charge is expressed in the accumulation of units cost per kilo meters.

d) Comparison of all water transport and land / RO/RO vessels compound container transport basic charge

(4) Comparison of All Water and Sea/Land Combined Transport Freight Rate

In most cases, prices of domestic container freight are decided by the transport distance. Current prices in the main container handling ports from Manila area are shown in Table 6.2.16.

a) Tariffs for all water transport, and sea and land combined transport are as follow:

- In the case of all water transport, the transport extent which reflects transportation cost is from port to port.

- In the case of sea and land combined transport, the transport extent which reflects transportation cost is from origin to destination, which includes costs for land transportation.

From the viewpoint of transport rate charged from origin to destination, both transport methods are nearly same and in competition. Customers choose either based on the distance, transit time or the kind of cargo.

b) Volume discounts are applied ranging from 5% to 20% to large lots client.

Table 6.2.16 All Water and Sea / Land Combined Transport Rate

Destination Ports	Transportation Mode			
	All Water by Large RoRo Ferry		Sea & Land Combined Transport	
Size of Container	20'	40'	20'	40'
Cebu	US$ 506	US$ 874	US$ 583	US$ 1,050
Cagayan De Oro	US$ 576	US$ 1,021	Not Service	
Davao	US$ 645	US$ 1,152	US$ 930	US$ 2,020
Gen'l Santos	US$ 645	US$ 1,152	US$ 930	US$ 2,020
Zanboaqnga	US$ 645	US$ 1,152	Not Service	

Source: Shipping Line Hearing and JICA Study Team

Transit time between Manila and main container port depends on navigating route and speed of vessels. Comparison of transit time by RO/RO ferry vessel and LO/LO conventional vessel is shown in Table 6.2.17. Differences are negligible.

Table 6.2.17 Standard Transit Time of Main Container Handling Port

Port of Call	Region	RoRo Ferry Vessel	LoLo Conventional
Cebu	VII	18 Hours	24 Hours
Iloilo	VI	18 Hours	21 Hours
Dumaguete	VII	*27 Hours	27 Hours
CagayabDe Oro	X	30 Hours	33 Hours
Surigao	XIII	*33 Hours	34 Hours
General Santos	XI	*41 Hours	41 Hours
Davao	XI	*52 Hours	55 Hours
Port of Call	Region	RoRo Ferry Vessel	LoLo Conventional
Zanboanga	IX	28 Hours	41 Hours

* Stop off way ports, not direct calling

Source: Domestic Shipping Lines Hearing and JICA Study Team

(5) Domestic Container Fare carried by Truck

Fare of domestic container carried by truck is almost proportional to transport distance. In case that transport distance is within 100 km, unit cost per km is nearly 280 pesos. In case of longer distance over 500 km, it is cheaper than 80 peso/km, while, in case of shorter distance, it is higher.

Several cases of container transport fare carried by truck between Manila (Manila North/South harbor) and destination are shown in Table A6.2.7. For example, fare of a 20 feet container carried by truck from Manila to Matnog is 42,000pesos. Volume discounts are applied ranging from 5% to 20% at the maximum to large lot users.

(6) Passenger Fare

In the Philippines, an archipelago country, long distance passengers are generally transported by long distance RO/RO ferry, long distance bus and ferry, and airplane. Comparison of fares among them shows that airplane is most expensive and that long distance RO/RO ferry follows. Long distance bus and ferry is the cheapest transport way. Foe example, incase of the travel from Manila to Cagayan De Oro, airplane fare is 3,645 pesos, RO/RO 1,740 pesos, and bus and ferry 1,190 pesos. (Other examples are shown in Table A6.2.11.)

However, bus passengers have to sit in a narrow seat for many hours. On the contrary, RO/RO ferry passenger can move freely or even lie on the floor and its fare includes meal cost. Therefore many passengers prefer long distance RO/RO ferry to long distance bus and ferry. In the future, as individual income will increase, passenger will select airplane more than now.

6.3 Transport Fleet

6.3.1 World Fleet

(1) World Container Fleet

Container fleets play an important role in the field of maritime transport. Container fleets have been getting larger and larger to pursue the economy of scale. It is expected that this trend will continue in the future too.

Table 6.3.1 Change of Container Fleet Capacity by TEU

Year	Change of Container Fleet Capacity			Average Capacity Per Vessel
	Nr of Vessel	Total Capacity	Growth	
1994	1,384	2,235,236	---	1,615 TEU
1995	1,534	2,500,189	11.9%	1,630 TEU
1996	1,710	2,822,817	12.9%	1,651 TEU
1997	1,886	3,192,056	13.1%	1,693 TEU
1998	2,118	3,659,197	14.6%	1,728 TEU
1999	2,328	4,100,191	12.1%	1,761 TEU
2000	2,441	4,327,099	5.5%	1,773 TEU
2001	2,588	4,747,619	9.7%	1,834 TEU
2002	2,743	5,341,477	12.5%	1,947 TEU
2005	*2,839	*5,819,948	9.0%	*2,050 TEU
2009	*2,960	* 6,271,628	7.8%	*2,120 TEU
2024	N/A	N/A	N/A	N/A

* Estimated figure

Source: Nippon Yusen Research Report and JICA Study Team

According to the maritime business plan including future building plan of container vessels, many "Post-Panamax type Vessels" have been ordered. At present larger container vessels of which capacities are 6,000～8,000 TEUs type are employed on the main routes between Europe and Asia/US West coast to Asia. Summary of the worldwide container fleets in service and on order are shown in Table 6.3.2.

An excess of container slots on most trade routes was outstanding in 2002, due mainly to the flood of new container vessels. Although the capacity of container vessels was not short in 2001, container vessel deliveries in 2002 reached a new high. The addition of 185 new vessels, with an aggregate slot capacity of 520,000 TEU, during 2002 represented an expansion of the global cellular fleet of approximately 12%, reaching just over 6 million TEU.

In line with the trend forwards larger container vessels, many over 5,000 TEU type vessels have been ordered. With an additional 900,000 TEU of capacity provided by some 300 vessels still awaiting delivery over the next three years, the over capacity of the container liner business looks to become more severe.

Table 6.3.2 Summary of World Container Fleet in Service and on Order by Vessel Type and Size (Jan. of 2002)

Type	Under 999	1,000－1,999	2,000－2,999	3,000 －3,999	4,000 －4,999	5,000 Over	Total
Full Cellular Type Vessel							
Present Slots	516,288	1,250,759	1,129,780	927,505	846,404	1,330,613	6,001,349
Present Ships	963	889	457	270	193	209	2,981
Slots on Order	37,142	69,526	170,734	62,357	268,322	430,462	1,038,543
Ships on Order	47	47	68	19	61	69	311
RO/RO Type Vessel							
Present Slots	269,354	87,120	38,404	0	0	0	394,878
Present Ships	809	67	15	0	0	0	891
Slot on Order	13,038	0	0	0	0	0	13,038
Ships on Order	17	0	0	0	0	0	17
Non Cellular Type Vessel							
Present Slots	1,002,336	418,545	31,176	0	0	0	1,452,057
Present Ships	3,077	310	15	0	0	0	3,402
Slots on Order	6,822	43,575	20,988	0	0	0	71,385
Ships on Order	10	25	10	0	0	0	45
Total Amount							
Present Slots	1,787,978	1,756,424	1,199,360	927,505	846,404	1,232,893	7,750,564
Present Ships	4,849	1,266	487	270	193	209	7,274
Slots on Order	57,002	113,101	191,722	62,357	268,322	430,462	1,122,966
Ships on Order	74	72	78	19	61	69	373

Note: Includes Bulk container, Semi container, Multi purpose and Lash/Barges

Source: Containerization International Yearbook 2003

As larger container vessels go into service on trunk routes such as Far East - Europe and Far East - Trans-Pacific, the container vessels retired from trunk routes are transferred to North / South routes and more regional routes. Feeder vessels will also be larger in the future. Future trend of container vessels by route is shown in Table 6.3.3. It is expected that the largest container vessel coming to Philippine ports will be 3,000 - 3,500 TEUs class vessel.

Table 6.3.3 Standard Size of Vessel Capacity on Each Service Route

(1) Far East - Europe Liner Service Route (TEU)

1998		2000		2005		2010		2024	
Suitable Vessel	Largest Vessel	Suitable Vessel	Largest Vessel	Suitable Vessel	Largest Vessel	Suitable Vessel	Largest Vessel	Suitable Vessel	Largest Vessel
4,500 5,000	6,500	4,500-5,500	7,500	5,500-6,500	9,000	7,000-7,500	10,000	8,500	12,400

(2) Far East - Trans-Pacific Liner Service Route (TEU)

1998		2000		2005		2010		2024	
Suitable Vessel	Largest Vessel	Suitable Vessel	Largest Vessel	Suitable Vessel	Largest Vessel	Suitable Vessel	Largest Vessel	Suitable Vessel	Largest Vessel
4,500-5,000	6,250	4,500-5,000	6,700	5,500-6,500	8,500	6,000-6.500	8,500	7,500	10,000

(3) North / South Liner Service Route (TEU)

1998		2000		2005		2010		2024	
Suitable Vessel	Largest Vessel	Suitable Vessel	Largest Vessel	Suitable Vessel	Largest Vessel	Suitable Vessel	Largest Vessel	Suitable Vessel	Largest Vessel
2,500	3,000	2,500	3,000	3,000	3,500	3,000	3,500	3,500	4,000

(4) Intra Asia Liner Service Route (TEU)

1998		2000		2005		2010		2024	
Suitable Vessel	Largest Vessel	Suitable Vessel	Largest Vessel	Suitable Vessel	Largest Vessel	Suitable Vessel	Largest Vessel	Suitable Vessel	Largest Vessel
550	1,200	750	1,500	1,250	2,000	2,000	2,500	2,500	3,500

(5) Feeder Liner Service Route (TEU)

1998		2000		2005		2010		2024	
Suitable Vessel	Largest Vessel	Suitable Vessel	Largest Vessel	Suitable Vessel	Largest Vessel	Suitable Vessel	Largest Vessel	Suitable Vessel	Largest Vessel
550	1,000	870	1,200	1,100	1,800	1,500	2,500	2,000	3,000

Source: Ocean Shipping Consultants Ltd and JICA Study Team

(2) Passenger Fleet

Currently there is no international liner route by passenger vessel due to the rapid development of air routes. However, cruising vessels are being seasonally operated at tourist resorts all around the world. Main seasonal cruising routes around the world are as follows and cruising area in the world is shown in Table 6.3.4.

Winter Season

- Caribbean Sea Area
- Mediterranean Sea Area
- South Pacific Island Area
- Malay Peninsula Area
- Indonesia Bali Island Area

Summer Season

- Scandinavia Peninsula Area
- Canadian East Coast Area
- Alaskan / Vancouver Island Area
- Antarctic Area (Arctic Area)

Table 6.3.4 Cruising Area in the World

Cruising Area	Ratio (%)
Caribbean Sea / Bahamas Area	44.3
Mediterranean Sea Area	17.0
Asian and South Pacific Area	11.7
Alaska and North Pacific Area	6.6
Mexico West Coast Area	5.0
North and West Europe Area	4.0
Other Area	11.4
Total	100.0

Source: Cruise Industry News

International Passenger and Cruise fleets by tonnage group are shown in Table A6.3.1.

Several passenger vessels call at domestic tourist resort ports in the Philippines every year on Visayas tourist spots ports (Cebu, Tagbilaran, and Bacolod).

6.3.2 Domestic Fleet in the Philippines

(1) Present Domestic Fleet

In general, Philippine vessels are old because a good many used vessels have been purchased from Japan. The list of vessels which operated in Japan in July 2003 is attached in Appendix (see Table A6.3.2). Domestic fleet by vessel type and by age group is shown in Table 6.3.5. More than

fifty-six percent (56%) of the vessels were constructed over 21 years ago.

Vessels can generally operate economically for a twenty year period. In addition, it is advisable that passenger high-speed boats and ferry vessels be renewed within a certain period of time for safety reasons. In order to ensure that defective vessels are decommissioned, reinforcement of vessel inspection, obligatory procurement of safety equipment and preferential tax treatment in accordance with the usage period of a vessel should be considered.

As shown in Table 6.3.6, vessel size in the Philippines is very small. Vessels of less than 100 tons account for nearly 50% of the total. The length, breadth and depth of the existing domestic vessels working in the Philippines are mentioned by the type of general cargo, passenger vessel, passenger cargo, and passenger ferry in the Appendix. The passenger cargo may be included in RO/RO cargo vessel category, and the general cargo may include vessels carrying the domestic containers. The size of RO/RO vessels in the Indonesia is also shown in Appendix for reference.

Table 6.3.5 Domestic Operating Fleet by Type of Service and by Age Group

Type of Vessel	Number of Fleet	Age Group				
		0 ～10	11～20	21～30	Over 31	No Information
Passenger Ferry	14,476	6,548	3,446	2,938	551	993
%	*100%*	*45.2%*	*23.8%*	*20.3%*	*3.8%*	*6.8%*
Passenger/Cargo	446,105	23,798	71,251	317,646	32,645	765
%	*100%*	*5.3%*	*16.0%*	*71.2%*	*7.3%*	*0.2%*
General Cargo	523,387	127,826	183,324	158,505	44,661	9,071
%	*100%*	*24.6%*	*35.1%*	*30.6%*	*8.5%*	*1.7%*
Container	71,887	7	25,122	33,453	13,305	4
%	*100%*	*0.01%*	*34.9%*	*46.5%*	*18.5%*	*0.01%*
Liquid Cargo	12,571	5,801	2,021	3,005	1,744	0
%	*100%*	*46.3%*	*15.9%*	*24.1%*	*13.7%*	*0%*
Total Fleet	1,068,426	163,980	285,164	515,547	92,906	10,833
%	*100.00%*	*15.35%*	*26.68%*	*48.25%*	*8.71%*	*1.01%*

Source: Philippines Maritime Data Book 2003 and JICA Study Team

Table 6.3.6 Domestic Container Vessel / Cargo Vessel by Tonnage Group (2000)

Kind of Vessel	Total	3-99	100-499	500-999	1000-1499	1500-1999	2000-2999	3000-4999	Over 5000
Container Vessel	27	3	6	2	2	0	5	3	6
General Cargo Vessel	2,805	1409	558	606	152	29	10	18	23
Total	2,832	1,412	564	608	154	29	15	21	29
Ratio	100%	49.9%	19.9%	21.5%	5.5%	1.0%	0.5%	0.7%	1.0%

Source: Marina Data Book 2003

(2) Future Domestic Fleet

Small and obsolete old type vessels are presently operating as container and conventional type cargo vessels. However, as the amount of transport cargo increases, adoption of large capacity vessels and modernization maritime transport business should be actively pursued.

Thirty-one long distance RO/RO ferry vessels and twenty-seven domestic container vessels are currently operated. More than 60% of domestic containers are now transported by large RO/RO ferry vessels. It is expected that this tendency will continue until 2024 if international container gateway ports will be established in Visayas and Mindanao. In addition, the role of container vessel will become more important after installation of quay cranes in major ports for domestic container transport. Efficiency of a quay with quay cranes will rise remarkably.

For small vessel of less than 1,000 ton, the Philippines should take advantage of its technical partnership with Japan, its relatively cheap labor, and low-priced steel from China or Russia to build new vessels.

Short distance passenger and cargo transport will also increase rapidly as the Philippine economy develops. Ferry vessels will continue to play an important role in cargo transport and fast crafts will become the predominant means for passenger transport. People who enjoy a higher standard of living than at present will prefer a fast craft to a ferry vessel with low speed.

(3) Standard Design of Domestic Fleet

Standard design of domestic fleet should be adopted to raise the efficiency of construction, management and operation of a port. This standardization will contribute to reduce the fleet investment costs and maintenance costs.

1) RO/RO Fleet

It is advisable that standard RO/RO fleets have three grades (see Table 6.3.7). When formulating standard designs, the following conditions should be considered. Main dimensions and schematic diagrams of 3 standard types of RO/RO ferry vessels are shown in Appendix 6.3.3.

a) Standard series for haul particularities
b) Common spare parts from the same manufacturing company
c) Simple haul design applicable to Philippine conditions
d) Maximum distance between ports is 50 nautical miles
e) Vessel design should be adjustable to accommodate more crew in multiple cabins (according to regulations and local rules)
f) Shallow draft
g) Adaptable to small port facilities
h) Adaptable to cemented slope system
i) Short distance route and frequent service
j) Navigation speed from 10 to 13 knots and 15 hours/day operation

Table 6.3.7 Standard RO/RO Vessels

Type of Vessel	Tonnage Class	Lane Length	Car Capacity	Stowage Method
Very Small Type	340GRT Class	30～ 40 meters	5～ 10 Units	Mixed Stowage
Small Type	900GRT Class	90～100 meters	20～ 30 Units	Mixed Stowage
Medium Type	1,900GRT Class	150～180 meters	30～ 40 Units	Mixed Stowage

Source: JICA Study Team

Note: Definition of Lane meter:

Lane meter shall refer to one meter of deck with a width of 2.50 to 3.00 meter.

For example : A passenger sedan of length 4.5 meters and width less 2.10 meters will occupy a minimum of (more than) 4.5 meters lane with a width 2.50 meters. A large vehicle bus or truck 10.00 meters and width 2.40 meters will occupy a minimum of (more than) 10.00 lane meters with a width of 3.00 meters.

2) Container Vessel

The size of domestic container vessels and tramping vessels employed by major domestic shipping lines will also increase in the near future (see Table 6.3.8 and 6.3.9).

Table 6.3.8 Domestic Container Liner Service (TEU Capacity)

1998		2000		2005		2010		2015	
Suitable Vessel	Largest Vessel	Suitable Vessel	Largest Vessel	Suitable Vessel	Largest Vessel	Suitable Vessel	Largest Vessel	Suitable Vessel	Largest Vessel
250	330	300	376	350	500	400	600	600	1,000

Table 6.3.9 Domestic Conventional Liner Service (GRT)

1998		2000		2005		2010		2015	
Suitable Vessel	Largest Vessel	Suitable Vessel	Largest Vessel	Suitable Vessel	Largest Vessel	Suitable Vessel	Largest Vessel	Suitable Vessel	Largest Vessel
100	500	200	500	250	700	300	800	450	1,000

Source: Ocean Shipping Consultant and JICA Study Team

3) Fast craft

It is expected that operation of fast crafts will replace the current operation of vessels for more safety and speed in the future passenger ferry network. The present fast craft systems in the world are shown in Appendix 6.3.4.

(4) Future Procurement of Domestic Fleet

Current vessels deployed in the Philippines, especially RO/RO ferry vessels and conventional type cargo vessels, are mainly second-hand vessels from Japan and surrounding countries. However, procurement of such vessels from the second-hand market will not be easy in the near future because these kinds of vessels are decreasing in Japan and other countries.

There are two alternatives to cope with this situation. One is that Philippine shipping companies continue to purchase available vessels from the second-hand market to the extent possible. The other is to develop the Philippine shipbuilding industry by introducing advanced foreign techniques on shipbuilding engineering and by making advantage of cheap Philippine labor. The ODA program can be an effective tool for developing shipbuilding industry.

1) Necessity of Planned Shipbuilding by Shipping Companies

For sound development of the shipbuilding industry in the Philippines, the government must examine the plan carefully. Based on fleet investment plans drawn up annually and submitted by shipping companies, the government formulates an integrated plan. In some cases, the government

may change that vessel sizes be changed to make the fleet as uniform as possible. The government should also make it easier for shipping companies to obtain a low interest loan from DBP and private financial institutions.

2) Selection of the Proper Vessel Type

Selecting the proper vessel type is another fundamental factor. After examining the distance and the navigation conditions of a transport route, the optimal vessel type can be identified. Through this procedure, expenses such as shipbuilding cost and operation cost, which are reflected in the overall transport cost, can be curtailed. Examples of identified vessel type are as follows;

- Shallow draft type vessel
- Pusher barge type vessel
- Derrick barge type vessel (Pearl delta river barge)

Chapter 7 Navigation Safety

7.1 General

As an archipelago country composed of more than 7,000 islands, both the economic activities and daily lives of people in the Philippines depend largely on maritime transportation, and domestic shipping together with ports are vital to the country. Domestic shipping, in particular, is the most popular inter-island transportation mode for common people and can be regarded as public transportation. Therefore domestic shipping is subject to strong regulations in terms of passage fare, sailing route, calling port, number of voyages per day/week, and so forth. These regulations are a prime reason why the domestic shipping industry doesn't necessarily generate much revenue.

This low profitability of domestic shipping has led to decreased investment in new vessels, increase in overaged ships, deterioration in safety and inefficient operation. This has in turn resulted in an increase in maritime accidents. Under these circumstances, the Government of the Philippines is making efforts to promote domestic shipping through deregulation and competition as well as to improve safety through vessel renewal and aids to navigation arrangement.

7.2 Present Situation

7.2.1 Marine Accidents and Rescue Activities

(1) Outline

According to the records of the Maritime Incident Report 1995-2002, there were 1300 marine accidents during the eight years from 1995 to 2002. Nine thousand and fifty (9,050) people were rescued but one thousand seven hundred and twenty two (1,722) people died or went missing.
On average, there have been one hundred and sixty two (162) marine accidents per year. And it is said that the actual number of maritime accidents is larger because some accidents are not reported to PCG for various reasons.

It is characteristic of the marine accidents in the Philippines that there are many victims and that the ratio of the dead and missing among victims is high. Moreover it is assumed that the actual number of victims is higher since shipping companies do not count passenger heads accurately and sometimes take more passengers on board than the capacity of a vessel.

(2) Types of Marine Accidents

There are many types of maritime accidents. Definitions of terms are given below.

Aground/ Grounding – Type of accident that results in forcing the vessel on the shore

Allision – Vessel traffic related accident involving the hitting of two vessels, one of which is docked

Capsize – Type of accident that results in the over-turning of the vessel

Case Dismissed – Accidents wherein the parties involved are no longer interested in pursuing the case, or have amicably settled the same

Collision – Vessel traffic related accident involving the hitting of two moving vessels

Damage to Pier – Accident that results in breaks and/or other damages in the dock

Drifting – Type of accident that results in the aimless floating of the vessel without its own propelled power

Engine Trouble – Type of accident that results from engine related problems

Explosion – Type of accident that results in explosion of a part of a vessel

Fire – Type of accident that results in burning of a part of the vessel

Flooding – Type of accident which results in the flow of water into a part of the vessel

Hitting of Object–Type of accident that results in the striking of the vessel with non-vessels (buoy, floating debris, etc.)

Human error – Accidents caused by mistakes made by the seafarers or ship owner/ shipping company.

Rammimg – Vessel traffic related accident representing vessels' collision with something on the pier/wharf

Sinking – Type of accident which represents submergence of vessel

According to another report recently compiled based mainly on the official record of the Philippine Coast Guard's Board of Marine Inquiry (PCG-BMI) and Marine Protest, 16.6% of the total accidents that were recorded for the past thirty three years (1970-2003) involved sinking. It could also be noted that the lack of vessel traffic management and aids to navigation such as sea lane, lighthouses and beacons contributed to the high rate of traffic related accidents namely collision (11.3%), ramming (10%), and allision (6.2%). In addition, harsh weather conditions and rough sea contributed to the high incidence of capsizing and grounding which comprise 19.1% and 13.8% of the total recorded accidents respectively.

Moreover, the issue of ship maintenance arises as mechanical and technical failure related accidents such as engine trouble, ship damage, fire and explosion accounted for 15.3% of the accidents recorded during the thirty- three year period.

(3) Maritime Accident by Ship Type

According to the same report, within the 33-year period from 1970 to 2003, Banca boat and cargo vessels were involved in the greatest number of accidents, comprising 24.9% and 19.3% of the total recorded accidents respectively, followed by passenger-cargo vessels at 17.4%. The increase in

accidents of cargo and passenger-cargo vessels may be attributed to inappropriate conversion and long-term use of those converted vessels.

In the '90s, the deregulation and liberalization of the domestic water transport industry resulted in the heavy acquisition of second hand vessels by local shipping companies. Due to the high cost of acquiring passenger vessels, it has been a common practice among shipping companies to import second hand cargo vessels and convert them into passenger-cargo vessels, which are most profitable in local shipping operations. Thus, insufficient ship conversion could be one factor that increased the prevalence of accidents among passenger-cargo vessels and cargo vessels, as well as the increasing utilization and patronage of such vessels over the years.

In addition, passenger-cargo and cargo vessels are seen to be prone to maritime accidents because most of them are bought second hand with an average age of over 12 years upon importation. The local water transport industry has been plagued by the proliferation of old and obsolete vessels that continue to ply Philippine waters, which are a great deterrent to maritime safety. As with banca boats, construction has remained the same since the 1970's, characterized by small-sized wooden-hulled vessels that are technically un-checked for stability and load limit. Fisher folk acknowledge that even though they are often involved in maritime accidents, nowadays they no longer bother to report the same because besides being time-consuming, they have to pay some money just to file a Marine Protest.

(4) Cause of Maritime Accidents

Together with the nature of accidents, it is important to indicate the causes of accidents as this will provide an idea of the issues and concerns surrounding the unusually large number of maritime accidents in the Philippine water. Causes of accidents as reported by PCG-BMI include human error, natural causes, and purely accidental (none at fault). In many instances, however, cases were dismissed and therefore, the causes of some accidents were not determined.

For the thirty-three year period, it can be noted that natural causes such as typhoons, bad weather and rough sea conditions were the main causes of maritime accidents, comprising 35.4% of the total incidents recorded. Accidents caused by human error were also predominant, comprising 23.5% of all the recorded accidents. Purely accidental cases, where no one is at fault, likewise comprised a large part (15.7%) of the accidents.

Philippine waters have less severe congestion in sea transportation than Japan. However, conditions for vessel navigation are not necessarily good due to insufficient navigation aids and navigation maps. In addition to this, remodeled second-hand vessels are in service and take a lot of passengers on board. In the event of inclement weather (e.g. typhoons) or crew error, these vessels are prone to sink easily due to their aged hull and instability. Coupled with the inadequate rescue system, accidents

involving these vessels may result in loss of life

Table 7.2.1 Occurrence of Maritime Accident near the Coast of the Philippines

Year	1995	1996	1997	1998	1999	2000	2001	2002	Total
Sinking (Sunk)	37	35	16	37	37	25	21	23	231
Capsize	33	32	11	88	109	47	49	44	413
Aground / Grounding	58	19	5	42	44	21	27	22	238
Caught Fire	23	6	8	9	10	7	10	15	88
Drifting / Engine trouble	13	9	9	8	0	14	17	20	90
Collision / Allision	17	5	6	5	8	14	11	10	76
Flooding	0	3	0	0	0	2	1	1	7
Missing	0	0	0	12	0	1	5	6	24
Rammed	0	10	2	6	0	3	6	5	32
Others	0	0	1	1	55	17	21	6	101
Marine Accidents Total	181	119	58	208	263	151	168	152	1300
Dead and Missing	218	120	68	335	350	279	133	219	1722

Source: Maritime Incident Report CY 1995-2002 by PCG

(5) Location of Marine Accidents

Being an archipelago, the Philippines is surrounded by several bodies of water. Although these waters are around and within the archipelago, sea conditions vary. In addition, the concentration of passenger, cargo and vessels traffic varies in different areas.

Maritime accidents for the thirty-three year period were heavily concentrated in 9 areas and provinces namely Cebu Pier (22.3%), Zamboanga del Sur (10.4%), Batangas (10.2%), Mindoro Occidental (7.3%), Caticlan-Boracay (4.9%), Palawan (3.8%), Pasig River (2.6%), Manila North Harbor (2.6%), Manila South Harbor (2.6%). (See figure 7.2.1) These areas are characterized as having high concentrations of vessel traffic.

There was also heavy concentration of maritime accidents along the Manila Bay (See figures 7.2.2) and Pasig River (See figures 7.2.3), particularly in the vicinities of Bataan, Cavite, Padancan and Delpan Bridge. Heavy traffic of vessels and the absence of navigational aids such as sea markers, buoys and sea lanes led to several traffic-related accidents such as collision, allision and ramming. Also, ignorance of existing navigation rules often leads to erroneous maneuvering and miscalculations.

In addition, areas such as Mindoro Occidental, Mindoro Oriental, Batangas and Palawan are noted to be accident prone areas due to the surge of the tidal currents. Sudden changes in tides and currents as well as the weather often result in accidents such as capsizing, drifting, grounding and sinking. Because of this, vessel crews and shipping companies should be well-informed of prevailing weather conditions and forecasts to avoid mishaps.

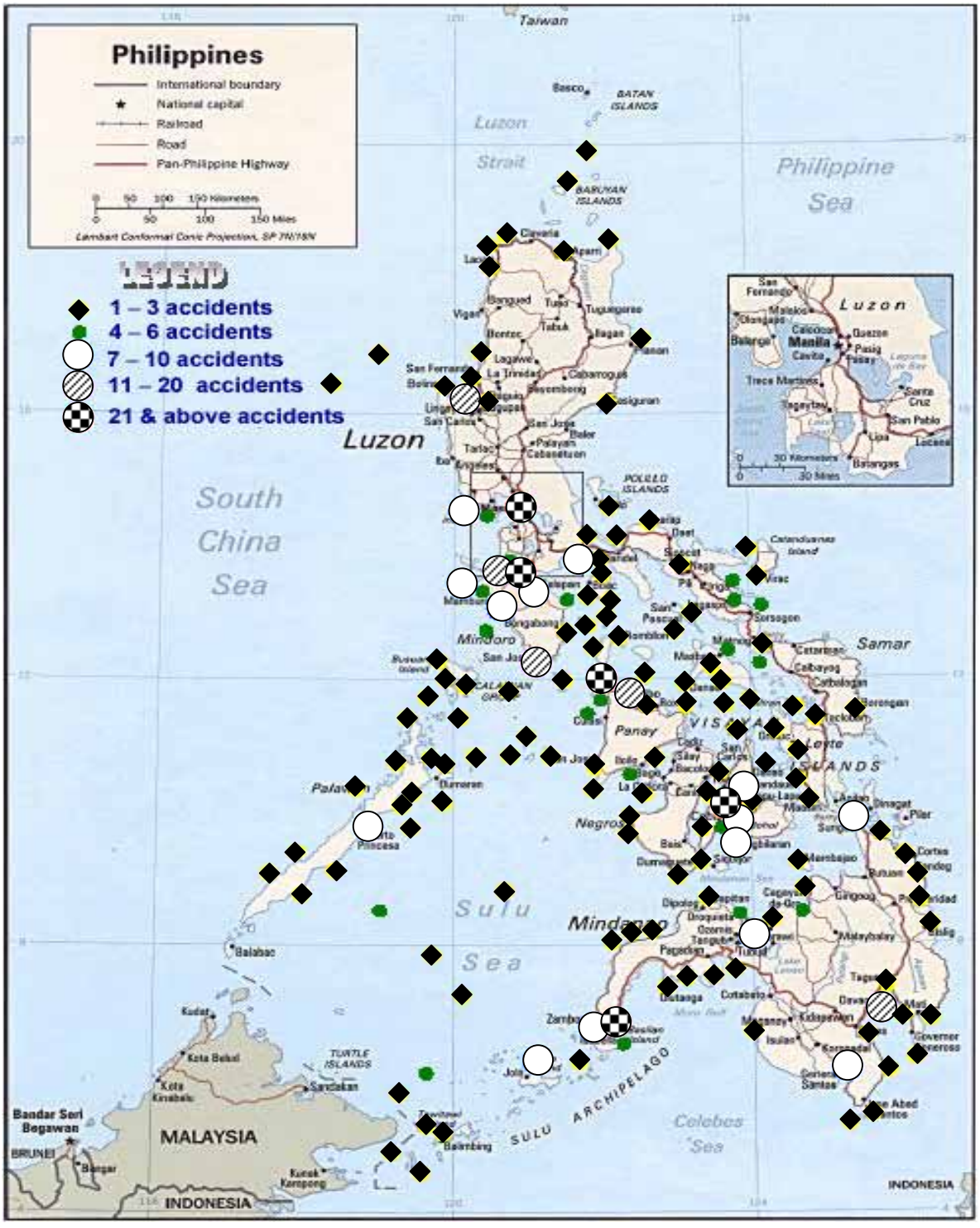


Figure 7.2.1 Location Map of Maritime Accidents Occurring in the Past 33 years

Figure 7.2.2. Incidents of Marine Accidents in Manila Bay(1970～2003)

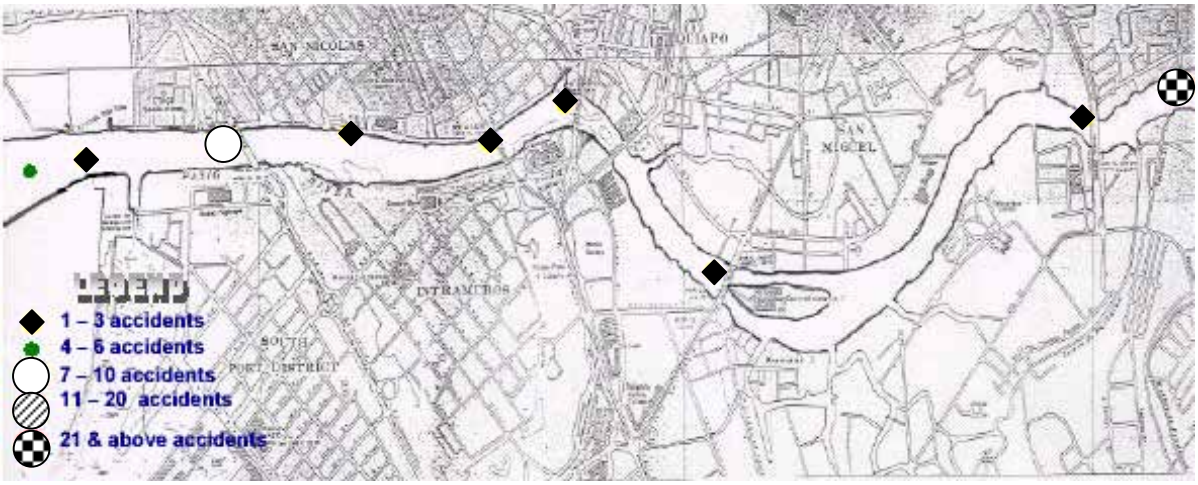


Figure 7.2.3 Incidents of Marine Accidents in Pasig River(1970～2003)

(6) Search and Rescue Activities

The PCG is responsible for search and rescue activities involving life and property at sea when maritime accident occurs. As of 15 October 2003, The PCG has eleven (11) vessels as well as 13 small crafts, one tugboat, 9 barges and 9 other types of ships. However, only nine (9) of the vessels are in operation. And some of other barges and other ships are under repair. As of 15 October 2003, PCG has five (5) aircraft. But only two (2) of them are operating. The number of vessels as well as aircraft in operation is scarce compared to the vast sea area that PCG is in charge of for search and rescue activities. That's why PCG isn't expected to undertake effective search and rescue operation.

Assisting the PCG in conducting maritime search and rescue is the Philippine Coast Guard Auxiliary (PCGA), which is a non-governmental organization composed of volunteers who are ship / pleasure yacht owners, individuals who have facilities that can be used for SAR (Search And Rescue); and doctors, nurses and other professionals who volunteered to help the PCG in the promotion of safety of life and property at sea as well as in the protection of our marine environment. At times the PCG conducts SAR operations in cooperation with the Philippine Navy to optimize utilization of government assets for such operation

7.2.2 Aids to Navigation

(1) Present Condition

Securing safety of marine traffic is one of the most important matters for the Philippine Government. Therefore the Government is promoting integrated countermeasures to ensure maritime safety. As one of the countermeasures, the Government is now implementing the Maritime Safety Improvement Project whose main aim is to set up navigation aids such as lighthouses and beacons.

As of 31 December 2003, the Philippine Coast Guard (PCG) operates and manages a total number of 564 ATON facilities and equipment including 516 lighthouses / light stations / beacons and 48 buoys. At present there are nearly 300 lighthouses that were constructed during Spainish and the USA occupation periods. Although these old types of ATON were already upgraded or modernized to meet current standards and specifications, total number of ATON facilities is still insufficient as per standard set by IALA. Although the Philippine Government has several ongoing projects to address this insufficiency, GOP has to puts emphasis on the development of navigation aids by foreign loan for some time in the future.

(2) Navigation Aids Development Project

The target of the Philippine Government is to install at least 900 new navigation aids in the near

future. However it is not clear if the Government will be able to realize this or not, because the Government has to rely on foreign loans for the most part. An outline of navigation aids projects completed, under construction or planned by DOTC is given below.

- Completed projects
  - Development project under 17th Yen Loan (Completed in 1994)
    Improvement, rehabilitation and renewal of 29 lighthouses of the old type located between Manila and Cebu
  - Development project under 20th Yen Loan (Completed in 2001)
    Project for installation of navigation aids mainly in Visayas region
    40 lighthouses, 12 buoy lights, 2 radar beacons, a buoy tender base and a new buoy installation vessel
  - Grant (Great Britain: Completed in 1996)
    New construction of 122 lighthouses along the Philippine coast
- Ongoing projects
  - Development project under 23rd Yen Loan(1999～)
    2 new buoy installation vessels, a buoy tender base and a disaster prevention base (Mactan Island in Cebu)
- Planned projects
  - Official development assistance from U.K.
  - Loan from Germany
  - Official development assistance from Canada.

As of 31 December 2003, the operational efficiency rate of all PCG ATON facilities has been recorded at 95.35%, however the operation rate of navigation aids is still lower than that recommended by the International Association Lighthouse Authority (IALA) and it should be raised. The following three items are indispensable for increasing the operation rate. (The lower limit of operation rate recommended by IALA is 99.99%.)

1) Periodical renewal of aged equipment
2) Appropriate operation and maintenance of equipment
3) Periodical change of consumable parts and supplement of spare parts

Table 7.2.2 Operation Rate of Aids to Navigation (Source: PCG)

Time	A	B	A/B (%)	Time	A	B	A/B (%)
Dec. 1995	362	508	71.3	Dec. 1999	467	636	73.4
Nov. 1996	385	485	79.4	Mar.2000	418	479	87.3
Jun. 1997	454	521	87.1	Mar.2001	499	557	89.6
Oct. 1998	441	552	79.9				

Note : A represents the number of Navigation Aids in operation
B represents the total number of Navigation Aids

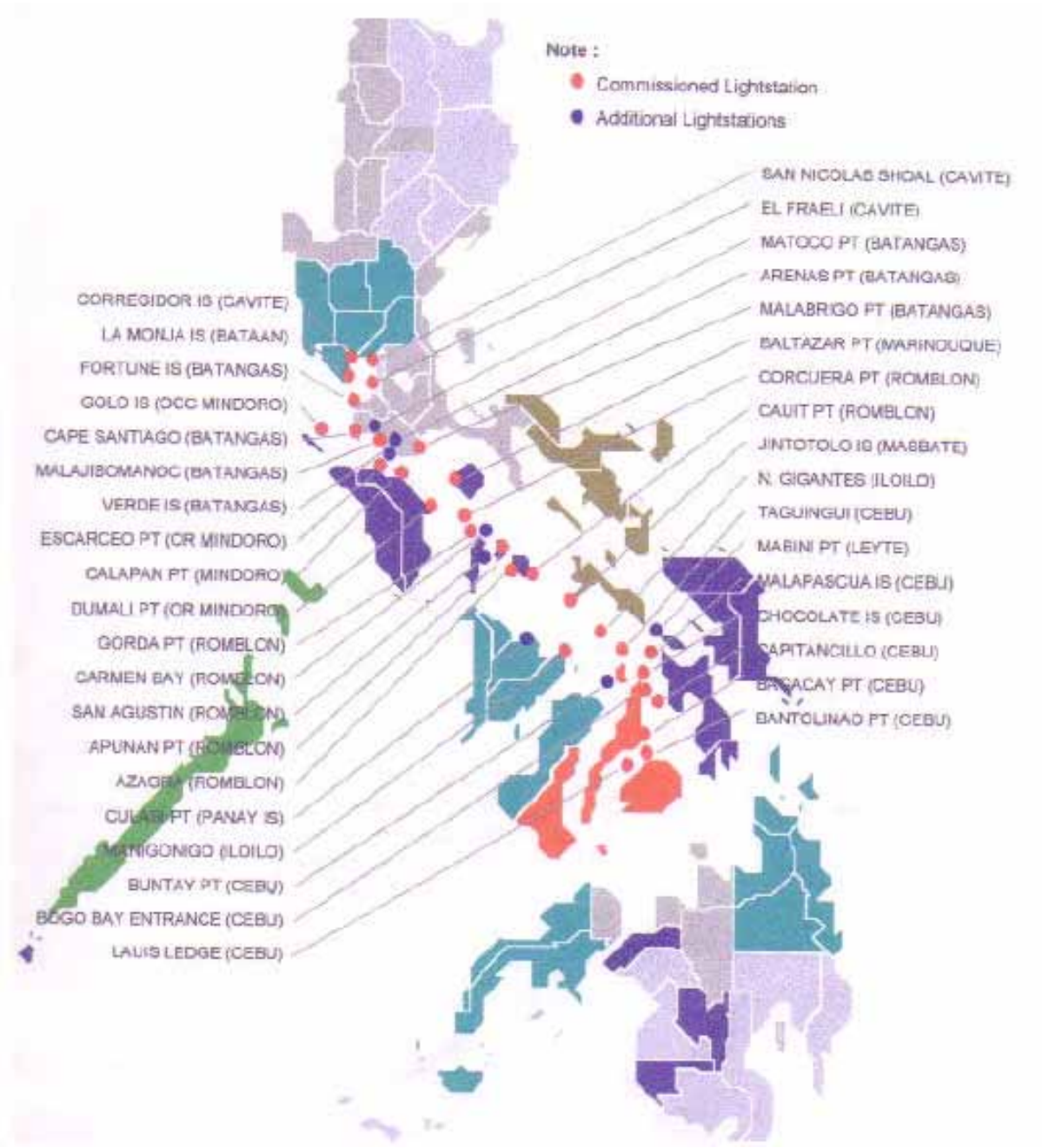


Figure 7.2.4 Location of Lighthouses Constructed/Rehabilitated by JBIC 17th Loan (Maritime Safety Improvement project-A)

In the planning stage, 28 aids to navigations had been constructed or rehabilitated, however actually 37 aids to navigations including additional 9 aids to navigation have been installed.

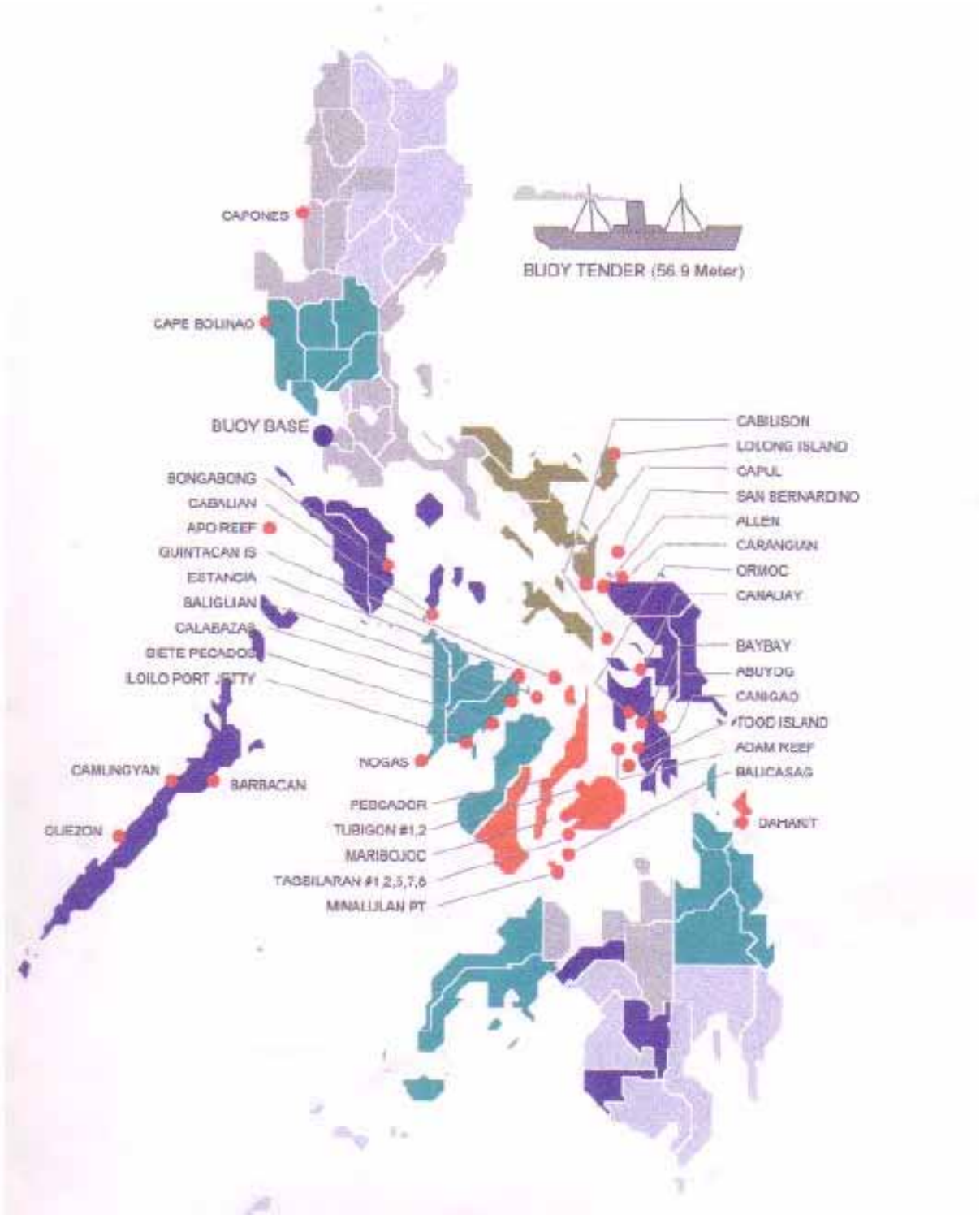


Figure 7.2.5 Location of Aids to Navigation Planned and Constructed/Rehabilitated under JBIC 20th Loan (Maritime Safety Improvement project-B)

(3) Navigation Map

NAMRIA-CGSD (National Mapping and Resource Information Authority, Coast and Geodetic Survey Department) is responsible for making navigation maps and has published 168 paper navigation maps as of February 2002. These maps cover almost all coastlines of the Philippines except a part of small islands, of which scale are one hundred thousandth (1/100,000) and two hundred thousandth (1/200,000). In addition, port and anchorage maps (scale: 1/10,000) are also published for major ports including Ports of Manila, Cebu, Davao and so on. But these maps have many problems in terms of accuracy. In short, navigation maps are unsatisfactory.

The problems are:

- The numerical values which were recorded in the original navigation maps made by the USA are used without conversion of the unit
- Black and white print
- No sounding has been carried out since 1996
- The data on navigation maps are quite old

The Government of the Philippines purchased two sounding vessels from Spain and started sounding works. However, it lacks the funds to purchase oils for vessels and thus the revision of navigation maps might be postponed.

Technology transfer from Japan for making electronic navigation maps is on going. The first electronic navigation map is to be published in December 2003.

7.2.3 Organization

(1) Philippine Coast Guard (PCG)

(a) Outline

The Philippine Coast Guard (PCG) was created by virtue of R.A.No. 5173 enacted on October 10, in 1967. In 1974, the Presidential Decree 601 or the Revised Coast Guard Law of 1974 was passed. During this time the PCG was placed under the direct supervision and control of the Department of National Defense. The function then of the PCG ranged from maritime law enforcement to supervision of training school. Since that time, however, the PCG has been stripped of both its police power and its regulatory functions, which have been transferred to the PNP-MG and MARINA; respectively. In 1998, the President issued E.O. No. 477 - Transferring The Philippine Coast Guard to the Department of Transportation and Communications - which completed the transformation of the PCG from a former military unit under the Philippine Navy to a now civilian agency of the DOTC.

Under the present structure, the PCG remains tasked with the maintenance and upkeep of Philippine lighthouses and all aids to navigation. The PCG is also the implementing arm of the MARINA for the latter's (MARINA's) issued Memorandum Circular on all matters regarding the shipping industry. Its power to penalize and fine are administrative in nature and are limited to licensed Filipino seafarers and ship owners.

Today, the central mission of PCG is to promote safety of life and property at sea, safeguard the marine environment and resources, enforce all applicable maritime laws and undertake other activities in support of the DOTC mission

(b) Functions

The Philippine Coast Guard shall perform the following functions:

1) **Maritime Safety Administration (MARAD)**[1] – includes among others, the enforcement of vessel safety regulations, port state control, type approval of life saving appliances and firefighting equipment and accreditation of their manufacturers/suppliers/servicing stations, investigation, administration of the removal of sunken derelicts and other hazards to navigation, regulation of the construction of bridges and other structures on waters subject to the jurisdiction of the Philippines, and assistance to the Maritime Training Council (MTC) and the Commission on Higher Education (CHED) in the administration of maritime education and training.

2) **Maritime Search and Rescue (MARSAR)** – covers the establishment, operation and maintenance of search and rescue (SAR) equipment and facilities, monitoring and guarding of distress frequencies, obtaining information on maritime safety and distress incidents and dissemination of same to all units capable of rendering assistance, and the actual conduct of SAR and disaster response operations.

3) **Marine Environmental Protection (MAREP)** – includes but is not limited to the prevention, mitigation and control of marine pollution through the conduct of marine pollution monitoring, scientific research and control operations and enhancement of PCG capability to respond to oil spills and other types of marine pollution. This function is likewise undertaken through the enforcement of marine environmental laws, rules and regulations and participation in national and local integrated coastal resource management initiatives.

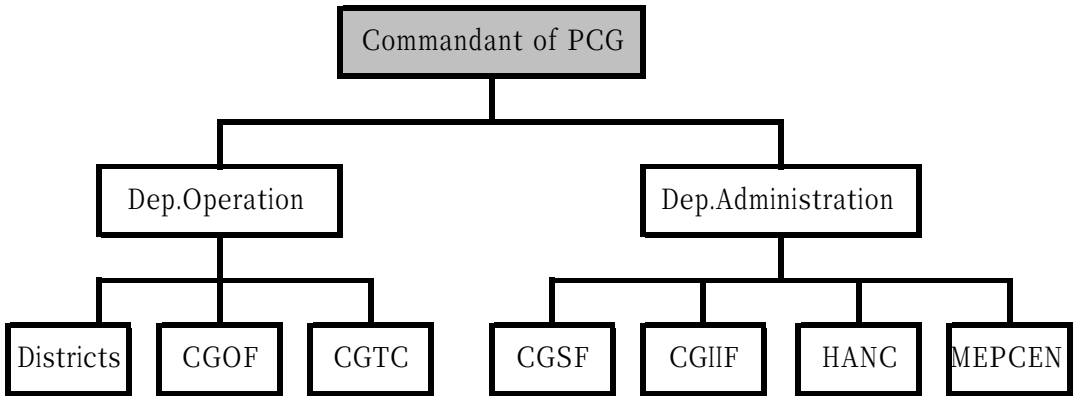
4) **Maritime Law Enforcement (MARLEN)** – refers to the enforcement of all applicable laws, rules and regulations pertinent to maritime shipping, immigration, quarantine, fisheries and such

[1] Note: PCG's function of Maritime Safety Administration is a deputized function from MARINA. MARINA's Maritime Safety Administration is mentioned in section (2) subsection (b) 6), 7), 8) on page 7-15 of this report.

other areas of national interest upon request of appropriate authorities or as deputized by other government agencies to the PCG.

5) **Maritime Operations (MAROPS)** – includes but is not limited to the conduct of maritime patrol and security operations of ports, harbors and coastal waters, control of shipping, maritime communications and important port facilities in times of emergency, limited sealift operations, and public affairs to include the administration of the CG Auxiliary and other volunteer groups.

Since 1994, MARINA had bee the sole governmental entity responsible for vessels inspection in the Philippines, however in 1998, in order to strengthening the safety of life and property at sea, PCG was deputized to undertake both function of vessels inspection and issuing seafarers license by D.O.98-1180 " Enforcing of Maritime Safety Rules and Regulations. After that although MARINA has continuously been legally the sole government entity responsible for vessel inspection, PCG has been inspecting vessels in operation entity to improve safety at sea. In other words MARINA makes good use of PCG's staff and facilities for vessel inspection under the responsibility of MARINA.
As a civilian unit, with the foregoing functions, the PCG has been successful in increasing its assets and upgrading its facilities and equipment through foreign grants, aid and loans.



CGOF :Coast Guard Operation Force
CGTC :Coast GuardTraining Center
CGSF :Coast Guard Support Facility
CGIIF :Coast Guard Intelligence and Investigation Force
HANC :Headquarters on Aids toNavigation Control
MEPCEN :Marine Environmental Protection Center

Figure 7.2.6 Organization Chart of PCG

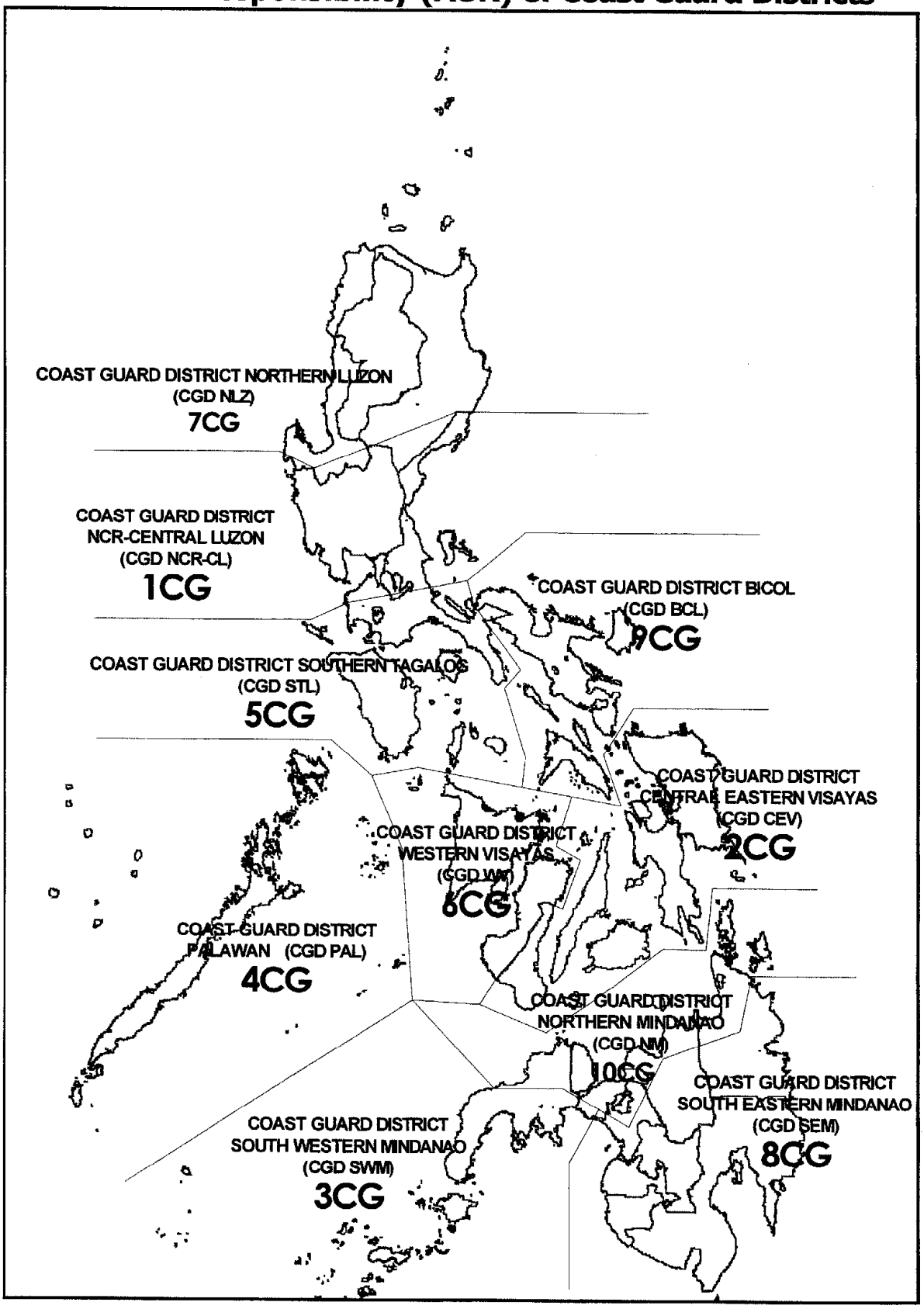


Figure 7.2.7 Precinct of the Philippine Coast Guard

(2) MARINA (Maritime Industry Authority)

(a) Outline

The Maritime Industry Authority (MARINA) was created in June 1974 by presidential Decree to integrate the development, promotion and regulation of the maritime industry (Domestic Shipping, Overseas Shipping, Shipbuilding & Ship Repair and Maritime Manpower) in the country. It was originally placed under the Office of the President. With the creation of the Ministry (now Department) of Transportation and Communications in1979, MARINA was attached to the MOTC for policy and program coordination in July 1979. With the issuance of EO No1011, quasi-judicial functions pertaining to water transportation were transferred to the MARINA
In January 1987, when MOTC was reorganized, and it became DOTC, the powers and function of the department and the agencies under its umbrella were defined which further increased the responsibility of the MARINA to the industry.

(b) Functions

The functions prescribed in Executive Order No. 125 and 125-A are as follows.

1) Develop and formulate plans, policies, programs, projects, standards, specifications and guidelines geared toward the promotion and development of the maritime industry, the growth and effective regulation of shipping enterprises, and for the national security objectives of the country.
2) Establish, prescribe and regulates routes, zones and/or area of operation of particular operator of public water services.
3) Issue certificate of Public Convenience for the operation of domestic and overseas water carriers.
4) Register vessels as well as issue certificates, licenses or documents necessary or incident thereto.
5) Undertake the safety regulatory functions pertaining to vessel construction and operation including the determination of manning levels and issuance of certificates of competency to seamen.
6) Enforce laws, prescribe and enforce rules and regulation, including penalties for violation thereof, governing water transportation and the Philippine merchant marine, and deputized the Philippine Coast Guard and other law enforcement agency to effectively discharge these functions.
7) Undertake the issuance of license to qualified seamen and harbor bay and river pilot.
8) Determine, fix and/or prescribe charge and/or rates pertinent to the operation of public water transport utilities, facilities and service except in case where charge or rates are established by international bodies or association of which the Philippine is a participating member or by

bodies or associations recognized by the Philippine Governments as the proper arbiter of such charges or rates.

9) Accredit marine surveyors and maritime enterprises engaged in shipbuilding, ship repair, shipbreaking, domestic and overseas shipping, ship management and agency.
10) Issue and register the Continuous Discharge Book of Filipino Seamen.
11) Establish and prescribe rules and regulations, standards and procedure for the different and effective discharge of the above functions.
12) Perform such other functions as may now or hereafter be provided by law.

(c) Business

MARINA is responsible for all aspects of safety for ships, especially for hull (hull structure). In case a vessel is newly built, purchased or remodeled, MARINA inspects the hull structure from the viewpoint of safety before the vessel goes into service. It is said that aged vessels purchased from Japan occupy nearly 80% of all vessels more than 500 gross tonnage, which are classified as large vessels in the Philippines. Moreover the vessels are remodeled for increasing passenger and cargo capacities in many cases. Therefore MARINA bears a heavy responsibility when it inspects such remodeled vessels.

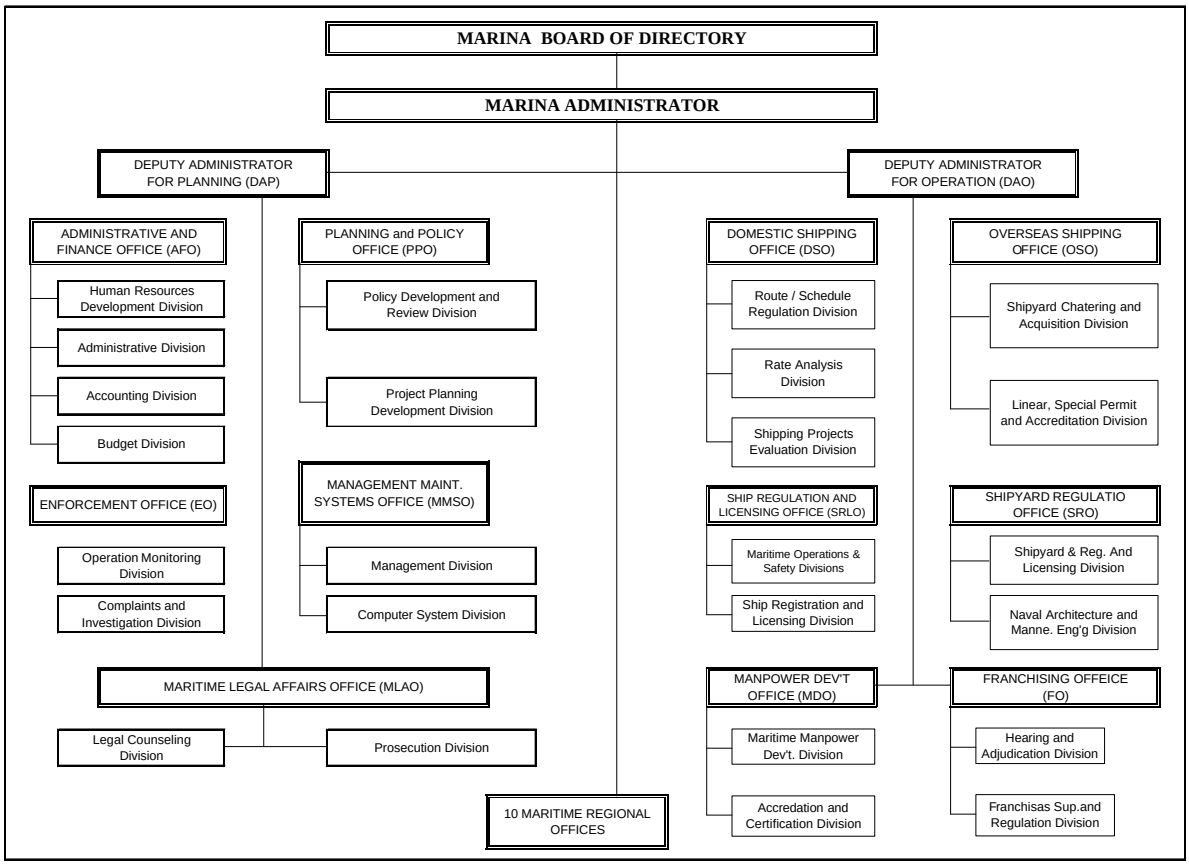


Figure 7.2.8 Organization Chart of MARINA

7.3 Navigation Safety Measures

7.3.1 Present Condition

Under the present set-up, the PCG has deputized by MARINA by virtue of Memorandum Circular No. 139 to undertake enforcement of laws, rules and regulations affecting maritime safety; and issuance of certain specific vessel safety document

At present PCG is deputized to undertake periodical inspections of the vessels in service. Under the system, PCG is obliged to inform the result of the periodical inspection to MARINA. But it has been said that, PCG does not always inform the result to MARINA.

However, according to PCG, sometimes problems crop up in the course of implementing these deputized functions, but the PCG and MARINA maintain close coordination and cooperation to rectify them. At present, both agencies are continually evaluating the procedures and policies regarding the deputization in order to further improve the enforcement of maritime safety law in the Philippines.

Meanwhile, MARINA recommends that the strength of vessels more than 300 gross tonnage be certified according to strict inspection such as that by Lloyds register, but actually MARINA also allows those vessels to be certified based on more lenient inspections. To safeguard lives and property at sea, MARINA should use its authority and introduce strict controls and systems.

In order to promote a sound shipping industry and reduce the number of maritime accidents and loss of lives and property at sea, strict regulation such as restrictive ban on importation of overage ships or ship's conversion might be necessary.

7.3.2 Analysis of Causes of Maritime Accidents

Analyzing the causes of maritime accidents is quite important for improving maritime transport safety. Philippine statistics on maritime traffic accidents indicate the type of accident, cause of accidents, ship type of accident, location of accident and the number of accidents. However, records are incomplete because all accidents are not necessarily reported to PCG.

In Japan all maritime accidents are reported to the Maritime Safety Agency. In the Philippines the Philippine Coast Guard assumes this role. Firstly PCG should make accurate and comprehensive reports on maritime traffic accidents and have the branch offices submit them to the head office periodically.

Next, causes of the accidents should be studied carefully. Then countermeasures can be considered. In addition, the government has to impose a duty on people to report all types of maritime accident to PCG, even if they seem small or inconsequential.
Maritime traffic accidents in Japan are shown in the following table.

Table 7.3.1 Maritime Traffic Accidents in Japan

	1993	1993	1995	1996	1997	1998	1999	2000	2001	2002
Collision	1116	1041	1121	1162	1007	928	972	1051	1008	1016
Aground	350	376	385	321	329	354	396	412	351	352
Capsized	268	169	134	193	148	204	179	203	158	139
Flooding	107	109	128	103	72	101	94	121	171	133
Propeller trouble	123	115	115	114	116	104	117	180	153	165
Rudder trouble	16	12	21	19	19	19	33	22	28	39
Engine trouble	248	217	224	218	204	219	261	298	339	230
Fire	114	136	108	134	98	107	110	135	110	102
Explosion	3	4	1	4	4	3	3	2	4	5
Missing	1	2	2	3	5	3	7	10	2	2
Others	214	223	251	265	225	209	256	333	368	510
Total	2560	2404	2490	2536	2227	2251	2428	2767	2692	2693

The number of maritime traffic accidents in Japan is nearly 15 times more than that in the Philippines. It is thought that the difference is due to the greater accuracy of statistics and busier maritime traffic in Japan. Related information is attached in the form. Based on these records, the following facts come to light.

a) Accidents of cargo vessels, tankers, fishing boats and passenger vessels increased while those of pleasure boats decreased.
b) Dead or missing reached 168 (nearly half of those in the Philippines in recent three years from 1998 to 2000).
c) Three-fourths of maritime accidents by vessels of more than 1,000 tons were foreign ones.
d) Three-fourths of maritime transport accidents occurred as a result of human error.

This kind of information is very useful for improving of maritime transport safety.

7.3.3 Navigation Safety Measures

(1) Development of Aids to Navigation

The Philippine government has a plan to install at least 900 new navigation aids. However the government has installed only a small number of aids to navigation so far because of insufficient budget. Prioritized development of navigation aids is a must under the limited budget. It is also very important to study the relation between lack of navigation aids and maritime transport accidents and to hear ship crews' opinions and requests.

(2) Publication of Navigation Map

Navigation maps in the Philippines are inaccurate and unsatisfactory. "Aground" vessels account for a sixth of all accidents in the Philippines. Sounding vessels purchased by loan from Spain do not work well because of shortage of vessel operating cost. Making navigation maps over dangerous waters should be given high priority.

(3) Weather Forecast

Weather forecast is indispensable for safe navigation. When a typhoon approaches, vessels need to seek sheltered waters of refuge. At present there is no reliable weather forecast information in the Philippines. Therefore some major shipping companies rely on the US Navy weather forecast and/or weather forecast in Japan which covers the Philippine area. A reliable meteorological organization needs to be established in the Philippines.

(4) Establishment of Vessel Traffic Control Center

In a congested sea area, narrow passages/channel, it's often necessary for vessels to navigate at low speed in order to avoid maritime accidents. Vessel traffic control center is able to provide necessary information about navigation speed limit at fairways, direction and speed of tidal current and into/out of port control by using large display unit and public radio information systems. There are many congested sea areas and narrow passages/channel in Philippine waters. Vessel Traffic Control Centers are indispensable to reduce the number of maritime accidents.

(5) Vessel Inspection

Vessel inspection is very important because aged vessels purchased from Japan account for about 80% of all vessels more than 500 gross tonnages. Inspections are currently carried out by two organizations, MARINA and PCG, however, their coordination is not always sufficient. Unified inspection by a single organization should be studied.

(6) Enforcement of Rules and Regulations

Large number of maritime accidents in the Philippines results from violation of rules and regulations of maritime transportation such as illegal conversion of ships, overloading of cargo/people, inadequate life-saving equipment and so on. It is important for shipping operators to observe the rules and regulation of maritime shipping in order to decrease the number of maritime accidents and casualties in the Philippines.

(7) Installation of Communication Devices

Communication devices are indispensable for small ship operators, especially banca boat operators. In the event of an accident, communication devices allow the ship in distress to alert the proper authorities or other vessels in the area.
Shipping operator has to call in the responsible agency with information on the location of the ships, type of accident, number of passengers/crew member and volume of cargoes. This information is necessary for quick and accurate search and rescue operations.

Chapter 8 Technical Standards for Port Planning

8.1 Present Situation

In the Philippines, many kinds of manuals, codes and standards are used for detailed design, civil/structural and architectural works and the construction of other facilities. Some of them were established in foreign countries. Major manuals, codes and standards are shown in Table 8.1.1.

Table 8.1.1 Manual, Codes and Standards Used in the Philippines

Detailed Design	Civil/structural and architectural works	Electric, mechanical, & other discipline	Other reference code
1) Design Manual, Port & Harbor Facilities in the Pilis. PPA 2) American Association of State Highway and Transportation Officials 3) Standard Specification (DPWH) 4) National Building Code (NBC) 5) Design Guidelines Criteria and Standards (DPWH) 6) US Corps of Engineers Marin Construction Manual 7) American Institute of Steel Construction (AISC) 8) American Concrete Institute (ACI) 9) American Society of Testing Materials (ASTM) 10) American National Standards Institute (ANSI)	1) National Structural Code of the Philippines (NSCP) 2) Uniform Building Code (USA) 3) Building Code Requirements for Structural Concrete & Commentary (ACI31EM-99) 4) Concrete Reinforcement Detailing (ACI) 5) Manual of Steel Construction (AISC) 6) Minimum Design Loads for Building & Other Structures (ANSI)	1) Philippine Electrical Code (PEC) 2) Philippine Society of Mechanical Engineers' Code (PSME) 3) Uniform Plumbing Code (UPC) 4) American Waterworks Association (AWWA) 5) National Electrical Manufacturers Association (NEMA)	1) International Standards Organization (ISO)

There is no technical standard related to port planning with regulatory power in the Philippines. In order to secure the safety at ports and to invest more efficiently with proper maintenance of facilities, it is necessary to establish a technical standard with regulatory power.

On the other hand, there is a guide for port planning and a design manual for port facilities entitled "Guide to Port Planning, 1995(PPA)" and "Design manual for Port Facilities in the Philippine Ports Authority (1995)".

The former was prepared and submitted by a JICA expert assigned to the Philippine Ports Authority, in cooperation with PPA staff. This manual is not a technical standard but a textbook which explains how to plan a port.

The latter manual was also prepared and submitted by a JICA expert assigned to the Philippine Ports Authority in cooperation with PPA staff. It is not a planning manual but a design manual. While mainly based on Japanese criteria, the manual contains significant modifications in order to conform to Philippine conditions and practices.

According to the manual, these design criteria can be applied to all the port and harbor facilities under the PPA locally funded and also to the facilities funded by foreign loans and the private port facilities. But designers can adopt other design methods based on technical standards of foreign countries when practical.

However, the manual does not cover some facilities such as RO/RO facilities, container berths for cellular type container fleet, etc. It is expected that subsequent editions of this manual will be expected to include such facilities.

8.2 Japanese Technical Standards for Port Planning

In Japan, the technical standards are stipulated in the Port and Harbour Law and the related Enforcement Order and Enforcement Regulations, and they are compulsorily applied when port facilities are constructed, improved and maintained. Therefore it can be said that the technical standards contribute to the safe and smooth administration, management and operation of ports.

Port and Harbour Law in Japan
[Article 56-2-2] (Technical Standards for Port Facilities)

> Construction, improvement or maintenance of water facilities, protective facilities, mooring facilities and other facilities specified by Government Ordinance shall be in conformity with technical standards set by the Ministry of Land, Infrastructure and Transport Ordinance in addition to the provisions of application laws or regulations, if any.

Port and Harbour Law Enforcement Order
[Article 19] (Port and Harbor Facilities)

The port facilities specified by Enforcement Regulations under Article 56-2-2 of the law shall be the port facilities given below (excluding the port facilities specified by the Ministry of Land, Infrastructure and Transport Ordinance in consideration of their scale and structure). However, the facilities given in clauses 4 to 7 shall be limited only to port facilities.

(1) Water facilities
(2) Protective facilities: (excluding coastal conservation facilities as specified in Article 2 paragraph 1 of the Coastal Law for the establishment of coastal management bodies (Law No.101 of 1956) and river management facilities as specified in Article 3 paragraph 2 of the River Law for the establishment of river management bodies (Law No.196 of 1964)
(3) Mooring facilities
(4) Port transport facilities
(5) Cargo handling facilities (in the case of goods handling machinery, limited to petroleum goods handling machinery).
(6) Custody facilities
(7) Vessel servicing facilities
(8) Fixed facilities for passenger embarkation and disembarkation and mobile facilities for passenger embarkation and disembarkation

Port and Harbour Law Enforcement Regulations
[Article 28] (Stipulation of Facilities excluded from coverage)

In this Article, the excluded port facilities in consideration of their scale and structure are stipulated.

Technical Standards [The Ministerial Ordinance]

The Ministerial Ordinance regarding the technical standards is composed of 5 chapters and 16 articles. The detailed regulations are stipulated in the Ministerial Notification.

These law, Enforcement Order, Enforcement Regulation and the Ministerial Ordinance are applied not only to planning but also to designing, construction, improvement and maintenance of port facilities.

In addition, Ministerial Ordinance specifying standards on basic matters of port and harbor planning has been issued. This provides basic matters on policies of port and harbor planning, port capacity, scale and layout and port facility planning. The detailed criteria are stipulated in the technical standards.

8.3 Main Items of the Technical Standards for Planning in the Philippines

The following items should be included in the technical standards for planning in the Philippines. Each item is mainly based on the technical standards in Japan. Some of them may be modified to adjust Philippine circumstances. For example, technical standards for small ships should be studied because Japanese technical standards mostly target port facilities for large vessels.

It is proposed that the technical standards for planning should be issued as a law or a government order to promote safe and smooth activities at ports.

8.3.1 General items

Port and harbor planning policies and the methods of determining port capacities and scale and layout of port and harbor facilities should be provided as general items.

(1) Policies of port and harbor planning

In order that the policies for the development, utilization, and preservation of ports and harbors as well as the preservation of areas adjacent to ports and harbors might be appropriate in view of natural conditions, economic and social conditions in the port or harbor and surrounding areas, the functions of ports and harbors in the vicinity, the conditions of transportation in the port or harbor and its environs, the effects on the natural environment and living environment of the port and its environs, and the effects on fisheries, policies relating to the matters given as follows shall be specified in uniform and comprehensive fashion, while the target year of the port plan shall also be specified.

1) The position and function of the port and harbor
2) The development and use of port and harbor facilities
3) The use of land in the port and harbor
4) The development and preservation of the port and harbor environment
5) Maintaining the safety of the port and harbor
6) Conservation of areas adjacent to the port and harbor

(2) Port capacities

In order that matters relating to the volume of cargo that can be handled and other capacities of the port and harbor might be appropriate in view of natural conditions, the economic and social conditions of the port and harbor and its surrounding areas, the functions of the port and harbor, etc., the volume of cargo to be handled, the number of passengers embarking and disembarking, and other capacities of the port and harbor in the target year of the port and harbor plan shall be specified.

In these cases, consideration will be made of measures to cope with changes in the systems of conveyance and cargo handling in the port and harbor and its environs, the maintenance of safety and preservation of the environment in the port and harbor and its environs, and other matters.

(3) Scale and layout of port and harbor facilities

In order that matters relating to the scale and layout of the port and harbor facilities in accordance with the capacities of the port and harbor might be appropriate to the capacities of the port and harbor in view of the natural conditions, the economic and social conditions in the port and harbor and surrounding areas, the conditions of use of existing port and harbor facilities, and the preservation of the port and harbor and the areas adjacent to it, the scale and layout of the port and harbor facilities shall be specified in a uniform and comprehensive fashion.

8.3.2 Planning conditions

When making a port development plan, planning conditions such as socio-economic conditions, natural conditions, ship dimensions, present port facilities and cargo throughput need to be grasped properly.

(1) Socio-economic conditions

Major items on socio-economic conditions are as follows:

1) Socio-economic framework
   - Population
   - Income
   - Industry (GRDP, Turnout by industry)
2) Utilization of land and waters
3) Transportation
   - Access to adjacent cities
   - Transport capacity
   - Present situation and future plan of transportation network
   - Transport cost
4) Marine activities
   - Fishery
   - Marine recreation
5) Environment
   - Social environment (Squatter, Cultural heritage, etc.)
6) Related plan
   - National plan (National development plan, Economic plan etc.)
   - Regional development plan

(2) Natural conditions

Major items on natural conditions are as follows:

1) Meteorological conditions (Wind; wind direction, wind velocity, typhoon, Rainfall, Temperature etc.)
2) Hydrographic conditions (Wave, Tide, Current, Tsunami etc.)
   Design tidal levels at major ports in the Philippines are described in "Design Manual for Port and Harbour Facilities in PPA (1995)". (see Appendix 8.3.1.)
3) Inflow of rivers
4) Geographical conditions (Geography on land and sea bed)
5) Littoral drift
   In the Philippines severe sedimentation problem has not been occurred, because many structures of mooring facilities are open-type wharf on vertical piles and there are few large breakwaters. However when planning large breakwater or long gravity type wharf perpendicular to a shore line, littoral drift phenomenon should be examined carefully.
6) Geological conditions
7) Earthquake
8) Environment (Water quality, Bottom sediment, Vegetation etc.)

(3) Dimensions of target vessels

Dimensions of target vessels are also provided in "Design Manual for Port and Harbour Facilities in PPA (1995)". Most of them are quoted from the old Japanese technical standards. The new dimensions are shown in Appendix 8.3.2. There are many smaller vessels and boats in the Philippines than the vessels shown in Appendix 8.3.2. Examples of the small vessels and boats are shown in Appendix 8.3.3. Dimensions of a target vessel shall be determined appropriately considering these examples.

(4) Present port facilities and cargo throughput

Protective facilities (Length)
Water facilities (Radius, Length, Width, Water depth)
Mooring facilities (Length, Water depth)

8.3.3 Port and harbor facilities

(1) Water facilities

The scale and layout of water facilities shall be specified such that the functions of the port and harbor can be adequately maintained and moreover that vessels can use them safely and smoothly, in

view of the types, forms and numbers of vessels making use of the water facilities, the conditions of use of mooring facilities, the level of calmness of the water areas, and so on.

1) Navigation channel

a) General

In planning a navigation channel, consideration shall be given to the safety of navigation, the ease of ship maneuvering, the topographic, meteorological and marine conditions, and the conformity with related facilities.

b) Alignment

When a navigation channel has a bend, the intersection angle of centerlines of channels at the bend shall be made as small as possible.

* In the determination of the intersection angle at a bend of navigation channel, it is necessary to consider the turning diameters, the sailing speeds, the ration of vessel's draft to water depth, the number of navigation aids deployed, etc.
* When the direction of wind or tidal currents is nearly perpendicular to a navigation channel, ship maneuvering is greatly affected by the wind or tidal currents. Therefore, it is necessary to consider these effects where wind and/or tidal currents are strong.
* It is advisable that the intersection angle of channel centerlines at a bend will not exceed approximately 30 ° .

c) Width

In the determination of the width of a navigation channel, due consideration shall be given to the types and dimensions of target vessels, the traffic volume and length of the channel, and natural conditions including meteorological and marine conditions.

* For a double-way channel: 1.0L (L indicates the length overall of the target vessel.)

  Except for

  + cases in which the length of the navigation channel is relatively long : 1.5L
  + cases in which the target vessels frequently pass in both ways through the channel : 1.5L
  + cases in which the target vessels frequently pass in both ways through the channel and the length of the channel is relatively long : 2.0L

  For one-way channel: 0.5L
* For navigation channels for fishing boats or ships of less than 500GT, appropriate channel width is determined in consideration of the usage conditions.

d) Depth

The depth of a navigation channel shall be determined by adding an appropriate keel clearance to the maximum draft expected of the target vessel. In addition, appropriate allowance should be added as necessary in consideration of the type of the bottom material, vessel motions, trim

and hull sinking of vessels, errors of charts and surveying data, and accuracy of dredging.

In the case that the target vessels always navigate with shallower drafts than the respective full drafts, such as in the channels for vessel's approach from/to docks and in those for vessels that always call for after finishing unloading at another port, however, the channel depth may be otherwise.

e) Length

The length of a navigation channel at the harbor entrance and the area of basin neighboring the channel shall be determined appropriately in consideration of the stopping distance of the target vessel.

2) Basins

a) General

In planning basins, considerations shall be given to the safety in anchorage, the ease of ship maneuvering, the cargo handling efficiency, the meteorological and marine conditions, the effects of reflected waves and ship-generated waves on vessels in the harbor, and the conformity with related facilities.

b) Location

The location of basin shall be determined appropriately in consideration of the layout of breakwaters, wharves and navigation channels, and the calmness requirement.

c) Area of basin used for anchorage or mooring

* In determination of the area of a basin used for anchorage or buoy mooring, due consideration shall be given to the purpose of the use, anchorage method, sea bottom material, wind speed, and water depth.
* For buoy mooring considerations shall be given to the type of the use, and to the horizontal movement of the buoy when the tidal range is large.

In Japan, the anchorage area is generally determined according to the criteria in Table 8.3.1.

Table 8.3.1 Anchorage Area

Purpose of the use of the basin	Anchorage method	Sea bottom material or wind speed	Radius
Offshore waiting or cargo handling	Swinging mooring	Good anchoring	L + 6D
		Poor anchoring	L + 6D + 30m
	Mooring with the two anchors	Good anchoring	L + 4.5D
		Poor anchoring	L + 4.5D +25m

Note: L; length overall of target vessel(m) D; water depth(m)

Area of basin used for buoy mooring is determined according to the criteria in Table 8.3.2.

Table 8.3.2 Area of Basin used for buoy mooring

Anchorage method	Area
Single-buoy mooring	Circle having a radius of (L+25m)
Double-buoy mooring	(L+50m) x L/2 rectangle

Note: L; length overall of target vessel(m)

d) Area of basin used for ship maneuvering

(d-1) Turning basin

In the determination of the area of a basin used for bow turning, due consideration shall be given to the method of bow turning, the vessel's bow turning performance, the layout of mooring facilities and navigation channels, and the meteorological and marine conditions.

The standard area of basin in Japan is as follows:

* Bow turning without assistance of tugboats : Circle having a diameter of 3L
* Bow turning using tugboats : Circle having a diameter of 2L

As for small ships, when the above standard area cannot be provided due to topographic conditions, the area of turning basin in Japan may be reduced to the following level by using mooring anchors, winds, or tidal currents.

* Bow turning without assistance of tugboats : Circle having a diameter of 2L
* Bow turning using tugboats : Circle having a diameter of 1.5L

(d-2) Mooring/Unmooring basin

In the determination of the area of a mooring/unmooring basin, consideration shall be given to whether or not tug boats are used, effects of wind and tidal currents, and ease of ship maneuvering.

e) Depth

The depth of basin below the datum level shall be determined by adding an appropriate keel clearance to the maximum draft expected.

f) Calmness

For basins that are located in front of mooring facilities and used for accommodating or mooring vessels, the calmness of a specified level shall be achieved for 97.5% or more of the days of the year.

Most of the Philippine ports have no breakwater, where the calmness of the port is low. In busy ports, the calmness criteria should be provided.

The threshold wave heights for cargo handling for basins in front of mooring facilities should be determined appropriately in consideration of the type, size, and cargo handling characteristics of the vessels. In Japan, the values listed in Table 8.3.3 are usually used.

Table 8.3.3 Threshold wave height for cargo handling

Ship size	Threshold wave height for cargo handling (H1/3)
Small-sized ship	0.3m
Medium- and large sized vessels	0.5m
Very large vessels	0.7 – 1.5m

g) Maintenance

In principle, navigation channels and basins shall be maintained appropriately for safe and smooth vessel operations in accordance with relevant standards, in consideration of the natural conditions and the status of the use.

(2) Protective facilities

The scale and layout of protective facilities shall be specified such that their functions can be adequately fulfilled in view of various conditions such as those of the use of water facilities and mooring facilities protected by the protective facilities.

1) General

In planning of protective facilities such as breakwaters, the following consideration shall be made:

* Interrelations with navigation channels, basins, mooring facilities, and other facilities
* Their influences exerted on the nearby water area, facilities, topography, currents, and other environment after their construction
* Room for future development of the port

2) Maintenance

Protective facilities for harbors shall be maintained in good condition based upon appropriate standards and guidelines, considering the natural conditions and construction characteristics in question, so that they will fully perform their functions.

3) Layout of breakwaters

Breakwaters shall be appropriately located so that the calmness conditions of channels and basins will be satisfied.

(3) Mooring facilities

The scale and layout of mooring facilities shall be specified such that safe and effective operation can be made of the functions and mooring facilities of the port and harbor and other proper management can be sufficiently maintained, in view of the types, forms, and numbers of the vessels using the mooring facilities, the types and volume of cargo handled, the cargo handling system, and the conditions of use of the water facilities.

1) General

In planning of mooring facilities, careful consideration shall be given to their relationship with navigation channels, basins, and protective facilities, their influence on topography, harbor and other facilities, and the environment in the neighboring locations, as well as the space for the future development of the port.

2) Maintenance

In principle, mooring facilities shall be maintained in accordance with appropriate standards in consideration of the structural characteristics of the facility so that the facilities can perform the required function.

3) Length and water depth

a) When the target vessel can be identified, the length and water depth of berth shall be determined as follows:

* The length of a berth shall be set in principle by adding the lengths of the bow and stern mooring ropes to the length overall of the target vessel.
* The water depth of a berth shall be set in principle by adding an appropriate keel clearance to the maximum draft. In Japan, a value equal to about 10% of the maximum draft is usually used for the keel clearance as a standard.

b) When the target vessel cannot be identified, appropriate length and water depth shall be used. Japanese standard main dimensions of berths are shown in Appendix 8.3.2. However berths dimensions for smaller vessels are not included. Examples of small vessel dimensions in the Philippines are shown in Appendix 8.3.3. The standard main dimensions of berth for small vessels should be stipulated using these data.

c) The datum level to measure the water depth of mooring facilities shall be appropriately determined based on "8.3.1 Tidal Levels".

4) Crown height

The crown of mooring facilities shall be set at an appropriate height that is suitable for the main dimensions of the target vessel and the natural conditions of the surrounding area. The tidal level that is used as the datum in the determination of the crown height shall be the mean monthly-highest water level.

In Japan the values listed in Table 8.3.4 are used as a standard. These values can be applicable to a tidal range of less than 3.0m.

Table 8.3.4 Typical crown heights of mooring facilities above the high water level

	Typical crown height
Mooring facilities for large vessel (with a water depth of 4.5m or over)	+1.0 ～ 2.0m
Mooring facilities for small vessel (with a water depth of less than 4.5m)	+0.5 ～ 1.5m

5) Ship clearance

The wall and front toe of the quay wall shall not contact with a berthing vessel.
In the cross sections of a vessel, the bottom corner sections are slightly rounded and have bilge keels projecting from them. In many cases, the radius of curvature of the corner sections and the height of the bilge keels are 1.0 to 1.5m and 30 to 40cm, respectively. Therefore the envelope of corner sections may be assumed nearly 90° including the bilge keels. The planned water depths of berths are generally deeper than the full-load draft of the target vessel by 0.3m or more. Figure 8.3.1 shows the ship clearance for mooring facilities that is set by taking into consideration the above facts and past examples.

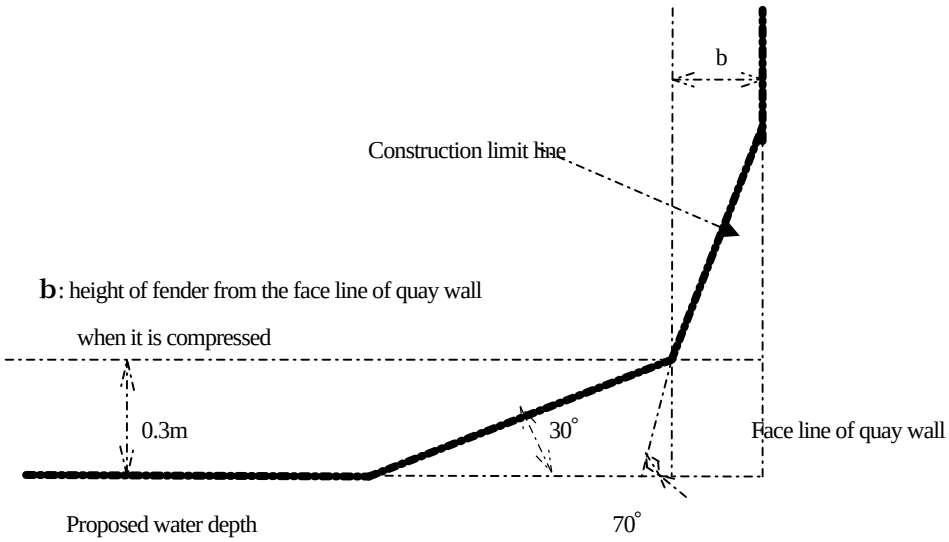


Figure 8.3.1 Ship Clearance for Mooring Facilities

(4) Sites of passenger facilities, cargo handling facilities, and storage facilities

The scale and placement of sites for passenger facilities shall be such that passengers can use them safely and smoothly, in view of the numbers of passengers embarking and disembarking, and others. The scale and placement of cargo handling facilities and storage facilities shall be specified such that they can adequately fulfill their functions in view of the types and volumes of cargo handled, the conditions of use of mooring facilities and port transport facilities, and so on.

1) Facilities for passenger

a) The structure of passenger boarding facilities shall meet the following requirements.

* The width of a passage shall be set at 75cm or more considering the conditions of use. It is preferable to set at 1.2m or more in light of the use by the elderly and the physically handicapped persons.
* A passageway shall have ancillary provisions such as the sidewalls and hand rails on both sides, and a skid proof agent shall be applied or a non-slippery material shall be used on the surface of passageway.
* The rise of step stairway shall be set in the light of safety. A landing shall be set on the stairway as necessary.
* The boarding facility shall not be used both for passengers and vehicles. If passenger can be separated from vehicles, however, the facility may be used for both passengers and vehicles.
* The gradient of a slope shall be determined appropriately in light of safety. (The gradient of a slope is normally 12% or less, but should preferably be 5% to 8% or less in light of the use by the elderly and the physically handicapped persons.

b) The allowable vertical displacement at the seaward end of a movable bridge for passenger boarding shall be determined in light of the tidal range, the change in the molded draft, and the pitching and rolling of ships.

c) Ancillary facilities shall be equipped appropriately in light of the safety of passengers.

* Handrails not only represent a preventive measure against falling but also work to ensure smooth passage by alleviating passengers' feel of danger. The height of handrails should be 1.1m or more, which may prevent an average-sized adult from jumping over the handrail. Stays, crosspieces, and/or netting should be installed for infants, children and users in wheelchairs.
* Fences, ropes, and chains should be provided at the gateways, in order to guide passengers safely to boarding facilities. Fences should be at least 70cm high to ensure safety. Ropes and chains should be extended tightly and should not be loosened unnecessarily.
* When a roof is provided, the height should be 2.1m or more.
* Emergency exit should be provided when the length of the passageway exceeds 60m. The distance between entrance/exit and emergency exit or that between emergency exits should be 60m or less. Marking sign or signs indicating an emergency exit should be provided in the passageway.

2) Aprons

a) General

* The apron shall be provided between the face line of wharf and the shed or the open storage yards in order to ensure safe and smooth operations of temporary stacking of loading / unloading cargoes, cargo handling work, entry and exit of cargoes, and traffic of cargo handling vehicles.
* The apron shall have an adequate area ensuring safe and smooth cargo handling.

b) Width

The width of apron shall be planned appropriately in consideration of the size and use of the wharf, and the structure and use of the sheds or warehouses behind the wharf, so that safe and smooth cargo handling is ensured.

Table 8.3.5 Standard Apron Width

Water depth of berth (m)	Apron width (m)
Less than 4.5	10
4.5 or more and less than 7.5	15
7.5 or more	20

c) Gradient

The gradient of the apron shall be planned appropriately in consideration of the rainfall intensity and the use of the area behind the apron so that cargo handling will be performed in a smooth manner. Ordinarily a gradient of 1% to 2% toward the sea is used.

3) Cargo Sorting Areas

* The size of a cargo sorting area shall be planned appropriately considering the kinds and quantities of cargo handled and their handling conditions.
* Cargo sorting areas shall be paved appropriately according to the purpose and condition of their use.
* The width and curves of passageways shall allow safe and smooth operation of vehicles and cargo handling equipment.
* A cargo sorting area shall be provided with drainage facilities such as drain ditches.
* Provision of signs, boards, and fences prohibiting public entrance shall be made at cargo sorting areas which are considered dangerous.
* In a cargo sorting area where the contents of cargo may be blown and scattered by wind, walls or other proper measures shall be provided around its periphery.

4) Quay shed

* Quay sheds shall meet the following requirements to ensure smooth cargo handling before the entrance and after the departure of vessels.
  + The size of a shed shall be determined considering the kinds and quantities of cargoes and their handling conditions.
  + The width and curves of passageways in a shed shall be determined to allow safe and smooth operation of cargo handling equipment.
* Where dust is raised by cargo handling works, proper ventilating equipment shall be provided as necessary.
* When there is danger of inundation due to a storm surge, a tide gate or any other equipment shall be installed for preventing the intrusion of sea water.
* Quay shed shall be equipped with the provisions of appropriate signs to ensure safe and smooth use as necessary.

5) Yards for dangerous cargo and oil storage facilities

* Yards for dangerous cargo and oil storage facilities shall be located in a close proximity, unless topographical conditions or other reasons require otherwise.
* An open space with an appropriate width shall be reserved around the yards for dangerous cargo and oil storage facilities in correspondence to the type of dangerous cargo and the

structure of the facilities.

(5) Special Purpose Facilities

1) Container terminals (for LO/LO ships)

a) General

A container terminal shall be planned with due consideration for factors such as the trend of container transport, the economic activities of its hinterland, intermodal transport conditions, and the amount of available land. To ensure the smooth and efficient container loading / unloading and storage of containers, a container terminal needs a sufficiently wide area in order for its various facilities to be properly arranged.

b) Length and water depth

The length and water depth of a berth for mooring a container ship shall be determined to allow safe and smooth berthing of the target vessel. In the Philippines, standard for smaller container vessels should also be provided.

Table 8.3.6 Standard berth length and depth of container wharf

Size of ship (DWT)	Berth length (m)	Berth depth (m)
30,000	250	12.0
40,000	300	13.0
50,000	330	14.0
60,000	350	15.0

2) Ferry (RO/RO) terminals

a) General

A ferry terminal shall be planned with particular attention paid to both structural stability and safety of users, because a ferry terminal is generally utilized simultaneously by both passengers and vehicles, day and night.

b) Length and water depth

The length and water depth of berths for mooring ferryboats (RO/RO vessels) shall be determined appropriately to ensure the safe and smooth use by the target vessel.

Table 8.3.7 Standard length and water depth of short- and medium-distance ferry terminal berths

Target ferry Gross tonnage (GT)	Wharf for ferries with bow and/or stern ramps		
	Quay length of bow and stern side (m)	Length of berth (m)	Water depth of berth (m)
400	20	60	3.5
700	20	80	4.0
1,000	25	90	4.5
2,500	25	130	5.5
5,000	30	160	6.5
10,000	30	180	7.0

Table 8.3.8 Standard length and water depth of long-distance ferry terminal berths (sailing distance 300km or more)

Target ferry Gross tonnage (GT)	Wharf for ferries with side ramps	Wharf for ferries with bow and/or stern ramps		
	Length of berth (m)	Quay length of bow and stern side (m)	Length of berth (m)	Water depth of berth (m)
6,000	190	30	170	7.0
10,000	220	30	200	7.5
13,000	240	35	220	8.0
16,000	250	40	230	8.0
20,000	250	40	230	8.0
23,000	260	40	240	8.5

c) Vehicle ramp

The requirements for vehicle ramps are as follows:

* The width of a vehicle ramp shall be an appropriate value that is equal to or greater than the value listed in Table 8-6. In the case of a movable bridge, the structural characteristics of the bridge shall be taken into consideration in an appropriate manner.
* The inclination of a vehicle ramp shall be an appropriate value that is equal to or small than the value listed in Table 9.3.9.
* The standard length of the horizontal part shall be 7m. In the case of a small-scale facility, a length of 4m may be used as a standard.
* The radius of the centerline of a curved section shall be an appropriate value equal to or larger than 15m.
* Signs and notices shall be provided appropriately in consideration of the structural characteristics and use of the facility.

Table 8.3.9 Width and Inclination of Vehicle Ramp

Type of facility	Number of lanes	Width (m)	Inclination (%)	
			Fixed section	Movable section
Ramp mainly used by vehicles with a width of 1.7m or less (small-scale facility)	1	3	12	17
	2	5		
Ramp mainly used by vehicles with a width of 2.5m or less	1	3.75	10	12
	2	6.5		
Ramp frequently used by container trailers	1	4	+	+
	2	7		

Note: The inclination of a facility that is to be frequently used as a ramp for container trailers shall be determined appropriately in consideration of the safety of container trailers during embarkation / disembarkation and the state of their traffic on the facility.

d) Slope and Movable ramp

When the tidal range at a port is large and/or many kinds of RO/RO vessels are moored to a berth, installation of a slope or a movable ramp should be considered. A movable ramp is generally constructed at a place where bow-ramp-way of a RO/RO ferry touches. Dimensions of a movable ramp should be decided considering the width and inclination of vehicle ramp.

8.3.4 Facilities for small ships

The following items are applied to facilities for small ships of less than 50GRT.

(1) Water facilities

1) Navigation channel

a) General Same as 8.3.3 (1) 1) a)

b) Alignment Same as 8.3.3 (1) 1) b)

c) Width

Appropriate navigation channel width is determined in consideration of the types and dimensions of target vessels, the traffic volume and length of the channel, the usage condition, and natural conditions including meteorological and marine conditions.

In the case many small ships like fishery boat leave or arrive in a port collectively in a short period of time, navigation channel width shall be determined appropriately. In general 5B to 8B is adopted. (B is width of a ship.)

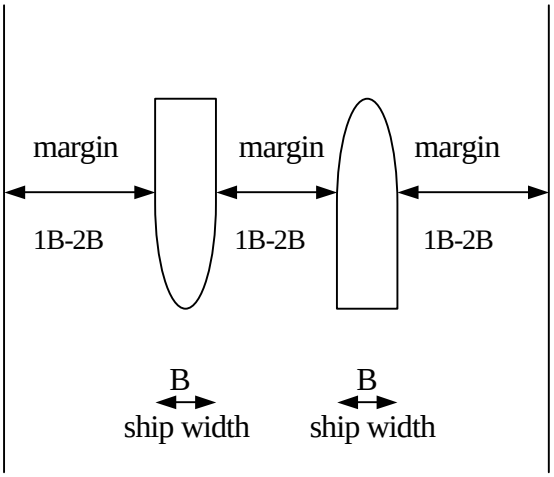


Figure 8.3.2 Width of Navigation Channel

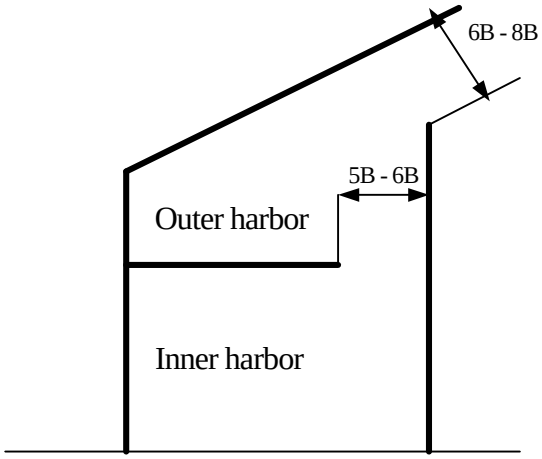


Figure 8.3.3 Outer Harbor and Inner Harbor

Table 8.3.10 Channel Width for Small Ships

Location of channel	Width
Open sea to outer harbor	6B – 8B
Outer harbor to inner harbor	5B – 6B

Note: B is width of small ship.

d) Depth Same as 8.3.3 (1) 1) d)

In the case of small ships, depth of navigation channel is usually determined using the following formula.

Depth of navigation channel = Draft of target ship + Margin

Margin : In the case of hard sea bed more than 1m

In the case of soft sea bed 1m

e) Length Same as 8.3.3 (1) 1) e)

2) Basin

Basin for small ships shall be determined appropriately considering mooring and ship turning methods.

a) Basin for mooring

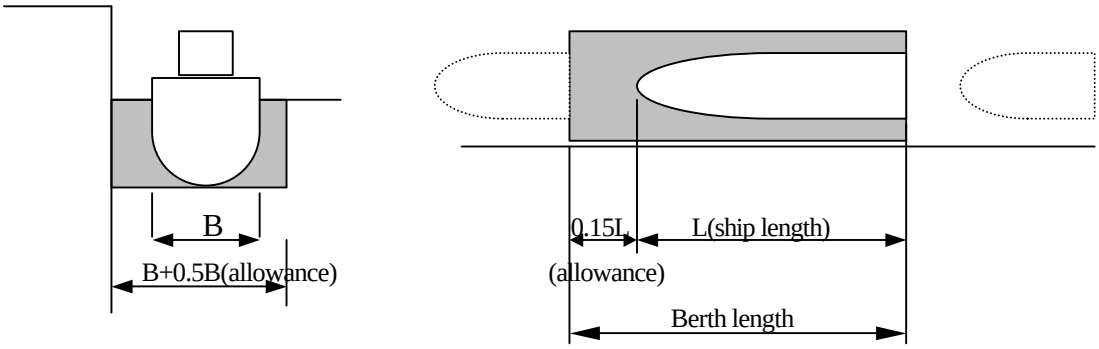


Figure 8.3.4 Lateral Mooring

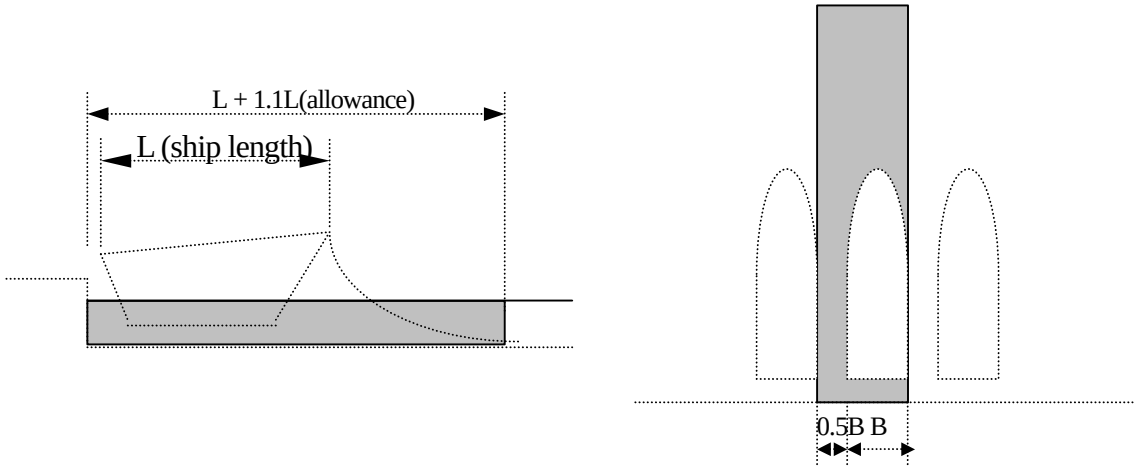
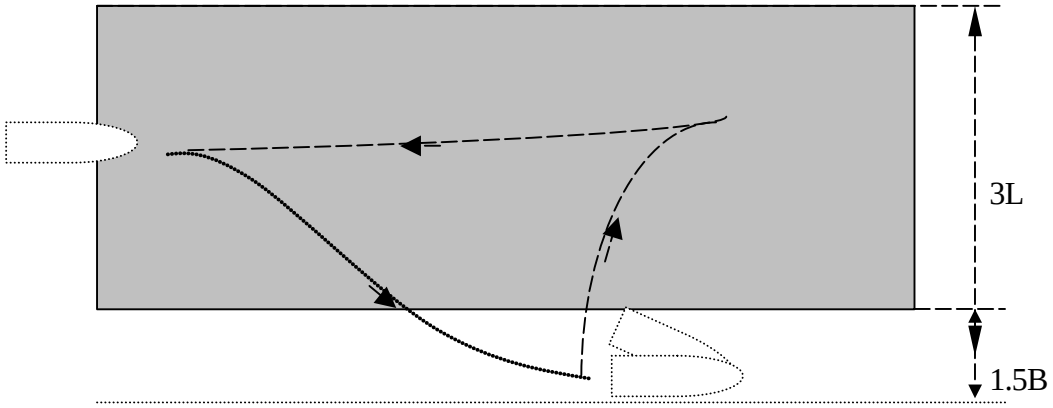
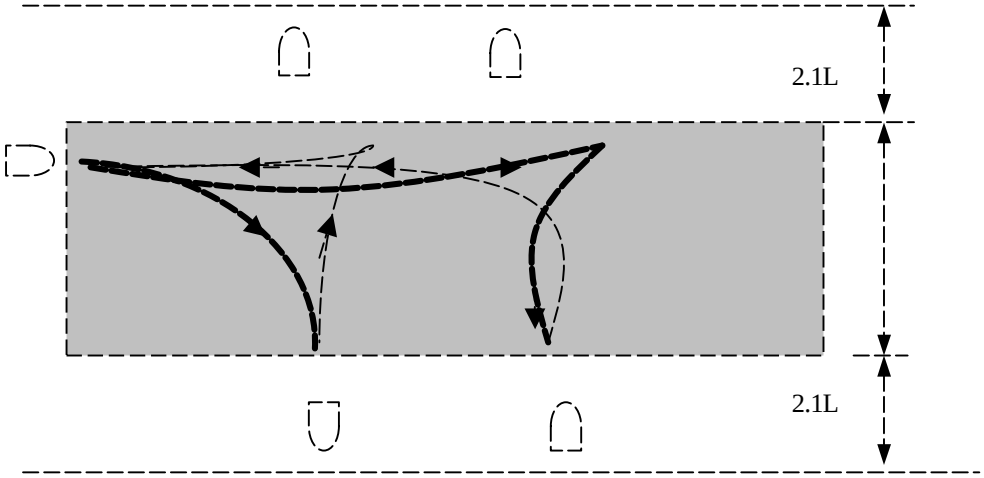


Figure 8.3.5 Longitudinal Mooring

b) Basin for ship turning



In case of lateral mooring



In case of longitudinal mooring

Figure 8.3.6 Water Basin for Ship Turning

c) Depth Same as 8.3.3 (1) 2) e)

Depth of basin is usually the same as that of navigation channel.

e) Calmness

The threshold wave height for cargo handling for basins in front of mooring facilities for small ships is basically 0.3m. However huge cost is needed to construct protective facility in order to control the threshold wave height under 0.3m.

Therefore priority should not be put on calmness in the Philippines for the time being. But port facility has to be durable enough against big waves.

(2) Protective facilities Same as 8.3.3 (2)

The following sentence is attached at the last part of "1) General".

When selecting a port site for small ships, calm sea area where protective facilities are not needed such as sheltered cove should be sought out, because the high cost of protective facilities can be detrimental to the financial viability of a project. If calm sea area can not be found, it will be necessary to look for ways to reduce the construction cost. For example, mooring facilities could be constructed just behind a breakwater.

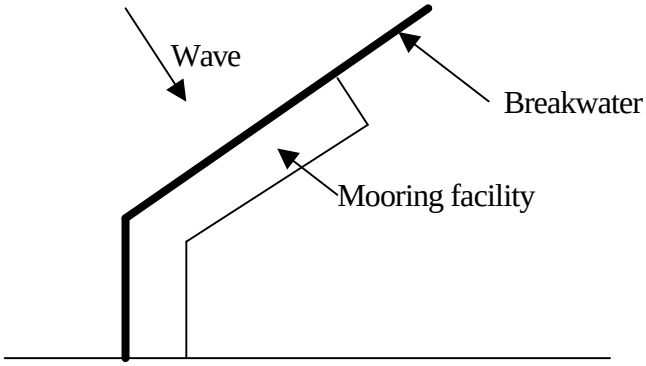


Figure 8.3.7 Mooring Facility Incorporated with Breakwater

(3) Mooring facilities

1) General Same as 8.3.3 (3) 1)

2) Maintenance Same as 8.3.3 (3) 2)

3) Length and water depth

a) When the target vessel can be identified, the length and water depth of berth shall be determined as follows:

* In case of lateral mooring, the length of a berth shall be set in principle by multiplying the length overall of the target vessel and 1.15.
* In case of longitudinal mooring, the length of a berth shall be set in principle by multiplying the width overall of the target vessel and 1.5.
* The water depth of a berth shall be set in principle by adding an appropriate keel clearance to the maximum draft. In general, the water depth of a berth is same as that of water facilities.

b) When the target vessel cannot be identified, appropriate length and water depth shall be used.

c) The datum level to measure the water depth of mooring facilities shall be appropriately determined based on "8.3.2 (2) 2) and Appendix 8.3.1 Tidal Levels".

4) Crown height

The crown of mooring facilities shall be set at an appropriate height that is suitable for the main dimensions of the target vessel and the natural conditions of the surrounding area. The tidal level that is used as the datum in the determination of the crown height shall be the mean monthly-highest water level.

Crown height of a mooring facility for small vessels is +0.5m to +1.0m.

5) Ship clearance Same as 8.3.3 (3) 5)

6) Structural types

The structural types of mooring facilities shall be determined by considering their characteristics and examining the following matters:

* Natural conditions
* Usage conditions
* Conditions of construction works
* Construction and maintenance cost
* Employment of different structural types in a port

In the Philippines, open-type wharf on vertical piles and gravity type wharf are widely used. Floating piers (pontoons) are sometimes adopted for high-speed boats. A slipway is also constructed in a port for small vessels.

a) Floating pier

Floating piers shall be so planned that they are stable and safe during the handling and loading / unloading of cargoes and the embarking / disembarking of passengers and vehicles and that they have sufficient durability.

Floating piers are made of many materials:

* Steel
* Reinforced concrete
* Pre-stressed concrete

* Reinforced concrete hybrid (reinforced concrete + steel)
* Pre-stressed concrete hybrid (pre-stressed concrete + steel)

Steel is economical for smaller floating piers, while reinforced concrete is economical for larger ones. Hybrid structures are usually adopted for middle size floating piers.

There are two kinds of mooring systems for floating piers; mooring chains and anchors, and piers and rollers. These days, piers and rollers mooring system is widely used because it has an advantage of high stability (low movement) and it can be applied in shallow waters.

Non-slip coating should be placed on the upper surface of a floating body.
Technical standards for designing floating piers are shown in Appendix 8.3.5.

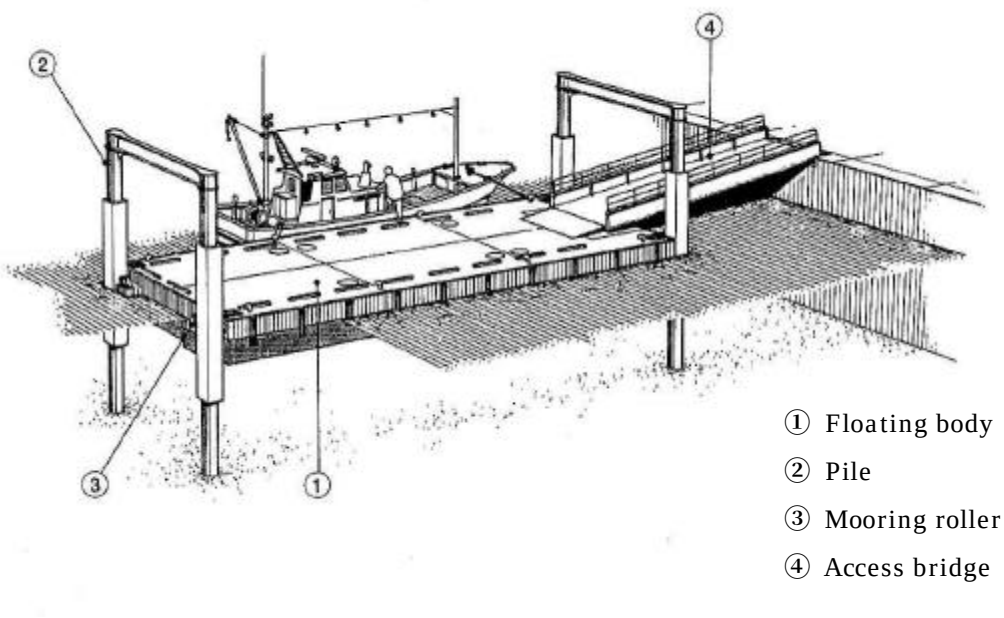


Figure 8.3.8 Floating Pier (Pontoon)

b) Slipway

A slipway is a facility used to take ships up to the shore and down to the sea for such purposes as repair, protection from storm waves and storm surges, and land storage of ships during winter.

Locations of slipways shall be determined in such a way that the following requirements are satisfied:

* The front water area is clam
* The front water area is free from siltation or scouring
* Navigation and anchorage of other ships are not hindered
* There is adequate space in the background for the work for ship lifting and lowering

as well as for ship storage

The slope length of the slipway and the area of the background space shall be adequate for the handling of the ships being considered.

The reference depth of water in front of the slipway is the sum of the draft of the ship being considered and a margin of 0.5m.

The gradient of slipway shall be determined appropriately in consideration of the shape of ships that are to use the slipway, the characteristics of foundation, and the tidal range, so that the lifting of ships can be performed smoothly.

When the slope is to be utilized by small ships, it is desirable to design the slope as having a single gradient. A slope inclination of 1:6 to 1:12 may be used.

When the water in front of the slipway is deep or the area of the construction site is limited, the slope may be built with two or more gradients. When this is the case, a two-gradient slope may be employed when the crown elevation of the front wall is about -2.0m, and a three-gradient slope may be employed when the crown elevation of the front wall is lower than -2.0m. The following values may be used.

When the slope has two-gradients:

Front slope: 1:6 to 1:8

Rear slope: 1:8 to 1:12

When the slope has three gradients:

Front slope: an inclination steeper than 1:6

Center slope: 1:6 to 1:8

Rear slope: 1:8 to 1:12

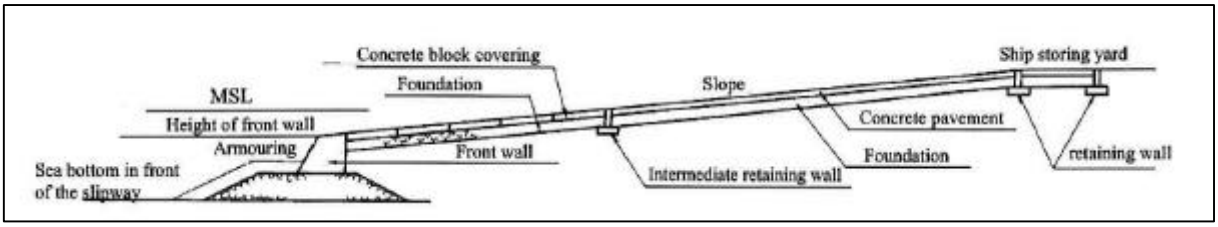


Figure 8.3.8 Slipway

The basin in front of a slipway shall have an appropriate area that allows a smooth operation of ship lifting and /or lowering without damage to the ships, and a safe and smooth navigation of nearby ships.

When the ship is lowered to the sea by free fall over the slope, the ship runs over a certain distance after hitting the water with the speed it gains during the fall. This distance is more than about five times the ship's length overall, although it varies depending on the slope inclination, slope friction, and fall distance. However, because the ship becomes maneuverable after running a distance about 4 to 6 times its length, it is sufficient to secure a distance about five times the ship's length overall from the waterfront line of the slope to the other end of the basin. When a strong tidal current exists, it is necessary to add an appropriate margin.

When the ship is lowered to the sea gently by means of wire ropes and other means, a distance of about three times the ship's length overall will suffice to define the required basin area.

(4) Other facilities

1) Safety facilities

The mooring facilities shall be provided with a skirt guard or other safety equipment to hold small ships from moving under piled piers. Safety equipment other than the skirt guard includes fences, ropes or similar equipment, and signs showing safety passage for pedestrians.

a) When there is a risk that small ships may accidentally underrun a mooring facility such as piled piers and dolphin, an appropriate skirt guard shall be provided.

b) Mooring facilities for passenger shall be provided with fences or ropes as necessary, to ensure the safety of passengers, to secure the pathway for passengers, and to prevent vehicles from entering the facility.

2) Stairways and ladders

Stairways, ladders and other similar facilities shall be provided in such a way that they can be used easily and safely.

a) Stairway

When constructing a port for small ships in a sea which has large tidal differences, stairway should be installed at certain intervals. The width of stairways shall be more than 75cm, the height 20cm and the depth 30cm. Surface of concrete shall be rough.

b) Ladders

Ladders are used at emergency. However they are usually installed at the edge and / or the root of a mooring facility so that they do not hinder cargo handling and passenger

embarkation / disembarkation.

The standard dimensions of ladders are 45cm in width and 30cm in space. It is advisable that the lower end of ladders go down under low water level and that the upper end go up to 30cm over the crown height of a mooring facility and enter into 45cm of the surface line of a mooring facility.

Ladders should be planned with a design load of 1 KN per meter of ladder length for both horizontal and vertical directions.

3) Curbing

The structure, shape, layout, and material of curbing shall be planned appropriately in such a way that the safety of users in vehicles will be ensured and cargo handling work will not hindered, in consideration of the use and structural characteristics of the mooring facility.

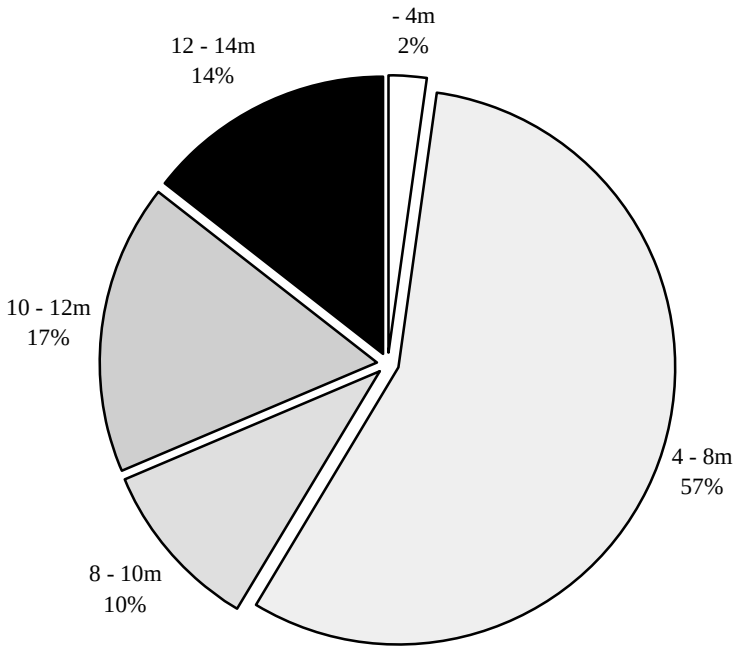
The standard interval between two curbings is 30cm.

Chapter 9 Current Port Facilities and Existing Development Studies / Plans

9.1 Current Situation of Port Facilities and their Usage

9.1.1 Berths

The berths length is one of the basic information to know the scale of port. Generally speaking, a berth whose depth is less than 8m is mainly used for domestic transportation while a berth whose depth is more than 8m can be used for international transportation. As Figure 9.1.1 shows, about 60% of berths at major public ports have a depth of less than 8m depth[1].

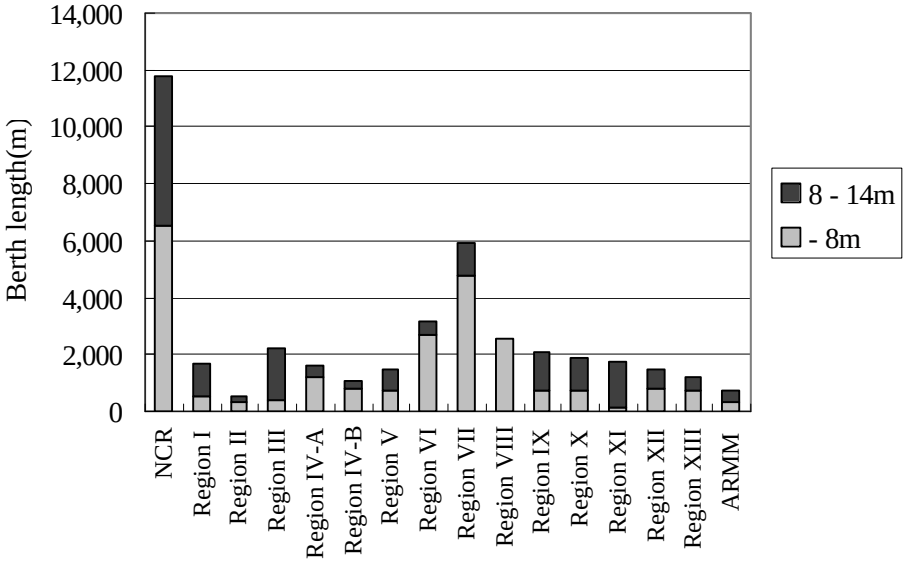


* Source: JICA Study Team

Figure 9.1.1 Nationwide share of berth length by depth

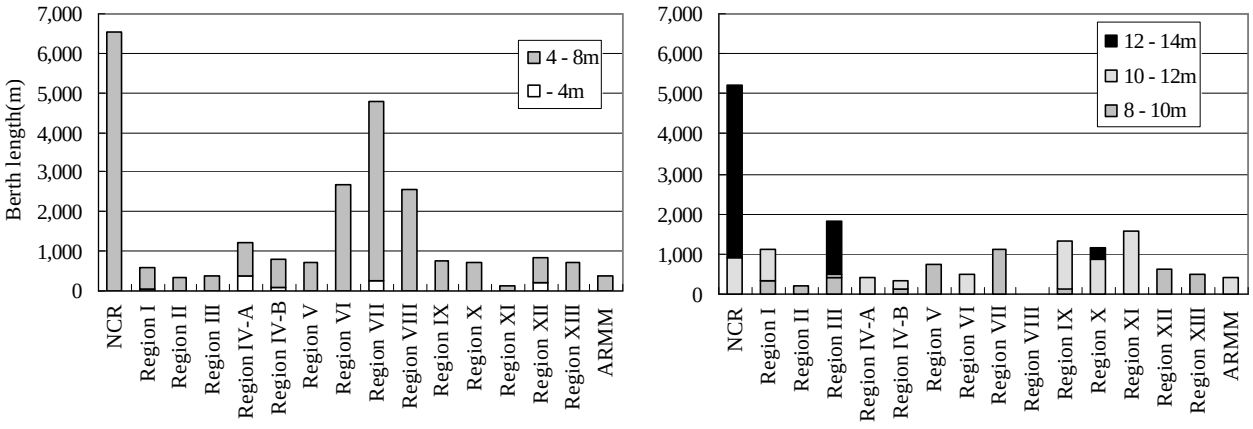
The distribution of berths is, of course, not homogenous within the country. The total berth length in NCR is the longest followed by that in Region VII (See Figure 9.1.2). Deeper berths (i.e. more than 8m depth) are located mainly in the Luzon area, in particular in NCR, as well as in the Mindanao area. Among the berths whose depth is less than 8m, the majority is found in NCR and Visayas areas (i.e. Region VI - VIII). NCR also has the largest portion of berths greater than 8m depth, including deep berths of 12 - 14m (See Figure 9.1.3).

[1] This figure indicates the aggregated lengths of total length of all ports. The berth length of each port is shown in Appendix 9.1.1.



* Source: JICA Study Team

Figure 9.1.2 Berth Length of Public Ports by Region and Depth

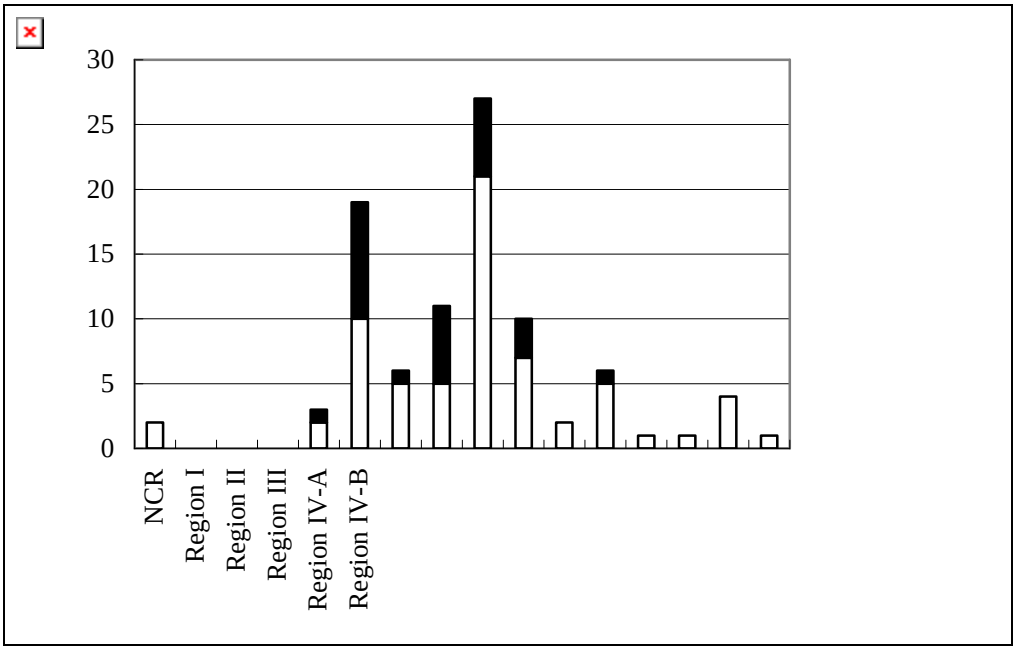


* Source: JICA Study Team

Figure 9.1.3 Berth Length of Public Ports by Region and Classified Depth

9.1.2 RO/RO Facilities

Figure 9.1.4 shows the regional distribution of ports with RO/RO ramps. Many ports with RO/RO ramps have been developed in the Visayas area (especially Region VII).



* Source: JICA Study Team

Figure 9.1.4 Regional Distribution of Ports with RO/RO Ramps

9.1.3 Fairways

Forty-three ports have fairways, and thirty-four ports among them require maintenance dredging (See Appendix 9.1.2).

9.1.4 Land Accessibility to Major Ports

The condition of the existing access road is briefly described in Table 4.3.2. Although heavy traffic generated by the increasing city activities hampers accessibility to the ports in Metro Manila, other major ports do not seem to have serious problems in terms of land access.

9.1.5 Present Ship Calls

Roughly speaking, there were over 200 thousand ship calls at public ports in 2002 according to PPA statistics while more than 80 thousand ship calls were recorded at private ports. About 99% of vessels use berths rather than anchorage both at public and private ports. (Table 9.1.2)

Table 9.1.1 Current Condition of Access Roads at Major Ports

Region	Port	Existing		Future
		Access Road	Condition	Development
NCR	Manila South Harbor	National 4 Lanes	Daily Congested	Improvement Required
	Manila North Harbor	National 4 Lanes	Daily Congested	Improvement Required
	MICT	National 4 Lanes	Daily Congested	Improvement Required
	Harbor Center	National 4 Lanes	Daily Congested	Improvement Required
Region 3	Subic Bay	Highway 2 Lanes	Good	Under Implementation
Region 4	Batangas	Second Class 2 lanes	Under Developing	
Region 6	Iloilo	Second Class 2 lanes	Narrow	Required depending on Traffic
Region 7	Cebu	National 2 Lanes	Good	
Region 9	Zamboanga	National 4 Lanes	Good	
Region 10	Cagayan de Oro	National 2 Lanes	Daily Congested	Required depending on Traffic
	PHIVIDEC	National 2 Lanes	Good	
Region 11	Davao	National 2 Lanes	Fair	Required depending on Traffic
Region 12	Gen. Santos	National 2 Lanes	Good	

Source: DOTC PMO-Port / DPWH

Table 9.1.2 Present Situation of Ship Call (2002)

		No of ship calls			GRT/Ship	
		Total	Domestic	Foreign	Domestic	Foreign
Public ports	Berth	200,857	195,893	4,964	718	11,377
		(98.8%)	(99.2%)	(84.1%)		
	Anchorage	2,540	1,602	938	519	10,191
		(1.2%)	(0.8%)	(15.9%)		
	Total/Ave	(100%)	(100%)	(100%)	716	11,188
Private ports	Berth	81,616	77,850	3,766	474	12,078
		(98.9%)	(98.9%)	(98.3%)		
	Anchorage	945	878	67	1,148	20,367
		(1.1%)	(1.1%)	(1.7%)		
	Total/Ave	(100%)	(100%)	(100%)	482	12,223
Grand total		285,958	276,223	9,735	649	11,596

*Source: PPA statistics

The size of foreign vessels calling at public ports is more than 10 thousand GRT while that of domestic vessels ranges from approx 500 - 700 GRT. The size of foreign vessels accommodated at anchorages of private ports is about 1.7 times larger than that of foreign vessels accommodated at berths of private ports while the size of foreign vessels accommodated both at berths and anchorages of public ports is almost the same.

9.2 Studies and Projects on Port Developments

9.2.1 Overview

The studies and projects related to port development are listed below. Figure 9.2.1 categorizes them into three types, namely, policy studies on all transportation modes in the Philippines, port development studies and individual port development projects.

Year	**Policy Studies on All Transportation Modes in the Philippines** *Port development studies* Port Development Projects
1961 -1979	Port Project (1961, WB)
	Development of Port of Catabato (1973, WB)
	Port Project 2 (1973, WB, CDO Port, Gen. Santos Port)
	Manila Port (1979, ADB, Dev't of Int'l container berths, Studies on domestic container berths)
1980 -1989	Port Project 3 (1980, WB)
	Strengthening cargo handling facilities (1980, OECF)
	National Transport Planning Project (1982, WB)
	Studies on the development of Port of Irene (1982, JICA)
	Studies on the development of Port of San Fernando (1983, JICA)
	Studies on the development of Port of Batangas (1984, JICA)
	Studies on the development of South Harbor at Manila Port (1986, JICA)
	Port Project 4 (1987, WB, 16 ports)
	Second Manila Port (1987, ADB)
	Strengthening cargo handling facilities 2 (1988, OECF)
	Studies on Feeder ports (1988, ADB: 39 ports)
	Studies on Local Ports (1988, USAID, 41 ports)
	Studies on Feeder ports (KFW, 5 ports)
	Nationwide Feeder Ports Development Program (NFPDP, 1988, OECF: 27 ports)
1991	Batangas Port Development Project (1991, JBIC)
	Maritime safety project (1991, JBIC)
1992	*Nationwide roll-on roll-off transport system development study (1992, JICA)*
1994	*The greater capital region integrated port development study in the republic of the Philippines (1994, JICA)*

		Studies on Subic Free trade port (1994, WB)
1995		*The Philippine Ports Authority 25-year Development Plan (1995, PPA)*
1996/7	**Philippine Transport Strategy Study (PTSS, 1996/7, ADB)**	
		Social Reform Related Feeder Ports Development Project (SRRFPDP, OECF, 1997: 36 ports)
1998	**The Philippine National Development Plan (Directions for the 21st Century, 1998, Philippine government)**	
1998		Batangas Port Development Project II (1998, JBIC)
1999	**Transport Infrastructure and Capacity Development (TICD, 1999, ADB)**	
1999		*The Study on the Subic Bay Port Master Plan (1999, JICA)*
2000		*Master plan for feeder port development in Social Reform Related Feeder Ports Development Project (SRRFDP, 2000, JBIC)*
2000		*Implementation program for the Roll-on / Roll-off Ferry Network Development Project for the Trans Visayas Intermodal Transport Network (2000/2002, DOTC)*
1999&2001	**Medium Term Philippine Development Plan (MTPDP, 1999&2001, Philippine government)**	
2000		Subic Bay Port Development Project (2000, JBIC)
2000		Mindanao Container Terminal Development Project (2000, JBIC)
2001		*Preliminary study for Roll-on Roll-off system development in the Philippines (2001, DOTC)*
2001		*Bohol ferry link and terminal feasibility study Phase I (2001, DOTC)*
2002		*The Cebu Integrated Port Development Plan (2002, JICA)*

Figure 9.2.1 Existing Studies and Projects related to Port Development

9.2.2 Policies on Ports in Nationwide Transport Development Plans/Studies

Since the 1990s, the following plans/studies covering all transportation modes have been formulated / commissioned by the Philippine government.

- Philippine Transport Strategy Study (PTSS),
- The Philippine National Development Plan (Directions for the 21st Century, so called " Plan 21"),
- Medium Term Philippine Development Plan (MTPDP, 1999 [2001]-2002), and
- Transport Infrastructure and Capacity Development (TICD).

PTSS set out the Transport Agenda for the Medium Term Philippine Development Plan (1999-2002),

and the idea of PTSS was incorporated into the followed nationwide economic plan, i.e. Plan 21. TICD was commissioned to assist the Philippine government to take PTSS recommendations forward especially in preparation of a Transport Sector Action Plan. Major policies stated in the Philippine National Development Plan (Plan 21) and/or the Medium-Term Philippine Development Plan 2001-2004 (MTPDP) will be reviewed in this section.

In Plan 21, the development of a clear strategy for port provision in the Greater Capital Region (GCR) is stressed. Moreover, the Plan asserts the importance of the following items:

- Developing competitive international ports;
- Rationalizing hubs-spokes system;
- Promoting transport for the Manila-Cebu corridor;
- Improving the RO/RO network particularly in the Visayas area;
- Enhancing sea transport along the Pan-Philippine Highway;
- Supporting Brunei-Indonesia-Malaysia-Philippines-East ASEAN Growth Area (BIMP-EEAGA) and Autonomous Region of Muslim Mindanao (ARMM) development; and
- Supporting the eco-tourism program.

The Plan also makes an effort to classify the development of ports through functions. The categories in the Plan include international ports, RO/RO terminals along the Pan-Philippine Highway, transfer points along Manila-Cebu corridor, ports to be developed in ARMM, and feeder ports.

Regarding port development and administration, MTPDP stresses,

- The necessity of PPA restructuring (i.e. the role of PPA as regulator or operator, decentralization of head offices functions to Port District Office and Port Management Office),
- Modification of the tariff level taking into account the discontinuation of the payment of levies from the private ports to the PPA as well as the contribution of PPA to government revenue,
- A proactive approach to the planning of ports considering commercial requirements and financial feasibility,
- Maximum private sector participation and restrictions on government subsidies (only ports with social value will be eligible),
- The necessity of a clear strategy for port provision in the Great Capital Region (GCR), and
- Development of feeder ports.

In addition to port development, MTPDP asserts the importance of "integrated planning and investment" in order to enhance economic impact on local and regional areas. In other words, MTPDP stresses that integrated planning as well as investment are desirable to pursue balanced regional development. In MTPDP, proposed infrastructure developments for physical integration are described in Table 9.2.1. One good example is the combined development of the Batangas Port, the Subic-Clark Toll Road and the Southern Tagalog Arterial in order to ease congestion in Metro Manila. If investment can be attracted to Subic-Clark as well as Calabarzon, this area could be a

viable alternative to NCR.

Table 9.2.1 Proposed Infrastructure Projects for Physical Integration

Major Projects	Location/Description	Schedule Year
PORTS		
Batangas Port Development Project (Phase II)	Batangas	2002-2004
Southern Philippine Ports Development Package	Port of Iloilo, Davao, Gen. Santos City and Zamboanga	2002-2006
Pan-Philippine Highway Ferry Terminals Privatization	Port of Matnog, San Isidro, Liloan and Lipata	2005-2010
Western Seaboard Intermodal Transport Project	Port of Batangas, Calapan, Mansalay, Catician, Iloilo, Jordan, Cabano, Palupandan, Zamboanguita/Sic on, Dapitan, Coron, Taytay and Brooke's Point	2005-2010
ASEAN Highway Network Project	Port of Zamboanga, Basilan, Jolo, Siasi, Bongao and Sitangkai	2005-2010
ROADS		
Pan Philippine Highway	Link from the province of Cagayan in the northeastern part of Luzon to the City of Davao in Mindanao	2001-2010
Subic-Clark-Tarlac Toll Road Projects	Subic-Clark Expressway and the North Luzon Expressway	2001-2005
Southern Tagalog Arterial Road (STAR)	Road widening from Lipa City to Batangas City (Phase II) and operation of toll road from Sto. Tomas to Lipa City (Phase I)	2001-2004
Butuan-Cagayan de Oro City-Iligan-Tubod Road	354 km road in Northern Mindanao from Butuan City to Tubod	2002-2010
Cotabato-Pagadian-Zamboanga City Road	Rehabilitation of existing road	2001-2008
Bukidnon-Davao City Road	Interprovincial link between Davao and Bukidnon	2001-2003
Surigao del Sur-Davao Oriental Coastal Road	North-South road link along the east coast of Mindanao	2001-2010

* Source: Extract from BOX 14.1 in MTPDP (2001-2004)

*Note: The title of this table is the same as that in MTPDP (2001-2004)

9.2.3 Existing Studies on Port Development

The existing studies on port development can be classified into 2 groups, namely studies mainly on international container port development and studies mainly on RO/RO port development. These

studies will be reviewed in this section.

(1) Studies mainly on International Container Port Development

1) The greater capital region integrated port development study in the republic of the Philippines (1994, JICA)

Metro Manila and its surrounding eight provinces (i.e. GCR: the Great Capital Region) have great potential for economic development. The large scale port infrastructure, however, has been developed and utilized mainly at Manila port so far. This leads to cargo and passengers being concentrated at Manila, and causes an unfavorable and excessive impact on the land transportation within the hinterland of the port. In order to address these problems, development strategies of major ports in the Greater Capital Region (i.e. Subic Bay, Manila, Sangley Point, Naic/Cavite, Batangas ports) for the period up to the year 2010 are formulated in this study. The port of Manila is considered as super-hub port of the Philippines, and the provision of further port facilities for rapidly increasing domestic container and roll on / roll off cargo is very urgent. The study also examines the possibility of a new port development at Sangley Point or Naic/Cavite. It is concluded that an international commercial port at Sangley Point is possible if relocation of the Naval Base is achieved while a large scale commercial port along the Naic coast has high economic potential considering the natural and social conditions of the area. The study also proposes the demarcation of function of the other ports in GCR. That is, Subic Bay port covers the North-west Luzon Island as a hinterland, and Batangas port is considered as a base port for trade between Luzon Island and the Mindoro Island.

2) Subic Bay Port Master Plan (1999, JICA)

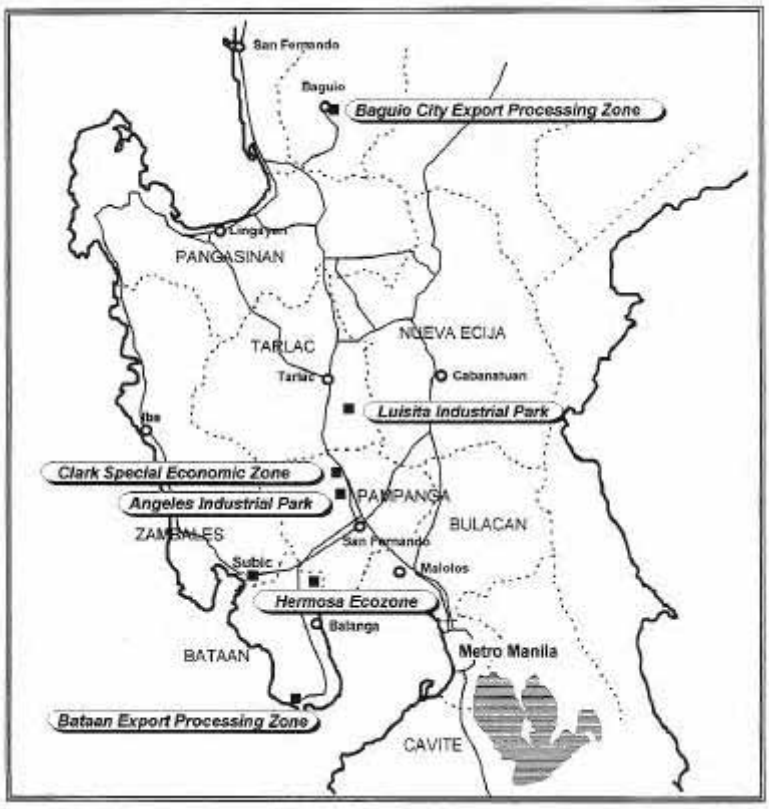
Subic Bay Port Master Plan proposes the effective usage of existing facilities in the port, and recommends the development of three new international container berths (-13m) which can accommodate 2,000 TEU container carrier by 2015.

The Plan suggests the role/function of Subic Bay port as follows.

"The role and function of Subic Bay Freeport is not as a public commercial port to support the economic growth in Central Luzon and Metro Manila, but rather a supporting infra-structure for SSEFZ[1] *and adjacent Special Economic Zones as a special port".*

"Adjacent Special Economic Zones" are one Special Economic Zone (Clark) and four Economic Processing Zones (Baguio, Luisita, Angeles and Bataan). The location of these zones is indicated in Figure 9.2.2

[1] SSEFZ: Subic Special Economic and Freeport Zone



*Source: JICA (1999), The Study on the Subic Bay Port Master Plan in the Republic of the Philippines

Figure 9.2.2 Location of Special Economic Zone and Economic Processing Zones around Subic Bay port

3) Cebu Integrated Port Development Plan (2002, JICA)

Cebu Integrated Port Development Plan proposes the port development policy in Cebu island with target year 2020. According to this plan, it is recommended to develop a new port at Cebu city to handle foreign cargoes including four container berths of 13m depth while the existing Cebu Baseport is expected to be used for domestic cargo. "Outerports", which are neither Cebu Baseport nor the new Cebu Port, are considered as the gates to the neighboring islands. Toledo port and new San Remigio port, in place of Hagnaya port, serve RO/RO routes with Negros island and Bantayan island respectively.

(2) Studies mainly on RO/RO Port Development

1) Nationwide Roll-on Roll-off Transport System Development Study (1992, JICA)

This JICA study examines 42 potential/existing sea links, and evaluates them in terms of (i) the degree of development of road transportation sector, (ii) the demand of traffic on the link, (iii) expense of construction of RO/RO terminal, and (iv) contribution of the development to nationwide RO/RO network. Twelve sea links as first priority and 14 sea links as second priority are chosen

from the 42 candidate routes (See Table 9.2.2 and Figure 9.2.3). Roughly speaking, most of the first priority routes serve islands within Visayas area. Sea linkages in the Pan Philippine Highway are prioritized as well. The study also recommends the modification of some policies on domestic shipping industry as well as the simplification of procedures on the movement of goods and vehicles between islands.

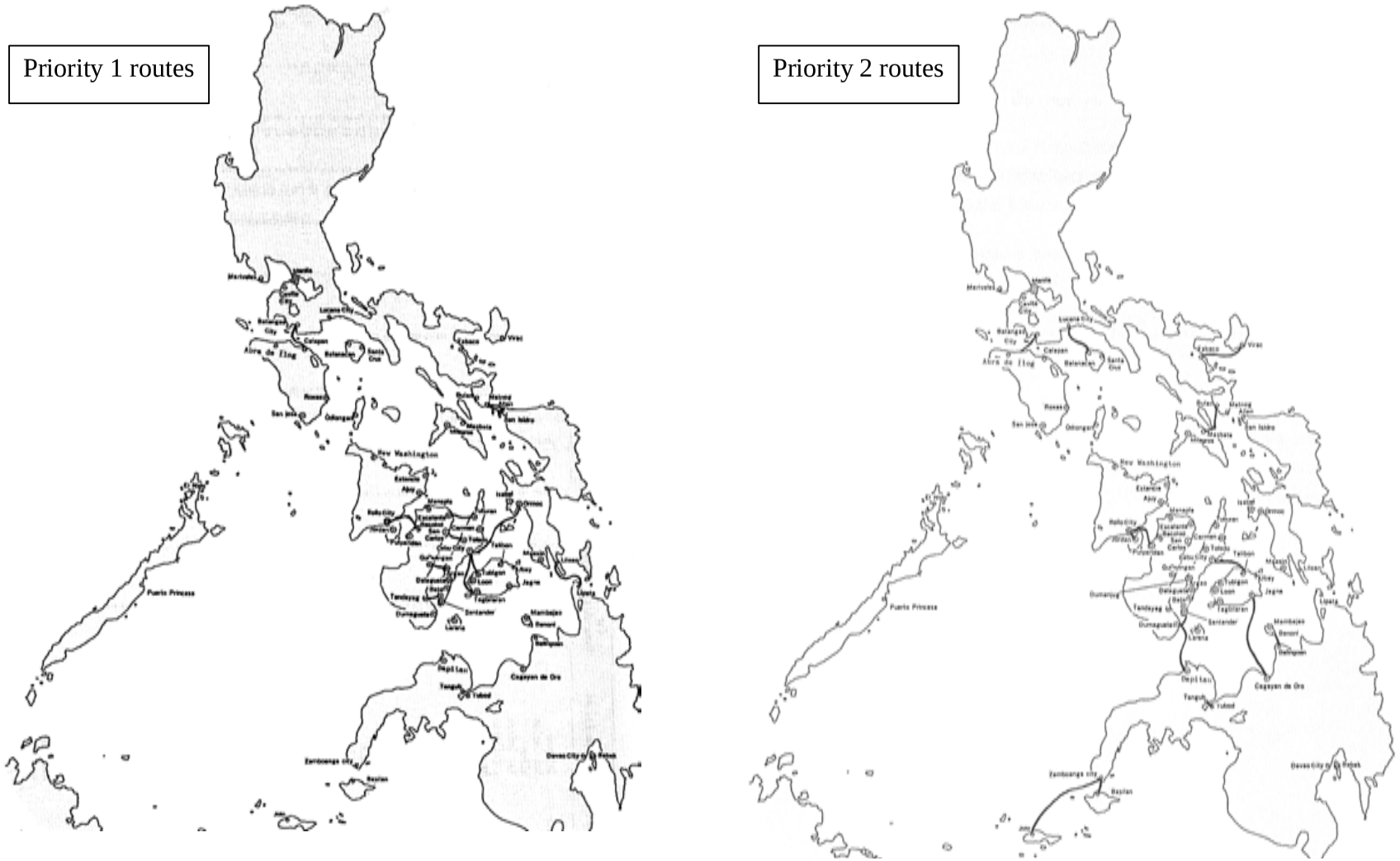
Table 9.2.2 Proposed RO/RO Links (JICA Nationwide Roll-on / Roll-off Study, 1992)

Priority 1	**Priority 2**
Batangas City - Calapan	Dumaguete - Santander
Toledo - San Carlos	Iloilo City - Jordan
Matnog - San Isidro	Tubod- Tangub
Matnog - Allen	Dumaguete - Dapitan
Cebu City - Tagbilaran	Iloilo City - Pulupandan
Iloilo City - Bacolod	Batangas City - Abra de Ilog
Liloan - Lipata	Jagna - Cagayan de Oro
Cebu City - Tubigon	Lucena City - Balanacan
Cebu City - Ormoc	Zamboanga City - Basilan
Escalante - Tuburan	Zamboanga City - Jolo
Tandayag - Bato	Benoni - Balingoan
Guihulngan - Dumanjug	Tabaco - Virac
	Bulan - Masbate
	Cebu – Talibon

2) Master Plan for Feeder Port Development (2000, JBIC (OECF))

DOTC carried out the study of the master plan on "feeder ports"[1] in 2000 titled "Master Plan Report for Feeder Port Development" under social reform related feeder ports development project through OECF funds. In the master plan, 82 candidate ports, located in 33 area clusters, are chosen from 1,494 feeder ports in the Philippines for development until 2020. After examining the population of isolated areas and their future possible connection with national maritime and/or road network, the master plan proposes that 31 ports be developed by 2010.

[1] "Feeder ports" in the Philippines are not ports which serve container feeder services in the context of large scale international hub and spoke system. "Feeder ports" are to be understood as small scale local ports operated by LGUs.

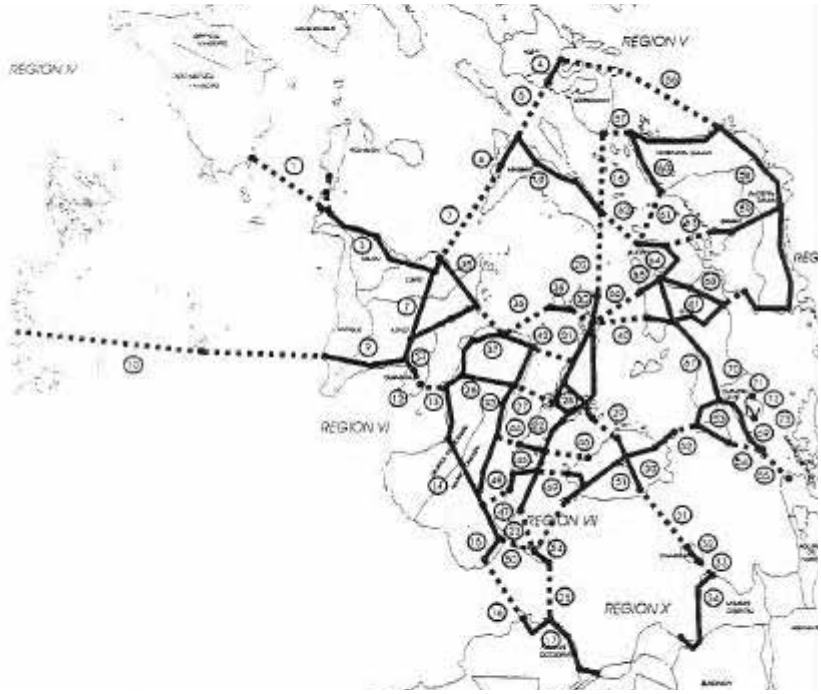


*Source: JICA (1992), *Nationwide roll-on roll-off transport system development study in the Republic of the Philippines*

Figure 9.2.3 Proposed RO/RO Links (JICA, 1992)

3) Implementation program for the roll-on / roll-off ferry network development project for the trans Visayas intermodal transport network (2000/2002, DOTC)

The Philippine government plans to establish an inter modal transport network in the Visayas area. In this context, DOTC has revised above mentioned JICA study on RO/RO system in the area and has proposed a development plan. In "the implementation program for the roll-on / roll-off ferry network development project for the trans Visayas intermodal transport network", long term development plan has been proposed including 32 RO/RO ferry routes and 33 highways (See Figure 9.2.4). These routes are chosen considering 1) current and future traffic demand, 2) development of RO/RO traffic on the routes of JICA 1992 study, and 3) potential of development of RO/RO traffic.



* source: DOTC (2002), *Implementation program for the roll-on / roll-off ferry network development project for the trans Visayas intermodal transport network*

Figure 9.2.4 Long term Plan on the Trans Visayas Intermodal Transport Network

4) Bohol Ferry Link and Terminal Feasibility Study Phase I

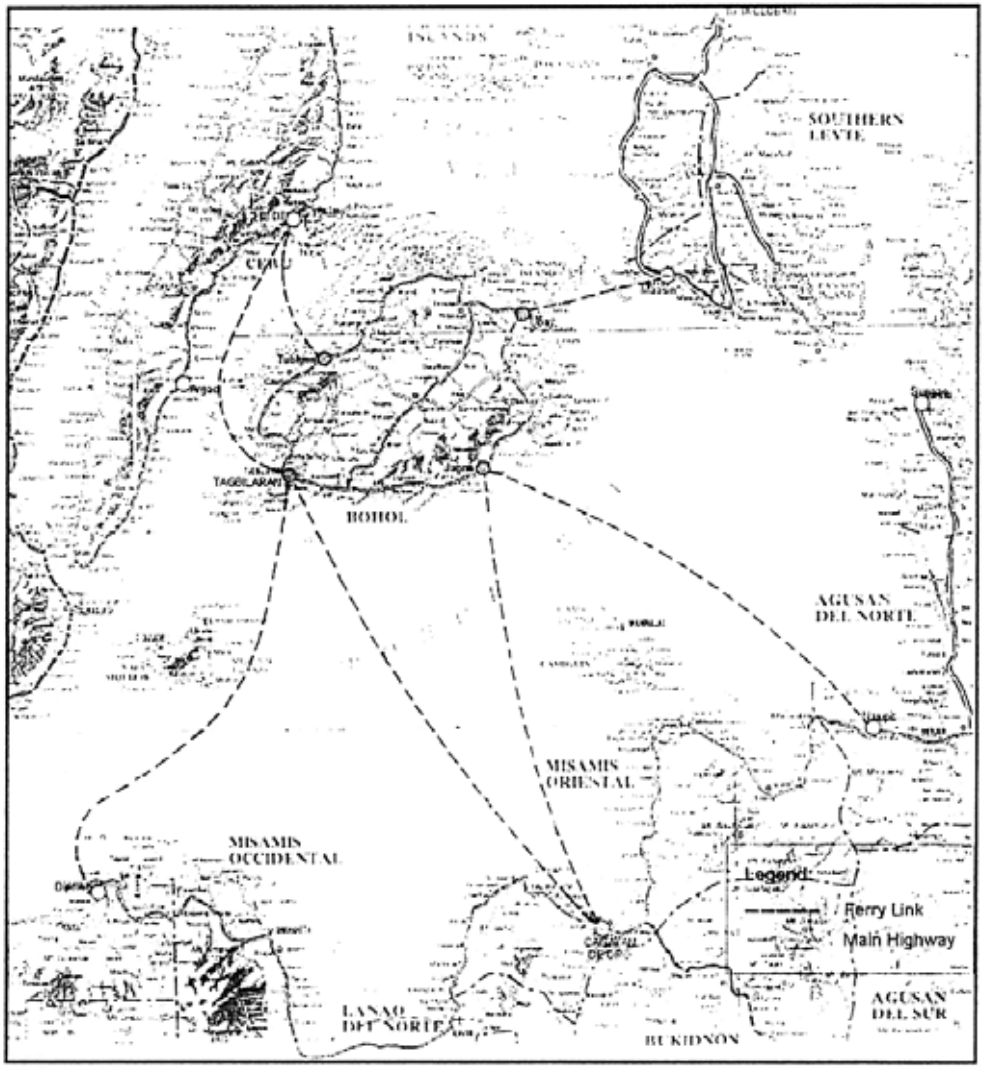
This study argues the geographical advantage of Bohol island. That is, *"Cebu in the northwest, Leyte in the northeast and Cagayan de Oro in the south, makes this province an ideal inter-modal transfer point and a potential focal point for trading or tourism activities in the region"*. The Phase I study assesses the prospects and desirability of development/improvement of the ferry linkages of Bohol with Cebu, Leyte and Mindanao.

Through the evaluation on the population of influence area, accessibility to ports, existing shipping services, port development situation, etc., seven routes are selected (Table 9.2.3 and Figure 9.2.5).

Table 9.2.3 Selected Ferry Links for Bohol

Bohol side		Linked side
Tagbilaran	-	Cebu City (Cebu island)
Tubigon	-	Cebu City (Cebu island)
Ubay	-	Maasin (Leyte island)
Tagbilaran	-	Cagayan de Oro (Mindanao island)
Jagna	-	Cagayan de Oro (Mindanao island)
Tagbilaran	-	Dipolog (Mindanao island)
Jagna	-	Nasipit (Mindanao island)

*Source: DOTC (2001), *Bohol ferry link and terminal feasibility study, Phase I*



*Source: DOTC (2001), *Bohol ferry link and terminal feasibility study, Phase I*

Figure 9.2.5 Selected Ferry Links for Bohol

9.2.4 Existing Projects / Schemes on Port Development and Maritime Sector

(1) Major Port Development Projects

Each port management public corporation and related organizations have their own future port development plan. The Study Team puts together the major port development projects in Table 9.2.4. Some of these projects are reviewed briefly as follows.

1) PPA 25-year Development Plan and the Port Modernization Program

The PPA 25-year Plan was formulated in 1995. The major development thrusts are:
- Establishment of world-class ports in terms of transshipment cargo,
- Development of the Manila-Central Visayas Corridor,
- Development of the Pan-Philippine Highway ports,
- Development of a nationwide RO/RO network, and
- Establishment of the Hubs and Spokes System.

This Plan also indicates the port capacity in the long term. The development scale of each port is illustrated in Table 9.2.4.

Recently PPA has revised its vision as follows: *"By 2010, PPA shall have met the international standards in port facilities and services in at least ten (10) ports in support of national development"*.

In line with PPA's revised vision, PPA has established *"the Port Modernization Program"*, which includes:
- North Harbor Modernization,
- South Harbor Development,
- Batangas Port Development Project,
- Development of the Port of Cagayan de Oro,
- Philippine Ports Development Package including Iloilo, Davao, General Santos and Zamboanga ports, and

The scale of these projects is shown in Table 9.2.5, and the expected schedule is also shown in Table 9.2.4.

Table 9.2.5 Major Port Development Plan in PPA Port Modernization Program

Name of Port	Target year	Projects	Expected major source of fund
South Harbor expansion	2022	- Container berths 1,925m (D: 11.0 - 13.5m) - General cargo berths: 2,685m (12.0 - 13.0m)	Private sector
North Harbor modernization	2012	- A capacity of 26.6 M tons (1.7 m TEU, 2.0 m tons of non-containerized cargo) - Amenities to accommodate 6.0 Million passengers	Private sector
Batangas Port	2012	- A capacity of 14.5 Million tons (1.15 m TEU, 3.3 m tons of non-containerized cargo) - Amenities to accommodate 4.0 Million passengers	Foreign assistance
Iloilo Port	2010	- A capacity of 6.4 Million tons (0.3 m TEU, 3.6 m tons of non-containerized cargo) - Amenities to accommodate 3.3 Million passengers	Foreign assistance
Davao Port	2010	- A capacity of 6.0 Million tons (0.4 m TEU) - Amenities to accommodate 0.35 Million passengers	Foreign assistance
General Santos Port	2010	- A capacity of 2.8 Million tons (0.25 m TEU) - Amenities to accommodate 0.26 Million passengers	Foreign assistance
Zamboanga Port	2010	- A capacity of 2.1 Million tons (0.13 m TEU) - Amenities to accommodate 4.2 Million passengers	Foreign assistance
Cagayan de Oro	2011	- A capacity of 3.3 Million tons (0.2 m TEU, 1.3 m tons of non-containerized cargo) - Amenities to accommodate 2.1 Million passengers	PPA fund

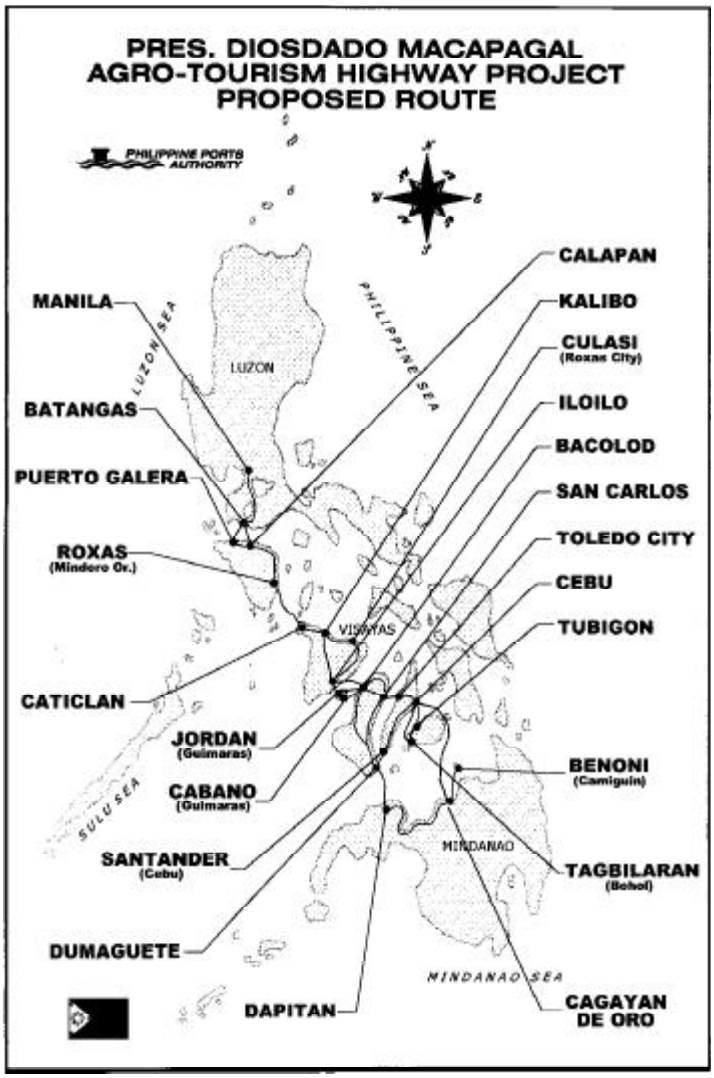
*Source: JICA Study Team based on information provided by PPA

PPA also launched " Development of the Western Seaboard Intermodal Links, namely Agri-Tourism Highway" in the Port Modernization Program. The routes are shown in Figure 9.2.6. One of the routes has been launched as "Strong Republic Nautical Highway"[1].

2) Trans-Visayas Intermodal Transport Projects

In order to enhance mobility in the Visayas area, DOTC has launched Trans-Visayas intermodal transport projects. The candidate ports and routes are shown in Table 9.2.6 and Figure 9.2.7.

[1] This route connects Batangas, Roxas (Mindro Or.), Caticlan, Iloilo, Bacolod, Dumaguete and Dapitan.



*Source: PPA

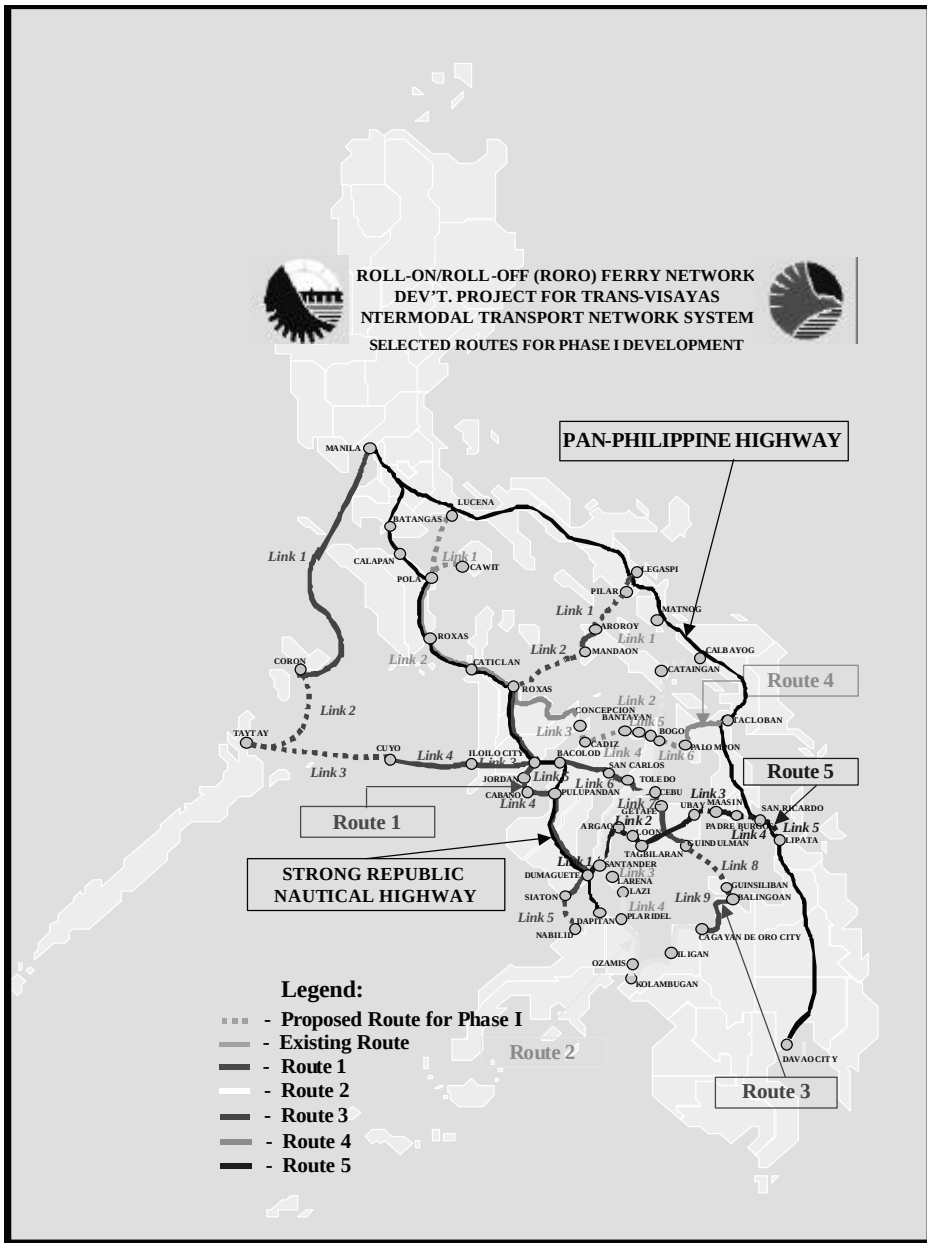
Figure 9.2.6 Proposed route of Agri-tourism Highway

Table 9.2.6 Proposed ports for Trans-Visayas Intermodal Transport Network

Trans-Visayas intermodal transport network
Pilar (Luzon) - **Aroroy (Masbate)**
Mandaon (Masbate) - *Roxas/Culasi (Panay)*
Concepcion (Panay) - **Cadiz (Negros Occidental)** - **Bantayan (Cebu)**
Palompon - **Bogo (Cebu)** - **Cataingan (Masbate)** - *Calbayog*
Siaton (Negros Occidental) - **Nabilid (Mindanao)**
Coron - **Taytay (Palawan)** - *Cuyo*
Tapal/Ubay (Bohol) - *Maasin (Samar)*
Guindulman (Bohol) - **Guinsiliban (Camiguin)** - *Balingoan (Mindanao)*
Padre Burgos (Samar) - **San Ricardo (Panaon)** - *Lipata (Mindanao)*
Lucena - **Pola (Mindro Oriental)** - *Cawit*

*Source: DOTC

Note): Names of ports to be developed are in bold. Already developed ports are in italics.



*Source: DOTC

Figure 9.2.7 Trans-Visayas Intermodal Transport Projects

(2) Existing schemes on the maritime sector

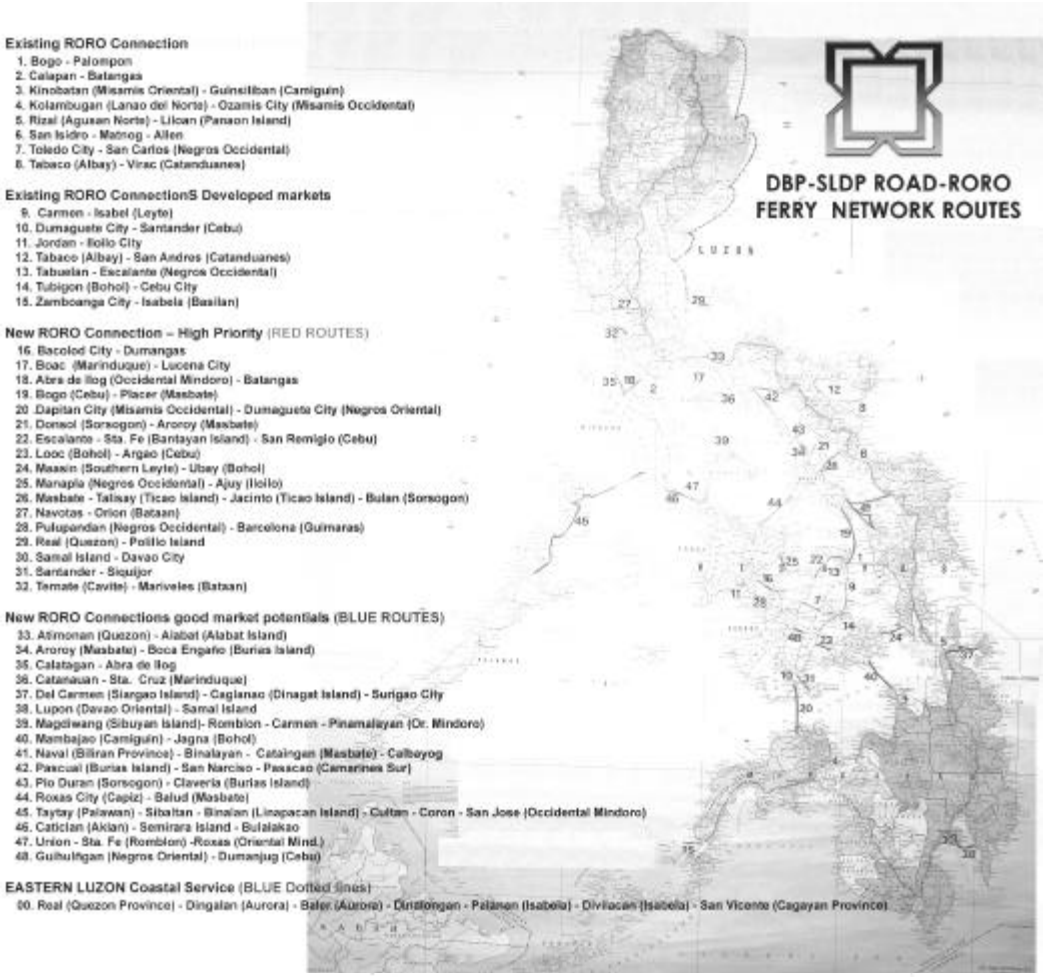
One of the major concerns of the maritime sector in enhancing RO/RO services in the Philippines is vessel acquisition and upgrading. In order to provide financial assistance to the private sector engaged in domestic shipping operation as well as their relevant industries, the Philippine government has introduced a lending program[1], namely the Domestic Shipping Modernization Program (DSMP) with Development Bank of the Philippines (DBP), as the executing agency. The eligible projects include ship building/repair, construction of terminals and development of cargo

[1] The program is funded by the Japan Bank for International Cooperation (JBIC).

handling system, etc. The second phase of DSMP is currently being implemented (1999-2004).

Moreover, DBP has recently launched Sustainable Logistic Development Program (SLDP). SLDP advocates the introduction of a modern storage handling and transport system, and the necessity of establishing an efficient road and RO/RO ferry network. In SLDP, RO/RO ferry network is considered as "Floating Bridges". SLDP explains that *"RO/RO ferry route provides continuity for land transports to travel from one landmass to another"*. SLDP provides 49 candidate routes as road RO/RO ferry network routes (See Figure 9.2.8).

Correspondingly, Executive Order 170 on "Promoting private sector participation and investment in the development and operation of the road roll-on / roll-off terminal system" was issued in January 2003. This Executive Order defines the RRTS toll which consists terminal fee for the usage of the terminal, passage fee levied on self-powered vehicles based on lane-meter and berthing fee levied on the RO/RO vessel for mooring or berthing at the RO/RO terminal.



*Source: Presentation material of Development Bank of the Philippines

Figure 9.2.8 Proposed RO/RO route by DBP

Table 9.2.4 Existing Port Development Projects

Org.	Name of Plan	Name of Port	Kinds of services	Present (2002) No of bert	Length(m)	Depth(m)	Short term (2009) No of bert	Length(m)	Depth(m)	Target (if indicated)	Long Term (2024) No of bert	Length(m)	Depth(m)	Target (if indicated)
PPA	*Development of MICT* in Major port development plan of PPA	MICT	International container	5	1,300	12-14	6	1,600	12-14		6	1,600	12-14	
PPA	*South Harbor expansion* in Major port development plan of PPA	Manila South Harbor	International container	4	250 350 200	14 12 10	5	250 600 200	14 12 10		9	500 850 560	14 12 11	1.8m TEU + non-container cargo (at 2012): Total 15.5m tons
PPA	*North Harbor Modernization* in Major port development plan of PPA	Manila North Harbor	Domestic container/ multi purpose		5,098	4 - 8		3,828 1,130	4 - 8 10.5 (Terminal -1)	1.45m TEU (1.7m TEU at 2012)		3,748	10.5	1.7m TEU, 2 m tons non-container cargo (at 2012): Total 26.6m tons
PPA	Major port development plan of PPA	Batangas Port	Domestic multi purpose	2	400	4 - 8	2	400	4 - 8		2	400	4 - 8	
PPA	Major port development plan of PPA	Batangas Port	International container	0	0	-	4	1,470	13		10	3,615	13	1.15m TEU, 3.3 m tons non-container cargo (at 2012): Total 14.5 m tons
PPA	*Southern Philippine Port Development Package* in Major port development plan of PPA	Iloilo Port (ICPC)	Domestic container/ multi purpose		400	10		770	10			770	10	0.3m TEU, 3.6 m tons non-container cargo (at 2012): Total 6.4 m tons
PPA	*Southern Philippine Port Development Package* in Major port development plan of PPA	Davao Port	International and Domestic container/ multi purpose		820	9 - 10		1,120				1,120		0.4m TEU + non-container cargo (at 2012): Total 6 m tons
PPA	*Southern Philippine Port Development Package* in Major port development plan of PPA	General Santos Port	International and Domestic container/ multi purpose		726	10		996	10			1,636	10	0.25m TEU + non-container cargo (at 2012): Total 2.8 m tons
PPA	*Southern Philippine Port Development Package* in Major port development plan of PPA	Zamboanga Port	International and Domestic container/ multi purpose		500	10		700	10			770	10	0.13m TEU + non-container cargo (at 2012): Total 2.1 m tons
PPA	Major port development plan of PPA	Cagayan de Oro	Domestic container/ multi purpose		868	10		868(10) 405(13)	10 - 13			868(10) 660(13)	10 - 13	0.2m TEU, 1.3 m tons non-container cargo (at 2012): Total 3.3 m tons

				Present (2002)			Short term (2009)				Long Term (2024)			
Org.	Name of Plan	Name of Port	Kinds of services	No of bert	Length(m)	Depth(m)	No of bert	Length(m)	Depth(m)	Target (if indicated)	No of bert	Length(m)	Depth(m)	Target (if indicated)
Private		Harbour Centre	International private cargo Domestic container/ multi purpose		870 280	10-11.5 5-7.5		870 280	10-11.5 5-7.5			870 280	10-11.5 5-7.5	
Poro		Seaport of San Fernando	Internatiola/Domestic multi purpose		700	8.6-15		800	8.6-15			800	8.6-15	
Subic	The Subic bay port master plan	Subic	Internatiola/Domestic multi purpose		1,323 411 117	12-14 8-10 4-8		1,323 411 117	12-14 8-10 4-8			1,323 411 117	12-14 8-10 4-8	
Subic	The Subic bay port master plan	Subic	International container		0	-		560	13			840	13	
CEZA	Rehabilitation and Development of Port of Irene	Port of Irene	International container / multipurpose	1	189	7.8-11.8	3	600	14			6	1,000	
PIA		Mindanao container terminal	International container	0	0	-		300	13	270,000 TEU		400	13	500,00 - 550,000 TEU
PIA		Mindanao Bulk terminal	International multi purpose	0	0	-		270	11			270	11	
Cebu	Cebu integrated port development plan	Cebu (Existing Container)	International container, multi purpose >> Domestic container in the futhure		386.5	8.5		258.5	8.5			243	8.5	
Cebu	Cebu integrated port development plan	Cebu (New container)	International container					300	13			1,200	13	
Cebu	Cebu integrated port development plan	Cebu (new Internationl multi purpose)	Internation multi purpose									131 380	8.5 10	

Org.	Name of Plan	Name of Port	Kinds of services	Present (2002) No of bert	Length(m)	Depth(m)	2002	2003	2004	2005	2006	2007	2008	2009	Short term (2009) No of bert	Length(m)	Depth(m)	Target (if indicated)	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	Long Term (2024) No of bert	Length(m)	Depth(m)	Target (if indicated)
Cebu	Cebu integrated port development plan	Cebu (Domestic multi purpose)	Domestic multi purpose		3,972	4 - 7										503 3192	8.5 4 - 8									- Rehabiliation/renovation of existing berth								450 3191	8.5 5 - 8.5	
DOTC	Social Reform Related Feeder Ports Development Project	10 Ports (Package E (2004-2006)	Feeder Port													10 Ports (Package E (2004-2006)																				
DOTC	Trans-Visayas intermodal transport network	17 ports in Visayas area	Ro/Ro						- 17 Ro/Ro ports development							17 ports																					
PPA	PPA 25-Year Development Plan (*1) (1995 - 2020, This plan indicates the port capacity in long term.)	Puerto Princesa			195	10-12																												*773*	*10-12*	
PPA	PPA 25-Year Development Plan (1995 - 2020, This plan indicates the port capacity in long term.)	Legaspi			404	4-8																												*647* *(*2)*	*4-8*	
PPA	PPA 25-Year Development Plan (1995 - 2020, This plan indicates the port capacity in long term.)	Tabaco			310	8-10																												*945*	*8-10*	
PPA	PPA 25-Year Development Plan (1995 - 2020, This plan indicates the port capacity in long term.)	Tacloban			622	4-8																												*1,549* *(*3)*	*4-8*	
PPA	PPA 25-Year Development Plan (1995 - 2020, This plan indicates the port capacity in long term.)	Dumaguete			358	8-10																												*2,073* *(*4)*	*8-10*	
PPA	PPA 25-Year Development Plan (1995 - 2020, This plan indicates the port capacity in long term.)	Tagbilaran			266	4-8																												*2,431*	*4-8*	
PPA	PPA 25-Year Development Plan (1995 - 2020, This plan indicates the port capacity in long term.)	Iligan			620	8-10																												*1,320*	*8-10*	
PPA	PPA 25-Year Development Plan (1995 - 2020, This plan indicates the port capacity in long term.)	Nasipit			185	4-8																												*3,743*	*4-8*	
PPA	PPA 25-Year Development Plan (1995 - 2020, This plan indicates the port capacity in long term.)	Surigao			342	8-10																												*1,118*	*8-10*	
PPA	PPA 25-Year Development Plan (1995 - 2020, This plan indicates the port capacity in long term.)	Ozamiz			410	4-8																												*2,076*	*4-8*	
PPA	PPA 25-Year Development Plan (1995 - 2020, This plan indicates the port capacity in long term.)	Jolo			364																												*863*		

(Note)

*1 PPA 25-Year Development Plan indicates the port capacity in the long term. Thus, the length of berths might not show the plan of investment.

*2 According to the 25 year development plan, there is no capacity over current facilities. This figure is based on the PPA port development plan 2002

*3 This figure excludes the new port development

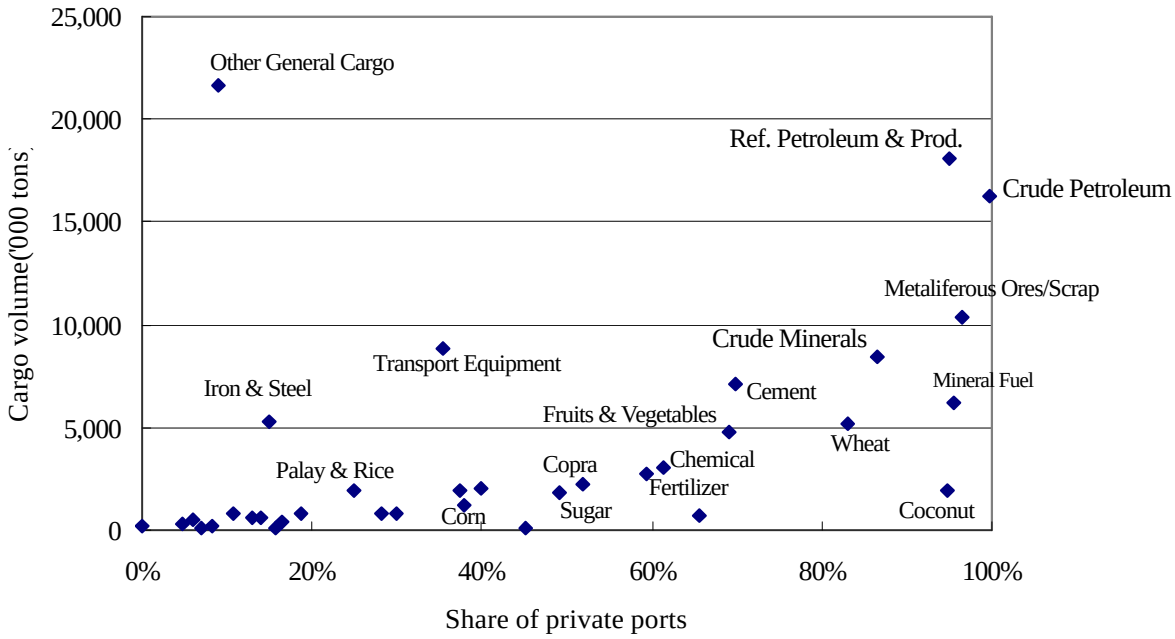
*4 Berths in Inner harbour area are not counted because of shallow water.

Chapter 10 Master Plan with the Target Year of 2024

10.1 Types of Ports to be Considered in the Master Plan

Generally speaking, ports can be classified into two groups in terms of port management bodies: public ports and private ports. Public ports are open to anybody who wishes to use the facilities while private ports are usually used by certain private entities exclusively*[1].

As shown in Figure 10.1.1, some commodities are predominantly handled at private ports. Energy related commodities such as crude petroleum, refinery petroleum, and mineral fuel account for the largest volume. Crude mineral, wheat, and cement are also predominantly handled at private ports, but the cargo volume is smaller than that of the above mentioned commodities.

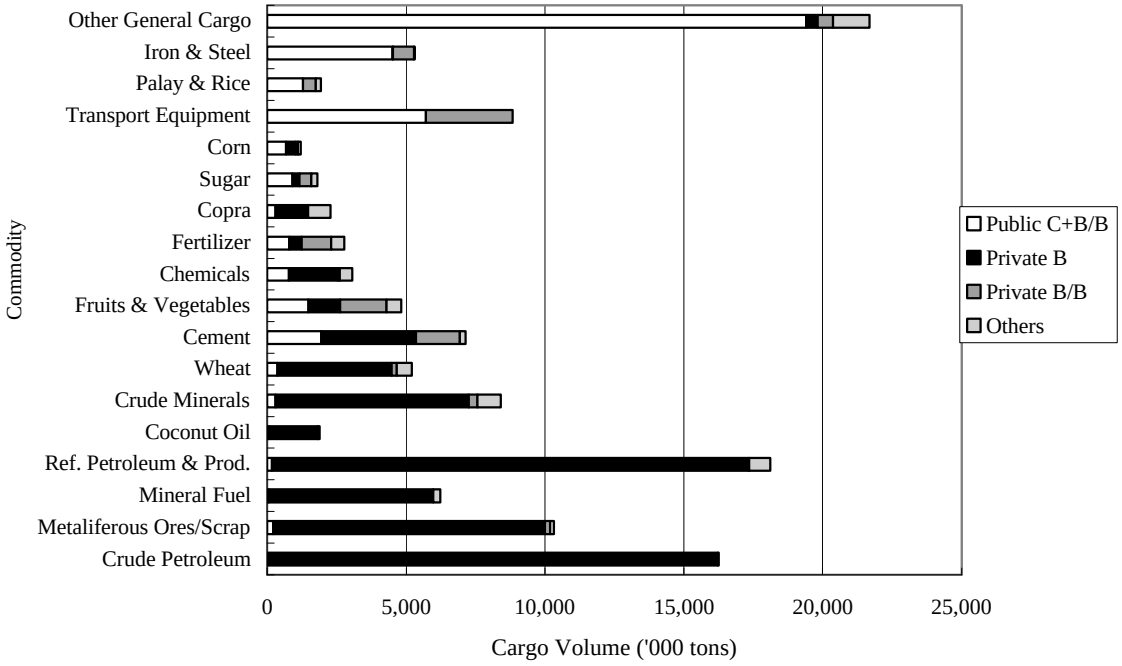


*Source: JICA Study Team on the basis of data from PPA

Figure 10.1.1 Share of the Cargo Volume Handled at Private Ports by Commodities (2001)

Figure 10.1.2 shows cargo type of each commodity in ascending order of private port share. It is clear that the commodities transported as bulk cargo are mostly handled at the private ports. On the other hand, most break bulk cargo is handled at public ports.

*[1] There are so-called "private commercial ports", which are developed and managed by private entities in the Philippines. Although the private commercial ports are used openly for the public, the private entities, of course, are solely able to develop and manage their own ports. Thus, this type of port is also categorized as a private port in this Study. It should, however, be stressed here that the exchange of information between the public ports and the private commercial ports is very important since both kinds of ports handle the same type of cargo.



*Source: JICA Study Team on the basis of the data from PPA.

Figure 10.1.2 Volume by Cargo Type of Each Commodity (2001)

Generally, specialized and dedicated facilities are indispensable to handle bulk cargo efficiently. According to the above analysis, private ports handle a large amount of bulk commodities directly related to commercial industries such as energy, foodstuffs, and chemical. In other words, the private sector focuses mainly on the specialized and dedicated cargo according to commercial advantage, and the development of private ports is driven by the market demands of specific related industries.

Therefore, the JICA Study Team proposes that the government establish the Master Plan of port development for public ports. At the same time, however the government should also monitor, regulate and coordinate with the private sector to grasp the total demands of maritime transportation (see Table 10.1.1).

Table 10.1.1 Government Intervention in Public and Private Ports

Types of ports	Port usage	Typical type of cargo	Form of government intervention
Public ports	- Common usage	- Container - Break Bulk - Bulk (mainly handled at multi-purpose berths)	- Planning (including coordination with private ports)
Private ports	- Dedicated usage - Common usage	- Bulk - Break Bulk	- Monitoring (cargo and passengers) - Regulations > Navigation safety > Safety usage of port > Environment, etc. - Planning coordination in terms of : > Division of roles with public ports in vicinity > Coastal area development > Land usage around the port, etc.

10.2 Proposed Nationwide Trunk Maritime Routes

In order to establish a nationwide port development plan, it is indispensable to have a consensus on the nationwide trunk maritime routes. The JICA Study Team proposes three kinds of trunk networks. First one is the land and intermodal trunk route (see Figure 10.2.1). This trunk route is based on the road network in 2024, and includes the two major north-south linkages, i.e. Pan-Philippine Highway and Strong Republic Nautical Highway. In addition to the linkages, the JICA Study Team considers the important roles of road on the connections within the Luzon area and Mindanao area respectively taking into account DPWH future development of road network in the areas*[1]. Moreover, the JICA Study Team proposes east-west intermodal linkage in Palawan, Visayas and west Mindanao area. Obviously, this trunk maritime route combines land transportation and maritime transportation. Thus, short distance RO/RO linkage has, in particular, vital a role in this route.

Second proposed trunk route is the domestic maritime trunk route (see Figure 10.2.2). This represents major lines between the Luzon area and Visayas/Mindanao areas, and these lines form maritime north-south major corridors. The long distance maritime transportation, in particular, is important in this trunk route.

*[1] At the northern part of Luzon island, land transportation and maritime transportation can be competing modes connecting with GCR because of the lower cost of the maritime transport portion. It should be noted, however, the maritime transportation would require more steps in handling cargo including transportation to a port and waiting there. These steps require not only additional cost but also additional time which directly relates to the convenience of consignees.

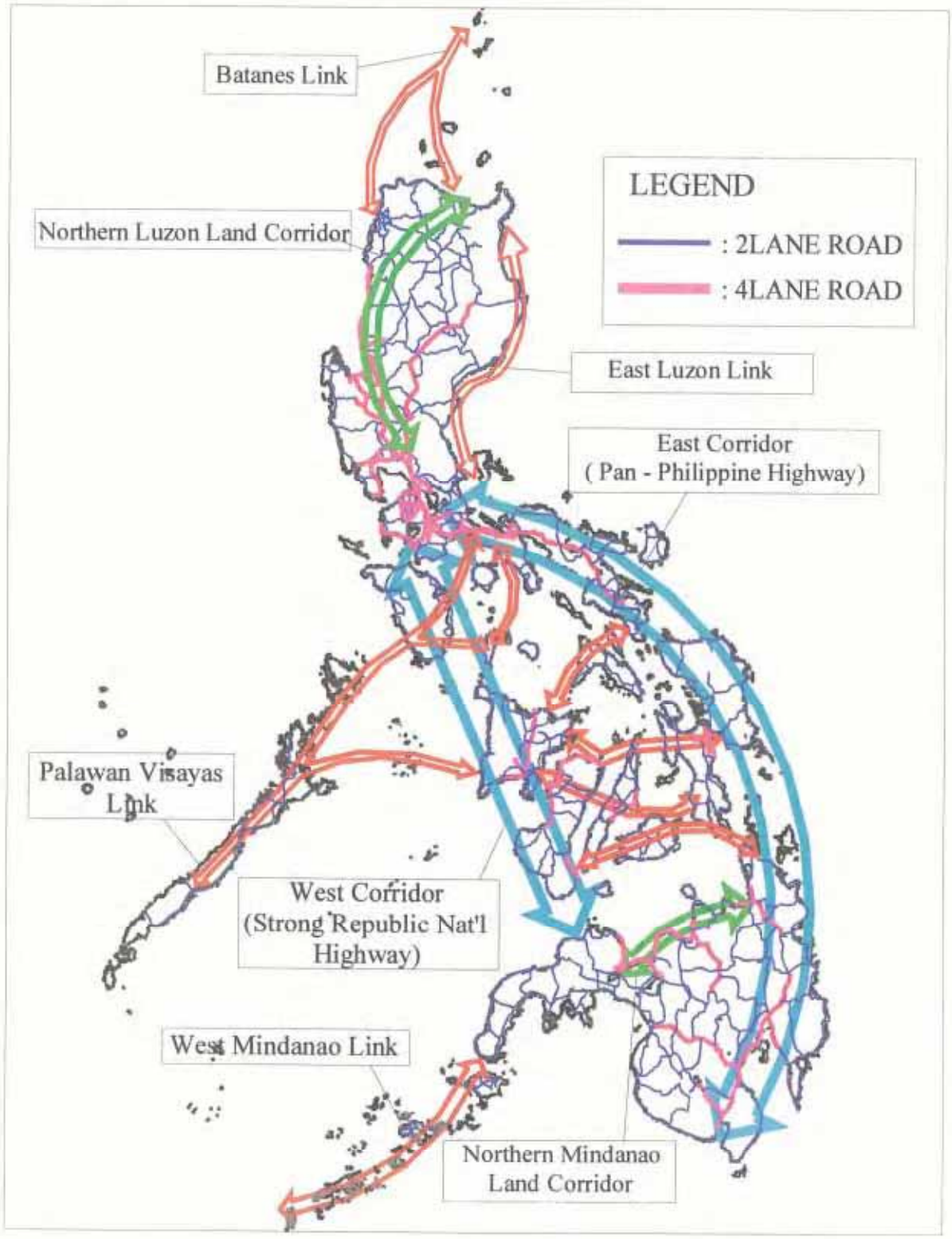


Figure 10.2.1 Proposed Land/Intermodal Trunk Routes

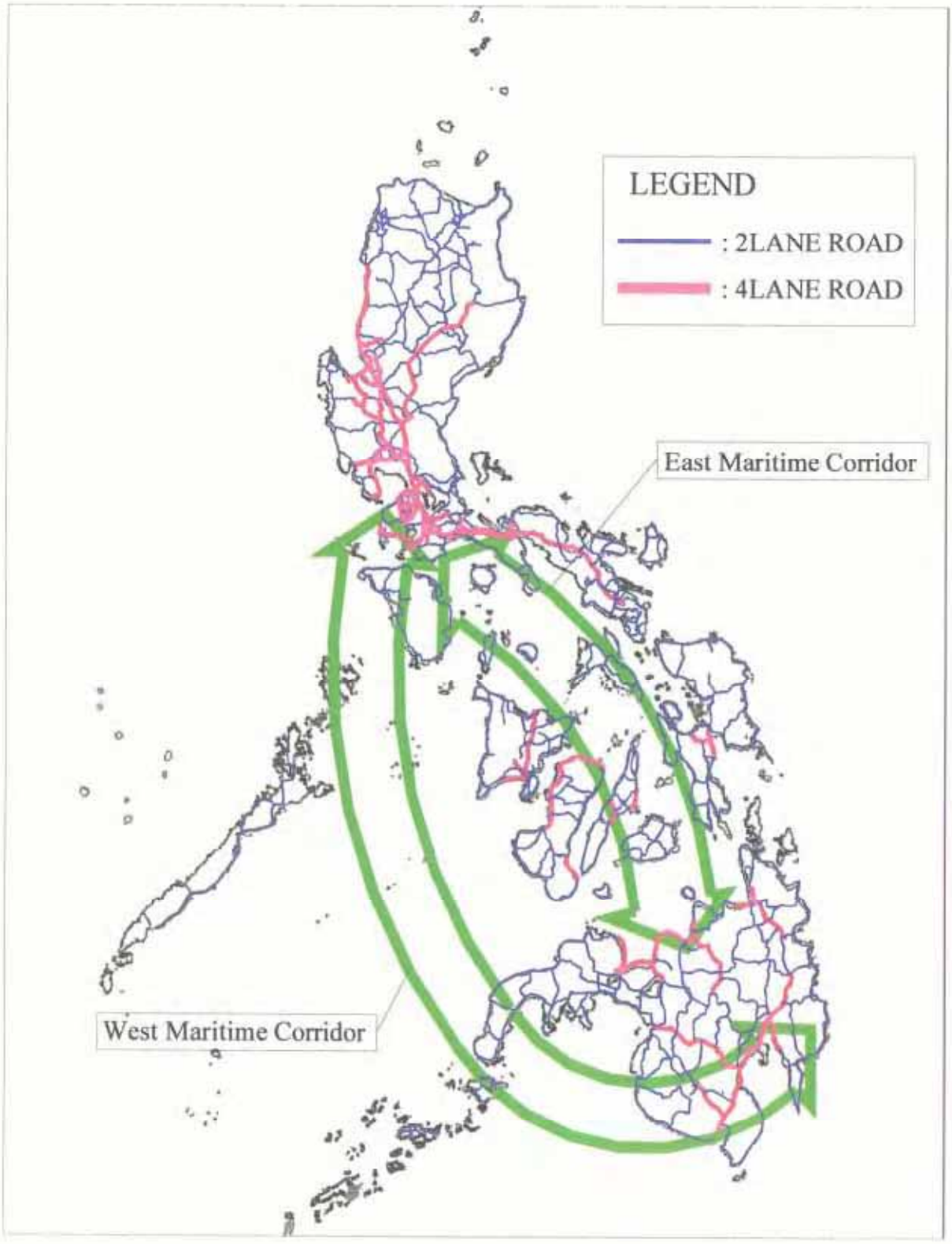


Figure 10.2.2 Proposed Domestic Maritime Trunk Routes

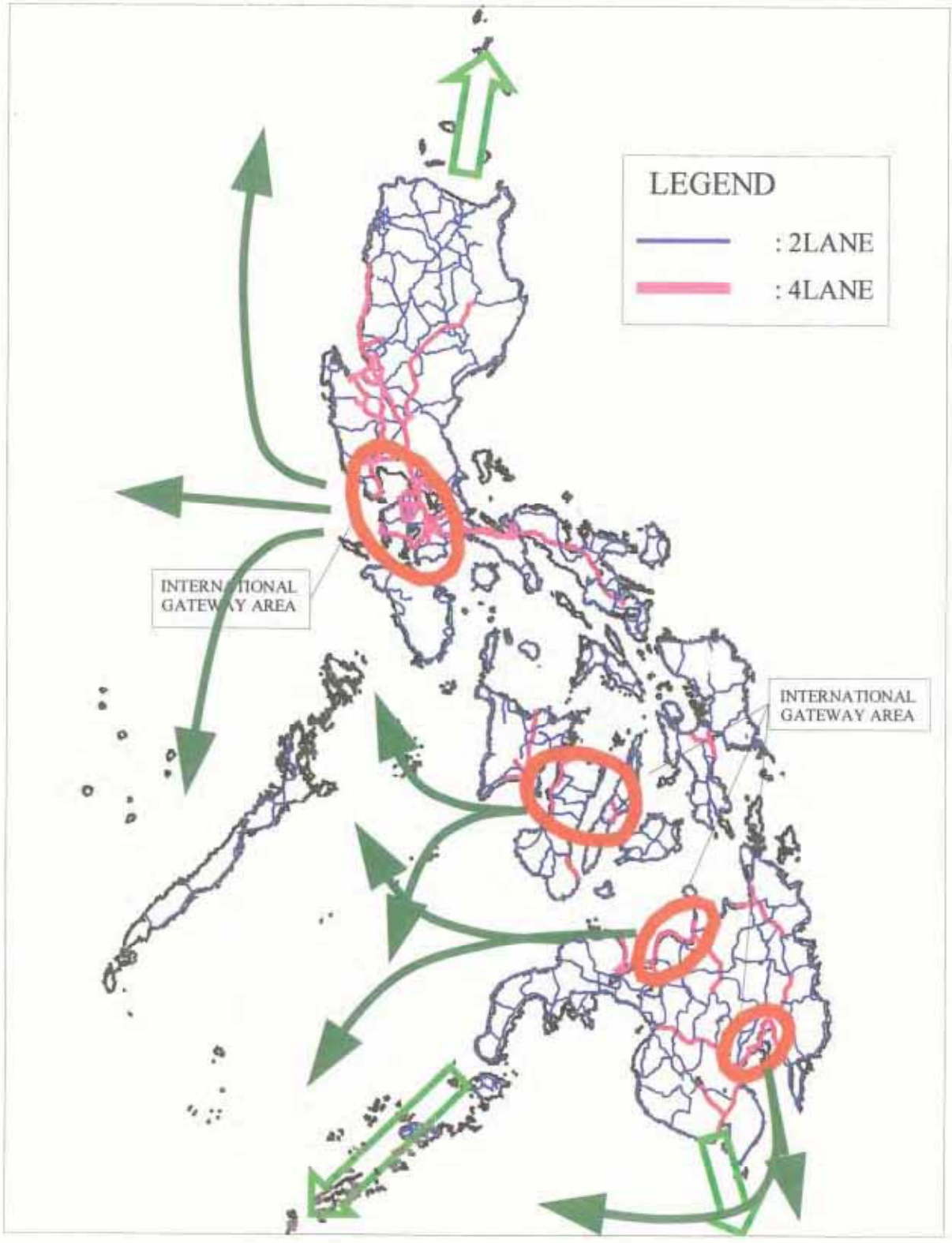


Figure 10.2.3 Proposed Areas for International Maritime Linkage

Thirdly, areas for international maritime linkage are proposed (see Figure 10.2.3). The JICA Study Team proposes four international gateway areas, i.e. Greater Capital Region, which has been already established, Visayas area, Northern Mindanao area and Southern Mindanao area. The JICA Study Team also proposes other possible areas for international linkage considering the geographical location and their growth potentials.

10.3 Port Classification

The overall evaluation on the importance of an individual port (although a port usually has various functions with varying degrees of importance) is indispensable when coordinating with future plans of other sectors, in particular the road sector. According to the extent to which the port contributes to international/domestic maritime transportation, the notion of port classification is introduced here. In the classification, ports are classified into four types (see Table 10.3.1).

Table 10.3.1 Port Classification

Type of port		**Functions of ports (The extent to which the port contributes to international/domestic maritime transport)**
International gateway port (Gateway port)		Ports as major "windows" of the country to the world
Principal international trade port (Principal port)		Highly important ports for **both** international **and** domestic maritime transport (The ports have at least one dedicated berth for international cargo)
Major port (including RO/RO ports for major corridors)		Important ports for domestic and/or international maritime transport
	Major domestic container port	Ports which are important for domestic container transport (Among the Major ports, ports which have container handling dedicated quay side cranes and/or have at least one dedicated berth for long distance RO/RO ferry vessels)
Regional port		All ports not included in above types. Regional ports, which mainly support regional society as maritime transport bases, consist of RO/RO ports for short and middle distance transport (RO/RO ports for mobility enhancement, RO/RO ports for remote islands development), Social reform support ports, etc.

Criteria to be classified as a Gateway port, Principal port or Major port, as of 2001 is proposed in Table 10.3.2. Since the cargo volume of nationwide ports in 2024 will be 3.29 times of that in 2001, the criteria in 2024 is set three times higher than that in 2001. Similarly, the criteria in 2009 is set 1.5 times higher than that in 2001. All Gateway ports, Principal ports and Major ports are listed in Table

10.3.3.

It should be clarified here that criteria in the future is based on the cargo forecasted in this Study. The criteria can be revised according to the future nationwide cargo, the cargo of individual port, etc. Naturally, the number of ports under each type in Table 10.3.3 may increase or decrease.

Table 10.3.2 Criteria on Port Classification in 2001, 2009 and 2024
(Gateway Port, Principal Port and Major Port)

(Unit: '000 tons)

Year	Type of port	Total cargo	International cargo	Domestic cargo		
				Ro/Ro	B, B/B (excl. Ro/Ro)	Container
2001	Gateway port	1,000	1,000	--	--	--
	Principal port	1,000	100	--	--	--
	Major port	500	--	--	--	--
		200	--	30	--	--
		200	--	--	150	--
		200	--	--	--	150
2009 (Tentative)	Gateway port	1,500	1,500	--	--	--
	Principal port	1,500	150	--	--	--
	Major port	750	--	--	--	--
		300	--	45	--	--
		300	--	--	225	--
		300	--	--	--	225
2024 (Tentative)	Gateway port	3,000	3,000	--	--	--
	Principal port	3,000	300	--	--	--
	Major port	1,500	--	--	--	--
		600	--	90	--	--
		600	--	--	450	--
		600	--	--	--	450

Table 10.3.3 Gateway Ports, Principal Ports and Major Ports in 2001, 2009 and 2024

Type of port	Name of port		
	2001	2009 (Tentative)	2024 (Tentative)
Gateway port	Subic, Manila, Cebu	Subic, Manila, Batangas, Cebu, CDO/MCT, Davao	Subic, Manila, Batangas, Cebu, CDO/MCT, Davao
Principal port	CDO/MCT, Iloilo, Davao, General Santos, Zamboanga, San Fernando, Batangas	Iloilo, General Santos, Zamboanga, San Fernando	Iloilo, General Santos, Zamboanga
Major port	Bay/river, Calapan, Pto. Princesa, Tabaco, Legazpi, Matnog, Masbate, Tacloban, Liloan, Dumaguete, Tagbilaran, Surigao, Lipata, Nasipit, Ozamiz, Dapitan	Bay/river, Calapan, Pto. Princesa, Tabaco, Legazpi, Matnog, Masbate, Tacloban, Liloan, Culasi, Dumaguete, Tagbilaran, Surigao, Lipata, Nasipit, Ozamiz, Dapitan, Masao	San Fernando, Bay/river, Calapan, Pto. Princesa, Tabaco, Legazpi, Matnog, Masbate, Tacloban, Palompon, Liloan, Culasi, Dumaguete, Tagbilaran, Surigao, Lipata, Nasipit, Ozamiz, Dapitan, Masao

Regional ports are smaller sized ports in terms of cargo/passenger volume compared to those of Gateway ports, Principal ports and Major ports. It should be stressed, however, that the selective development of a number of small and medium scale ports can not only provide the socio-economic foundation of a region but also can contribute to raising the socio-economic bottom lines nationwide Thus, it is proposed to develop RO/RO ports for mobility enhancement as well as RO/RO ports supporting the development of remote areas. A hundred (100) RO/RO ports are expected to carry out the former function in 2024 while 83 RO/RO ports will have the latter role in 2024. Furthermore, it is possible for some small-scale ports without RO/RO facilities to support social reform. This kind of port is also proposed to be developed as a social reform support port. Twenty-two (22) ports will be developed until 2024. In addition, other regional ports will be developed in response to the actual demand.

10.4 Long-Term Strategic Port Development Plan

10.4.1 The Planning Principles

For an archipelago like the Philippines, ports are indispensable transport infrastructure. It should be stressed here that ports are not merely an intersection of different transportation modes but the bases for supporting socio economic activities. Port-related industries as well as other industries accumulate in and around ports. In addition, ports in isolated/remote areas play a vital role in supporting the daily lives of citizens.

In the Philippines, ports can act as the catalyst in promoting the exchange of people and goods between wealthy urban areas and developing regional areas. This in turn benefits the national economy as a whole. Most of the economic activities including service industries concentrate mainly in urban areas while non-urban areas mainly rely on primary industry. That is why the exchange of people and goods is quite important especially in terms of regional economies.

Moreover, globalization of the economy has led to a deeper interrelation of the economic and social activities of individual countries, and an efficient horizontal division of labor especially among Asian countries has been observed. In other words, an efficient transport system with easy access to neighboring and foreign countries is indispensable for the socio-economic prosperity to reap the most benefits. It is necessary to adapt to the changing international circumstances.

Based on the above, the premise of the long-term strategic port development plan is to carry out the following two missions ***concurrently*** and ***strategically***. The missions are,

- Establishment of fast, economical, reliable and safe maritime transport network accelerating the development of national economy, and
- Formation of maritime transport bases to support regional society.

Under the premise, the principles for the planning of each mission are proposed as follows.

(1) Establishment of Nationwide Maritime Transport Network

In order to formulate nationwide efficient maritime trunk routes (see Figure 10.2.1 - 3), the rationale / importance of individual port development should be examined in terms of the following principles.

1) Concentrated Development of Specific International Gateway Bases

Generally speaking, ports for international container trade can be classified international hub ports and international gateway ports. The former in Asia has a role to collect/distribute container cargo from/to the neighboring countries/areas and to transport the consolidated cargo to/from North America and/or Europe using Panamax or Over Panamax vessels. On the other hand, the latter, international gateway ports, function as windows to international trade.

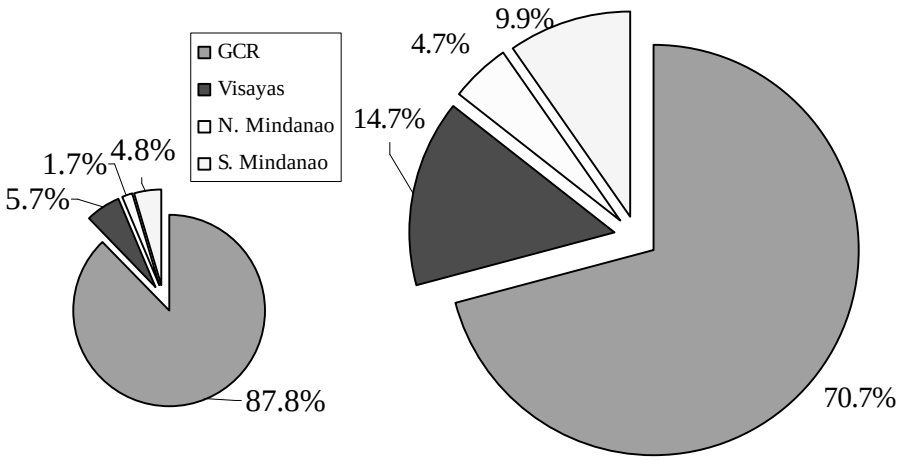
As discussed in Chapter 6, international hub ports have been established in Asia, and active shipping services have been conducted on commercial bases there. To focus exclusively on the international hub function might not be prudent since the major market of international container cargo in Asia is not located near the Philippines. Instead, it is necessary to develop the international maritime gateway function because the interdependence of Philippine socio-economy with other countries/areas is progressing. Thus, intense development of international gateway ports is proposed.

Then, it is necessary to discuss where the international gateway functions should be located in the country. In order to enjoy the scales of economy, it is better to concentrate this function into one specific area especially from the shipping line point of view. Currently, about 90% of international container cargo flow in/out through the ports in Manila area, and some of these cargo are transported to/from other areas as domestic container cargo. However, the negative externality of the concentration of land transportation in Manila has also been tangible. Namely, traffic congestion in Manila has reached a serious level. Thus, it is proposed to develop the international gateway areas intensively outside NCR and import/export from/to foreign countries directly without diverting to the Manila areas (see Figure 10.4.1 and Table 10.4.1).

In addition to the decongestion of Manila, the development of international gateways can contribute to regional development through, for instance, providing shippers with more reasonable and efficient maritime transportation. Taking into account the current conditions of the area and ports in the areas, it is proposed to establish three international gateway areas in addition to NCR. They are Visayas area, Northern Mindanao area and Southern Mindanao area.

In a nutshell, in order to promote regional development at the middle and south part of the Philippines as well as to reduce the burden of GCR, the strategic development of international

gateways at Visayas area, North Mindanao area and South Mindanao area is required.



*Source: JICA Study Team

Figure 10.4.1 Share of International Container Cargo Volume

Table 10.4.1 Share of International Container Cargo Volume

Name of Area	2001		2024	
	Volume ('000 tons)	Share (%)	Volume ('000	Share (%)
GCR	13,156	87.8%	57,482	70.7%
Visayas	853	5.7%	11,960	14.7%
N. Mindanao	249	1.7%	3,823	4.7%
S. Mindanao	725	4.8%	8,005	9.9%
Total	14,986	100.0%	81,270	100.0%

*Source: JICA Study Team

2) Improvement of Domestic Container Transport Efficiency

It is estimated that about 60% of domestic container cargo are carried by long distance RO/RO ferry vessels with passengers[1] at present while other container cargo is carried by geared vessels. It is expected that transport by RO/RO ferry vessel will continue in the future.

It is forecasted, however, that the increase ratio of container cargo volume will be larger than that of passengers, and as a result, the volume of container cargo carried by non-RO/RO ferry will increase. It is forecasted that about half of the containers will be transported by non-RO/RO ferry in 2024. Thus, it is proposed that the quayside cranes such as gantry cranes and mobile cranes, which enables

[1] Long distance passengers stay on board more than twelve hours.

more efficient container handling at berth, should be introduced at some major domestic container ports.

3) Development of Break Bulk and Bulk Cargo Handling Facilities

While the volume of break bulk cargo will increase steadily in the coming 20 years, bulk cargo will increase rapidly. However, the majority of bulk cargo has been handled at private terminals. On the other hand, almost all break bulk cargo and some bulk cargo has been handled at the same berth in public ports due to limited port facilities. It is expected that this mixed cargo-handling system will continue in many public ports, since cargo-handling volumes are not expected to greatly increase in future.

Thus, it is proposed that the public sector develop "multi-purpose berths" to handle these kinds of cargo in accordance with the demand for ports. Since greater private sector participation is expected, in particular in the field of the improvement of bulk cargo handling operation, public and private partnerships which coordinate/enhance private investment in cargo handling equipments/warehouses should be pursued.

4) Port Planning at the Greater Capital Region

In order to meet the cargo demand with minimum negative economic externalities related to land traffic congestion, it is proposed that the expansion of existing ports in Manila be avoided as much as possible for the moment. Thus, the non-consumer goods for NCR such as industrial materials might be handled outside NCR. In order to handle these kinds of goods, it is proposed that ports at Subic and Batangas be developed intensively for this purpose. Guidelines or regulations on the industrial location would be established by the urban planning authority in order to prevent factories related to non-consumer goods locating inside NCR.

5) Formation of Major Corridors

There are two major north-south intermodal corridors in the Philippines, i.e. Pan-Philippine Highway and Strong Republic Nautical Highway at present. It is proposed that the RO/RO ports along the major corridors be strategically developed.

(2) Formation of Maritime Transport Base to Support Regional Society

Small and medium scale port development to formulate maritime transport bases to support regional society is another goal of the planning. Major principles for these ports are described as follows. Ports which are not applicable to the principles should also be developed steadily in accordance with their demand.

1) Enhancing the Mobility of People and Goods in the Region

While socio-economic development often requires the concentration of resources in a specific area, it is desirable to pursue the development of the nation as a whole. In order to resolve these two contradictory issues, it is necessary to promote "National Dispersion through Regional Concentration"[1] through the formation of an effective intermodal network and elicitation of regional growth potential. Thus, it is proposed that RO/RO ports which enhance the inter-regional and intra-regional mobility of people and goods should be strategically selected and developed.

2) Securing Transportation Bases to Support Daily Life in Remote Islands

An improved transportation system can not only secure a more stable daily life in remote islands but also contribute to economic development. Thus, for remote islands that have a population of more than 5,000 in 2024 and existing port facilities, RO/RO ports should be strategically selected and developed considering the growth potential of remote islands as well as the accessibility to population center in main islands and other islands.

3) Supporting Social Reforms

Improving accessibility and supporting the production activities such as fishery in remote islands without port facilities and other isolated areas can reduce regional gaps and contribute to poverty alleviation. Thus, it is proposed that social reform support ports should be strategically developed to form maritime routes linking the isolated area/island and population center, to support the establishment of population centers within isolated area as well as to upgrade existing shipping services.

(3) Other Relevant Planning Principles

1) Separation of Berth Usage by Type of Cargo

Many public berths in this country are used in a multi-purpose manner. For example, container vessels and bulk cargo vessels use the same berth. In some cases, it is observed that a bulk vessel has to leave the berth even during the load/unloading in order to secure the time schedule of liner vessels.

If the volume of one specific cargo is not sufficient to fill up one berth, multi-purpose use of the berth becomes inevitable. But for better cargo handling efficiency, it is proposed to plan/use a berth by type of cargo if the berth length becomes long enough to accommodate two or more vessels.

[1] NEDA (1998), The Philippine National Development Plan for the 21st Century

In addition, due to the intensification of security checks on international cargo, in particular on international container cargo, it is likely that international cargo will have to be handled separately from domestic cargo. From the viewpoint of planning, the mixed usage of international/domestic cargo should be avoided as much as possible.

10.4.2 Planning Options

Under the above-mentioned principles, it is proposed that the following major port functions be considered as planning options. The required facilities of each planning option at ports will be examined taking into account the separate berth usage according to the types of cargo handling.

(1) International Transport
   1) International container transport
   2) International bulk and break bulk cargo transport

(2) Domestic Transport
   1) Domestic container transport
   2) Domestic bulk and break bulk cargo transport
   3) RO/RO transport for short distance
   4) Social reform support
   5) Passenger transport

It is also proposed that a port which will be developed during long-term and short-term period be called Strategic Development Port.

10.4.3 Required Port Facilities in 2024 and Strategic Development Port[1]

(1) Ports for International Transport

Nine ports will handle international container cargo in 2024, and it is necessary to install container handling dedicated quayside cranes such as gantry cranes at these ports (see Table 10.4.2 and Figure 10.4.2.). Six of these ports, i.e. Subic, Manila (MICT, South Harbor), Batangas, Cebu, Cagayan de Oro (CDO/MCT) and Davao, will function as international gateway ports, and must be developed in line with the growing demand. International containers will also be handled at Iloilo, General Santos and Zamboanga. Thus, these three ports also require the installation of dedicated container quayside cranes.

[1] The detailed procedures of calculation are described in Appendix 10.4.1~10.4.8.

Table 10.4.2 Plans for International Container, Bulk and Break Bulk in 2024

Name of port	International container							International bulk, break bulk					Int'l gateway port (Int'l cargo > 3m ton)	Principal int'l trade port (Total:3m and Int'l cargo:0.3 m ton or more)	Major port (Total 1.5 m ton or others)	Remarks
	No. of berths (@250-300)	Berths length (m)	Berths length to be developed (m)	Depth of berth (m)	Qauy side cranes	Cranes to be installed	Strategic Dev't Ports for int'l container	No. of berths (@200)	Berths length (m)	Berths length to be developed (m)	Depth of berth (m)	Strategic Dev't Ports for int'l bulk and break bulk				
Subic	3	840	840	13	6 GC	6 GC	○	1	200		10.5		○			
Manila (MICT)	6	1,600	300	12-14	12 GC	2 GC	○						○			
Manila (South Harbor)	4	1,200	250	10.5-12	8 GC	2 GC		10	1,800		10.5					
Batangas	9	3,020	3,020	13	18 GC	18 GC	○	1	200		10.5		○			
Cebu	4	1,200	1,200	13	8 GC	8 GC	○	2	400	400	10.5	○	○			
CDO / MCT	2	600	300	13	4 GC	2 GC	○	2	400	200	10.5	○	○			
Davao	2	600	350	12	4 QC	4 QC	○	2	400	200	10.5	○	○			
Iloilo	1	250	250	12	1 QC	1 QC	○	2	400	400	10.5	○		○		
General Santos	1	250	250	12	2 QC	2 QC	○	1	200		10.5			○		
Zamboanga	1	250	250	12	1 QC	1 QC	○	1	200		10.5			○		
San Fernando								3	600		10.5				○	
Pt. Princesa								1	200(*)	200(*)	10.5	○			○	*) Multi purpose usage of int'l B, B/B and long dis. RO/RO
Ozamiz								1	200(*)	200(*)	10.5	○			○	*) Multi purpose usage of int'l B, B/B and long dis. RO/RO
Tacloban								1	200(*)	200(*)	10.5	○			○	*) Multi purpose usage of int'l B, B/B and long dis. RO/RO
Legazpi								1	200	200	10.5	○			○	Development will be at Tabaco or Pantao

Note): Port of Irene and Limay, which are Regional ports, also handle international bulk cargo.

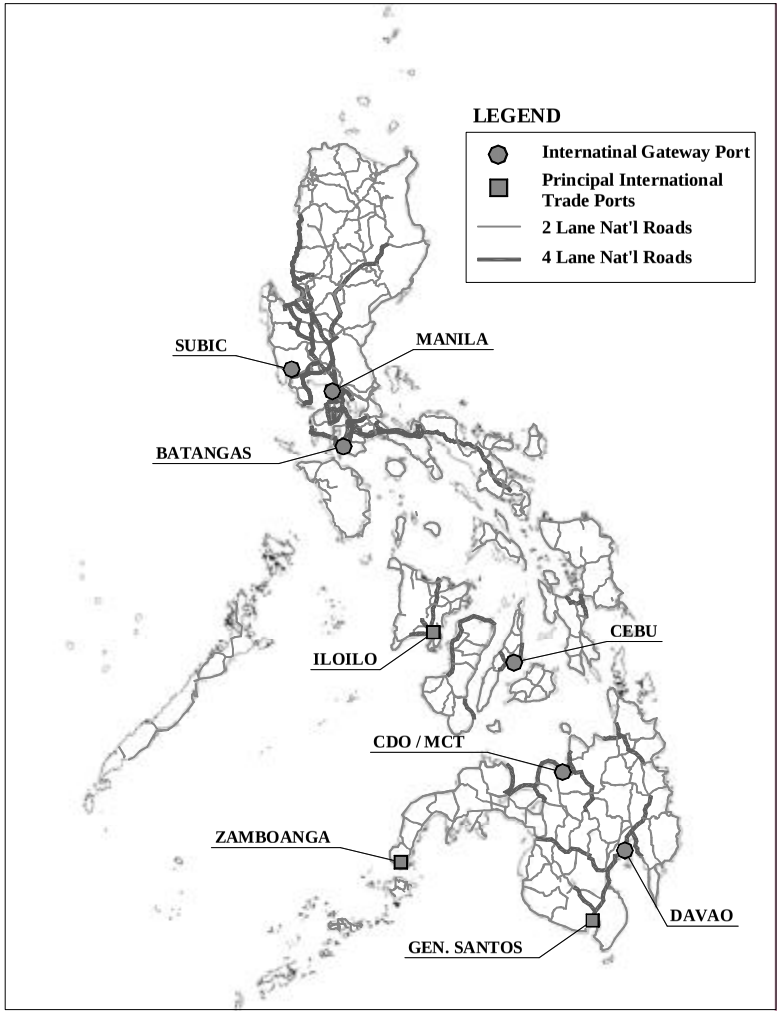


Figure 10.4.2 International Gateway Ports and Principal International Trade Ports (2024)

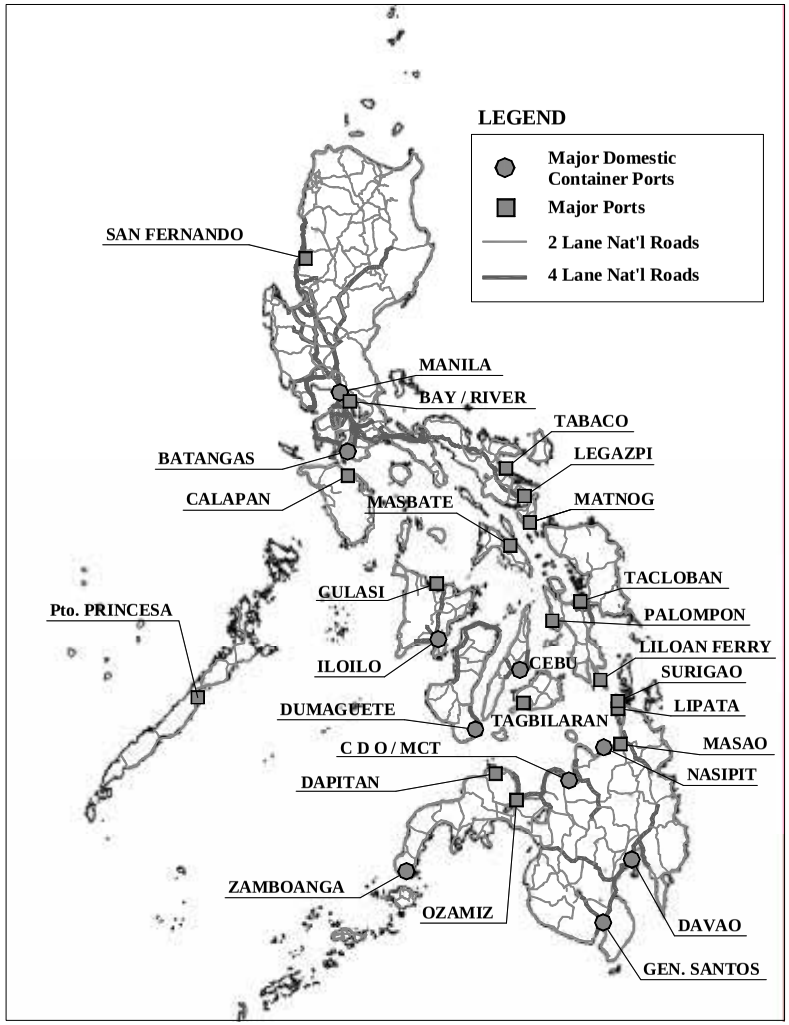


Figure 10.4.3 Major Domestic Container Ports and Major Ports (2024)

International bulk and break bulk will be mainly handled at fourteen (14) ports in 2024. Of the eight ports among them which are not international gateway ports, three ports (Iloilo, General Santos and Zamboanga) are developed as Principal international trade ports while the other five ports are developed as Major ports.

Strategic Development Ports, which will be developed from 2004 to 2024, and their required facilities to be developed are also shown by each planning option in Table 10.4.2. Twenty-three (23) berths for international container and 10 berths for international bulk and break bulk (including "multi-purpose usage" with other cargo) are required to be developed. The outline of the major strategic development of individual port will be explained here (see also Appendix 10.4.9 and 10.4.10)[1].

1) International Gateway Port

a) Subic

- Two international container berths will be developed until 2009. One more berth will be developed until 2024.

b) Manila (MICT and South Harbor)

- One more berth will be developed at each area until 2014.

c) Batangas

- Until 2024, total nine berths will be developed. Two, one, three and three berths will be developed during the first quarter of long-term (i.e. initial five years) and consecutive quarters respectively.

d) Cebu

- With regard to international containers, one berth will be developed during every quarter of long-term (i.e. every five years). That is, four international container berths will be developed until 2024. Due to the space restrictions at the existing port, this development will be carried out at new site.
- In order to handle international bulk and break bulk cargo, it is necessary at first to improve the existing berth within the port through deepening the channel and water basin to accommodate larger vessels. By 2024, one more berth for the cargo will be required. Due to the space limitations of new development within the existing port, this new development will be carried out at new site. However, in order to avoid the separation of the improved berth and new berth and to separate international cargo handling berth and domestic cargo handling berth, it is proposed that two more berths be developed at new site, and the existing berth be converted to a domestic container berth.

[1] Appendix 10.4.9 shows the development phase plan with required construction costs. Appendix 10.4.10 also shows the development phase plan taking into account the existing facilities.

e) CDO/MCT

- One more berth will be developed for international container until 2024 in addition to the existing newly opened berth.
- One berth also will be developed for international bulk and break bulk until 2019.

f) Davao

- The installation of two quayside cranes for international container and 250m expansion of existing berth are required by 2009. For improvement of handling efficiency, two more quayside cranes will be installed, one by 2014 and the other by 2019. For improving cargo handling efficiency and accepting larger vessels, berth will be expanded by 100m by 2024.
- For international bulk and break bulk, one more berth will be developed by 2024.

2) Principal International Trade Port

a) Iloilo

- For handling international bulk and break bulk, 400m berth extension is required by 2009. In order to minimize physical development of berth, it is indispensable to improve bulk cargo handling efficiency by 2024 through, say, introducing proper cargo handling equipment under the Public and Private Partnerships.
- To accommodate international containers vessels, it is proposed to develop one dedicated international container berth with one quayside crane by 2014.

b) General Santos

- Since the forecasted international container cargo volume up to 2004 does not require one dedicated berth, international and domestic container cargo will be handled at one berth. It is proposed, however, that one dedicated international container berth be developed by 2014 with one quayside crane. One more quayside crane will be installed by 2019.

c) Zamboanga

- Since the forecasted international container cargo does not require one dedicated berth until 2019, international and domestic container cargo will be handled at one berth. It is proposed, however, that one dedicated international container berth be developed until 2024. At that time, one more quayside crane will be installed dedicatedly for international container.

3) Major Port

- Five ports are considered as Major ports in 2024. Although one berth is expected to be developed at Legazpi as one of the Major ports, the development will be carried out at Tabaco or Pantao due to the spatial limitation at Legazpi.

(2) Ports for Domestic Transport

1) Ports for Establishment of Nationwide Maritime Transport Network

With regard to domestic container transport, ten ports will be developed nationwide as Major domestic container ports in 2024, and container will be transported by long distance RO/RO ferry and other vessels. It is proposed, in particular, that eight ports (i.e. Manila (North Harbor), Batangas, Cebu, Cagayan de Oro (CDO/MCT), Iloilo, Davao, General Santos, Zamboanga) among these ten ports install container handling quayside cranes such as mobile cranes, and that gearless container vessels be used at the eight ports to improve the container handling efficiency. It should be noted that the role of long distance RO/RO ferry vessels will continue to be important in the future. These two different modes of transport will complement one another (see Table 10.4.3 and Figure 10.4.3).

Domestic bulk and break bulk will be mainly handled at twenty-eight (28) ports in 2024. Among them, ten (10) are Major domestic container ports and eighteen (18) are Major ports.

Strategic Development Ports, which are developed during 2004 and 2024, and their required facilities are shown by each planning option in Table 10.4.3. Twenty-two (22) berths for domestic container and 50 berths for domestic bulk and break bulk (including "multi-purpose usage" with other cargo) are required to be developed. The outline of the major development of individual port (mainly on Major domestic container port) will be explained here (see also Appendix 10.4.9 and 10.4.10).

a) Major Domestic Container Port

- Manila (South Harbor and North Harbor) is one of the biggest major domestic container ports. South Harbor of Manila will continue to operate long distance RO/RO ferry while North Harbor of Manila will be rehabilitated and deepened. Six quayside cranes will be installed as well at North Harbor for domestic container. Due to the spatial limitation, high cargo handling efficiency will be required.
- Cebu will not only utilize current gantry cranes for domestic container transport but also needs to install quayside cranes.
- Among the ten Major domestic container ports, two ports (Nasipit and Dumaguete) can serve domestic container transport without installation of quayside cranes.

b) Major Port

- There are three ports which require more than 1,000 m length berth for domestic bulk and break bulk in 2024; namely, Manila (North Harbor), Cebu and Iloilo. These ports have similar problems. That is, the enhancement of bulk and break bulk handling efficiency. Through rehabilitation of existing facilities including the deepening of berths and widening of the back up area, installation of cargo handling facilities etc., the bulk and break bulk handling efficiency should be improved.

Table 10.4.3 Plans for Domestic Container, Bulk and Break Bulk in 2024

Name of port	Domestic container							Domestic bulk, break bulk							Major dom'c container port	Major port (Total 1.5 m ton or others)	Remarks
	No. of berths (@200)	Berths length (m)	Berths length to be developed (m)	Depth of berth (m)	Qauy side cranes	Cranes to be installed	Strategic Dev't Ports for dom'c container	No. of berths (@100)	Berths length (m)	Berths length to be developed (m)	Depth of berth (m)	Short dis. RORO berth (m)	RORO berth to be developed (m)	Strategic Dev't Ports for dom'c bulk and break bulk			
Manila (South Harbor)	2	400		-7.5													
Manila (North Harbor)	3	600	600	-10.5	6 QC	6 QC	○	12	1,200	950 (*)	-6.5 or more			○	○		*) More 250m of berth is required. Cooperation with Harbour Centre is indispensable.
	11	2,200	2,200	-7.5 or more													
Batangas	1	200		-7.5	1 QC	1 QC		3	300		-6.5	700			○		
Cebu	3	600		-10.5	2 GC, 4 QC	4 QC	○	10	1,000		-6.5	1,100			○		
	5	1,000		-7.5													
CDO/MCT	1	200	200	-10.5	1 QC	1 QC	○	7	700	400	-6.5			○	○		
	2	400		-7.5													
Davao	1	200		-7.5			○	4	400	100	-6.5	100	100	○	○		
	1	200	200	-10.5	1 QC	1 QC											
Iloilo	1	200		-10.5	2 QC	2 QC	○	10	1,000		-6.5	200		○	○		
	2	400		-7.5													
General Santos	1	200	200	-10.5	2 QC	2 QC	○	5	500	300	-6.5			○	○		
	1	200		-7.5													
Zamboanga	1	200	200	-10.5	2 QC	2 QC	○	7	700	200	-6.5	200	100	○	○		
	1	200		-7.5													
Nasipit	1	200		-7.5				5	500	400	-6.5			*	○		*) The development for domestic B, B/B cargo will be carried out at Masao.
Dumaguete	1	200		-7.5				4	400	200	-6.5	100	100	○/(Major corrido	○	(Major corridors)	
Bay/river								8	800		-6.5					○	
Masao		150		-10.5				1	150		-10.5					○	
Pt. Princesa	1	200(*)	200(*)	-10.5				4	400	200	-6.5	100		○		○	*) Multi purpose usage of int'l B, B/B and long RO/RO ferry
Ozamiz	1	200(*)	200(*)	-10.5				6	600	300	-6.5	600	300	○		○	*) Multi purpose usage of int'l B, B/B and long RO/RO ferry
Matnog												700	400	(Major corridors)		○/(Major corridors)	
Tacloban	1	200(*)	200(*)	-10.5				8	800	200	-6.5			○		○	*) Multi purpose usage of int'l B, B/B and long RO/RO ferry
Tagbilaran								6	600	400	-6.5			○		○	
Legazpi								6	600	200	-6.5			*		○	*) The development for domestic B, B/B cargo will be carried out at Tabaco or Pantao.
Tabaco								2	200	100	-6.5	400	200	○		○	
Lipata								2	200	200	-6.5	500	400	○/(Major corridors)		○/(Major corridors)	
Dapitan	1	200		-7.5				2	200	200	-6.5	100	100	○/(Major corridors)		○/(Major corridors)	
Masbate								4	400	200	-6.5	300	200	○		○	
Surigao								6	600	300	-6.5			○		○	
San Fernando								3	300		-6.5					○	
Calapan								1	100		-6.5	300	100	○		○/(Major corridors)	
Palompon	1	200(*)	100(*)	-7.5				2	200	100(*)	-7.5(*)	200	100	○		○	*) Multi purpose usage of long dis. RO/RO ferry and dom'c B, B/B
Culasi	1	200		-7.5				1	100		-6.5	100		○		○	
Liloan												200	100	(Major corridors)		○/(Major corridors)	

Note): Some short distance RO/RO berths at the ports along the major corridors are also indicated in this table.

- Even if efficiency at Manila (North Harbor) is improved, the capacity of the port will not be enough for the demand in 2024 since rehabilitation at Manila (North Harbor) results in a wider back up area but a shorter total berth length. Due to the spatial limitation, it is not possible to expand the existing port. Fortunately, the adjacent private-commercial port, Harbour Centre, has more room to accommodate demand. Thus, the public and private partnership between the PPA North Harbor and Harbour Centre is vital.
- One of the biggest bulk cargo handling public ports in the northern Luzon area is San Fernando port. One of the major roles of the port is to cater to the petroleum product for the hinterland. Thus, although the berth facilities are adequate with minor improvement until 2024, it is necessary to maintain/improve bulk cargo handling equipment properly in order to deal with the future demand efficiently.

c) RO/RO Port for Major Corridors

As described in section 10.2, there are two national corridors in the Philippines, i.e. Pan-Philippine Highway (East corridor) and Strong Republic Nautical Highway (West corridor). Since these corridors consist of sea and land transportation, RO/RO ports for major corridors play an important role in the nationwide transport system.

There are 12 RO/RO ports for major corridors at present (see Table 10.4.4). These ports have already had RO/RO ramps. However, Matnog port, Lipata Port, Calapan Port, Dumaguete Port and Dapitan Port need additional RO/RO ramps in 2024 to cope with increasing transport demand. In addition, RO/RO facilities of Caticlan Port are decrepit and cannot cope with larger RO/RO ships. Since Caticlan Port is located at a strategic point along the West corridor, which is nearest to Mindoro Islands in Panay Island, it should be promptly improved to secure an efficient transport network.

Moreover, Mansalay port in Mindoro island are more suitable for RO/RO port for major corridors than existing Roxas port because Mansalay port is located in natural cove which secures calmness and nearer to Caticlan. Furthermore, the basin area of Roxas Port is relatively shallow, while that of Mansalay Port is deeper. Mansaly Port is also able to cope with berthing of larger RO/RO ships in the future. Thus, Mansalay Port should be developed as a RO/RO port for major corridors instead of Roxas Port.

On the other hand, San Recardo Port which is located at the southern tip of Panaon Island along the East corridor has a calm basin area and is nearer to Lipata Port than Liloan Port, which has sea linkage to Lipata Port at present. Since the land linkage between Panaon Island and Leyte Island will be better, it is preferable to develop San Ricardo Port as a RO/RO port and to change the existing Lipata–Liloan route to the Lipata–San Recardo route. This will result in a considerable time saving. Thus, 8 RO/RO ports for major corridors should be strategically developed by 2024. The 8 ports are listed in Table 10.4.5. The RO/RO port network for major corridors in 2024 is shown in Figure 10.4.4.

Table 10.4.4 List of RO/RO Ports for Major Corridors (2001)

	Name of Port	Region	Name of Municipality	Population of Municipality (2000)	Income classification of Municipality	RO/RO Cargo Volume (2001)	RO/RO Passenger (2001)	Existing RO/RO Ramp (2001)	Existing RO/RO vessels calling (2001)	Remarks
PAN-PHILIPPINE HIGHWAY (East Corridor)										
1	***Matnog (PPA)***	Region V	Matnog	32,712	4th	1,357,222	1,513,590	○	○	
2	Balwharteco (Allen)	Region VIII	Allen	20,066	5th	897,273	960,353	○	○	Private Port
3	***Liloan (PPA)***	Region VIII	Liloan	19,838	4th	312,916	365,866	○	○	
4	***Lipata (PPA)***	Region XIII	Surigao City	118,534	2nd	317,932	366,440	○	○	
STRONG REPUBLIC NAUTICAL HIGHWAY (West Corridor)										
1	***Batangas (PPA)***	Region IV	Batangas City	247,588	1st	668,774	2,613,542	○	○	
2	***Calapan (PPA)***	Region IV	Calapan City	105,910	4th	244,663	1,560,370	○	○	
3	Roxas	Region IV	Roxas	41,265	4th	-	-	○	○	
4	Caticlan	Region VI	Malay	24,519	4th	-	-	○	○	
5	***Iloilo (PPA)***	Region VI	Iloilo City	365,820	1st	23,955	2,311,370	○	○	
6	***Bacolod (PPA)***	Region VI	Bacolod City	429,076	1st	13,877	1,688,338	○	○	Private Port
7	***Dumaguete (PPA)***	Region VII	Dumaguete	102,265	2nd	10,726	1,097,785	○	○	
8	***Dapitan (PPA)***	Region IX	Dapitan City	68,178	2nd	5,446	417,761	○	○	
						3,852,784	12,895,415	12	12	

Table 10.4.5 List of RO/RO Ports for Major Corridors (2024)

	Name of Port	Region	Name of Municipality	Population of Municipality (2024)	Income classification of Municipality	RO/RO Cargo Volume (2024)	RO/RO Passenger (2024)	Existing RO/RO Ramp (2001)	Existing RO/RO vessels calling (2001)	Strategic Development Ports	Remarks
PAN-PHILIPPINE HIGHWAY (East Corridor)											
1	***Matnog (PPA)***	Region V	Matnog	45,012	4th	5,682,586	6,773,232	○	○	○	Additional 4-RO/RO Ramps
2	Balwharteco (Allen)	Region VIII	Allen	30,139	5th	4,946,266	5,141,586	○	○		Private Port
3	San Recardo	Region VIII	San Recardo	13,464	5th	1,840,094	2,051,509			○	6-RO/RO Ramps
4	***Lipata (PPA)***	Region XIII	Surigao City	189,299	2nd	1,613,094	1,437,492	○	○	○	Additional 4-RO/RO Ramps
STRONG REPUBLIC NAUTICAL HIGHWAY (West Corridor)											
1	***Batangas (PPA)***	Region IV	Batangas City	438,478	1st	949,971	13,329,339	○	○		
2	***Calapan (PPA)***	Region IV	Calapan City	187,567	4th	947,014	3,817,337	○	○	○	Additional 1-RO/RO Ramp
3	Mansalay	Region IV	Mansalay	69,142	3rd	189,403	763,467			○	
4	Caticlan	Region VI	Malay	34,155	4th	189,403	763,467	○	○	○	Additional 1-RO/RO Ramp
5	***Iloilo (PPA)***	Region VI	Iloilo City	509,587	1st	438,811	5,218,398	○	○		
6	***Bacolod (PPA)***	Region VI	Bacolod City	597,703	1st	593,033	10,564,751	○	○		Private Port
7	***Dumaguete (PPA)***	Region VII	Dumaguete	145,523	2nd	123,975	4,416,573	○	○	○	Additional 1-RO/RO Ramp
8	***Dapitan (PPA)***	Region IX	Dapitan City	105,335	2nd	94,093	3,973,536	○	○	○	Additional 1-RO/RO Ramp
						17,607,743	58,250,687	10	10	8	

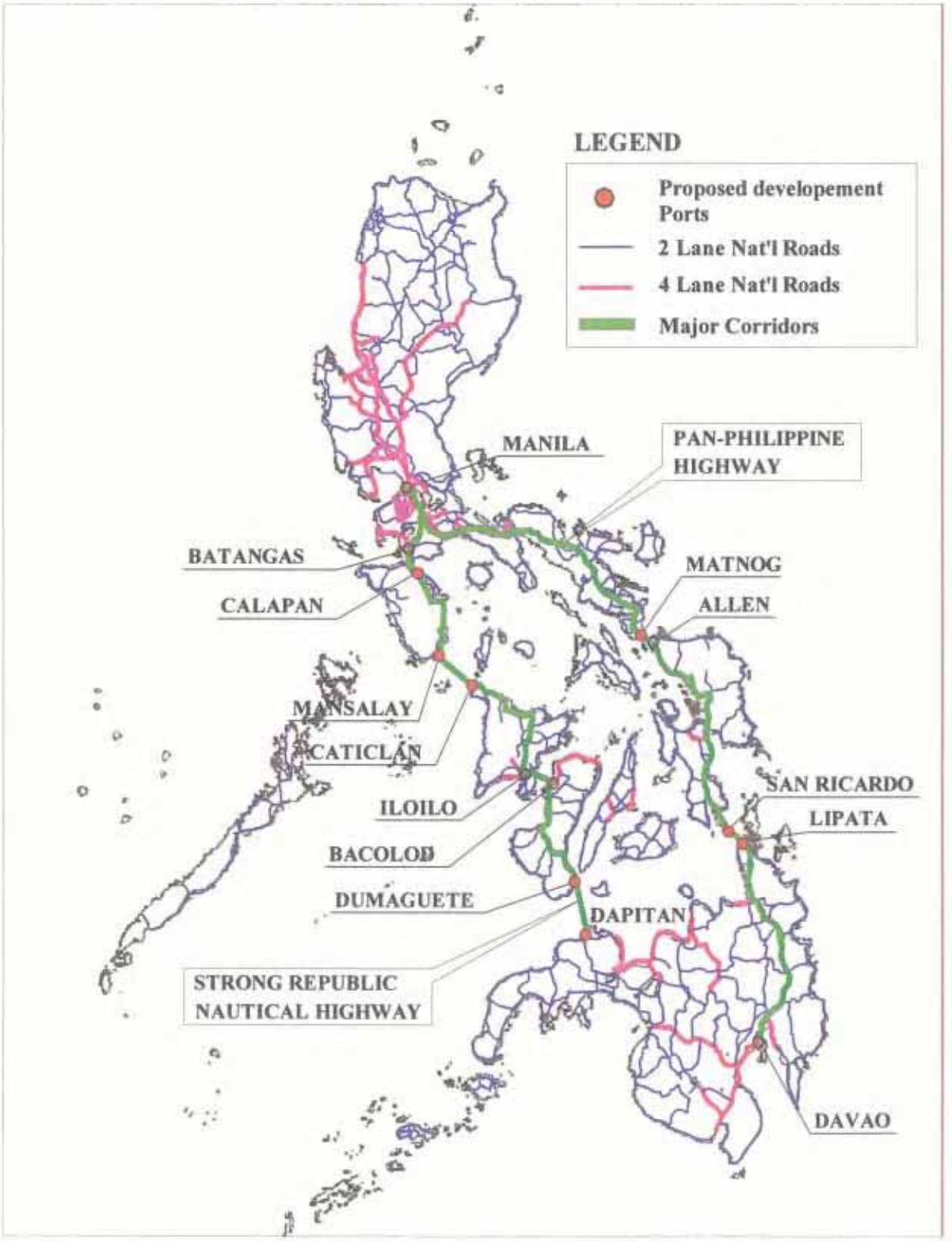


Figure 10.4.4 RO/RO Port Network for Major Corridors (2024)

2) Formation of Maritime Transport Bases to Support Regional Society

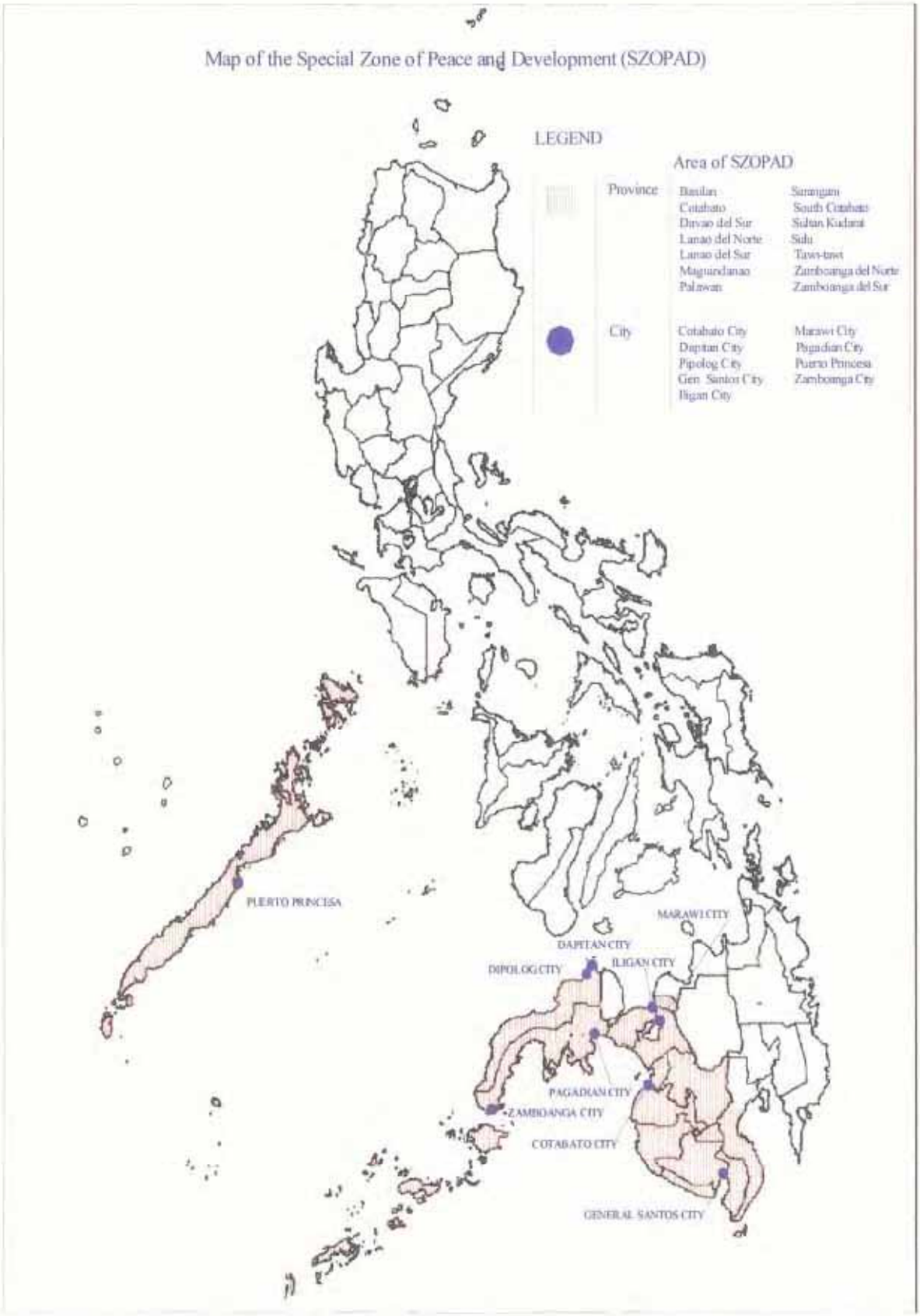
Port development for short and middle distance maritime transportation which supports regional society is carried out not only by port authorities / public port development bodies but also DOTC since the national government is responsible for assisting disadvantaged and economically depressed areas. On the other hand, since the investment is not so large due to the small scale of the projects, Development Bank of the Philippines has launched new scheme to develop small facilities utilizing private investment. In this long-term plan, it is proposed that two kinds of ports for short and middle distance vessels be established for supporting regional society: short and middle distance RO/RO ports and ports for small and medium scale vessels without RO/RO facilities. Considering the functions of both kinds of ports, the former is proposed to be sub-classified into RO/RO ports for mobility enhancement and RO/RO ports for remote islands development. The latter will be categorized as social reform support ports. It is recommended that priority be given to the ports applicable to the following principles, but other regional ports should be also properly developed in accordance with their demand.

a) RO/RO Port for Mobility Enhancement

RO/RO linkage is an efficient means to connect the many scattered islands. Therefore, the RO/RO linkage should be developed strategically.

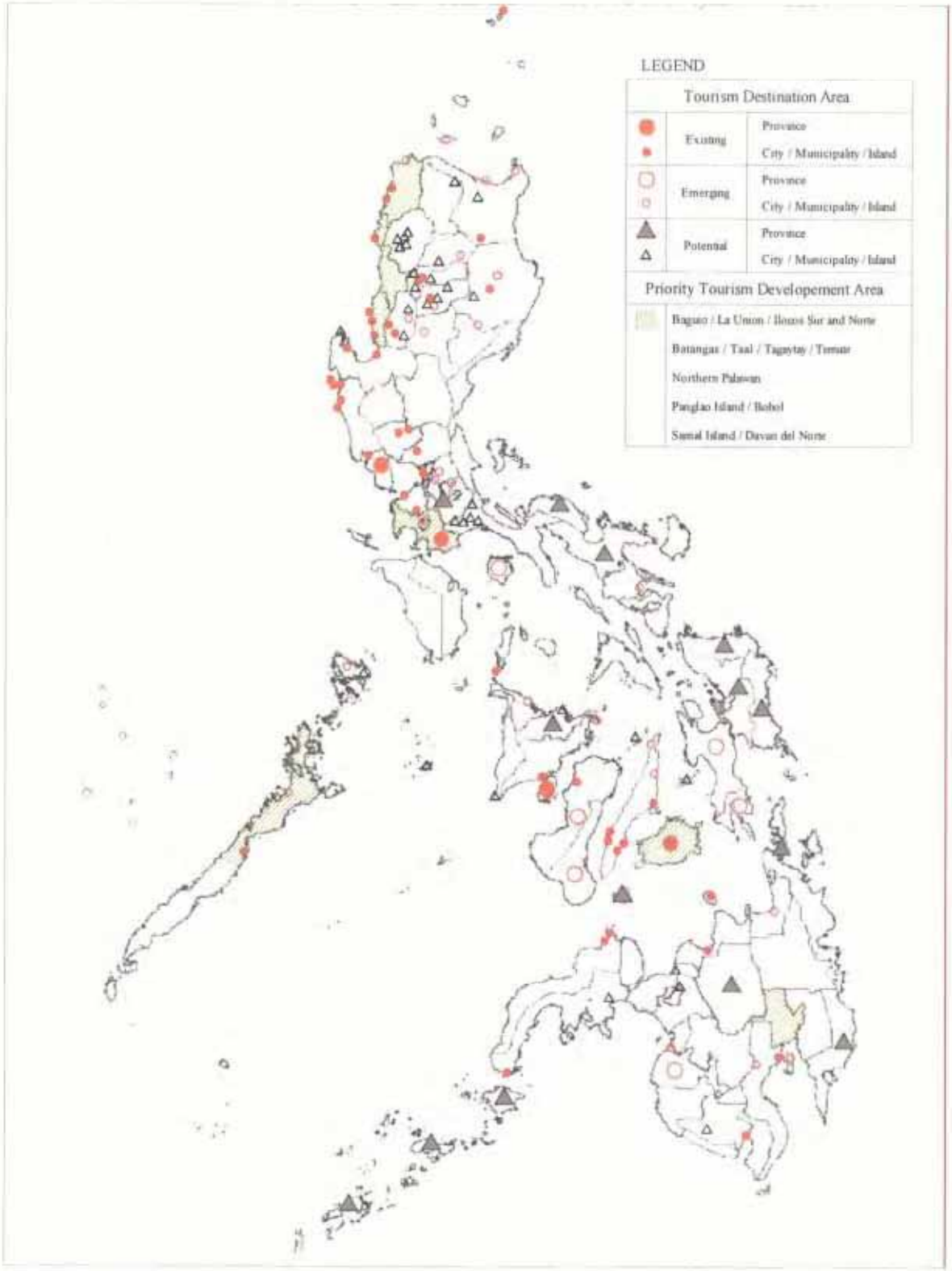
Based on "Nationwide Roll-on Roll-off Transport System Development Study in the Philippines" (1992, JICA Study), "the Master Plan for Trans Visayas Intermodal Transport Network "(2002, DOTC), "DBP-SLDP Road – RO/RO Ferry Network Routes" and the Reconnaissance Survey (1999, DOTC) on site conditions of existing and proposed RO/RO ports including road linkage to the port, a hundred (100) ports are selected as RO/RO ports for mobility enhancement in 2024. These ports are selected based on the following criteria.

- RO/RO cargo volume is about 30 thousand tons or more in 2024 (except for RO/RO major corridors pots)
- The port is prioritized if it is located in the Special Zone of Peace and Development (SZOPAD) (see Figure 10.4.5)
- Road connection is good in 2024 (except for ports located in the SZOPAD)
- The port has different hinterland of neighboring RO/RO ports
- The port has high growth potential of hinterland, i.e. the port is located in an Industrial Area (see Figure 2.2.10) or Special Economic Zone (see Figure 2.2.11) or Tourism Development Area (see Figure 10.4.6) (except for ports located in the SZOPAD) or the port forms a vital link in the RO/RO Transport Network (except for ports located in the SZOPAD)



Date Source: Special Development Planning Task Group/NEDA/Southern Philippines Council for Peace and Development

Figure 10.4.5 Special Zone of Peace and Development (SZOPAD)



Data Source: DOT

Figure 10.4.6 Tourism Development Areas

Fifty-four (54) out of the 100 ports should be newly developed as strategic development ports by 2024. The 100 RO/RO ports for mobility enhancement and 54 strategic development ports are listed

in Table 10.4.6. The RO/RO port network for mobility enhancement in 2024 is shown in Figure 10.4.7. The RO/RO Ferry Service Routes for mobility enhancement in 2024 are listed in Appendix 10.4.11.

In addition, the number of people benefiting from mobility enhancement will increase from 14 million in 2000 to 40 million in 2024 as a result of the proposed project.

b) RO/RO Port for Remote Islands Development

There are 120 remote islands that have ports in the Philippines (see Appendix 10.4.12). Only nine islands among them have RO/RO ports at present. The number of these remote islands is considerably small in spite that the Philippines is made up of more than 7,000 islands.

In order to support the daily life in remote islands and remote islands development, Eighty-three (83) ports are selected as RO/RO ports for remote islands development in 2024. These ports are selected based on the following criteria.

- Population of the island that has existing port facilities is more than 5,000 in 2024
- The port is prioritized if it is located in the SZOPAD
- Income classification of the municipality where the port locates is 3rd or less in 2001 (except for ports located in the SZOPAD)
- The port has different hinterland of neighboring RO/RO ports

Seventy-four (74) out of 83 ports should be newly developed as strategic development ports by 2024. The 83 RO/RO ports for remote islands development and 74 strategic development ports are listed in Table 10.4.7. In addition, Fifty (50) ports are selected as RO/RO ports connecting remote islands with the population centers of the main island/other island and linking to RO/RO ports for remote islands development. Among them, eighteen (18) ports should be newly developed. The 18 ports are listed in Table 10.4.8. The RO/RO port network for remote islands development in 2024 is shown in Figure 10.4.8. The RO/RO Ferry Service Routes for remote islands development in 2024 are listed in Appendix 10.4.13.

Among 120 remote islands which have existing port facilities, 92.5% of the population will have safe and improved access to population centers as a result of the proposed project in 2024 (30.1% in 2000).

The above-mentioned development plans of "RO/RO ports for major corridors", "RO/RO ports for mobility enhancement", "RO/RO ports for remote islands development" and "RO/RO ports connecting remote islands" are collectively referred to as the "Nationwide RO/RO port development plan".

Table 10.4.6 List of RO/RO Ports for Mobility Enhancement (2024)

	Name of Port	Region	Population of Municipality (2024)	Criteria								Existing RO/RO Ramp (2001)	Existing RO/RO Vessels Calling (2001)	Strategic Development Ports	Remarks
				RO/RO Cargo Volume (ton) (2024)	*1 Road Access (2024)	Peace and Dev't Area (2001)	Defferent Hinterland	Growth Potencial of Hinterland			Formation of RO/RO Transport Network				
								Industrial Areas	Special Economic Zones	Tourism Development Areas					
1	Navotas	NCR	296,068	72,024	◎		○		○					○	
2	San Vicente (Sta. Ana)	Region II	30,321	52,576	○		○	○	○	○	○			○	
3	Maconacon	Region II	5,221	42,679	○		○	○			○			○	
4	Palanan	Region II	21,490	41,429	○		○	○			○			○	
5	Mariveles (Aplaya)	Region III	120,863	140,201	◎		○	○	○	○				○	
6	***Capinpin (Orion) (PPA)***	Region III	62,090	72,024	◎		○	○	○	○		○			
7	Dilasag	Region IV	25,991	42,538	○		○	○	○		○			○	
8	Casiguran	Region IV	38,004	50,734	○		○	○	○		○			○	
9	Baler	Region IV	52,994	61,473	○		○	○	○		○			○	
10	Dingalan	Region IV	35,698	55,965	○		○	○	○		○			○	
11	***Real (PPA)***	Region IV	54,341	63,036	○		○	○	○		○	○			
12	***Lucena (PPA)***	Region IV	347,249	62,264	◎		○	○	○		○	○	○		
13	Catanauan	Region IV	102,250	118,610	○		○	○	○		○			○	
14	San Narciso	Region IV	68,137	79,039	○		○	○	○		○			○	
15	Cavite (Bucana)	Region IV	128,722	140,201	◎		○	○	○					○	
16	Calatagan	Region IV	79,815	45,631	△		○	○	○	○				○	
17	***Abra de Ilog (PPA)***	Region IV	39,337	45,631	○		○	○				○			
18	***San Jose, Min. Occ. (PPA)***	Region IV	196,597	190,201	○		○	○			○	○	○		
19	Pola	Region IV	56,562	93,249	○		○	○			○	○			Improvement of Back-up Area
20	Puerto Garela (Balatero)	Region IV	38,829	45,042	○		○	○				○	○		
21	***Balanacan (PPA)***	Region IV	55,485	264,847	○		○		○	○	○	○	○		
22	Cawit	Region IV	85,901	30,985	○		○		○	○	○	○			
23	***Sta. Cruz (PPA)***	Region IV	106,357	118,610	○		○		○	○	○	○			
24	***Romblon (PPA)***	Region IV	64,840	141,570	○		○				○	○	○		
25	***Cuyo (PPA)***	Region IV	32,333	44,660	△	○	○	○		○	○	○	○		
26	***Coron (PPA)***	Region IV	57,102	72,477	△	○	○	○		○	○	○	○		
27	***El Nido (PPA)***	Region IV	47,868	55,527	○	○	○	○		○				○	
28	***Puerto Princesa(PPA)***	Region IV	286,746	119,163	○	○	○	○		○	○	○	○		
29	Taytay	Region IV	95,027	109,563	○	○	○	○		○	○			○	
30	***Pasacao (PPA)***	Region V	52,870	121,885	△		○	○	○	○	○			○	1-RO/RO Ramp on-going const.
31	***Virac (PPA)***	Region V	78,524	418,672	○		○	○				○	○		
32	San Andres	Region V	43,293	212,128	○		○	○				○	○		
33	***Tabaco (PPA)***	Region V	147,460	1,213,798	○		○	○	○			○	○	○	Additonal 3-RO/RO Ramps
34	Pilar	Region V	79,668	34,521	○		○		○		○			○	
35	***Bulan (PPA)***	Region V	113,779	131,984	○		○		○		○	○	○		
36	***Masbate (PPA)***	Region V	98,303	691,612	○		○				○	○	○	○	Additonal 2-RO/RO Ramps
37	Aroroy	Region V	80,841	34,521	○		○				○			○	
38	Cataingan	Region V	64,112	86,835	○		○				○			○	
39	Placer	Region V	61,119	70,898	○		○				○			○	
40	Mandaon	Region V	43,443	49,968	○		○				○			○	
41	***Culasi (PPA)***	Region VI	176,008	218,088	◎		○		○	○	○	○	○		
42	Concepcion	Region VI	47,696	29,029	○		○	○			○			○	
43	***Dumangas (PPA)***	Region VI	78,413	90,959	○		○	○			○	○			
44	***San Jose de Buenavista (PPA)***	Region VI	67,228	154,891	○		○		○		○			○	
45	***Jordan (PPA)***	Region VI	40,042	46,449	○		○		○	○	○	○	○		
46	***San Lorenzo (PPA)***	Region VI	28,094	32,589	○		○		○	○	○			○	
47	***Pulupandan (PPA)***	Region VI	36,008	32,589	◎		○		○		○	○			
48	Cadiz	Region VI	197,742	281,004	◎		○			○	○			○	
49	***Danao (Escalante) (PPA)***	Region VI	110,184	127,813	◎		○			○	○		○	○	

	Name of Port	Region	Population of Municipality (2024)	Criteria								Existing RO/RO Ramp (2001)	Existing RO/RO Vessels Calling (2001)	Strategic Development Ports	Remarks
				RO/RO Cargo Volume (ton) (2024)	*1 Road Access (2024)	Peace and Dev't Area (2001)	Defferent Hinterland	Growth Potencial of Hinterland			Formation of RO/RO Transport Network				
								Industrial Areas	Special Economic Zones	Tourism Development Areas					
50	***San Carlos (PPA)***	Region VI	164,735	191,093	○		○		○	○	○	○	○		
51	***Guihulngan(PPA)***	Region VII	120,396	65,476	○		○	○	○	○	○	○			
52	Bais	Region VII	96,928	28,086	◎		○	○	○	○	○			○	
53	Siaton	Region VII	91,439	148,970	○		○		○	○	○			○	
54	Bantayan	Region VII	96,942	251,975	△		○	○		○	○		○	○	
55	***Sta. Fe (CPA)***	Region VII	32,666	37,893	○		○	○		○	○	○	○		
56	Mahayahay (Daanbantayan)	Region VII	98,665	70,898	○		○	○	○		○			○	
57	***Hagnaya (CPA)***	Region VII	62,652	37,893	○		○	○	○	○	○	○	○		
58	Bogo (Polambato)	Region VII	90,886	153,630	○		○	○	○		○	○	○	○	Additonal 1-RO/RO Ramp
59	***Cebu (CPA)***	Region VII	1,022,882	1,724,199	◎		○	○	○	○	○	○	○		
60	***Carmen (CPA)***	Region VII	53,150	263,539	○		○	○	○		○	○	○		
61	***Toledo (CPA)***	Region VII	200,891	191,093	◎		○	○	○		○	○	○		
62	***Tuburan (CPA)***	Region VII	73,775	85,579	○		○	○	○		○	○	○		
63	Dumanjug	Region VII	56,445	65,476	○		○	○	○		○	○			Improvement of Back-up Area
64	***Argao (CPA)***	Region VII	86,817	100,708	○		○	○	○	○	○	○	○		
65	Malabuyoc	Region VII	24,212	28,086	○		○	○	○		○			○	
66	***Oslob (CPA)***	Region VII	31,978	56,673	○		○	○	○		○			○	
67	Santander	Region VII	19,697	42,427	○		○	○	○		○	○	○		Private Port
68	***Larena (PPA)***	Region VII	16,878	58,735	○		○			○	○	○	○		
69	Lazi	Region VII	26,061	30,231	○		○			○	○			○	
70	***Tagbilaran (PPA)***	Region VII	110,567	31,714	○		○			○	○	○	○		
71	***Catagbacan (PPA)***	Region VII	64,341	863,488	○		○			○	○	○	○	○	Additonal 1-RO/RO Ramp
72	Tapal (Ubay)	Region VII	85,134	125,521	○		○			○	○			○	
73	***Tubigon (PPA)***	Region VII	57,468	66,663	○		○			○	○	○	○		
74	***Jetafe (PPA)***	Region VII	38,173	44,281	○		○		○	○	○	○	○		
75	***Talibon (PPA)***	Region VII	77,051	89,379	○		○			○	○	○	○		
76	Guindulman	Region VII	41,503	51,183	○		○			○	○			○	
77	***Calbayog (PPA)***	Region VIII	221,075	74,370	○		○			○		○			
78	Kawayan	Region VIII	26,296	30,503	○		○				○			○	
79	***Palompon(PPA)***	Region VIII	76,233	434,733	○		○	○	○	○	○	○	○	○	Additonal 1-RO/RO Ramp
80	Isabel (Philphos)	Region VIII	57,806	263,539	○		○	○	○	○	○	○	○		Private Port
81	***Ormoc (PPA)***	Region VIII	231,754	103,270	○		○	○	○	○		○	○		
82	***Hilongos (PPA)***	Region VIII	77,296	89,663	○		○	○	○	○	○	○	○		
83	***Maasin (PPA)***	Region VIII	106,887	125,521	○		○			○	○		○	○	1-RO/RO Ramp on-going const.
84	Padre Burgos	Region VIII	13,407	52,640	○		○			○	○			○	
85	Nabilid	Region IX	52,003	148,970	○	○	○	○	○		○			○	
86	Siocon	Region IX	50,520	58,603	○	○	○		○					○	
87	Sirawai	Region IX	25,545	59,264	○	○	○		○					○	
88	***Zamboanga(PPA)***	Region IX	929,772	387,343	○	○	○	○	○	○	○	○	○	○	Additonal 1-RO/RO Ramp
89	Solar (Olutanga)	Region IX	34,954	40,547	○	○	○						○	○	
90	***Guinsiliban (PPA)***	Region X	7,506	108,478	○		○		○	○	○		○	○	
91	Plaridel	Region X	43,157	50,062	○		○		○		○			○	
92	***Ozamis (PPA)***	Region X	162,759	5,519,862	◎		○		○		○	○	○	○	Additonal 3-RO/RO Ramps
93	***Cagayan De Oro (PPA)***	Region X	680,807	113,660	◎		○	○		○	○	○	○		
94	***Balingoan (PPA)***	Region X	12,082	57,295	○		○	○	○		○	○	○		
95	***Kolambugan (PPA)***	Region X	35,641	41,344	◎	○	○	○	○		○		○	○	
96	***Surigao (PPA)***	Region XIII	189,299	45,269	○		○	○		○	○	○	○		
97	***Basilan (PPA)***	ARMM	99,104	114,961	○	○	○			○	○	○	○		
98	Buli-Buli (Sumisip)	ARMM	70,173	81,401	-	○	○			○	○			○	
99	***Jolo (PPA)***	ARMM	119,413	138,519	○	○	○			○	○	○	○		
100	Languyan	ARMM	57,048	66,176	-	○	○			○	○		○	○	
				19,663,064		15	100	56	56	51	84	53	49	54	

Note: *1 ◎ Connection to 4 Lane National Highway, ○ Connection to 2 Lane National Highway, △ Connection to other Good Road

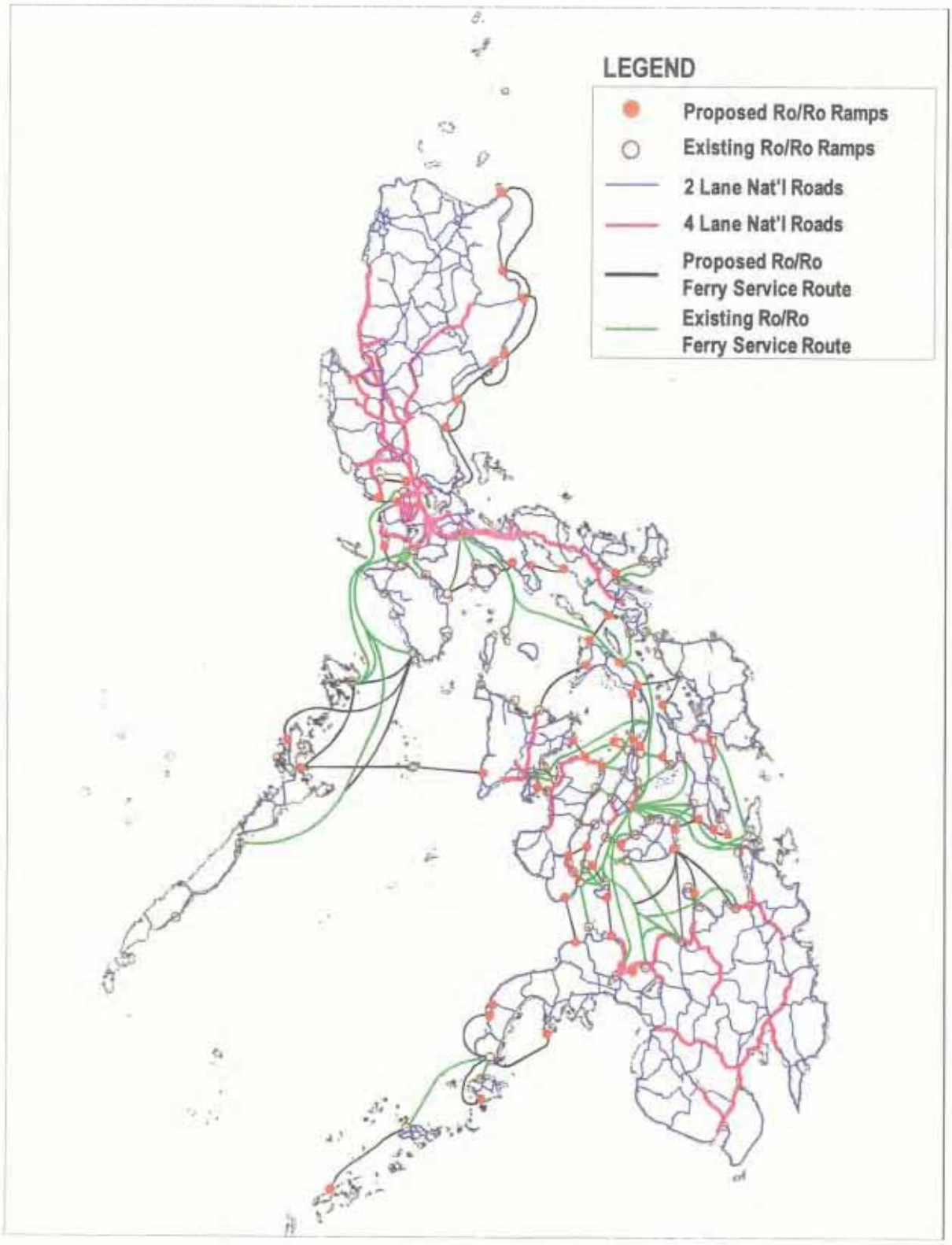


Figure 10.4.7 RO/RO Port Network for Mobility Enhancement (2024)

Table 10.4.7 List of RO/RO Ports for Remote Islands Development (2024)

	Name of Port	Region	Name of Island	Population of Municipality (2024)	Criteria				Growth Potential of Hinterlamd			Existing RO/RO Ramp (2001)	Existing RO/RO Vessels Calling (2001)	Strategic Development Ports	Remarks
					Population of Island (2024)	Peace and Dev't Areas	Income classification of Municipality (2001)	Defferent Hinterland	Industrial Areas	Special Economic Zones	Tourism Development Areas				
1	Itbayat	Region II	Itbayat	5,073	5,073		5th	○						○	
2	Basco	Region II	Batan	9,424	15,676		5th	○		○	○			○	
3	Calayan	Region II	Calayan	20,076	11,857		4th	○						○	
4	Camiguin	Region II	Camiguin	20,076	5,522		4th	○						○	
5	Polillo	Region IV	Polillio	42,690	89,648		4th	○				○			
6	San Rafael (Burdeos)	Region IV	Polillio	34,774	89,648		4th	○					○	○	
7	Patnanungan Sur	Region IV	Patnanungan	19,541	19,541		4th	○						○	
8	Sitio	Region IV	Jomalig	10,302	10,302		6th	○						○	
9	Alabat	Region IV	Alabat	25,155	69,515		5th	○		○		○	○		
10	Tingloy	Region IV	Maricaban	30,157	30,157		5th	○			○			○	
11	Tilik	Region IV	Lubang	40,549	44,946		5th	○						○	
12	Concepcion	Region IV	Maestro de Campo	8,294	8,294		-	○						○	
13	Banton	Region IV	Banton	11,988	11,988		5th	○						○	
14	Corcuera	Region IV	Simara	19,431	19,431		5th	○						○	
15	Calatrava	Region IV	Tablas	15,723	255,874		5th	○	○					○	
16	***Odiongan (Poctoy) (PPA)***	Region IV	Tablas	69,191	255,874		3rd	○	○			○	○		
17	Sta. Fe (Tablas Is.)	Region IV	Tablas	25,042	255,874		-	○	○					○	
18	San Agustin	Region IV	Tablas	38,330	255,874		4th	○	○			○	○		
19	Said (San Jose)	Region IV	Carabao	14,568	14,568		-	○						○	
20	Ambulong (Magdiwang)	Region IV	Sibuyan	21,309	93,181		5th	○	○				○	○	
21	Azarga (San Fernando)	Region IV	Sibuyan	37,570	93,181		4th	○	○			○	○		
22	***Cuyo (PPA)***	Region IV	Cuyo	32,333	38,500	○	4th	○			○	○	○		
23	Cagayancillo	Region IV	Cagayan	11,242	8,485	○	6th	○						○	
24	Culion	Region IV	Culion	25,329	24,860	○	4th	○	○			○			
25	Linapacan	Region IV	Linapacan	16,290	8,690	○	5th	○	○					○	
26	Araceli	Region IV	Dumaran	19,293	29,484	○	5th	○	○					○	
27	Bancalaan	Region IV	Bancalaan	44,730	11,396	○	3rd	○						○	
28	Balabac	Region IV	Balabac	44,730	16,113	○	3rd	○						○	
29	Mangsee	Region IV	Mangsee	44,730	10,879	○	3rd	○						○	
30	Visita	Region V	San Miguel	14,746	15,761		5th	○						○	
31	Caracaran	Region V	Batan	40,146	25,867		4th	○						○	
32	Rapu-rapu (Poblacion)	Region V	Rapu-rapu	40,146	13,423		4th	○						○	
33	San Pascual	Region V	Burias	52,106	99,427		4th	○						○	
34	Claveria	Region V	Burias	52,836	99,427		4th	○						○	1-RO/RO Ramp on-going const.
35	San Jacinto	Region V	Ticao	34,097	103,814		4th	○						○	
36	Talisay (San Fernand)	Region V	Ticao	26,390	103,814		-	○						○	
37	Caluya	Region VI	Caluya	27,928	8,917		4th	○						○	
38	***Sta. Fe (CPA)***	Region VII	Bantayan	32,666	141,348		5th	○	○			○	○		
39	***Poro (CPA)***	Region VII	Camotes	30,448	104,057		5th	○	○	○	○			○	
40	Pilar (Ponson Is.)	Region VII	Ponson	15,975	15,975		5th	○	○					○	
41	Pitogo	Region VII	Lapining	29,519	25,438		5th	○			○			○	
42	Bitaugan	Region VIII	Homonhon	58,118	6,322		3rd	○			○			○	
43	Bobon (San Antonio)	Region VIII	Capul	15,950	15,950		5th	○			○			○	
44	San Antonio	Region VIII	Dalupiri	11,888	11,888		5th	○			○			○	
45	Biri	Region VIII	Biri	13,067	6,615		5th	○			○			○	
46	Lunang I & II	Region VIII	Almagro	15,950	14,023		5th	○			○			○	
47	Sto. Niño	Region VIII	Sto. Niño	18,843	12,402		5th	○			○			○	
48	Sevulla	Region VIII	Camandog	18,843	6,441		5th	○			○			○	
49	Daram	Region VIII	Daram	53,369	48,865		4th	○			○			○	
50	Zumarraga	Region VIII	Zumarraga	23,165	23,165		5th	○			○		○	○	

	Name of Port	Region	Name of Island	Population of Municipality (2024)	Criteria				Growth Potential of Hinterlamd			Existing RO/RO Ramp (2001)	Existing RO/RO Vessels Calling (2001)	Strategic Development Ports	Remarks
					Population of Island (2024)	Peace and Dev't Areas	Income classification of Municipality (2001)	Defferent Hinterland	Industrial Areas	Special Economic Zones	Tourism Development Areas				
51	Tagapul-an	Region VIII	Tagapula	12,572	12,572		5th	○			○			○	
52	Binalayan	Region VIII	Maripipi	12,495	12,495		5th	○						○	
53	Limasawa	Region VIII	Limasawa	7,746	7,746		6th	○			○			○	
54	Babak	Region XI	Samal	132,257	119,476		5th	○			○	○	○		Private Port
55	Kaputian	Region XI	Samal	132,257	119,476		5th	○		○	○			○	
56	Sta. Cruz	Region XI	Talicud	132,257	12,781		5th	○			○			○	
57	Patuco	Region XI	Saranggani	29,444	9,375	○	5th	○						○	
58	Batuganding	Region XI	Balut	29,444	20,069	○	5th	○						○	
59	San Juan (Loreto)	Region XIII	Dinagat	13,975	159,438		5th	○	○		○			○	
60	***San Jose (PPA)***	Region XIII	Dinagat	40,775	159,438		5th	○	○		○			○	
61	Cagdianao	Region XIII	Dinagat	20,579	159,438		4th	○	○		○			○	
62	San Benito (Talisay)	Region XIII	Siargao	7,586	107,408		5th	○	○		○			○	
63	***Dapa (PPA)***	Region XIII	Siargao	31,154	107,408		5th	○	○		○			○	1-RO/RO Ramp on-going Const.
64	San Miguel	Region XIII	East Bucas	31,154	8,335		5th	○			○			○	
65	***Socorro (PPA)***	Region XIII	Bucas Grande	28,637	28,637		5th	○						○	
66	Patino	Region XIII	Masapelid	20,512	6,362		5th	○			○			○	
67	Pilas	ARMM	Pilas	37,300	5,750	○	4th	○			○			○	
68	Dungon	ARMM	Bucutua	21,621	5,841	○	5th	○			○			○	
69	Tongkil	ARMM	Tongkil	21,621	5,607	○	5th	○			○			○	
70	Capual	ARMM	Capual	52,677	7,310	○	3rd	○			○			○	
71	Pangutaran (Simbahan)	ARMM	Pangutaran	35,568	28,280	○	4th	○			○			○	
72	Pata	ARMM	Pata	16,000	13,083	○	5th	○			○			○	
73	Lugus	ARMM	Lugus	25,565	24,992	○	5th	○			○			○	
74	Siasi	ARMM	Siasi	80,157	65,839	○	4th	○			○			○	
75	Tapul	ARMM	Tapul	20,194	18,349	○	4th	○			○			○	
76	Lapak	ARMM	Pandami	27,091	19,991	○	5th	○			○			○	
77	Tampakan	ARMM	South Ubian	37,047	14,832	○	-	○			○			○	
78	Tandubas (Sapa-Sapa)	ARMM	Tandubas	33,789	22,106	○	-	○			○			○	
79	Tubig Indangan	ARMM	Simunul	43,372	27,642	○	-	○			○			○	
80	Tabawan	ARMM	Tabawan	37,047	10,397	○	-	○			○			○	
81	Lamion	ARMM	Bongao	78,942	44,320	○	-	○			○			○	
82	Sitangkai (Sibutu)	ARMM	Sibutu	71,612	71,612	○	4th	○			○		○	○	
83	Cagayan de Sulu (Tawi-Tawi)	ARMM	Cagayan Sulu	29,869	29,869	○	4th	○			○			○	
						27		83	17	4	44	9	11	74	

Table 10.4.8 List of RO/RO Ports Connecting Remote Islands (2024)

	Name of Port	Region	Population of Municipality (2024)	Income classification of Municipality (2001)	Existing RO/RO Ramp (2001)	Existing RO/RO Vessels Calling (2001)	*1 Road Access (2024)	Strategic Development Ports	Remarks
1	***Currimao (PPA)***	Region I	14,405	5th			○	○	
2	***Aparri (PPA)***	Region II	82,842	2nd			○	○	
3	***Real (PPA)***	Region IV	54,341	3rd	○		○		
4	Mauban	Region IV	88,787	1st		○	○	○	
5	Atimonan	Region IV	100,444	2nd	○	○	◎		
6	***Dalahican (Lucena) (PPA)***	Region IV	347,249	1st	○	○	◎		
7	Nasugbu	Region IV	170,216	1st			◎	○	
8	***Batangas (PPA)***	Region IV	438,478	1st	○	○	◎		
9	***Abra de Ilog (PPA)***	Region IV	39,337	4th	○	○	○		
10	***San Jose (PPA)***	Region IV	196,597	1st	○	○	○		
11	Pinamalayan	Region IV	129,210	2nd			○	○	
12	Roxas	Region IV	73,080	4th	○	○	○		
13	San Jose (Bulalacao)	Region IV	49,053	4th			○	○	
14	Cawit	Region IV	85,901	2nd	○		○		
15	***Romblon (PPA)***	Region IV	64,840	4th	○	○	○		
16	***Cuyo (PPA)***	Region IV	32,333	4th	○	○	△		
17	***Coron (PPA)***	Region IV	57,102	2nd	○	○	△		
18	Taytay	Region IV	95,027	1st			○		
19	***Puerto Princesa (PPA)***	Region IV	286,746	1st	○	○	○		
20	Bataraza	Region IV	73,422	2nd			○	○	New Port
21	***Pasacao (PPA)***	Region V	52,870	4th			△		1-RO/RO Ramp on-going const.
22	***Tabaco (PPA)***	Region V	147,460	5th	○	○	○		
23	***Legaspi (PPA)***	Region V	216,045	1st	○		◎		
24	***Pantao (PPA)***	Region V	91,109	2nd			○	○	1-RO/RO Ramp on-going const.
25	Bacon & Banao	Region V	58,020	4th			○	○	
26	***Bulan (PPA)***	Region V	113,779	1st	○	○	○		
27	Caticlan	Region VI	34,155	4th	○	○	○		Additional 1-RO/RO Ramp
28	***Iloilo (PPA)***	Region VI	509,587	1st	○	○	◎		
29	Mahayahay (Daanbantayan)	Region VII	98,665	3rd		○	○		
30	***Cebu (CPA)***	Region VII	1,022,882	1st	○	○	◎		
31	Tapal (Ubay)	Region VII	85,134	2nd			○		
32	***Guiuan (PPA)***	Region VIII	58,118	3rd			○	○	
33	***San Isidro (PPA)***	Region VIII	34,316	4th	○		○		
34	***San Jose, Carangian (PPA)***	Region VIII	20,373	5th			○	○	
35	***Calbayog (PPA)***	Region VIII	221,075	1st	○		○		
36	***Catbalogan (PPA)***	Region VIII	126,438	1st	○	○	○		
37	Talalora	Region VIII	9,883	5th		○	△	○	
38	Kawayan	Region VIII	26,296	5th			△		
39	***Ormoc (PPA)***	Region VIII	231,754	1st	○	○	○		
40	***Davao (Sasa) (PPA)***	Region XI	1,836,533	1st		○	◎	○	
41	Lupon	Region XI	91,404	1st			○	○	
42	***General Santos (PPA)***	Region XII	623,087	1st	○		◎		
43	***Surigao (PPA)***	Region XIII	189,299	2nd	○	○	○		
44	Taganaan	Region XIII	20,512	5th			○	○	
45	***Basilan (PPA)***	ARMM	99,104	5th	○	○	○		
46	Buli-Buli (Sumisip)	ARMM	70,173	3rd			-		
47	***Jolo (PPA)***	ARMM	119,413	3rd	○	○	○		
48	Lahing-Lahing	ARMM	52,677	3rd			○	○	
49	Punay	ARMM	29,098	5th			○	○	
50	Bongao (Pag-asinan)	ARMM	78,942	-		○	-	○	
					26	25		18	

Note: *1 ◎ Connection to 4 Lane National Highway ○ Connection to 2 Lane National Highway △ Connection to other Good Road

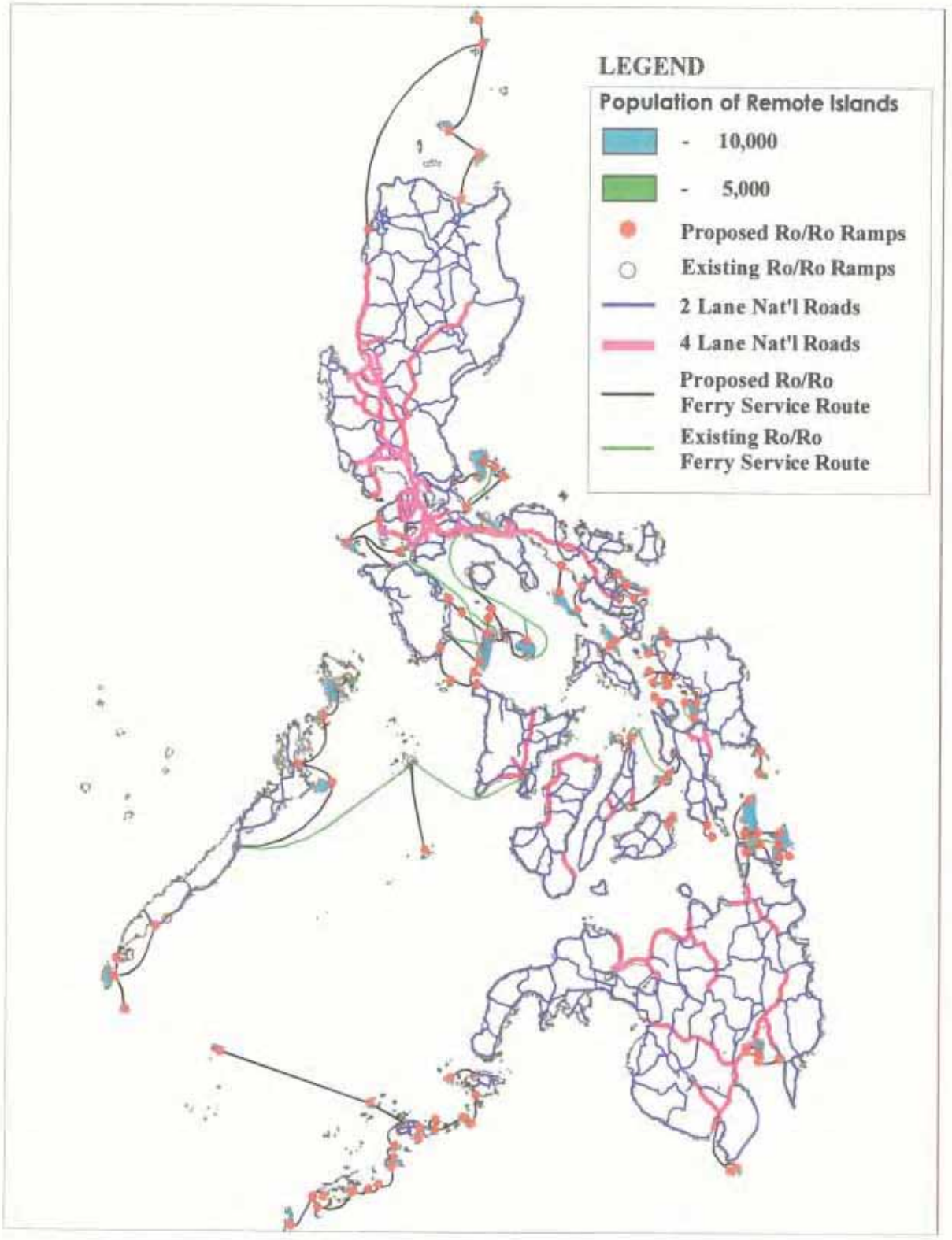


Figure 10.4.8 RO/RO Port Network for Remote Islands Development (2024)

c) Social Reform Support Port

To contribute to the reduction of regional gaps and poverty alleviation, Social reform support port should be strategically developed to form maritime routes linking the isolated area/island and population center, to support the establishment of population centers within isolated area as well as to upgrade existing shipping services. DOTC proposed 93 ports in its long-term development plan, i.e. "Master Plan Report for Feeder Port Development (March, 2000)" from the viewpoint of promoting social reform. Among them, twenty-two (22) ports are selected as social reform support ports. Other ports are assumed to be developed under the scheme of "RO/RO port for mobility enhancement" and " RO/RO port for remote islands development". The 22 ports are listed in Table 10.4.9. The location of social reform support ports is shown in Figure 10.4.9.

The percentage of remote islands and certain isolated areas/islands without sufficient port facilities (126 islands/areas in total) will decrease from 92.9% in 2001 to 37.3 % in 2024 as a result of the projects (see Figure 10.4.10).

3) Ports for Passenger Transport

Currently maritime passenger services using fast craft vessels dedicated only for passengers are already found in some parts of Visayas and Northern Mindanao areas and this mode will increase in the future. The majority, however, of maritime passengers will be transported by conventional way. Namely, long distance passengers are expected to be transported by long distance RO/RO ferries similar to the current system while short and middle distance passengers will be transported by RO/RO ferries and/or passenger vessels.

(3) Ports for Greater Capital Region

As discussed in section 10.4.1, in order to avoid the negative economic externalities related to land traffic congestion, it is proposed that Subic Bay port and Batangas port be developed intensively, and cargo, especially international container cargo, be handled there as much as possible. On the other hand, when the road network becomes well developed, the expansion of the existing Manila port might be possible since scale merits can be obtained. The examined scenarios are described in Appendix 10.4.14.

Table 10.4.10 shows the required number of berths and the generated road traffic in the case of dispersion to Batangas/Subic and in the case of concentration in Manila. In case of concentration in Manila, the estimated traffic is 4,400 vehicles per day more than that in case of dispersion to Batangas/Subic. This is an increase of more than 25 % of the surveyed traffic at Manila port in 1996.

Table 10.4.9 List of Social Reform Support Ports (2024)

	Name of Port	Region	Name of Municipality	Income classification of Municipality	Population of Municipality (2024)	Name of Remote Island	Population of Remote Is. (2024)	*1 Road Access	Peace and Development Area	Defferent Hinterland	Growth Potential of Hinterland			Strategic Development Port	Remarks
											Industrial Areas	Special Economic Zones	Tourism Development Areas		
1	Quezon	Region IV	Quezon	5th	25,846	Alabat	69,515	-		○		○		○	Complementary port for Alabat Port
2	Gumaca	Region IV	Gumaca	2nd	106,598			◎		○	○	○		○	Connecting port for Quezon Port
3	Dumaran	Region IV	Dumaran	4th	29,427	Dumaran	29,484	-	○	○	○			○	Complementary port for Araceli Port
4	Mercedes	Region V	Mercedes	4th	57,397			○		○		○	○	○	Connecting port for Siruma Port
5	Siruma	Region V	Siruma	5th	22,482			-		○	○	○	○	○	Isolated area
6	San Vicente	Region V	Caramoan	4th	54,547			△		○	○	○	○	○	Connecting port for Mayngaway Port
7	Mayngaway	Region V	San Andres	4th	43,293			○		○	○			○	Complementary port for San Andres Port
8	Milagros	Region V	Milagros	3rd	61,335			○		○				○	Marine Products Center of Masbate Is.
9	Calumpang	Region V	Balud	4th	41,374			-		○				○	Isolated area
10	Semirara	Region VI	Caluya	4th	27,928	Semirara	11,671	-		○				○	Isolated island, New port development
11	Malapascua	Region VII	Daanbantayan	3rd	98,665	Malapascua	4,665	-		○				○	Isolated island, New port development, High growth potential of tourism
12	Langub	Region VII	Sta. Fe	5th	32,666	Guintacan	9,158	-		○			○	○	Isolated island, New port development
13	Laoang	Region VIII	Laoang	3rd	81,894			○		○		○	○	○	Port for alternaitive route from east coast municipalities of Northern Samar to Legaspi
14	San Ishidro	Region VIII	San Ishidro	4th	44,174			○		○	○	○		○	Connecting port for Marapascua Port
15	San Francisco	Region VIII	San Francisco	5th	16,325			△		○			○	○	Port for cross-bay (Sogod Bay) sea route to Padre Burgos Port
16	Malabang Municipal	Region XII	Malabang	-	50,197			○	○	○	○			○	Port providing another outlet to the southern area of Lanao del Sur
17	Ganassi	Region XII	Ganassi	-	28,667			○	○	○		○		○	ditto
18	Palimbang	Region XII	Palimbang	3rd	66,182			○	○	○				○	Isolated area (at least up to 2009)
19	Butuan Municipal	Region XIII	Butuan City	1st	426,845			-		○		○	○	○	River port providing water transportation to municipalities with poor access roads alomg Agusan River
20	Escolta	Region XIII	Dinagat	5th	15,783	Dinagat	159,438	-		○	○		○	○	Complementary port for San Jose Port
21	Pilar	Region XIII	Pilar	5th	13,416	Siargao	107,408	-		○	○		○	○	Complementary port for Dapa Port
22	Parang	ARMM	Parang	1st	82,689			○	○	○		○	○	○	Port as an alternative to the new port development plan of Cotabato City
									5	22	9	10	10	22	

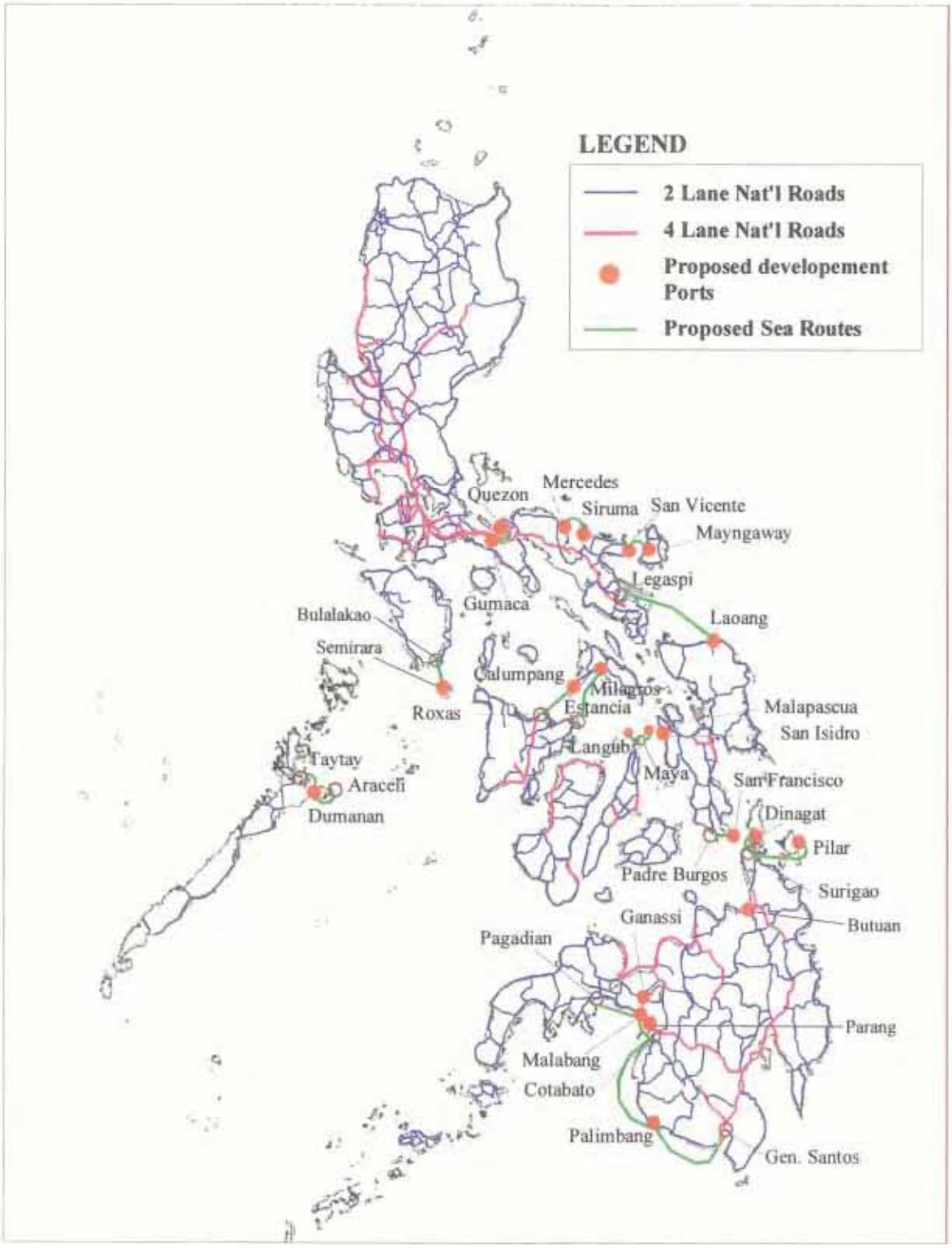
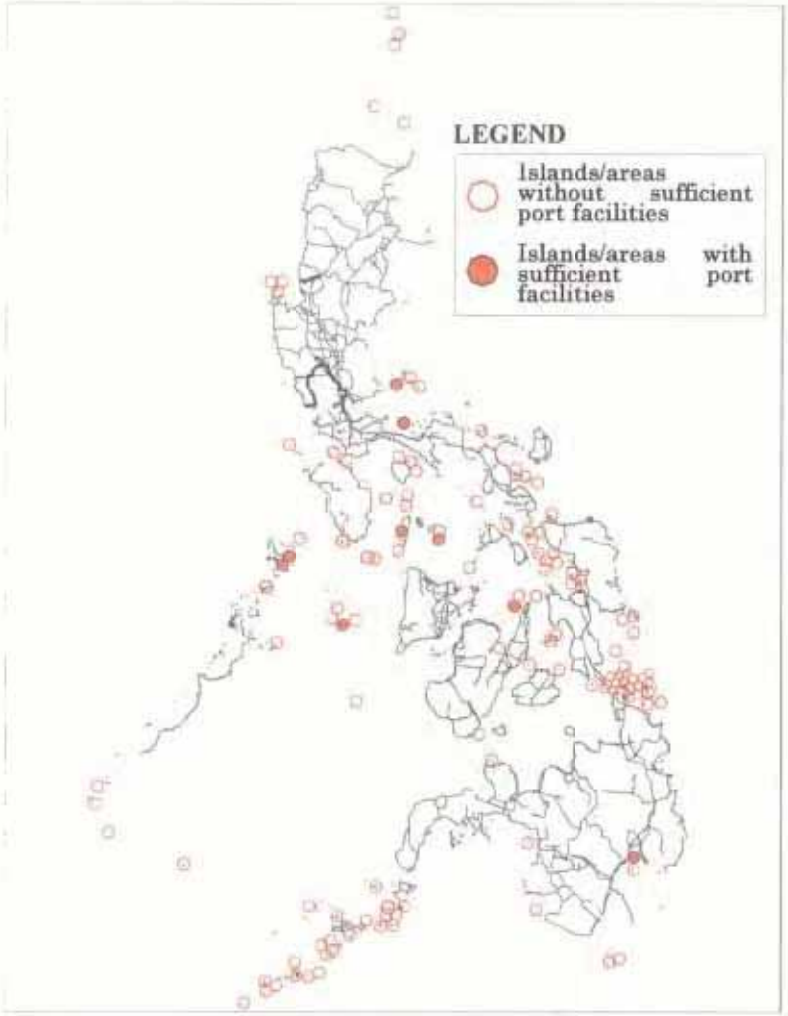
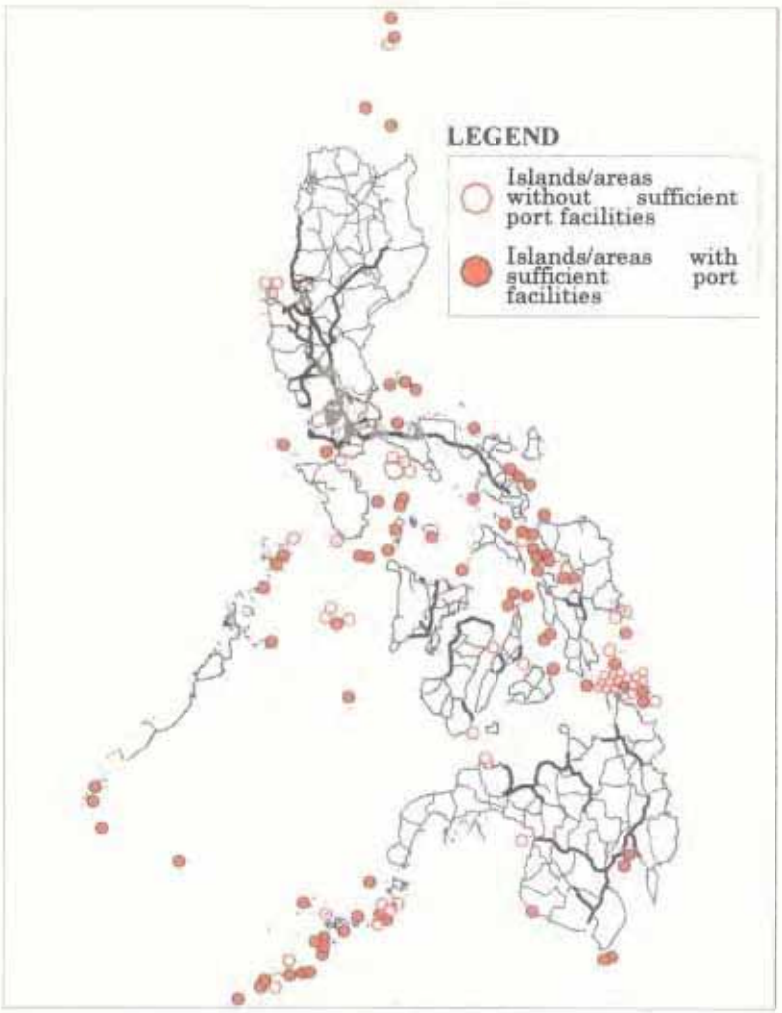


Figure 10.4.9 Location of Social Reform Support Ports (2024)



117 islands/areas for 126 in total (92.9%) (2001)



47 islands/areas for 126 in total (37.3%) (2024)

Figure 10.4.10 Situation of Remote Islands and Certain Areas/Islands without Sufficient Port Facilities (2024)

Therefore, diverting cargo to Batangas should be the basic direction of future development. However, after the port development in Batangas progresses to some extent, if the road network in Manila as well as the development of railway network sufficiently progresses, and the generated traffic can be absorbed, development of new port and/or expansion of existing ports in Manila area can be one of the options in future.

Table 10.4.10 Comparison of Generated Land Traffic between Batangas and Manila

Name of port	Dispersion to Batangas		Concentration in Manila		Deference (Concentration case - Dispersion case)	Remarks
	No. of berths	No. of vehicles in 2024 (per day)	No. of berths	No. of vehicles in 2024 (per day)		
Manila (MICT)	6	26,767	9	31,210	4,443	16,200 /day in 1996 at Manila (MICT, S. Harbor, N. Harbor)
Manila (S. Harbor)	4		5			
Batangas	9	13,746	5	8,787	-4,959	
Subic	3	4,459	3	4,239	-220	

Note): 1. No of vehicles at Manila includes the port-related vehicles from MICT, S. Harbor, N. Harbor and Harbour Centre
2. The generated traffic includes not only trucks but also jeepnies.

Assumptions:
- 1.0 TEU foreign containers are carried by one truck.
- 1.0 TEU domestic containers are carried by one truck.
- 7.6 tons of conventional cargo are carried by one truck.
- Shares of jeepny among total number are 0.36 at N.H etc., 0.39 at S.H, and 0.2 at MICT based on the data in 1996.
- Shares of jeepny among total number are assumed as 0.36 at Batangas and Subic.

10.4.4 Estimated Cost for the Development

Construction costs of new facilities in each planning option are shown in Table 10.4.11. Investment of about 150 billion pesos will be required for 2004-2024 in addition to an initial five-year investment of 41 billion pesos. Roughly speaking, about half of the investment will be spent on the international trade facilities of which the majority of the investment goes to international container facilities. The detailed breakdown is shown in Appendix 10.4.10.

Table 10.4.11 Investment for New Construction

(Unit: Mil pesos)

	2004-2024	Share (%)
Int'l container	68,650	45.9
Int'l B, B/B	13,800	9.2
Dom container	23,200	15.5
Dom B, B/B	25,370	16.9
Major corrdors	3,400	2.3
Mobility enhancement	9,620	6.4
Remote island development	5,175	3.5
Social reform	506	0.3
Total	149,721	100.0

Note) Only costs for new development /expansion are considered.
Maintenance cost or other costs are not considered.
Cost of quayside crane procurement is included.

With regard to the share of the investment by area, Luzon area, Visayas area and Mindanao area share 43%, 30% and 27% respectively. While the investment on the international container facilities shares more than half in Luzon area, the investment on other facilities such as domestic bulk, break bulk as well as short/middle distance RO/RO facilities shares more than half in Visayas and Mindanao area (see Appendix 10.4.9).

10.4.5 Possibility of Other Proposed Port Development Projects

This study, which is to formulate the long-term master plan for the coming 20 years and the initial 5 year development plan of all public ports in the Philippines, is conducted based on the premise that present trends regarding socio-economic activities and population will continue in the coming 20 years. In addition, the plan is basically in harmony with the government's policy. As to individual regional development and its related port development, projects, which will not be feasible according to our trend base development scenario, are not included in the plan. Whether or not these projects are to be included in the plan should be examined in the NPPD Council (mentioned in a latter part of the study) after the project takes concrete shape. However, as to the following two projects, the JICA Study Team offers its opinions below, because some strongly request that the project be included in the plan, at least in the long-term development plan.

(1) Possibility of Irene Port Development Project

Cargo handling volume of Irene Port was only about 56 thousand tons in 2001 although forecast to increase to more than 180 thousand tons in 2024. Nonetheless, since its hinterlands are not only Region II but also the whole of the Northern Luzon particularly in term of international trade, Irene Port should continue to be developed.

However, it would be difficult to make Irene Port an international hub-port without the participation of a shipping company in an Irene Port development project. The only possibility would be for a single mega shipping company to decide to make Irene Port a container base port in the Asian region where most of the that company's own container cargo would be concentrated. In this case, not only the shipping company but also the government and domestic private companies will invest in the development project.

Other alternative development plans may be possible. For example, the Cagayan Economic Zone could be a supporting area for Taiwanese industries taking advantage of its nearness to Taiwan. In this scenario, Irene Port would be a feeder port for Taiwan.

It should be stressed that the above-mentioned analysis does not deny the important roles currently being played by Irene Port. It is necessary to continue the current support of the development of Irene Port for the growth of Northern Luzon as well as the Cagayan Economic Zone.

(2) Possibility of Port Development Projects in Eastern Luzon

Most of the major ports in the Philippines are located on the west side of the country and no major port faces the Pacific Ocean. Therefore, new port development projects are proposed from the viewpoint of balanced national development and foreign trade with the USA. One of them is the Dingalan Port Project in Eastern Luzon. This project is to develop an international container hub-port at Dingalan which lies east of Manila and faces the Pacific Ocean in order to open an international container route with the US and Canada. However, it may be difficult to realize this project due to the reasons explained below.

As for the cargo transport between Asia and North America, major calling ports are those of Japan, China (Hong Kong), Korea and Taiwan. Export cargo handling volumes of each port are shown in Table 10.4.12.

Table 10.4.12 Export Cargo Handling Volumes from January to April in 2003

Nation	TEUs	Ratio
Japan	256,352	10.6%
Korea	166,883	6.8%
Taiwan	237,595	9.7%
China(Hong Kong, Macao)	1,396,211	57.1%
Other Asian Countries	386,667	15.8%
Total	2,443,709	100.0%

Note: Other Asian Countries; Singapore, Philippine, Malaysia, Indonesia, Thailand and Vietnam

Source: Maritime Industry Research Institute

Among East bound export containers transported from Asian countries, 84.2% are carried from the ports which are nearer to North America than Philippine ports. Trunk container routes such as the North America Route and European Route lie to the northwest of the Philippine archipelago.

Average container capacity of the vessels navigating on the trunk routes is 5500 TEUs. Average round trip periods are 5 – 6 weeks for the North America route and 8 – 9 weeks for European routes, and vessels call each port weekly. Vessels cannot call every port near the route within the above-mentioned round trip period. Generally speaking, the larger a vessel becomes, the fewer the number of calling ports becomes.

Containers to/from other ports are carried by feeder transport. However, vessels for feeder container transport will be those which were formerly in service on the trunk routes and thus will be fairly large (2,500 – 3,000 TEU capacity).

The Philippines will not be able to provide enough container cargo alone to accommodate trunk container vessels, even if a large-scale port were to be developed on the Pacific coast. The port has a disadvantage for connecting feeder ports because it is far from main container routes. Furthermore, the trend towards vessel enlargement will work against Philippine ports which have a relatively small demand. Therefore, it is difficult to realize an international container hub-port on the Pacific coast of the Philippines.

However, it may be possible to establish an international gateway port in Eastern Luzon if the private sector participates in a port development project.

Provided that the road network in Eastern Luzon and linkage between GCR and this area is improved and regional development such as agro-industry, tourism, and economic zone progresses, a single mega shipping company could establish a container port in this area as an international container base in the Asian region where most of the that company's own container cargo would be concentrated.

10.4.6 Establishment of Individual Port Master Plan

Ports are not merely a node between land transport and maritime transport. Ports also contribute to regional development through the promotion of industrial activities in the hinterland. To promote industry location near a port, coordination with urban/regional planning in the hinterland of the port is necessary. For instance, access roads to the port might require that the traffic flow in urban areas be changed. Areas where port related industries run their business during all day long are not suitable for residential areas. A highway just behind the port is generally advantageous but it might also prevent the port expansion. This kind integrated coordination should be carried out with relevant organizations of urban planning of each municipality not only at the project implementation stage but also at the planning stage.

Moreover, coordination of land usage within a port is also important. This means that port facilities assignment should be well coordinated not only within the public port but also across a wider area including private ports. For instance, generally speaking, dangerous/poisonous cargo should be handled at some specific areas where minimum affects will be expected if an accident occurs. Berths for small vessels might be located at calmer basin, and a passenger terminal is preferable to be located near an urban area for the convenience of the users.

The above-mentioned matters should be coordinated when the individual port master plan is established. Thus, it is proposed that some major ports (Gateway ports, Principal ports and Major ports) should establish individual port development master plans with target year 10 to 20 years into the future.