7.2.2 Conceptual Zoning of the Inner Harbor Area

The present condition of the Inner Harbor is shown in Figure 7.2.2-1 A more detailed zoning of the Inner Harbor is described below.

(1) Precondition of Conceptual Zonig

Preconditions to drawing up Conceptual Zoning of the Inner Harbor are as follows.

① To consider the present master plans
② To comply with SBMA's strategy and urban redevelopment plan in the Central Business Area.
③ To give priority to the existing facilities which can't be transferred easily.
④ To concentrate port function in Port Zone.
⑤ To identify the suitable area for port expansion.
⑥ To arrange facilities along the coast which are related to port activity
⑦ To connect port function and industrial function for the smooth transportation of cargo.
⑧ To arrange facilities for the many citizens gathering around the Urban Redevelopment Zone, such as passenger terminal, marina, etc.

(2) Drawing up of Conceptual Zoning

The following six zones are drawn up in the Inner Harbor.

1) Urban Redevelopment Zone

Zone to be redeveloped on the model of Kenzo Tange's Master Plan.

2) Marina Zone

Zone around Subic Bay Yacht Club.

3) Port Zone

Zone which consists of container and non-container terminal, oil terminal, passenger terminal, port related facilities, convention center, water front esplanade etc., along the coast.

4) Industrial Zone

Zone which consists of industrial estate, e.g. Subic Bay Indutrial Park and Subic Technopark behind the Port Zone.

5) Airport Zone

Zone in which Subic International Airport is located.

6) Port Expansion Zone

Zone which is a candidate area to cope with increasing cargo.

Conceptual Zoning of the Inner Harbor is shown in Figure 7.2.2-2

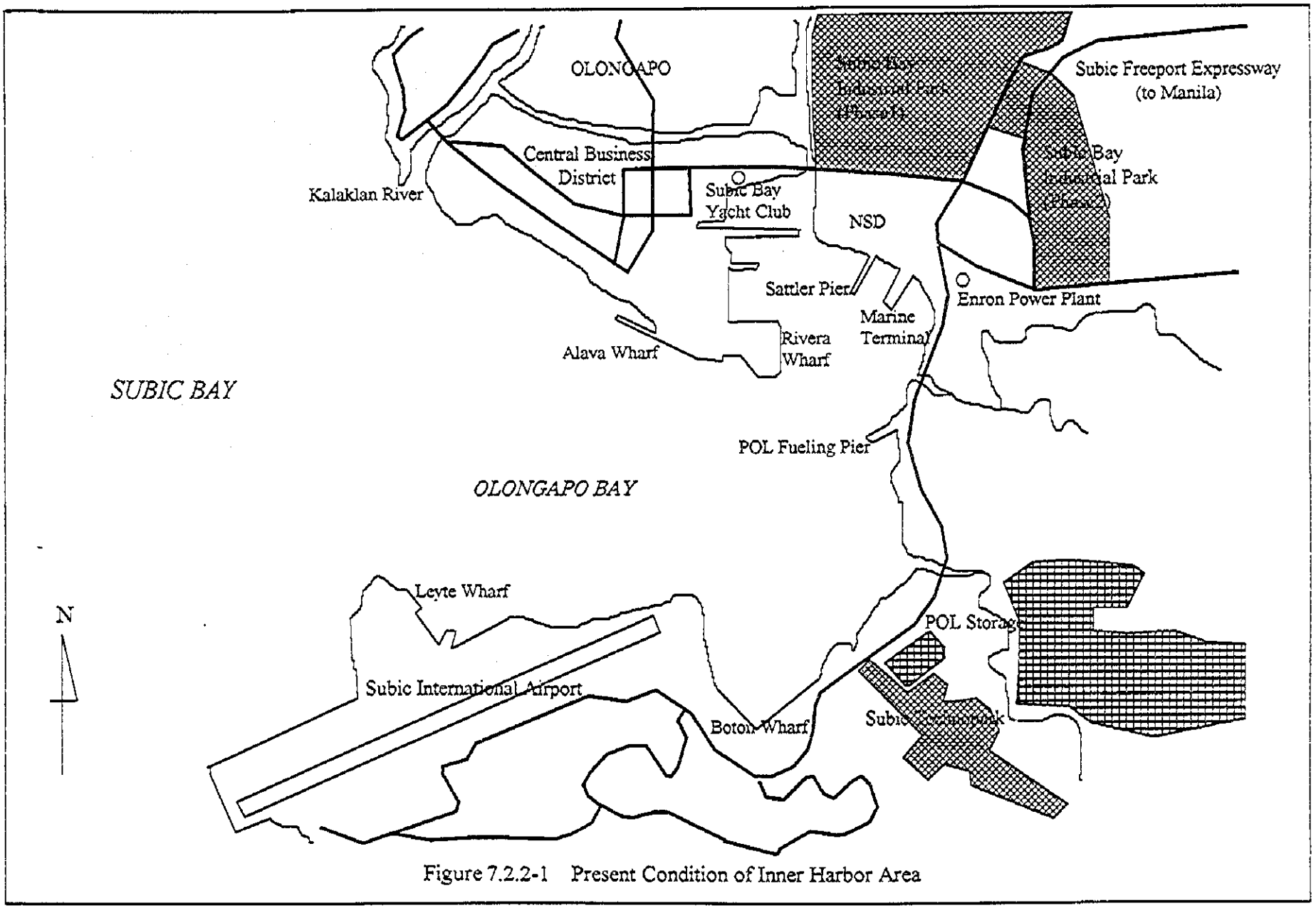


Figure 7.2.2-1 Present Condition of Inner Harbor Area

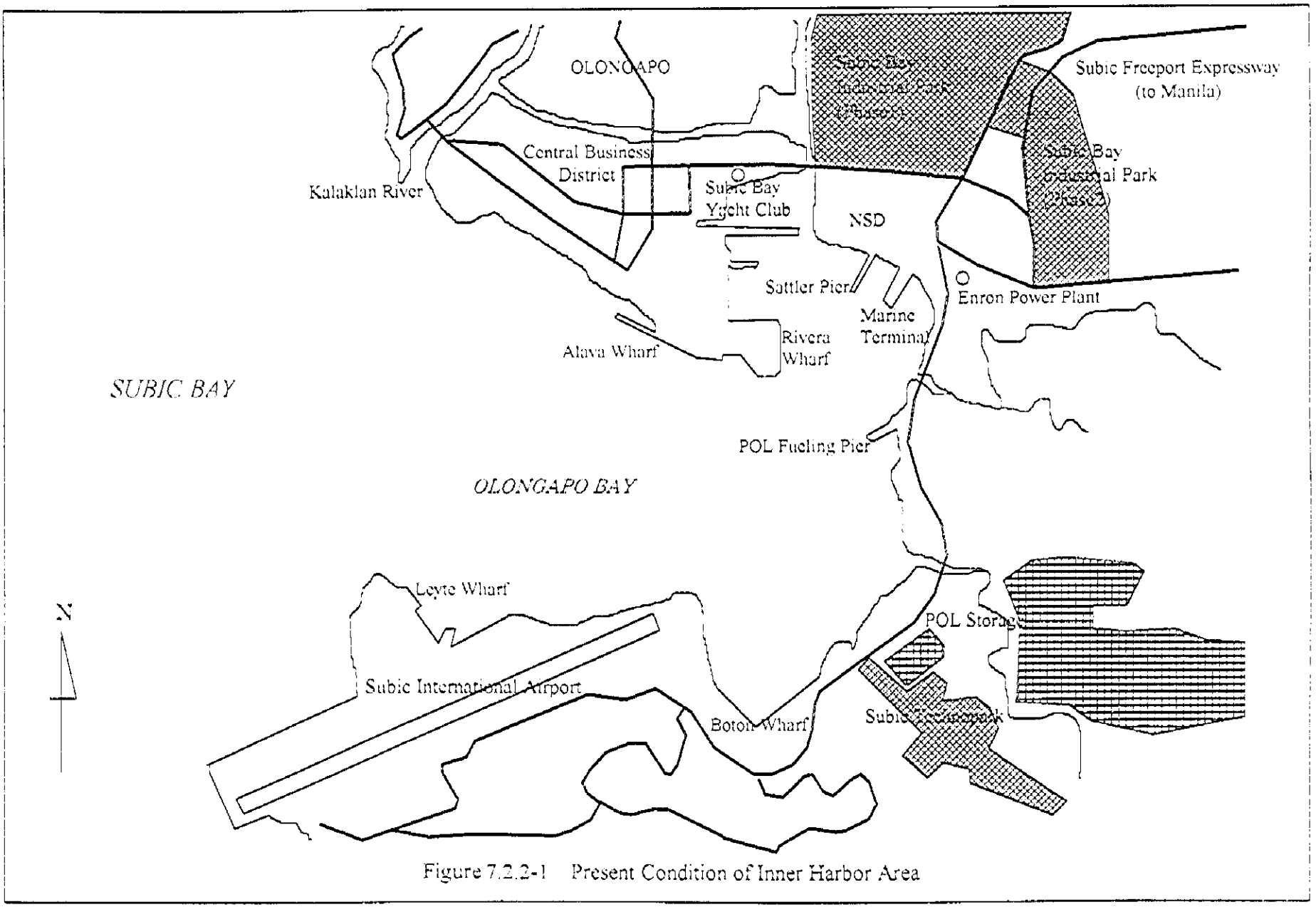


Figure 7.2.2-1 Present Condition of Inner Harbor Area

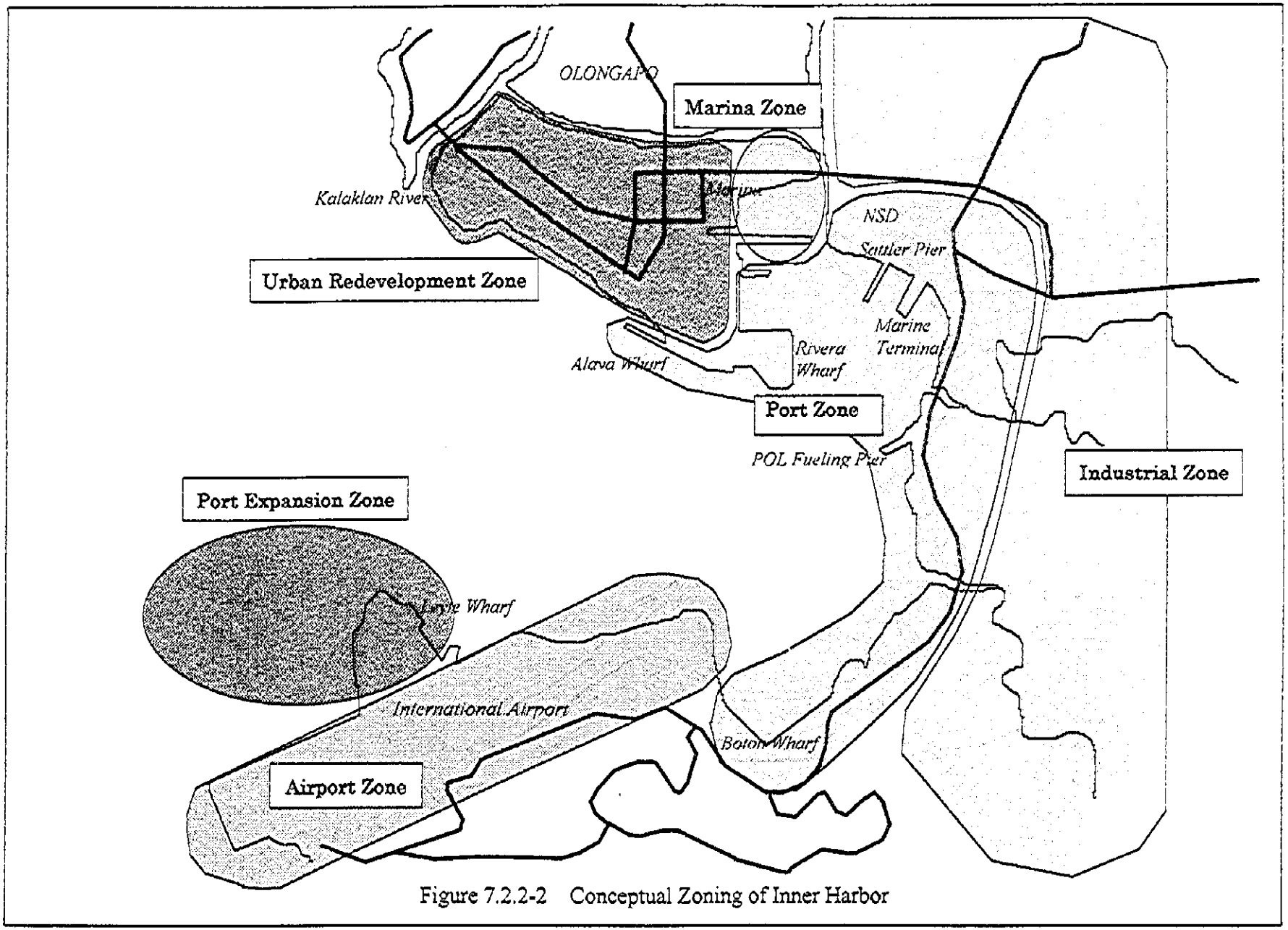


Figure 7.2.2-2 Conceptual Zoning of Inner Harbor

7.3 Traffic Demand Forecast

7.3.1 Methodology

There are two different methods of forecasting demand for port traffic in general. One is the so-called macro forecast method on the basis of socio-economic conditions, and the other is the so-called micro forecast method on the basis of the characteristics of cargo flow by each commodity group of cargo

The former method forecasts the total cargo volume as a whole by statistical correlation between the cargo volume and socio-economic indices such as GDP (gross domestic product) of the hinterland of the port and/or population and past time trend.

The latter one is a cumulative method forecasting the cargo volume based on analyses of the patterns of major commodities individually (related indices, the forecast demand and supply situation). Hereinafter, the handling cargo at SBF will be divided into non-containerized cargo and containerized cargo and a different forecast method will be applied to each.

(1) Non-containerized Cargo Forecast

The statistical data of cargo handled at SBF is insufficient to forecast the demand using the macro method because the period of commercial activities is so short that no clear tendency can be identified. Therefore, the cargo demand forecast in the target year will be carried out on the assumption that the future role of SBF, located in Region III(Central Luzon), will remain unchanged from the present concerning the import cargo in Luzon. As mentioned in Chapter 7.3.2, the five ports which are assumed to be in the hinterland are considered. At first, the import cargo demand by each commodity at the five ports which is the base of cargo flow to Luzon (NCR, CAR, Region 1, 2, 3, and 4) will be determined.

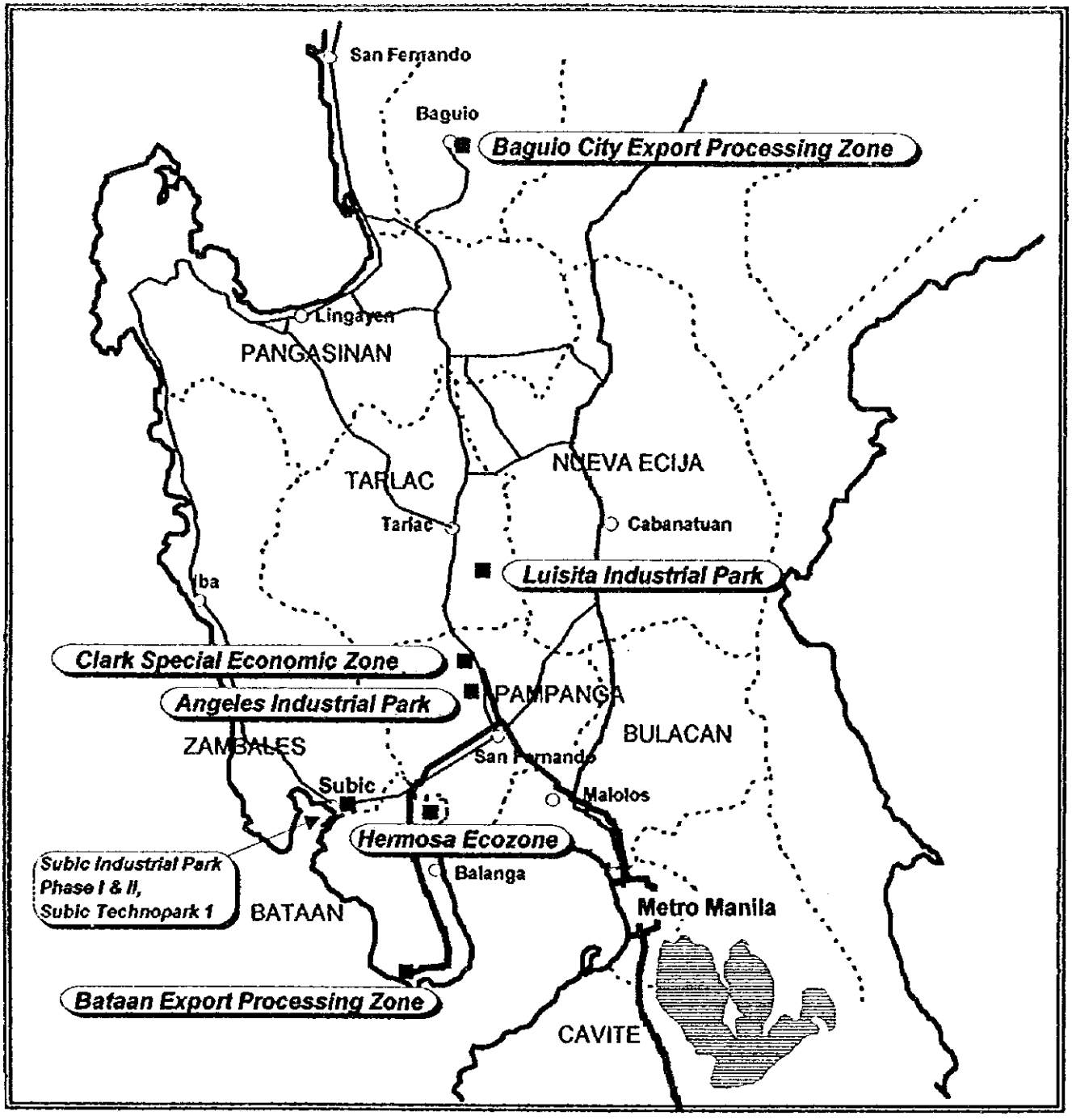
(2) Containerized Cargo Forecast

Raw materials and manufactured goods are transported from/to origin/destination as container cargo.

The containerized cargo handled at SBF is mainly raw materials and manufactured goods from factories located in SBFZ, EPZ, of Region III as shown in Figure 7.3.1-1.

Cargo volume survey with reference to production and absorption of cargo in industrial estate has been carried out.

Based on the questionnaire, unit rate of productivity of manufacturing goods at various factories will be determined by type of industry. The volume of incoming cargo(raw material) and outgoing cargo volume(production) of a factory against the factory's area is expressed by the following formula.



○ Provincial Capital
■ Special Economic Zone
Highway 4 lane concrete
Maharlika Highway asphalted
1st class concrete or asphalted

Figure 7.3.1-1 Location Map

$$\text{A: Raw Material Rate (ton/sq.m*year)} = \frac{\text{In-coming Material (ton/year)}}{\text{Factory's Building Area (sq.m)}}$$

$$\text{B: Production Rate (ton/sq.m*year)} = \frac{\text{Out-going Material (ton/year)}}{\text{Factory's Building Area (sq.m)}}$$

Using the above rates, import cargo and export cargo will be forecasted.

Other imported container cargo at SBF is mainly daily necessities for the duty free shops and heavy equipment. The forecast of these cargoes will be determined by relation to GDP

In this study, forecast of re-export (transshipment) container cargo will not be conducted. Despite the fact the concession contract for the container terminal was open to public bidding, a lawsuit has ensued. Therefore, the Study Team has been unable to see the proposals of each bidder. Moreover, the quantity of re-export (transshipment) cargo at the container terminal depends largely on the terminal operator's strategy and efforts.

7.3.2 Determination of Hinterland

(1) General

In determining the hinterland of a port, many factors are to be considered. The location of the hinterland depends upon such factors as geographical conditions around the port, networks of land transportation, the level of commercial activities in the related area and the conditions of other ports located around the study port. Theoretically, the area of the hinterland varies according to the kind of cargo, and may sometimes shift in the course of regional development. Hinterlands of adjacent ports, especially their outskirts, sometimes overlap each other.

However, in this study, the geographical profile, the network of roads, and the condition of the adjacent ports are considered to determine the hinterland of the Subic Bay Freeport.

(2) Geographical Profile

The Subic Bay Freeport (SBF) is located southwest of Luzon Island in the Philippines. The harbor lies between the Zambales Mountain Range at the east and the Subic Bay at the west and opens up to the South China Sea. It is northwest of the Bataan Peninsula and southwest of the Zambales Province. The SBF is 110 kilometers northwest of Manila. It is separated from Manila by Manila Bay and the Bataan Peninsula. The mountain ranges around

the Subic Bay area and deep natural harbor provide excellent and protected anchorage. In addition, these features make SBF naturally sheltered from typhoons as well as from the effects of the eruption of Mt. Pinatubo.

SBF belongs to Region III (Central Luzon Region). It is one of the points in the growth triangle and is an engine for economic development in the region. The SBF is a supplier of services and products for the Central Luzon Development Program (CLDP), a regional growth area composed of the provinces of Bulacan, Nueva Ecija, Tarlac, Pampanga, Bataan, and Zambales.

(3) Road Network

A future artery network for Central Luzon is proposed in line with the National Triad Growth Centers and the proposed hierarchical structure of urban centers. It consists of inter-regional arteries and intra-regional arteries linking those urban centers in the upper tiers.

The artery for Central Luzon is basically north - south road linking the northern regions to Metro Manila through Central Luzon. The main artery will continue to be the Manila North Road passing through Bulacan, Pampanga and Tarlac and the North Luzon Expressway with its extension. It has a secondary artery branching off at Tarlac and leading to the Lingayen Gulf area in Pangasinan.

The road link between SBF and Manila is being upgraded as a national priority project. The first section of the Subic Expressway upgrading is complete - the Bario Tipo road that shortens the distance from Dinalupihan, Bataan to the SBF by 30 minutes. The remaining section, which is the expressway from the San Fernando - Dinalupihan Road Improvement will be implemented through Phase I - phase II as a fast track alternative to the expensive Manila Coastal Road.

(4) Conclusion

Based on the preceding chapter, the hinterland of the Subic Bay Freeport will basically be assumed to be the whole Region III (Central Luzon), the adjacent Region I, CAR(Cordillera Administrative Region) and NCR (National Capital Region).

7.3.3 Socioeconomic Framework in the Future

(1) Population

National Statistic Office has tentatively projected the population and population growth rate of the Philippines and Region3 (see Table 7.3.3-1).

Table 7.3.3-1 Population Projection of the Philippines and Region3

	1995	1996	1997	1998	1999	2000
Philippines	68,349,452	69,946,205	71,538,593	73,130,985	74,723,373	76,320,126
Growth Rate (%)		2.34	2.28	2.23	2.18	2.14
Region 3	6,906,819	7,063,078	7,218,913	7,374,751	7,530,586	7,686,845
Growth Rate (%)		2.26	2.21	2.16	2.11	2.07

	2001	2002	2003	2004	2005	Average1995-2005
Philippines	77,898,184	79,476,245	81,054,304	82,636,689	84,214,747	
Growth Rate (%)	2.07	2.03	1.99	1.95	1.91	2.1
Region3	7,834,711	7,982,573	8,130,440	8,278,712	8,426,578	
Growth Rate (%)	1.92	1.89	1.85	1.82	1.79	2.0

Source: 1997 Philippine Statistical Yearbook, NSCB

According to the above projection, the population of the Philippines will be 84,214,747 in 2005. The population of Region3 will be 8,426,578 in 2005 and account for approximately 10% of the Philippine population.

"The Greater Capital Region Integrated Port Development Study" projected an average growth rate of 2.1 % per annum from 2001 to 2010. Judging from the above table and this study, the population growth rate of the Philippines and Region3 between 2005 and 2020 may be assumed to be 2.1 % on average for the purpose of the demand forecast of the Study.

The population of the Philippines based on above assumption in 2010, 2015 and 2020 is as follows;

Year	Population
2010	93 million
2015	104 million
2020	115 million

The future trend and population are shown in Figure 7.3.3-1

(2) GDP

Table 5.1.2-3 shows actual GDP and GRDP(Gross Regional Domestic Product) in real price at 1985 price. Using GDP data from 1985 to 1996, the long-term growth of 1985 to 1996 is 3.7 % and the short-term growth of 1994 to 1996 is 5.2 %. And using the data of GRDP(Region3) from 1985 to 1996, the long-term growth is 4.0% and the short-term growth is 5.0%. Accordingly, the growth of GDP and GRDP(Region3) between 1997 and 2020 may be assumed to follow the same trend.

Three alternatives, that is high, medium and low projections of GDP will be prepared based upon different assumptions.

The high projection corresponds to the Medium-Term Philippine Development Plan. The term of the Development Plan is from 1993 to 1998 and the Plan gives no information on GDP for the further future periods, up to 2020. On the other hand, "The Greater Capital Region Integrated Port Development Study" projected an average growth rate of 7.2 % per annum up to 2010 for the high case which has been applied to the study as the most practicable alternative.

Considering the annual average growth rate of GDP and GRDP from 1985-96, average growth rate of 4 % may be applied for the case of low projection.

Average growth rate of 5.6 % may be applied for the case of medium projection, which is the average of 4.0% and 7.2%.

But considering the economic depression throughout Asia from 1997 and the short-term growth of approx. 5.0 % of 1994-1996, average growth rate of 5.0 % may be only applied for 1997-1998.

One case was set from 1997-1998 while three cases were set from 1999-2020 for the demand forecasting scenarios as follows;

Term		GDP growth
1997-1998		5.0 %
1999-2020	(High case)	7.2 %
	(Medium case)	5.6 %
	(Low case)	4.0 %

Future trend and GDP at 1985 constant prices are shown in Figure 7.3.3-2

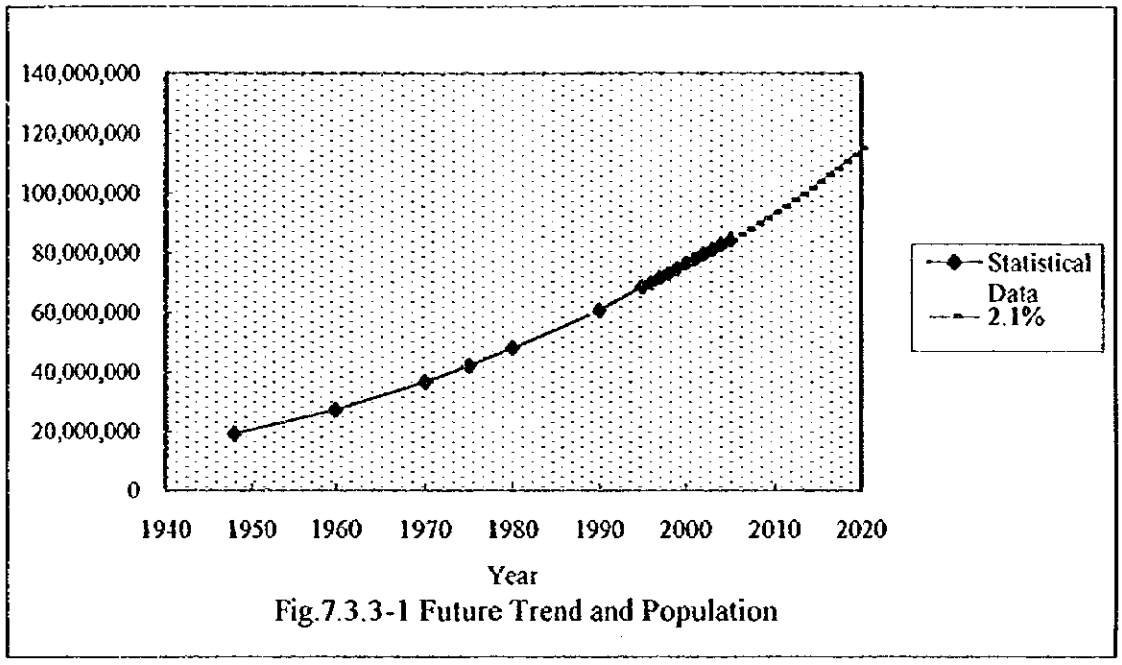


Fig.7.3.3-1 Future Trend and Population

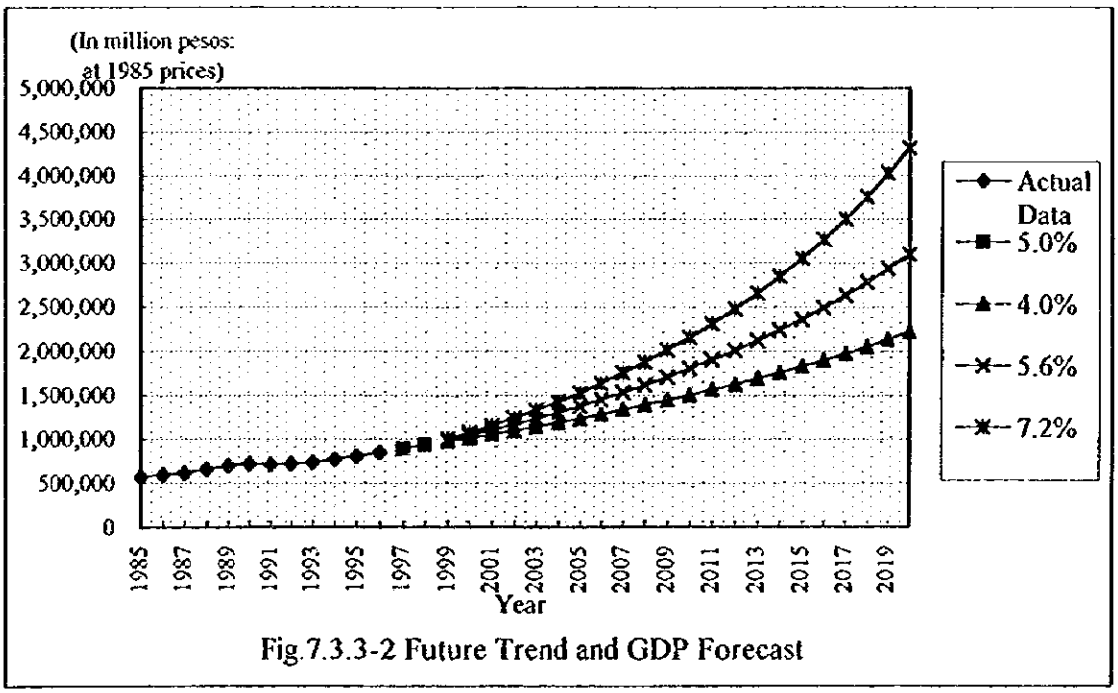


Fig.7.3.3-2 Future Trend and GDP Forecast

7.3.4 Traffic Demand Forecast

(1) Cargo Traffic Forecast

1) Demand forecast of import non-containerized cargo at SBF

The location of SBF is quite close to the Port of Manila (North Port, South Port, MICT), which means that each port's hinterland and trading area overlap with one another. Therefore, the cargo volume handled at adjacent ports will be determined to grasp the present port activities and trend of trade in Central Luzon. The cargo volume by commodity handled at the following five PMO ports (North Port, South Port, MICT, Batangas and San Fernando) will be studied to make clear their role as regional ports. And then the role of SBF in Region III will be identified.

The volume of non-containerized cargo of certain commodities handled at SBF in 1996 and 1997 is shown Table 7.3.4-1.

Table 7.3.4-1 Cargo Volume by Commodity

Import Unit: tons

Non-containerized cargo	1996	1997
Rice	106,071	95,997
Cement	36,995	68,300
Fertilizer	0	8,015
Soya bean	156,870	110,868
Heavy equipment	31,640	26,718
Construction material	26,229	51,295
Others	-	28,096
Total	357,805	389,289

A micro forecast of each commodity above mentioned in Table 7.3.4-1 is carried out as follows.

a) Rice

The future import volume of rice is assumed by the rice production and consumption in the Philippines. Agricultural area is forecasted by the production and yield per area.

The production of rice will be forecasted by correlation with year. The correlation between the production and year 1987 to 1999 is expressed in the following equation.

$$Y = 185 \times X - 358810 \qquad (R^2 = 0.6304)$$

Where, Y: Production of rice in the Philippines (thousand tons)

X: Year

R^2: Correlation coefficient

The yield per area will be forecasted by correlation with year. The correlation between the yield per area and year 1987 to 1996 is expressed in the following equation.

$$Y = 0.0264 \times X - 49.733 \qquad (R^2 = 0.6913)$$

Where, Y: Yield per area of rice in the Philippines (tons/ha)

X: Year

R^2: Correlation coefficient

On the other hand, consumption volume in the Philippines will be calculated by future consumption volume per capita and population. The average consumption volume per capita from 1994 to 1998 is 162kg. Future per capita consumption toward the target year 2020 will be expected to decrease gradually year by year (0.75% after 1999) due to changes in people's life-styles. Per capita consumption will eventually become 138kg. Based on these assumptions, consumption volume in the Philippines will be 15.9 million tons in 2020. Import volume will be calculated by the lack / surplus of rice.

The SBF is classified as a government port in PMO's port (north port). The share of five ports of import rice in Philippines is 63% and the share of SBF of import rice through five PMO's ports is 19% in 1996.

The present shares of the five ports and SBF are assumed to remain the same up to the target year 2020.

The shares of the five ports and SBF in the future will be fixed as 70% and 13% respectively.

Based on the above, the import volume at SBF is estimated in Table 7.3.4-2.

Table 7.3.4-2 Import Volume of Rice

Unit: 1000 tons

	1997	2000	2005	2010	2015	2020
Import through Five Ports	725	757	648	626	646	713
Import through SBF	*96	100	86	83	86	94

*Note; *Actual volume*

b) Cement

The future import volume of cement is assumed by the cement production and consumption in the Philippines.

The gross value added in construction by region (at constant 1985 prices) from 1986 to 1996 is as shown in the following Table 7.3.4-3.

Table 7.3.4-3 Gross Value Added in Construction by Region

(In million pesos: at constant 1985 prices)

	1986	1996	Growth Rate
Philippines	28,648	49,341	5.6%
NCR (Metro Manila)	10,939	14,558	2.9%
CAR	(1987) 669	831	2.4%
Region 1	1,178	2,021	5.5%
Region 2	1,302	928	-3.3%
Region 3	3,182	6,261	7.0%
Region 4	3,740	8,013	7.9%
Total	20,341	32,612	4.8%
Share	71.3%	66.1%	

Based on the above, the production and consumption of cement in the Philippines

will be assumed as growing at a constant rate of 5%. Consumption volume will reach 44 million tons in 2020.

The share of five ports of import cement in Philippines is 65% and the share of SBF of import cement through five PMO's ports is 8.2% in 1997.

The present share of the five ports is assumed to remain unchanged up to the target year 2020. The role of SBF will basically be unchanged, but considering the recent demand in the construction sector, the share of SBF is set at 5% in 1998 and 8% in 2005. From 2005 until 2020, the share of import cement at SBF will be maintained at 8%.

Based on the above, the import volume at SBF is estimated in the following Table 7.3.4-4.

Table 7.3.4-4 Import Volume of Cement

Unit: 1000 tons

	1997	2000	2005	2010	2015	2020
Import through Five Ports	835	966	1,233	1,574	2,009	2,563
Import through SBF	*68	55	99	126	161	205

Note: *Actual Volume*

c) Fertilizer

The future import /export of fertilizer is assumed by the fertilizer production and consumption in the Philippines.

The total production volume and import volume of fertilizer will be forecasted by correlation with year. The correlation between the total production and import and year 1987 to 1996 is expressed in the following equation.

$$Y = 116.18 \times X - 229161 \qquad (R^2 = 0.9623)$$

Where, Y: Total production and import of fertilizer in the Philippines (thousand tons)

X: Year

R^2: Correlation coefficient

The production volume of fertilizer will be forecasted by correlation with total volume of production and import. The correlation between the production volume and total volume in 1987 to 1996 is expressed in the following equation.

$$Y = 0.704 \times X - 519.89 \qquad (R^2 = 0.8835)$$

Where, Y: Product volume of fertilizer in the Philippines (thousand tons)

X: Total volume of product and importation

R^2: Correlation coefficient

The average growth rate of fertilizer consumption from 1987 to 1996, 3.5%, will be applied in forecasting future consumption.

Consumption volume in the Philippines will be 3.7 million tons in 2020. Import volume of fertilizer in the Philippines will be calculated by the result of aforesaid equations.

The SBF is classified as a government port in PMO's port (north port). The share of the five ports of import fertilizer in the Philippines is 45% while the estimated share of SBF in 1997 is 1.3%.

The present role of the five ports is assumed to remain unchanged up to the target year 2020. The role of SBF is expected to become more important to support agriculture in Region III. The share of SBF will be set at 1.5% in 1998 and 5% in 2005. From 2005 until 2020, the share of import fertilizer at SBF will be maintained at 5%.

Based on the above, the import volume at SBF is estimated in the following Table 7.3.4-5.

Table 7.3.4-5 Import Volume of Fertilizer

Unit: 1000 tons

	1997	2000	2005	2010	2015	2020
Import through Five Ports	614	660	737	815	892	970
Import through SBF	*8	14	37	41	45	48

Actual Volume

d) Soya bean

Most soya bean imported at SBF is delivered to the local markets as animal feed. The consumption of animal feed in the Philippines is mainly by livestock (especially hogs). The importation of animal feed in the Philippines will be forecasted as follows.

The import volume and export volume of animal feed, number of livestock(hog) and consumption per head from 1991 to 1996 are shown in the following Table 7.3.4-6.

Table 7.3.4-6 Statistical Data for Animal Feed

		1991	1992	1993	1994	1995	1996
Import	(1000 tons)	643	683	113	920	949	863
Export	(1000 tons)	77	63	74	133	120	85
Balance	(1000 tons)	566	620	39	787	829	778
Livestock(Hog)	(1000 head)	8,079	8,022	7,954	8,227	8,941	9,026
Consumption	(kg/head)	70	77	5	96	93	86

Source: Annual Statistical Report, PPA

Philippine Statistical Yearbook, 1997

The number of livestock(hog) will be forecasted by correlation with year.

The correlation between the number of livestock(hog) year 1989 to 1997 is expressed in the following equation.

$$Y = 206.82 \times X - 403752 \qquad (R^2 = 0.7578)$$

Where, Y: Number of livestock(hog) in the Philippines (thousand head)

X: Year

R^2: Correlation coefficient

The balance of import volume and export volume of animal feed is assumed to be consumed as feed for hogs. The consumption in future is assumed as 90kg per head based on the results of the last few years. The export volume of animal feed in future is expected to be 14% of the total.

Based on these assumptions, import volume in the Philippines will be 1.44 million

tons in 2020.

The share of five ports of import animal feed in the Philippines is 100% and the share of SBF is estimated at 11.1% in 1997.

The share of the five ports is assumed to remain the same up to the target year 2020. The role of SBF is expected to become more important to support agriculture in Region III. The share of SBF is set as 15% from 1998 to 2020.

Based on the above, the import volume at SBF is estimated in the following Table 7.3.4-7.

Table 7.3.4-7 Import Volume of Soya Bean

Unit: 1000 tons

	1997	2000	2005	2010	2015	2020
Import through Five Ports	1,001	1,015	1,121	1,227	1,333	1,439
Import through SBF	*111	152	168	184	200	216

Actual Volume

e) Heavy equipment

The demand for heavy equipment in the Philippines is assumed based on the condition of the construction industry. The mechanical & electrical equipment in the annual report of PPA is considered as heavy equipment.

GDP of the construction industry sector and import volume of heavy equipment from 1992 to 1996 are shown in the following Table 7.3.4-8.

Table 7.3.4-8 GDP of Construction Sector and Imported Heavy Equipment

Unit: Million pesos, tons

	1992	1993	1994	1995	1996
GDP of construction Sector	36,261	38,344	41,774	44,490	49,341
Import of heavy equipment	254,950	261,574	289,755	315,433	329,311

Source: National Statistical Coordination Board

Annual Statistical Report, PPA

GDP of construction industry sector will be forecasted by correlation with year. The correlation between GDP of construction industry sector and year 1992 to 1996 is expressed in the following equation.

$$Y = 3.2306 \times X - 6399.8 \qquad (R^2 = 0.9806)$$

Where, Y: GDP of construction industry sector (Billion peso)

X: Year

R^2: Correlation coefficient

The correlation between the import volume of heavy equipment and GDP of construction industry sector from 1992 to 1996 is expressed in the following equation.

$$Y = 6.1728 \times X + 30689 \qquad (R^2 = 0.9591)$$

Where, Y: Import of heavy equipment (tons)

X: GDP of construction industry sector (million peso)

R^2: Correlation coefficient

Based on these assumptions, import volume in the Philippines will be 809 thousand tons in 2020.

The share of the five ports is 100% while the share of SBF is 9.6% in 1996.

The present share of the five ports is assumed to remain the same up to the target year 2020. The share of SBF is set at 7.6% in 1998 and 10% in 2005. From 2005 until 2020, the share of import heavy equipment at SBF will be maintained at 10%.

Based on the above, the import volume at SBF is estimated in the following Table 7.3.4-9.

Table 7.3.4-9 Import Volume of Heavy Equipment

Unit: 1000 tons

	1997	2000	2005	2010	2015	2020
Import through Five Ports	350	410	509	609	709	809
Import through SBF	*27	34	51	61	71	81

Actual Volume

f) Construction material

The import volume of construction material in the Philippines is assumed based on the consumption and export of construction materials. In this study, the cargo volume of iron & steel and manufactures of metal (listed in the annual report of PPA) are considered as construction materials.

GDP of construction industry sector and import volume of construction materials from 1992 to 1996 are shown in the following Table 7.3.4-10.

Table 7.3.4-10 GDP of Construction Sector and Import of Construction Materials

	1992	1993	1994	1995	1996
GDP of construction Sector (Million pesos)	36,261	38,344	41,774	44,490	49,341
Population of Philippines (Thousand person)	64,259	65,649	67,038	68,614	69,946
GDP (Const. Sect.) per capita (peso)	564	584	623	648	705
Import of construction materials (1000 tons)	2,072	2,510	2,801	3,766	4,034
Export of construction materials (1000 tons)	70	157	427	48	102
Balance (consumption) (1000 tons)	2,002	2,353	2,374	3,718	3,932

Source: National Statistical Coordination Board

Annual Statistical Report, PPA

GDP of construction industry sector will be forecasted by correlation with year. The correlation between GDP of construction industry sector and year 1992 to 1996 is expressed in the following equation.

$$Y = 3.2306 \times X - 6399.8 \qquad (R^2 = 0.9806)$$

Where, Y: GDP of construction industry sector (Billion peso)

X: Year

R^2: Correlation coefficient

Based on these assumptions, GDP of construction industry sector per capita will be 1,096 pesos per person in 2020. Average growth rate of GDP of construction industry sector

per capita from 1996 to 2020 is 1.85%.

The consumption (balance of import and export) of construction materials will be forecasted by applying 1.85% as a constant growth rate till 2020.

The export volume of construction materials from 1992 to 1996 shows a lot of fluctuation. Therefore, a average ratio of export volume/consumption volume from 1992 to 1996, 6.3%, will be applied to forecast future export volume.

Total import volume is projected at 6.5 million tons in 2020.

The share of the five ports is 72% while the share of SBF is 1.7% in 1997.

The present share of the five ports is assumed to remain the same up to the target year 2020. The share of SBF is set at 2.0% in 1998. The share of import at SBF will be maintained at 2.0% from 1998 until 2020.

Based on the above, the import volume at SBF is estimated in the following Table 7.3.4-11.

Table 7.3.4-11 Import Volume of Construction Materials

Unit: 1000 tons

	1997	2000	2005	2010	2015	2020
Import through Five Ports	3,056	3,238	3,550	3,890	4,264	4,674
Import through SBF	*51	65	71	78	85	93

Actual Volume

g) Others

The other non-containerized cargo volume is 28 thousand tons in 1997. The ratio of the other cargo to total volume of above mentioned items a) to f) is 7.8% in 1997.

This ratio is expected to be maintained up to the year 2020.

Based on the above, the import volume of other cargo at SBF is estimated in the following Table 7.3.4-12.

Table 7.3.4-12 Import Volume of Other Cargo

Unit: 1000 tons

	1997	2000	2005	2010	2015	2020
Total Import from a) to f)	361	420	511	572	647	738
Import other cargo	*28	32	40	45	50	58

Actual Volume

h) Result of import non-containerized cargo in SBF

According to the above method, the import cargo volume is estimated and results are shown in Table 7.3.4-13.

Table 7.3.4-13 Summary of forecasted import cargo volume in SBF

Unit: 1000 tons

	2000	2005	2010	2015	2020
1) Rice	100	86	83	86	94
2) Cement	55	99	126	161	205
3) Fertilizer	14	37	41	45	48
4) Soya bean	152	168	184	200	216
5) Heavy equipment	34	51	61	71	81
6) Construction materials	65	71	78	85	93
7) Others	33	40	45	50	58
Total	453	551	617	697	796

Forecast of import non-containerized cargo is shown in the following Figure 7.3.4-1.

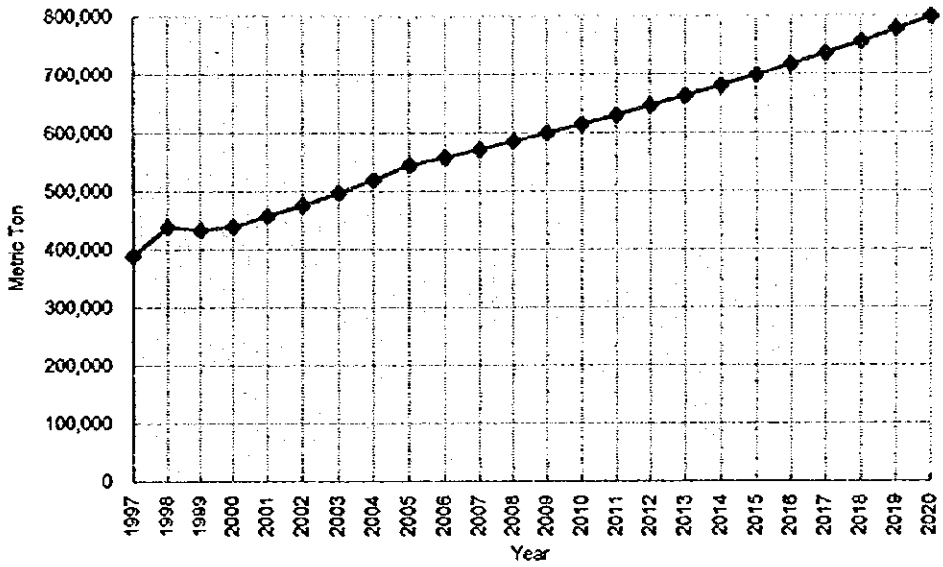


Figure 7.3.4-1 Demand Forecast for Non-containerized Cargo

Two transition points in the above Figure can be seen in the year 1998 and 2005. In estimating demand forecast of above mentioned cargo, the following was assumed.

i) The demand forecast in 1998 is based on average growth rate, ratio or value of the last few years

ii) Facilities for non-containerized cargo in the Long Term Plan will be fully operational in 2005. Therefore, the share of SBF among the five ports will be set as a transition point.

Hereinafter, aforesaid forecast volume will be amended to eliminate sudden shifts in the demand curve.

The non-containerized cargo volume obtained above will be forecasted by correlation with GDP. The correlation between the cargo volume and GDP from 1997 to 2020 is expressed in the following equation.

$$Y = 301.91 \times Ln(X) - 3727.7 \qquad (R^2 = 0.9959)$$

Where, Y: Cargo volume (1000 tons)

Ln: Natural logarithm

X: Forecasted GDP in the Philippines (Billion peso)

R^2: Correlation coefficient

R^2: Correlation coefficient

Table 7.3.4-14 and Figure 7.3.4-2 shows projection for the non-containerized cargo volume based on three economic growth cases (high, middle and low) in the Philippines.

Table 7.3.4-14 Cargo demand forecast

Unit: 1000 tons

	2000	2005	2010	2015	2020
High Case	465	570	675	780	885
Middle Case	456	538	621	703	785
Low Case	447	506	565	624	684

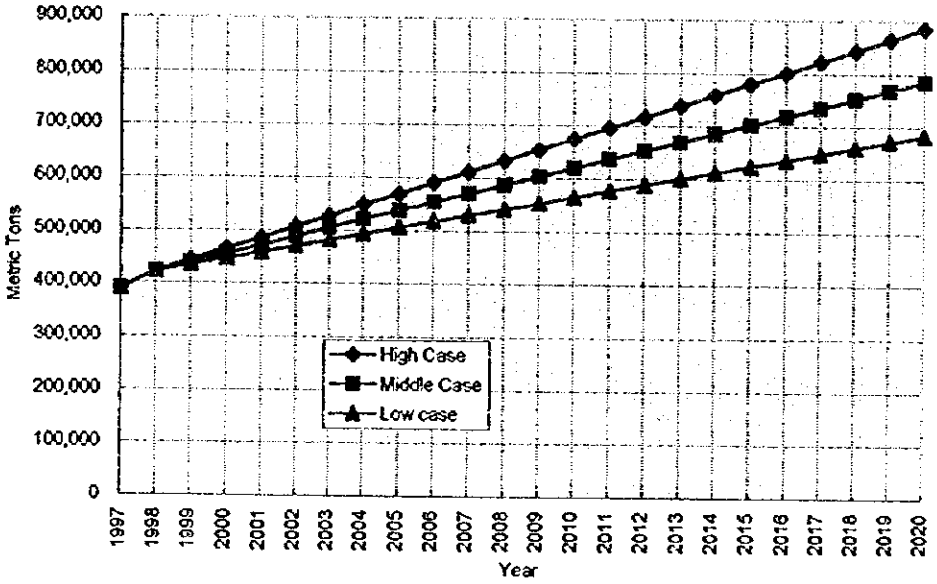


Figure 7.3.4-2 Non-container Cargo Demand Forecast

2) Demand forecast of other non-containerized cargo at SBF

a) Export of non-containerized cargo

As mentioned in chapter 4.3.1, export volume of non-containerized cargo through the SBF was 1,181 metric tons in 1997. The main commodity of export cargo is heavy equipment. The export volume of heavy equipment will be forecasted by the growth rate of GDP. Growth rate of the middle economy case, 5%, will be applied from 1997 to 1999 and 5.6% will be applied from 1999 to 2020.

Based on the above, the export volume of heavy equipment through the SBF is estimated in the following Table 7.3.4-15.

Table 7.3.4-15 Export of Heavy Equipment

Unit: tons

	2000	2005	2010	2015	2020
Export	1,400	1,800	2,400	3,100	4,100

The correlation between the cargo volume and GDP from 1997 to 2020 is expressed in the following equation.

$Y = 0.0013 \times X + 2.5899 \quad (R^2 = 1.0)$

Where, Y: Cargo volume (tons)

X: Forecasted GDP in the Philippines (Billion peso)

R^2: Correlation coefficient

Table 7.3.4-16 shows projection for export of heavy equipment based on three economic cases (high, middle and low) in the Philippines.

Table 7.3.4-16 Forecast of Heavy Equipment

Unit: tons

	2000	2005	2010	2015	2020
High Case	1,400	2,000	2,800	4,000	5,600
Middle Case	1,400	1,800	2,400	3,100	4,100
Low Case	1,300	1,600	2,000	2,400	2,900

b) Re-export cargo

As mentioned in chapter 4.3.1, re-export cargo through the SBF was 14,727 metric tons in 1997. The main commodity of re-export cargo is heavy equipment and cigarettes (refer to chapter 4.3.1, Table 4.3.1-10).

In the same manner as export of non-containerized cargo, the re-export cargo volume through the SBF is estimated in the following Table 7.3.4-17.

Table 7.3.4-17 Re-export Cargo

Unit: tons

	2000	2005	2010	2015	2020
Re-export Cargo	17,100	22,500	29,600	38,800	51,000

The correlation between the re-export cargo volume and GDP from 1997 to 2020 is expressed in the following equation.

$Y = 0.0164 \times X + 32.295 \quad (R^2 = 1.0)$

Where, Y: Re-export cargo volume (tons)

X: Forecasted GDP in the Philippines (Billion peso)

R^2: Correlation coefficient

Table 7.3.4-18 shows projection for re-export cargo volume based on three economic growth cases (high, middle and low) in the Philippines.

Table 7.3.4-18 Forecast of Re-export Cargo

Unit: tons

	2000	2005	2010	2015	2020
High Case	17,700	25,000	35,400	50,100	70,800
Middle Case	17,100	22,500	29,600	38,800	51,000
Low Case	16,600	20,200	24,600	29,900	36,400

c) Domestic inbound cargo

As mentioned in chapter 4.3.1, domestic inbound cargo volume of non-containerized cargo through the SBF was 12,281 metric tons in 1997. The main commodity of inbound cargo is fertilizer from Leyte (refer to chapter 4.3.1 Table 4.3.1-11). The re-export volume will be forecasted by the growth rate of GDP.

Based on the previous method, the inbound cargo volume through the SBF is estimated in the following Table 7.3.4-19.

Table 7.3.4-19 Domestic Inbound Cargo

Unit: tons

	2000	2005	2010	2015	2020
Domestic Inbound	14,300	18,800	24,700	32,400	42,500

The correlation between the domestic inbound cargo volume and GDP from 1997 to 2020 is expressed in the following equation.

$$Y = 0.0137 \times X + 26.931 \qquad (R^2 = 1.0)$$

Where, Y: Domestic inbound cargo volume (tons)

X: Forecasted GDP in the Philippines (Billion peso)

R^2: Correlation coefficient

Table 7.3.4-20 shows projection for domestic inbound cargo volume based on three economic growth cases (high, middle and low) in the Philippines.

Table 7.3.4-20 Forecast of Domestic Inbound Cargo

Unit: tons

	2000	2005	2010	2015	2020
High Case	14,800	20,900	29,500	41,800	59,200
Middle Case	14,300	18,800	24,700	32,400	42,500
Low Case	13,900	16,900	20,500	25,000	30,400

d) Domestic outbound cargo

As mentioned in chapter 4.3.1, domestic outbound cargo volume through the SBF was 32,939 metric tons in 1997. The main commodities of outbound cargo are soya bean and heavy equipment, which are mainly distributed to Manila, Cebu and other southern provinces of the Philippines (refer to chapter 4.3.1, Table 4.3.1-13). The outbound cargo volume will be forecasted by the growth rate of GDP.

Based on aforementioned GDP growth rate, the outbound cargo volume through the SBF is estimated in the following Table 7.3.4-21.

Table 7.3.4-21 Domestic Outbound Cargo

Unit: tons

	2000	2005	2010	2015	2020
Domestic Outbound	37,900	49,700	65,300	85,800	112,600

The correlation between the domestic outbound cargo and GDP from 1997 to 2020 is expressed in the following equation.

$Y = 0.0363 \times X + 71.343 \quad (R^2 = 1.0)$

Where, Y: Domestic outbound cargo volume (tons)

X: Forecasted GDP in the Philippines (Billion peso)

R^2: Correlation coefficient

Table 7.3.4-22 shows projection for domestic outbound cargo volume based on three economic growth cases (high, middle and low) in the Philippines.

Table 7.3.4-22 Forecast of Domestic Outbound Cargo

Unit: tons

	2000	2005	2010	2015	2020
High Case	39,100	55,300	78,300	110,800	156,800
Middle Case	37,900	49,700	65,300	85,800	112,600
Low Case	36,800	44,800	54,400	66,200	80,500

e) Result of non-containerized cargo forecast at SBF

According to the above examination, the import non-containerized cargo and other non-containerized cargo volume is estimated and the results are shown in Table 7.3.4-23.

Table 7.3.4-23 Summary of Non-containerized Cargo Volume through SBF

High Case

Unit: 1,000 tons

	2000	2005	2010	2015	2020
2) - a) Export	1	2	3	4	6
2) - b) Re-export	18	25	35	50	71
Foreign Trade Total	19	27	38	54	77
2) - c) D. Inbound	15	21	30	42	59
2) - d) D. Outbound	39	55	78	111	157
Domestic Trade Total	54	76	108	153	216
TOTAL	73	103	146	207	293

Middle Case

Unit: 1,000 tons

	2000	2005	2010	2015	2020
2) - a) Export	1	2	2	3	4
2) - b) Re-export	17	23	30	39	51
Foreign Trade Total	18	25	32	42	55
2) - c) D. Inbound	14	19	25	32	42
2) - d) D. Outbound	38	50	65	86	113
Domestic Trade Total	52	69	90	118	155
TOTAL	70	94	122	160	210

Low Case

Unit: 1,000 tons

	2000	2005	2010	2015	2020
2) - a) Export	1	2	2	2	3
2) - b) Re-export	17	20	25	30	36
Foreign Trade Total	18	22	27	32	39
2) - c) D. Inbound	14	17	21	25	30
2) - d) D. Outbound	37	45	54	66	81
Domestic Trade Total	51	62	75	91	111
TOTAL	69	84	102	123	150

3) Result of Demand Forecast for Non-containerized Cargo

Table 7.3.4-24 and Figure 7.3.4-3 shows projection for the demand forecast of non-containerized cargo handled at SBF based on three economic growth cases (high, middle and low) in the Philippines.

Table 7.3.4-24 Demand forecast for non-containerized cargo

High Case

Unit: 1,000 tons

	2000	2005	2010	2015	2020
1) Import of Non-containerized Cargo	465	570	675	780	885
2) Import & Export of Other Non-container Cargo	73	103	146	207	293
TOTAL	538	673	821	987	1,178
Middle Case					
1) Import of Non-containerized Cargo	456	538	621	703	785
2) Import & Export of Other Non-container Cargo	70	94	122	160	210
TOTAL	526	632	743	863	995
Low Case					
1) Import of Non-containerized Cargo	447	506	565	624	684
2) Import & Export of Other Non-container Cargo	69	84	102	123	150
TOTAL	516	590	667	747	834

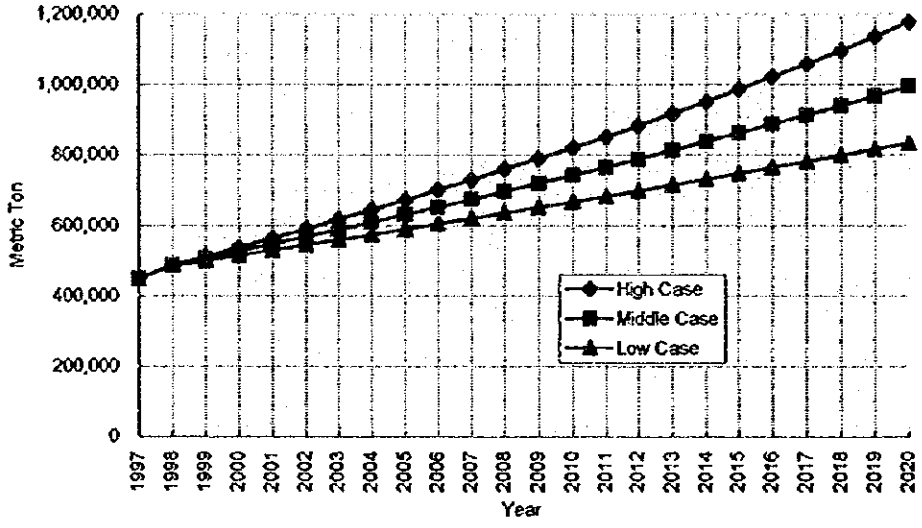


Figure 7.3.4-3 Non-container Cargo Demand Forecast

4) Cargo Demand Forecast Generated at Industrial Estate

a) Cargo Demand Forecast at SBFZ

Answers were received from twenty-three (23) companies located in the SBFZ, Baguio EPZ and Luisita Industrial Park.

The factories located in EPZ's have been divided into three types according to size and weight of the finished product.

Type A denotes companies engaged in the semi-conductor and micro-chip business. Products of Type A are naturally very light.

Type B refers to the Textile/garment industry. Textile products are not heavy but they can be bulky.

Type C denotes the electronics industry and other types of industries whose cargoes are heavy in nature.

Accordingly the above mentioned raw material and production rates have been calculated for each type of industry as shown in Table 7.3.4-25.

The summary of raw material and production rates at each type of industry is as shown in Table 7.3.4-26.

Table 7.3.4-26 Raw Material and Production Rate at Each Type of Industry

	Raw material rate (ton/m2)	Production rate (ton/m2)
Type A	0.051	0.048
Type B	0.225	0.213
Type C	0.602	0.434

At present, Industrial Park Phase 1 is almost fully occupied. Among industries locating in Industrial Park Phase 1, type A will account for 50%, type B 10%, and type C 40%.

Based on above assumption, the raw material and production rate of Industrial Park Phase 1 is 0.289 ton/sq.m/year and 0.219 ton/sq.m/year respectively.

For other industrial parks such as Industrial Park Phase 2, Subic Techno Park 1 and Industrial Park Phase 3 and Techno Park 2 which are under planning, the same raw material and production rate as in Industrial Park Phase 1 will be applied (see Table 7.3.4-27).

The development progress of industrial parks is estimated as shown in Table 7.3.4-28.

Based on the above assumption, the cargo volume generated at factories in future will be estimated as shown in Table 7.3.4-29.

Based on returned questionnaires, the present condition of transportation mode is as shown in Table 7.3.4-30. At present, although the SBFZ has a seaport and an airport, approximately 50% of the cargo generated from this area is transported and loaded at Manila.

When the port facilities of SBF become sufficiently developed in 2004, 80% of the cargo of Industrial Park Phase 1 is expected to be transported by ship and 20% by air as shown in Table 7.3.4-31.

The cargo volume for import/export through SBF will be estimated using aforesaid

Table 7.3.4-25 Questionnaire Survey Result (1/2)

Cargo Volume Survey

Item	Company Type Location	Kind of Business	Factory Area (sq.m)	Total No. of Employee (person)	Incoming Materials (Ton/year)	Outgoing Production (Ton/year)	Material Ratio (Ton /m²)	Material Ratio (Ton/person)	Production Ratio (Ton /m²)	Production Ratio (Ton/person)
	TYPE A Conductors & Electr. Chip Business									
1	SBFZ	Assembly of personal Computer/Motherboard & Add-On Car Manufacturing	130,000	1,500	1,800.0	2,400.0	0.014	1.200	0.018	1.600
2	SBFZ	Assembly of Cables, Sockets & Wafers	484	34	28.2	-	0.058	0.829	-	-
3	SBFZ	Electronic Device Mfg. for Cable TV & Telecommunication	1,707	176	169.0	146.0	0.099	0.960	0.086	0.830
4	SBFZ	Mechanical Assembly of Component, Inspection & Packing for IC Chips	600	78	15.0	12.0	0.025	0.192	0.020	0.154
5	SBFZ	Manufacturer of Switch & Potentionmeter	660	35	3.6	3.7	0.005	0.103	0.006	0.107
6	Baguio EPZ	Manufacturer of Semi-Conductor	28,392	2,200	2,894.0	3,079.0	0.102	1.315	0.108	1.400
		Average Ratio					0.051	0.767	0.048	0.818
	TYPE B Garments Business									
1	SBFZ	Textile Manufacturing	4,000	153	1,817.0	1,600.0	0.454	11.876	0.400	10.458
2	SBFZ	Manufacturing of Hospital Textile & Garments	3,947	365	-	-	-	-	-	-
3	Baguio EPZ	Garments	2,750	430	500.0	100.0	0.182	1.163	0.036	0.233
4	SBFZ	Garments Manufacturing	745	220	350.0	362.0	0.470	1.590	0.486	1.645
5	SBFZ	Production/Wholesale of car Seats, Car Seat Covers and Other Car Accessories	2,695	80	183.2	336.8	0.010	0.290	0.125	4.210
6	SBFZ	Garments Manufacturing	10,000	500	100.0	160.0	0.010	0.200	0.016	0.320
		Average Ratio					0.225	3.024	0.213	3.373

Note: Based on above responses, big gap between in-coming cargo volume and out-going cargo volume can be seen.
The rates obtained above may have to be reconsidered.

Table 7.3.4-25 Questionnaire Survey Result (2/2)

Cargo Volume Survey

Item	Company Type Location	Kind of Business	Factory Area (sq.m)	Total No. of Employee (person)	Incoming Materials (Ton/year)	Outgoing Production (Ton/year)	Material Ratio (Ton /m²)	Material Ratio (Ton/person)	Production Ratio (Ton /m²)	Production Ratio (Ton/person)
	TYPE C Electronics & Others Business									
1	Baguio EPZ	Manufacturer of Injected Plastics	936	79	48.5	95.0	0.052	0.614	0.101	1.203
2	SBFZ	Luggage Carts, Car Wash Brushes & Other Plastic Product	1,936	63	408.0	568.0	0.211	6.476	0.293	9.016
3	San Miguel Tarlac	Manufacturer of Wire & Wiring Harness for Automobiles	40,000	3,071	16,152.0	11,320.0	0.404	5.260	0.283	3.686
4	Baguio EPZ	Plastic Shipping Tubes	2,000	100	1,200.0	-	0.600	12.000	-	-
5	SBFZ	Fishing Tackle Manufacturing/Assembly	616	110	536.0	78.6	0.870	4.872	0.128	0.714
6	SBFZ	High Precision Plastic Moulding, Second Processing & Assembly of Plastic Parts for Cameras & other Electronic Parts	2,400	73	36.0	23.0	0.015	0.493	0.010	0.315
7	SBFZ	Manufacturing & Distribution of Plastic Parts for Medical Applications	1,020	96	42.3	16.6	0.041	0.441	0.016	0.173
8	SBFZ	Wood and Metal Display Furniture Manufacturing	229	44	514.8	274.9	2.248	11.701	1.200	6.247
9	SBFZ	Audio & Communication Products Manufacturing	5,235	1,690	5,120.0	7,560.0	0.978	3.030	1.444	4.473
		Average Ratio					0.602	4.987	0.434	3.228

Note: Based on above responses, big gap between in-coming cargo volume and out-going cargo volume can be seen.
The rates obtained above may have to be reconsidered.

Table 7.3.4-27 Estimated Cargo Volume of Business generated, located factory in SBFZ

Location	Industrial Area (sq.m)	Type of Business	Factory		Building		Material(Import)		Production(Export)	
			share (%)	Compound (sq.m)	Area Ratio	Area (sq.m)	Average Ratio (Ton / m²)	Cargo (Ton/Year)	Average Ratio (Ton /m²)	Cargo (Ton/Year)
Industrial Park Phase 1	858,300	Type A	50%	429,150	65%	278,948	0.051	14,107	0.048	13,284
		Type B	10%	85,830	65%	55,790	0.225	12,565	0.213	11,864
		Type C	40%	343,320	65%	223,158	0.602	134,369	0.434	96,951
Sub- Total				858,300		557,895	0.289	161,041	0.219	122,098
Industrial Park Phase 2	368,800	Type A	50%	184,400	65%	119,860	0.051	6,062	0.048	5,708
		Type B	10%	36,880	65%	23,972	0.225	5,399	0.213	5,098
		Type C	40%	147,520	65%	95,888	0.602	57,737	0.434	41,659
Sub- Total				368,800		239,720	0.289	69,197	0.219	52,464
Subic Techno Park 1	417,000	Type A	50%	208,500	65%	135,525	0.051	6,854	0.048	6,454
		Type B	10%	41,700	65%	27,105	0.225	6,104	0.213	5,764
		Type C	40%	166,800	65%	108,420	0.602	65,282	0.434	47,103
Sub- Total				417,000		271,050	0.289	78,241	0.219	59,321
Grand Total				1,644,100		1,068,665		**308,478**		**233,883**

Note: SBFZ Industrial Estate Generated Cargo Volume(Material & Production) per sq.m (Ton/m²)
0.33 Ton/sq.m/year for Factory's Compound Area
0.51 Ton/sq.m/year for Building Area

Table 7.3.4-28 Development Progress of Industrial Area

Location		1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Subic	Industrial Park Phase 1	70%	75%	80%	85%	90%	95%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
	Industrial Park Phase 2	15%	35%	50%	65%	80%	90%	95%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
	Industrial Park Phase 3	0%	0%	0%	0%	0%	10%	20%	30%	40%	50%	60%	70%	80%	85%	90%	95%	100%	100%	100%	100%	100%	100%	100%
	Technopark Phase 1	10%	25%	40%	55%	70%	85%	95%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
	Technopark Phase 2	0%	0%	0%	0%	0%	0%	10%	20%	30%	40%	50%	60%	70%	80%	85%	90%	95%	100%	100%	100%	100%	100%	100%
Bataan EPZ	Type B		5%	10%	15%	20%	25%	30%	35%	40%	45%	50%	55%	60%	65%	70%	80%	85%	90%	95%	100%	100%	100%	100%
Clark Special Economic Zone	Type C		14%	20%	26%	32%	38%	44%	50%	55%	60%	65%	70%	75%	80%	85%	90%	95%	100%	100%	100%	100%	100%	100%
Angeles Industrial Park	Type C	50%	55%	60%	70%	80%	90%	95%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Luisita Industrial Park	Type C	5%	10%	15%	20%	25%	30%	35%	40%	45%	50%	55%	60%	65%	70%	75%	80%	85%	90%	95%	100%	100%	100%	100%
Baguio City Economic Zone	Type A	50%	55%	60%	65%	70%	75%	80%	85%	90%	95%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Hermosa Industrial Estate	Type C	0%	0%	0%	5%	10%	15%	20%	25%	30%	35%	40%	45%	50%	55%	60%	70%	75%	80%	85%	90%	95%	100%	100%

Table 7.3.4-28 Development Progress of Industrial Area

Location		1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Subic	Industrial Park Phase 1	70%	75%	80%	85%	90%	95%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
	Industrial Park Phase 2	15%	35%	60%	65%	80%	80%	95%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
	Industrial Park Phase 3	0%	0%	0%	0%	0%	10%	20%	30%	40%	50%	60%	70%	80%	85%	90%	95%	100%	100%	100%	100%	100%	100%	100%
	Technopark Phase 1	10%	25%	40%	55%	70%	85%	95%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
	Technopark Phase 2	0%	0%	0%	0%	0%	0%	10%	20%	30%	40%	50%	60%	70%	80%	85%	90%	95%	100%	100%	100%	100%	100%	100%
Bataan EPZ	Type B		5%	10%	15%	20%	25%	30%	35%	40%	45%	50%	55%	60%	65%	70%	80%	85%	90%	95%	100%	100%	100%	100%
Clark Special Economic Zone	Type C		14%	20%	26%	32%	38%	44%	50%	55%	60%	65%	70%	75%	80%	85%	90%	95%	100%	100%	100%	100%	100%	100%
Angeles Industrial Park	Type C	50%	55%	60%	70%	80%	90%	95%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Luisita Industrial Park	Type C	5%	10%	15%	20%	25%	30%	35%	40%	45%	50%	55%	60%	65%	70%	75%	80%	85%	90%	95%	100%	100%	100%	100%
Baguio City Economic Zone	Type A	50%	55%	60%	65%	70%	75%	80%	85%	90%	95%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Hermosa Industrial Estate	Type C	0%	0%	0%	5%	10%	15%	20%	25%	30%	35%	40%	45%	50%	55%	60%	70%	75%	80%	85%	90%	95%	100%	100%

Table 7.3.4-29 Estimated Cargo Volume of Business Generated, Located Factories in SBFZ and Industrial Estate in nearby Provinces

Location	Name	Project Area (Ha)	Industrial Area (Ratio)	Industrial Area (Ha)	Factory Area (%)	Factory Area (Ha)	Incoming Cargo Volume (Ton /m²)	Incoming (Ton)	Outgoing Cargo Volume (Ton /m²)	Outgoing (Ton)	2000 Incoming	2000 Outgoing	2005 Incoming	2005 Outgoing	2010 Incoming	2010 Outgoing	2015 Incoming	2015 Outgoing	2020 Incoming	2020 Outgoing
Subic	Industrial Park Phase 1	105	82%	85.83	65%	55.79	0.289	161,232	0.219	122,179	80% 126,985	80% 97,743	100% 161,232	100% 122,179	100% 161,232	100% 122,179	100% 161,232	100% 122,179	100% 161,232	100% 122,179
	Industrial Park Phase 2	55	67%	36.88	65%	23.97	0.289	69,279	0.219	52,499	50% 34,640	50% 26,249	100% 69,279	100% 52,499	100% 69,279	100% 52,499	100% 69,279	100% 52,499	100% 69,279	100% 52,499
*	Industrial Park Phase 3	140	70%	98.00	65%	63.70	0.289	184,093	0.219	139,503	0% 0	0% 0	30% 55,228	30% 41,851	80% 147,274	80% 111,602	100% 184,093	100% 139,503	100% 184,093	100% 139,503
	Techno Park Phase 1	60	70%	41.70	65%	27.11	0.289	78,333	0.219	59,360	40% 31,333	40% 23,744	100% 78,333	100% 59,360	100% 78,333	100% 59,360	100% 78,333	100% 59,360	100% 78,333	100% 59,360
*	Techno Park Phase 2	120	70%	84.00	65%	54.60	0.289	157,794	0.219	119,574	0% 0	0% 0	20% 31,559	20% 23,915	70% 110,456	70% 83,702	100% 157,794	100% 119,574	100% 157,794	100% 119,574
				Sub-Total		170.57		650,731		493,115	194,958	147,737	395,631	299,803	566,574	429,342	650,731	493,115	650,731	493,115
											342,695		695,434		995,916		1,143,846		1,143,846	
Bataan EPZ	Type B			166	65%	107.90	0.225	242,775	0.213	229,827	10% 24,278	10% 22,983	35% 84,971	35% 80,439	60% 145,665	60% 137,896	90% 218,498	90% 206,844	100% 242,775	100% 229,827
Clark Special Economic Zone	Type C			260	65%	169.00	0.602	1,017,380	0.434	733,460	20% 203,476	20% 146,692	50% 508,690	50% 366,730	75% 763,035	75% 550,095	100% 1,017,380	100% 733,460	100% 1,017,380	100% 733,460
Angeles Industrial Park	Type C			30	65%	19.50	0.602	117,390	0.434	84,630	60% 70,434	60% 50,778	100% 117,390	100% 84,630	100% 117,390	100% 84,630	100% 117,390	100% 84,630	100% 117,390	100% 84,630
Luisita Industrial Park	Type C			120	65%	78.00	0.602	469,560	0.434	338,520	15% 70,434	15% 50,778	40% 187,824	40% 135,408	65% 305,214	65% 220,038	90% 422,604	90% 304,668	100% 469,560	100% 338,520
Baguio City Economic Zone	Type A			38	65%	24.70	0.051	12,597	0.046	11,856	60% 7,558	60% 7,114	85% 10,707	85% 10,078	100% 12,597	100% 11,856	100% 12,597	100% 11,856	100% 12,597	100% 11,856
Hermosa Industrial Estate	Type C	400	70%	280	65%	182.00	0.602	1,095,640	0.434	789,880	0% 0	0% 0	25% 273,910	25% 197,470	50% 547,820	50% 394,940	80% 876,512	80% 631,904	100% 1,095,640	100% 789,880
				Sub-Total		581.10	0.509	2,955,342	0.377	2,188,173	376,180	278,344	1,183,493	874,755	1,891,721	1,399,455	2,664,981	1,973,362	2,955,342	2,188,173
											654,524		2,058,248		3,291,176		4,638,343		5,143,515	
						751.67	0.48	3,606,073	0.357	2,681,288	571,138	426,081	1,579,124	1,174,558	2,458,295	1,828,797	3,315,712	2,466,477	3,606,073	2,681,288
				Total							997,219		2,753,682		4,287,092		5,782,189		6,287,361	

Note:

* : *SBMA intends to develop the **Bataan Techno Park** instead of the Subic Industrial Park Phase 3 and Subic Techno Park Phase 2 in Subic Bay Freeport Zone.*
*The development area for the industrial estate area at the **Bataan Techno Park** approximately equals the total industrial estate area of the Subic Industrial Park 3 and Subic Techno Park 2.*

Table 7.3.4-30 Transportation Mode of Cargo Generated at Industrial Estate

Questionnaires for Cargo Demand Forecast Survey

Item	Location	Company Name	Kind of Business	Type of Business	Incoming Cargo Transpotation						Outgoing Cargo Transportation				
					Materials	SBF		Manila		Others	Production	SBF		Manila	
					(Ton/year)	Seaport	Airport	Seaport	Airport	Road	(Ton/year)	Seaport	Airport	Seaport	Airport
Operational Factory															
1	SBFZ		Assembly of personal Computer/Motherboard & Add-On Car Manufacturing	A	1,800.0	40%	60%	0%	0%		2,400.0	0%	0%	2%	98%
2	SBFZ		Assembly of Cables, Sockets & Wafers	A	28.2	30%	70%	0%	0%		-	-	-	-	-
3	SBFZ		Electronic Device Mfg. for Cable TV & Telecommunication Industry	A	169.0	100%	0%	0%	0%		146.0	0%	0%	80%	20%
4	SBFZ		mechanical Assembly of Component, Inspection & Packing for IC Chips	A	15.0	0%	100%	0%	0%		12.0	0%	100%	0%	0%
5	SBFZ		Manufacturer of Switch & Potentionmeter	A	3.6	0%	83%	17%	0%		3.7	0%	100%	0%	0%
6	Baguio EPZ		Manufacturer of Semi-Conductor	A	2,894.0	32%	19%	21%	28%		3,079.0	0%	0%	53%	47%
1	SBFZ		Textile Manufacturing	B	1,817.0	100%	0%	0%	0%		1,600.0	38%	0%	62%	0%
2	SBFZ		Manufacturing of Hospital Textile & Garments	B	-	0%	0%	12%	3%	85%	-	0%	0%	90%	10%
3	Baguio EPZ		Garments Manufacturer/Exporter	B	500.0	0%	0%	98%	2%		100.0	0%	0%	100%	0%
4	SBFZ		Garments Manufacturing	B	349.7	0%	0%	95%	5%		361.8	0%	0%	80%	20%
5	SBFZ		Production/Wholesale of car Seats, Car Seat Covers and Other Car Accessories	B	183.2	70%	30%	0%	0%		336.8	0%	55%	45%	0%
6	SBFZ		Garments Manufacturing	B	100.0	95%	0%	0%	5%		160.0	29%	0%	68%	2%
1	Baguio EPZ		Manufacturer of Injected Plastics	C	48.5	0%	0%	25%	75%		95.0	0%	0%	100%	0%
2	SBFZ		Luggage Carts, Car Wash Brushes & Other Plastic Product Mfg.	C	408.0	100%	0%	0%	0%		568.0	0%	0%	100%	0%
3	San Miguel, Tarlac		Manufacturer of Wire & Wiring Harness for Automobiles	C	16,152.0	0%	0%	100%	0%		11,320.0	0%	0%	100%	0%
4	Baguio EPZ		Plastic Shipping Tubes	C	1,200.0	0%	0%	100%	0%		-	-	-	-	-
5	SBFZ		Fishing Tackle Manufacturing/Assembly	C	536.0	50%	50%	0%	0%		78.6	0%	0%	100%	0%
6	SBFZ		High Precision Plastic Moulding, Second Processing & Assembly of Plastic Parts for Cameras & other Electronic Parts	C	36.0	97%	0%	0%	3%		23.0	0%	7%	93%	0%
7	SBFZ		Manufacturing & Distribution of Plastic Parts for Medical Applications	C	42.3	99%	0%	0%	1%		16.6	0%	30%	70%	0%
8	SBFZ		Wood and Metal Display Furniture Manufacturing	C	514.8	100%	0%	0%	0%		274.9	100%	0%	0%	0%
9	SBFZ		Audio & Communication Products Manufacturing	C	5,120.0	50%	17%	30%	3%		7,560.0	40%	0%	55%	5%
Non-operational factory (Pre-operation and under construction)															
1	SBFZ		Manufacture/Assembly of Card Readers	C	11.9	95%	5%	0%	0%		-	-	-	-	-
2	SBFZ		Manufacturer of Airconditioner & Stamping Parts	C	2,048.0	90%	10%	0%	0%		-	-	-	-	-

Note: Data obtained from questionnaire and hearing through telephone

Table 7.3.4-31 Projected Cargo Volume Per Port Usage

Name	Type of Business	Cargo Volume (Ton)	Type of Port	Present Condition		Prospected Fina Rate	
				Rate 1997 year	Cargo Volume (Ton)	Rate	Cargo Volume (Ton)
Incoming Cargo (Import)							
Industrial Park Phase 1	Type A	14,107	Sea	35%	4,938	70%	9,875
			Air	65%	9,170	30%	4,232
	Type B	12,565	Sea	75%	9,423	85%	10,680
			Air	25%	3,141	15%	1,885
	Type C	134,369	Sea	55%	73,903	80%	107,495
			Air	45%	60,466	20%	26,874
Total		161,041	Sea	55%	88,264	80%	128,050
			Air	45%	72,777	20%	32,991
Outgoing Cargo (Export)							
Industrial Park Phase 1	Type A	13,284	Sea	2%	266	5%	664
			Air	98%	13,018	95%	12,620
	Type B	11,864	Sea	78%	9,254	95%	11,270
			Air	22%	2,610	5%	593
	Type C	96,951	Sea	76%	73,683	90%	87,256
			Air	24%	23,268	10%	9,695
Total		122,098	Sea	68%	83,202	81%	99,191
			Air	32%	38,896	19%	22,908

transportation mode ratio.

The result of import/export cargo demand is as shown in Table 7.3.4-32 & -33.

b) Cargo Demand at other EPZ and Special Economic Zones

The future cargo demand up to the year 2020 at the other Industrial Estate will be estimated using the same data described in the preceding chapter.

Another important factor is the mode of transportation for raw materials and products entering and leaving the EPZ. Light and valuable products such as semi-conductor are usually conveyed by plane while bulkier and less valuable cargo such as textiles are usually transported by ship.

At present, the export cargo of factories located in EPZ's is almost all handled using the existing facilities in Manila. Only import cargo of some factories located in Baguio, Luisita and Bataan is handled at facilities in SBFZ.

However, once the port facilities of SBF are developed, the number of shipping lines and ship calls are likely to increase.

In addition, there is a plan to improve the access road from the other EPZ to SBF as described in Chapter 5.3. Transportation route and distance are important factors when considering cargo traffic.

Therefore, in future the cargo volume at SBF is anticipated to gradually increase as the transit distance from EPZ to Manila and that from EPZ to SBF is almost the same.

Based on the above, the future cargo demand will be forecast. The result of import/export cargo demand is as shown in Table 7.3.4-32 & -33.

c) Result of Demand Forecast Generated at Industrial Estate

The result of cargo demand generated at industrial estate is shown in Table 7.3.4-34.

Table 7.3.4-34 Cargo Generated from SBFZ and Other Industrial Estate

Unit: 1000 tons

	2000	2005	2010	2015	2020
3) - a) from SBFZ	208	556	797	915	915
3) - b) from outside of SBFZ	417	1,733	2,776	3,918	4,346
Total	625	2,289	3,573	4,833	5,261

Table 7.3.4-35 shows the import/export cargo volume through SBF by each industrial zone.

Table 7.3.4-35 Import / Export Cargo

Unit: 1000 tons

	2000	2005	2010	2015	2020
3) - a) from SBFZ	208	556	797	915	915
Import (Raw materials)	107	316	453	521	521
Export (Product)	101	240	344	394	394
3) - b) from outside of SBFZ	417	1,733	2,775	3,918	4,346
Import (Raw materials)	210	950	1,519	2,142	2,375
Export (Product)	207	783	1,256	1,776	1,971
Total	625	2,289	3,572	4,833	5,261

Table 7.3.4-32 Projected Incoming Cargo Volume Per Port Usage of Locator at SBFZ and nearby Provinces

	Name	Type of Business	Cargo Volume (Ton)	Type of Port	Estimated Rate 1997 year	Prospected Rate		2000			2005			2010			2015			2020		
						Rate	C. Volu. (Ton)	Total C. Volu.	Rate	C. Volu.	Total C. Volu.	Rate	C. Volu.	Total C. Volu.	Rate	C. Volu.	Total C. Volu.	Rate	C. Volu.	Total C. Volu.	Rate	C. Volu.
	Incoming Cargo (Import)																					
	Industrial	Type A,B,C	161,232	Sea	55%	80%	128,985	128,985	55%	70,942	161,232	80%	128,985	161,232	80%	128,985	161,232	80%	128,985	161,232	80%	128,985
	Park Phase 1			Air	45%	20%	32,246		45%	58,043		20%	32,246		20%	32,246		20%	32,246		20%	32,246
	Industrial	Type A,B,C	69,279	Sea	-	80%	55,423	34,640	55%	19,052	69,279	80%	55,423	69,279	80%	55,423	69,279	80%	55,423	69,279	80%	55,423
	Park Phase 2			Air	-	20%	13,856		45%	15,588		20%	13,856		20%	13,856		20%	13,856		20%	13,856
*	Industrial	Type A,B,C	184,093	Sea	-	80%	147,274	0	0%	0	55,228	80%	44,182	147,274	80%	117,820	184,093	80%	147,274	184,093	80%	147,274
	Park Phase 3			Air	-	20%	36,819		0%	0		20%	11,046		20%	29,455		20%	36,819		20%	36,819
	Techno	Type A,B,C	78,333	Sea	-	80%	62,667	31,333	55%	17,233	78,333	80%	62,667	78,333	80%	62,667	78,333	80%	62,667	78,333	80%	62,667
	Park Phase 1			Air	-	20%	15,667		45%	14,100		20%	15,667		20%	15,667		20%	15,667		20%	15,667
*	Techno	Type A,B,C	157,794	Sea	-	80%	126,235	0	0%	0	31,559	80%	25,247	110,456	80%	88,365	157,794	80%	126,235	157,794	80%	126,235
	Park Phase 2			Air	-	20%	31,559		0%	0		20%	6,312		20%	22,091		20%	31,559		20%	31,559
	Sub-Total			Sea			520,585			107,227			316,505			453,260			520,585			520,585
				Air			130,146			87,731			79,126			113,315			130,146			130,146
	Bataan EPZ	Type B	242,775	Sea	-	85%	206,359	24,278	75%	18,208	84,971	85%	72,226	145,665	85%	123,815	218,498	85%	185,723	242,775	85%	206,359
				Air	-	15%	36,416		25%	6,069		15%	12,746		15%	21,850		15%	32,775		15%	36,416
	Clark Special	Type C	1,017,380	Sea	-	80%	813,904	203,476	55%	111,912	508,690	80%	406,952	763,035	80%	610,428	1,017,380	80%	813,904	1,017,380	80%	813,904
	Economic Zone			Air	-	20%	203,476		45%	91,564		20%	101,738		20%	152,607		20%	203,476		20%	203,476
	Angelos	Type C	117,390	Sea	-	80%	93,912	70,434	55%	38,739	117,390	80%	93,912	117,390	80%	93,912	117,390	80%	93,912	117,390	80%	93,912
	Industrial Park			Air	-	20%	23,478		45%	31,695		20%	23,478		20%	23,478		20%	23,478		20%	23,478
	Lusita	Type C	469,560	Sea	-	80%	375,648	70,434	55%	38,739	187,824	80%	150,259	305,214	80%	244,171	422,604	80%	338,083	469,560	80%	375,648
	Industrial Park			Air	-	20%	93,912		45%	31,695		20%	37,565		20%	61,043		20%	84,521		20%	93,912
	Baguio City	Type A	12,597	Sea	-	70%	8,818	7,558	35%	2,645	10,707	70%	7,495	12,597	70%	8,818	12,597	70%	8,818	12,597	70%	8,818
	Economic Zone			Air	-	30%	3,779		65%	4,913		30%	3,212		30%	3,779		30%	3,779		30%	3,779
	Hermosa	Type C	1,095,640	Sea	-	80%	876,512	0	55%	0	273,910	80%	219,128	547,820	80%	438,256	876,512	80%	701,210	1,095,640	80%	876,512
	Industrial Estate			Air	-	20%	219,128		45%	0		20%	54,782		20%	109,564		20%	175,302		20%	219,128
	Sub-Total			Sea			2,375,153			210,243			949,972			1,519,400			2,141,650			2,375,153
				Air			580,189			165,937			233,521			372,321			523,331			580,189
	Total			Sea			2,895,738			317,470			1,266,477			1,972,660			2,662,235			2,895,738
				Air			710,336			253,668			312,647			485,636			653,477			710,336

Note:

** : SBMA intends to develop the **Bataan Techno Park** instead of the Subic Industrial Park Phase 3 and Subic Techno Park Phase 2 in Subic Bay Freeport Zone.*
*The development area for the industrial estate area at the **Bataan Techno Park** approximately equals the total industrial estate area of the Subic Industrial Park 3 and Subic Techno Park 2.*

Table 7.3.4-33 Projected Outgoing Cargo Volume Per Port Usage of Locator at SBFZ and nearby Provinces

	Name	Type of Business	Cargo Volume (Ton)	Type of Port	Estimated Rate 1997 year	Prospected Rate		2000			2005			2010			2015			2020		
						Rate	C. Volu. (Ton)	Total C. Volu.	Rate	C. Volu.	Total C. Volu.	Rate	C. Volu.	Total C. Volu.	Rate	C. Volu.	Total C. Volu.	Rate	C. Volu.	Total C. Volu.	Rate	C. Volu.
	Outgoing Cargo (Export)																					
	Industrial	Type A,B,C	122,179	Sea	68%	80%	97,743	97,743	68%	66,465	122,179	80%	97,743	122,179	80%	97,743	122,179	80%	97,743	122,179	80%	97,743
	Park Phase 1			Air	32%	20%	24,436		32%	31,278		20%	24,436		20%	24,436		20%	24,436		20%	24,436
	Industrial	Type A,B,C	52,499	Sea	-	80%	41,999	26,249	68%	17,850	52,499	80%	41,999	52,499	80%	41,999	52,499	80%	41,999	52,499	80%	41,999
	Park Phase 2			Air	-	20%	10,500		32%	8,400		20%	10,500		20%	10,500		20%	10,500		20%	10,500
*	Industrial	Type A,B,C	139,503	Sea	-	80%	111,602	0	0%	0	41,851	80%	33,481	111,602	80%	89,282	139,503	80%	111,602	139,503	80%	111,602
	Park Phase 3			Air	-	20%	27,901		0%	0		20%	8,370		20%	22,320		20%	27,901		20%	27,901
	Techno	Type A,B,C	59,360	Sea	-	80%	47,488	23,744	68%	16,146	59,360	80%	47,488	59,360	80%	47,488	59,360	80%	47,488	59,360	80%	47,488
	Park Phase 1			Air	-	20%	11,872		32%	7,598		20%	11,872		20%	11,872		20%	11,872		20%	11,872
*	Techno	Type A,B,C	119,574	Sea	-	80%	95,659	0	-	0	23,915	80%	19,132	83,702	80%	66,961	119,574	80%	95,659	119,574	80%	95,659
	Park Phase 2			Air	-	20%	23,915		-	0		20%	4,783		20%	16,740		20%	23,915		20%	23,915
	Sub-Total			Sea			394,492			100,461			239,843			343,473			394,492			394,492
				Air			98,623			47,276			59,961			85,868			98,623			98,623
	Bataan EPZ	Type B	229,827	Sea	78%	95%	218,336	22,983	78%	17,927	80,439	95%	76,417	137,896	95%	131,001	206,844	95%	196,502	229,827	95%	218,336
				Air	22%	5%	11,491		22%	5,056		5%	4,022		5%	6,895		5%	10,342		5%	11,491
	Clark Special	Type C	733,460	Sea	76%	90%	660,114	146,692	76%	111,486	366,730	90%	330,057	550,095	90%	495,086	733,460	90%	660,114	733,460	90%	660,114
	Economic Zone			Air	24%	10%	73,346		24%	35,206		10%	36,673		10%	55,010		10%	73,346		10%	73,346
	Angeles	Type C	84,630	Sea	-	90%	76,167	50,778	76%	38,591	84,630	90%	76,167	84,630	90%	76,167	84,630	90%	76,167	84,630	90%	76,167
	Industrial Park			Air	-	10%	8,463		24%	12,187		10%	8,463		10%	8,463		10%	8,463		10%	8,463
	Luisita	Type C	338,520	Sea	-	90%	304,668	50,778	76%	38,591	135,408	90%	121,867	220,038	90%	198,034	304,668	90%	274,201	338,520	90%	304,668
	Industrial Park			Air	-	10%	33,852		24%	12,187		10%	13,541		10%	22,004		10%	30,467		10%	33,852
	Baguio City	Type A	11,856	Sea	2%	5%	593	7,114	2%	142	10,078	5%	504	11,856	5%	593	11,856	5%	593	11,856	5%	593
	Economic Zone			Air	98%	95%	11,263		98%	6,971		95%	9,574		95%	11,263		95%	11,263		95%	11,263
	Hermosa	Type C	789,880	Sea	-	90%	710,892	0	-	0	197,470	90%	177,723	394,940	90%	355,446	631,904	90%	568,714	789,880	90%	710,892
	Industrial Estate			Air	-	10%	78,988		-	0		10%	19,747		10%	39,494		10%	63,190		10%	78,988
	Sub-Total			Sea			1,970,769			206,737			782,736			1,256,327			1,776,291			1,970,769
				Air			217,404			71,607			92,019			143,128			197,072			217,404
	Total			Sea			2,365,261			307,198			1,022,578			1,599,800			2,170,782			2,365,261
				Air			316,026			118,883			151,980			228,997			295,695			316,026

Note:

* : *SBMA intends to develop the* ***Batuan Techno Park*** *instead of the Subic Industrial Park Phase 3 and Subic Techno Park Phase 2 in Subic Bay Freeport Zone.*
The development area for the industrial estate area at the ***Batuan Techno Park*** *approximately equals the total industrial estate area of the Subic Industrial Park 3 and Subic Techno Park 2.*

Table 7.3.4-36 shows the total import/export cargo volume through SBF.

Table 7.3.4-36 Import and export cargo

Unit: 1000 tons

	2000	2005	2010	2015	2020
Import	318	1,266	1,973	2,662	2,896
Export	307	1,023	1,600	2,171	2,365
Total	625	2,289	3,573	4,833	5,261

The commodity of import/export cargo generated at industries can all be identified as containerized cargo.

Hereinafter, the cargo volume given in metric tons will be converted to TEU which is the commonly used unit for containerized cargo.

The weight of one TEU will be determined with import and export container cargo to/from factory in 1997 obtained from Seaport Department, SBMA. The unit weight of container for import (raw materials) and export (product) cargo is 7.9 ton/TEU and 6.1 ton/TEU, respectively.

Based on the above, container cargo volume generated at factories is converted into TEU in the following Table 7.3.4-37.

Table 7.3.4-37 Container volume generated at industrial estate

Unit: TEU

	2000	2005	2010	2015	2020
Import	40,200	160,300	249,700	337,000	366,600
Export	50,400	167,600	262,300	355,900	387,700
Total	90,600	327,900	512,000	692,900	754,300

Forecast container volume generated at industrial estates is also shown in Figure 7.3.4-4.

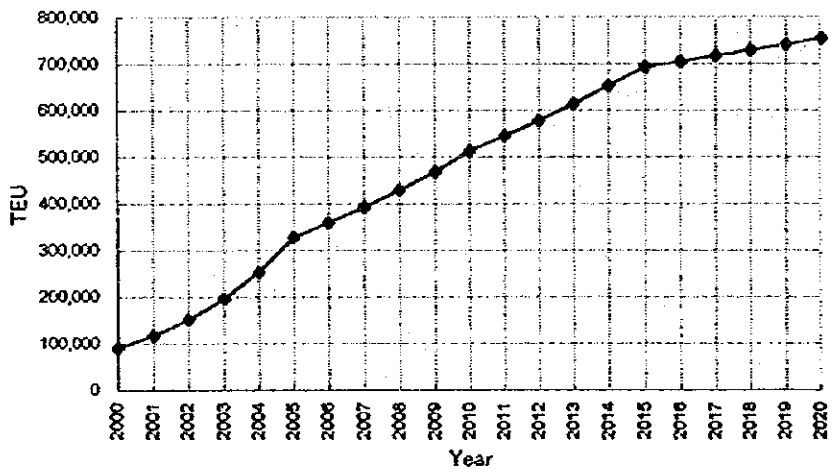


Figure 7.3.4-4 Container Volume at Industrial Estate

Two transition points in the above Figure can be seen in the year 2005 and 2015. In estimating the development schedule of above mentioned industrial estates, the following was assumed.

i) Some industrial areas will be fully occupied in 2005.

ii) Only above mentioned industrial projects are considered and almost all of these projects will be completed in 2015.

Hereinafter, aforesaid forecast volume will be amended to eliminate sudden shifts in the demand curve.

In considering development schedule of above mentioned industrial estates, GDP in the Philippines will be the principal factor. The development schedule as shown in Table 7.3.4-28 should be regarded as deriving from the high growth rate case of GDP. Therefore, the cargo volume of industrial estates will be forecasted by correlation with GDP(high case). The correlation between the cargo volume of industrial estates and GDP from 1997 to 2020 is expressed in the following equation.

$$Y = 509.48 \times Ln(X) - 6952.5 \qquad (R^2 = 0.9743)$$

Where, Y: Cargo volume of industrial estate (1000 TEU)

Ln: Natural logarithm

X: Forecasted GDP in the Philippines (Billion peso)

R^2: Correlation coefficient

Table 7.3.4-38 and Figure 7.3.4-5 shows projection for the cargo volume of industrial estates based on three economic growth cases (high, middle and low) in the Philippines.

Table 7.3.4-38 Cargo volume forecast of industrial estate

Unit: TEU

	2000	2005	2010	2015	2020
High Case	123,100	300,200	477,300	654,400	831,500
Middle Case	107,700	246,500	385,300	524,100	663,000
Low Case	92,200	192,100	292,000	391,900	491,800

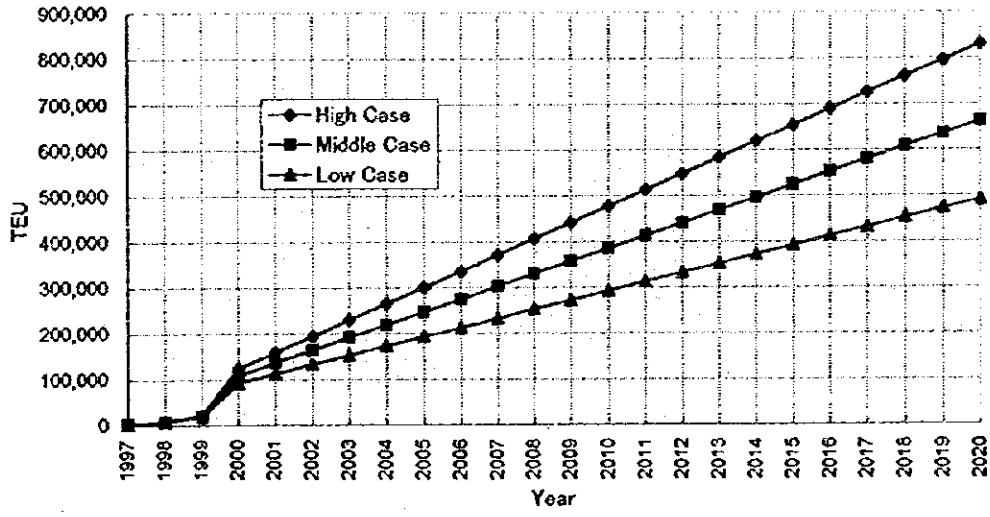


Figure 7.3.4-5 Container Cargo Demand Forecast from SEZ

5) Demand forecast of other containerized cargo at SBF

Total cargo volume of other containerized cargo through SBF which is non related industrial cargo was 6,602 TEU in 1997. These cargoes consist of the items listed below.

a) Import of containerized general cargo : 6,425 TEU
b) Import of containerized heavy equipment : 161 TEU
Export of containerized heavy equipment : 16 TEU

Based on aforementioned GDP growth rate, total cargo volume of the above containerized cargo through the SBF is estimated in the following Table 7.3.4-39.

Table 7.3.4-39 Total Volume of Other Containerized Cargo

Unit: TEU

	2000	2005	2010	2015	2020
Other Containerized Cargo	7,700	11,800	15,400	20,100	26,300

The correlation between total volume of the other containerized cargo and GDP from 1997 to 2020 is expressed in the following equation.

$Y = 9.0063 \times X - 1354.3 \quad (R^2 = 0.9946)$

Where, Y: Total volume of the containerized cargo (tons)
X: Forecasted GDP in the Philippines (1000 Billion peso)
R^2: Correlation coefficient

Table 7.3.4-40 shows projection for total volume of other containerized cargo based on three economic growth cases (high, middle and low) in the Philippines.

Table 7.3.4-40 Forecast of Other Containerized Cargo

Unit: TEU

	2000	2005	2010	2015	2020
High Case	8,300	12,400	18,100	26,100	37,500
Middle Case	7,700	11,800	15,400	20,100	26,300
Low Case	7,700	9,700	12,100	15,100	18,600

In addition, the following containerized cargo will be determined.

c) Re-export of containerized cargo

Re-export (transshipment) cargo through the SBF in 1997 is 2,430 TEU. As mentioned in chapter 7.3.1, this cargo volume depends on the terminal operator's strategy and efforts. However, re-export cargo volume will be assumed to grow together with the economic condition in the Philippines. Therefore, the import/export volume of re-export cargoes will be forecasted by the growth rate of GDP.

Table 7.3.4-41 shows projection for total volume of re-export containerized cargo based on three economic growth cases (high, middle and low) in the Philippines. Growth rate of 5% will be applied from 1997 to 1999 for all cases and 7.2%, 5.6% and 4% will be applied from 1999 to 2020, respectively.

Table 7.3.4-41 Forecast of Re-export Containerized Cargo

Unit: TEU

	2000	2005	2010	2015	2020
High Case	5,860	8,300	11,760	16,640	23,560
Middle Case	5,660	7,440	9,760	12,820	16,820
Low Case	5,520	6,720	8,180	9,940	12,100

d) Domestic outbound containerized cargo

At present, all containerized general cargo for domestic destination is transported by truck. Therefore, these cargoes are not handled using the port facilities. However, the estimation of domestic outbound container volume is necessary for the forecast of the empty container. Table 7.3.4-42 shows projection for domestic outbound containerized cargo based on three economic growth cases (high, middle and low) in the Philippines.

Table 7.3.4-42 Domestic Outbound Containerized Cargo

Unit : TEU

	2000	2005	2010	2015	2020
High Case	2,200	3,100	4,400	6,200	8,800
Middle Case	2,100	2,800	3,600	4,800	6,300
Low Case	2,000	2,500	3,000	3,700	4,500

e) Result of demand forecast of other containerized general cargo through SBF

The result of other containerized general cargo demand is shown in the following Table 7.3.4-43.

Table 7.3.4-43 Forecast of the Other Containerized Cargo through SBF

High Case

Unit: TEU

	2000	2005	2010	2015	2020
a) Import of G. Cargo	8,100	11,800	17,300	25,200	36,400
b) Import of Heavy Equip.	240	410	540	690	860
Export of Heavy Equip.	20	140	180	230	290
c) Re-export (Import)	2,930	4,150	5,880	8,320	11,780
(Export)	2,930	4,150	5,880	8,320	11,780
d) Domestic Outbound	2,200	3,100	4,400	6,200	8,800
Empty Container (IN)	2,250	0	0	0	0
Empty Container (OUT)	0	8,470	10,350	14,020	22,350
Total	18,670	32,220	44,530	62,980	92,260

Middle Case

Unit: TEU

	2000	2005	2010	2015	2020
a) Import of G. Cargo	7,500	11,300	14,800	19,400	25,510
b) Import of Heavy Equip.	220	390	460	530	610
Export of Heavy Equip.	20	130	150	180	200
c) Re-export (Import)	2,830	3,720	4,880	6,410	8,410
(Export)	2,830	3,720	4,880	6,410	8,410
d) Domestic Outbound	2,100	2,800	3,600	4,800	6,300
Empty Container (IN)	1,250	0	0	0	0
Empty Container (OUT)	0	8,780	9,280	10,270	13,540
Total	16,750	30,840	38,050	48,000	62,980

Low Case

Unit: TEU

	2000	2005	2010	2015	2020
a) Import of G. Cargo	7,500	9,300	11,700	14,500	18,010
b) Import of Heavy Equip.	220	320	360	400	430
Export of Heavy Equip.	20	110	120	130	140
c) Re-export (Import)	2,760	3,360	4,090	4,970	6,050
(Export)	2,760	3,360	4,090	4,970	6,050
d) Domestic Outbound	2,000	2,500	3,000	3,700	4,500
Empty Container (IN)	0	0	0	0	0
Empty Container (OUT)	460	7,730	7,770	7,810	9,000
Total	15,720	26,680	31,130	36,480	44,180

6) Result of Demand Forecast for Containerized Cargo

Table 7.3.4-44 and Figure 7.3.4-6 shows projection for the demand forecast of containerized cargo handled at SBF based on three economic growth cases (high, middle and low) in the Philippines.

Table 7.3.4-44 Demand forecast for containerized cargo

High Case

Unit: TEU

	2000	2005	2010	2015	2020
Container Cargo at Industrial Estate	123,100	300,200	477,300	654,400	831,500
Other Container Cargo at SBFZ	18,670	32,220	44,530	62,980	92,260
TOTAL	141,770	332,420	521,830	717,380	923,760
Middle Case					
Container Cargo at Industrial Estate	107,700	246,500	385,300	524,100	663,000
Other Container Cargo at SBFZ	16,750	30,840	38,050	48,000	62,980
TOTAL	124,450	277,340	423,350	572,100	725,980
Low Case					
Container Cargo at Industrial Estate	92,200	192,100	292,000	391,900	491,800
Other Container Cargo at SBFZ	15,720	26,680	31,130	36,480	44,180
TOTAL	107,920	218,780	323,130	428,380	535,980

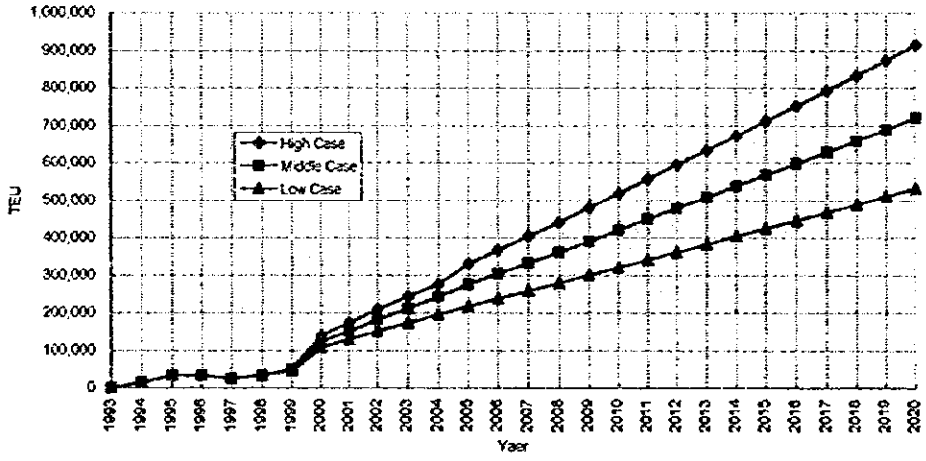


Figure 7.3.4-6 Container Cargo Demand Forecast through SBF

(2) Passenger Traffic Forecast

The passenger traffic at SBF was not recorded in 1997. Therefore, it is difficult to forecast future passenger traffic.

Together with development of SBF, the use of pleasure boats in Subic Bay will increase. Considering the potentiality of passenger traffic in future, SBF has a plan to transform the present facilities into a modernized port based on Kenzo Tange's Master Plan. Once realized, these facilities will be able to receive passenger vessels both foreign and domestic (mainly from Manila). At present, foreign passenger vessels enter the south port only about twelve times per year. Therefore, if there are no tourist attractions, these foreign passenger vessels will not enter SBF. Tourism development must thus be further promoted.

7.3.5 Ship Size Forecast

(1) Forecast of ship size in target year

On the basis of the statistics of calling ships in 1997, the average, 70% and maximum ship size at SBF are shown in Table 7.3.5-1. Assumption that the current trend of vessel size enlargement will continue in the future, the projection of the future ship sizes and loading ratio, the design ship sizes to be used for the Long Term Plan and Short Term Plan are given in the following Table 7.3.5-2.

Table 7.3.5-2 Future Average Vessel-Size and Loading Ratio

Unit: DWT

Commodity	Loading Ratio	2005	2020
Foreign Trade			
Break Bulk			
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, Ro/Ro	20%	7,000	7,000
Construction Materials	70%	7,000	7,000
Container	70%	1,200 TEU	1,500 TEU
Petroleum Product	60%	45,000	45,000
General Cargo	70%	7,000	7,000
Domestic Trade			
Fertilizer	70%	3,000	3,000
Heavy Equipment (LCT)	70%	2,500	2,500
Petroleum Product	90%	1,000	1,000

(2) Forecast for number of ship calls

With the average ship sizes and loading ratio assumed as shown in Table 7.3.5-2, the number of calling ships are estimated. Between 2005 and 2020, the number of container vessels is expected to greatly increase as well as the number of vessels calling for the re-export of cigarettes.

Ship calls of non-trade ships for ship repair and visits of military ships are assumed to remain at the same level up to the target year.

The results are summarized in Table 7.3.5-3.

Table 7.3.5-1 Ship Size at Subic Bay Freeport in 1997

Ship Flag	Type of Ship	Description/Commodity	Ship Call No.	Average Ship Size					70% Ship Size					Maximum Ship Size				
				GRT	DWT	LOA(m)	Draft(m)	Beam(m)	GRT	DWT	LOA(m)	Draft(m)	Beam(m)	GRT	DWT	LOA(m)	Draft(m)	Beam(m)
Domestic																		
	MV	Non-container Cargo	19	2,262	-	-	-	-	1,861	-	-	-	-	9,592	-	-	-	-
	BA	Non-container Cargo	25	666	-	-	-	-	695	-	-	-	-	1,464	-	-	-	-
	LCT	Heavy Equipment	41	726	-	-	-	-	857	-	-	-	-	1,915	-	-	-	-
	BA	Container Cargo	1	594	-	-	-	-	594	-	-	-	-	594	-	-	-	-
	MT,BA	Petroleum	512	457	498	-	-	-	477	533	-	-	-	3,369	5,601	103	6.3	168
	MT	Fuel Supply to Power Station	37	1,725	-	-	-	-	1,553	-	-	-	-	2,154	-	-	-	-
	MV, LCT, MT, BA	SSEI (Ship Repair)	28	2,097	-	-	-	-	4,376	-	-	-	-	5,387	-	-	-	-
	BRP, TB, MT	Others (Anchorage etc.)	127	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		Total	790															
Foreign																		
	MV, BA	Non-container Cargo																
		Heavy Equipment/General Cargo	85	5,280	6,966	111	6.5	17.8	6,303	8,543	119	6.8	18.9	22,009	32,758	170	9.0	266
		Cement/Fertilizer/Rice	22	7,019	10,504	136	8.1	19.5	9,123	13,907	143	8.7	21.1	16,794	26,316	173	9.9	24.7
		Soya Bean	6	17,287	29,119	169	9.7	26.1	22,009	37,487	178	10.6	28.1	26,064	44,673	185	11.1	295
		Cattle	10	1,684	-	-	-	-	1,487	-	-	-	-	3,555	-	-	-	-
		Copper (P. Dizon)	4	3,298	-	-	-	-	-	-	-	-	-	7,249	-	-	-	-
	RO-RO	Heavy Equipment	42	11,295	6,468	112	6.5	19.6	9,992	5,526	102	6.2	18.5	56,893	39,453	224	10.4	31.6
	MV	Container Cargo	189	8,840	12,000	139	8.1	19.2	8,944	12,137	139	8.1	19.3	13,488	18,126	156	9.0	20.8
	MT	Petroleum	68	22,188	38,579	188	11.5	30.3	26,356	45,887	195	12.0	31.5	60,782	106,220	232	14.3	37.4
	FB, MV	Cigarette	322	210	-	-	-	-	200	-	-	-	-	2,066	-	-	-	-
	MV, MT	SSEI (Ship Repair)	46	2,161	-	-	-	-	-	-	-	-	-	99,417	-	-	-	-
	RFA, HMS, CS, M	Others	67	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		Total	861															

Source: Seaport Department, SBMA

Abbreviations

BA	Barge	MT	Marine Tanker
BRP	Military Ship(Philippine)	MV	Marine Vessel
CS	Cable Ship	MY	Motor Yacht
FB	Fishing Boat	PN	Philippine Navy
HMS	Her Majesty Ship(Austraria)	RFA	Royal Fleet Auxiliary(British)
LCT	Landing Craft Transport	TB	Tug Boat
RO-RO	Car Carrier		

Table 7.3.5-3 Number of calling ships

	1997			2005				2020			
	Cargo Volume Tons	Ave. Load/vessel Tons	Ship Calls No.	Estimated Cargo volume Tons	Ave. Vessel Size DWT	Loading Ratio %	Ship Calls No.	Estimated Cargo volume Tons	Ave. Vessel Size DWT	Loading Ratio %	Ship Calls No.
High Case											
Import											
Break Bulk Rice				89,000	20,000	70%	6	105,000	20,000	70%	8
Cement				102,000	10,000	70%	15	228,000	10,000	70%	33
Bulk Fertilizer				38,000	10,000	70%	5	54,000	10,000	70%	8
Soya Bean				174,000	38,000	70%	7	240,000	45,000	70%	8
Heavy Equipment (Lo/Lo, Ro/Ro)				53,000	7,000	20%	38	90,000	7,000	20%	64
Construction Materials				73,000	7,000	70%	15	104,000	7,000	70%	21
Other General Cargo				41,000	7,000	70%	8	64,000	7,000	70%	13
Export											
Heavy Equipment (Lo/Lo, Ro/Ro)				2,000	7,000	20%	1	6,000	7,000	20%	4
Re-export											
Heavy Equipment (Lo/Lo, Ro/Ro)				9,000	7,000	20%	5	25,000	7,000	20%	18
Cigarettes				11,000	300	10%	367	32,000	300	10%	1,067
Other General Cargo				5,000	7,000	70%	1	14,000	7,000	70%	3
Container Unit: TEU				332,420	1,200	70%	396	923,760	1,500	70%	880
Pitroleum				1,810,000	45,000	60%	67	2,890,000	45,000	60%	107
Non-trade (ship repair & Other)							120				120
Total Foreign Ships							1,062				2,352
Inbound Fertilizer				21,000	3,000	70%	10	59,000	3,000	70%	28
Outbound Heavy Equip /Soya				55,000	2,500	70%	31	157,000	2,500	70%	90
Other General Cargo											
Pitroleum				590,000	1,000	90%	656	910,000	1,000	90%	1,011
Non-trade (ship repair & Other)							160				160
Total Domestic Ships							857				1,289
TOTAL							1,909				3,641
Middle Case											
Import											
Break Bulk Rice	96,000	16,000	6	84,000	20,000	70%	6	93,000	20,000	70%	7
Cement	68,000	4,533	15	96,000	10,000	70%	14	202,000	10,000	70%	29
Bulk Fertilizer	8,000	8,000	1	36,000	10,000	70%	5	48,000	10,000	70%	7
Soya Bean	111,000	18,500	6	164,000	38,000	70%	6	213,000	45,000	70%	7
Heavy Equipment (Lo/Lo, Ro/Ro)	27,000	643	42	50,000	7,000	20%	36	80,000	7,000	20%	57
Construction Materials	51,000			69,000	7,000	70%	14	92,000	7,000	70%	19
Other General Cargo	28,000		99	39,000	7,000	70%	8	57,000	7,000	70%	12
Export											
Heavy Equipment (Lo/Lo, Ro/Ro)	1,200			2,000	7,000	20%	1	4,000	7,000	20%	3
Re-export											
Heavy Equipment (Lo/Lo, Ro/Ro)	5,400			8,000	7,000	20%	6	18,000	7,000	20%	13
Cigarettes	6,500	20	322	10,000	300	10%	333	23,000	300	10%	767
Other General Cargo	3,100			5,000	7,000	70%	1	10,000	7,000	70%	2
Container Unit: TEU	23,400	124	189	277,340	1,200	70%	330	725,960	1,500	70%	691
Pitroleum	1,530,000	22,500	68	1,810,000	45,000	60%	67	2,890,000	45,000	60%	107
Non-trade (ship repair & Other)			113				120				120
Total Foreign Ships			861				947				1,840
Inbound Fertilizer	9,400	2,350	4	19,000	3,000	70%	9	42,000	3,000	70%	20
Outbound Heavy Equip /Soya	32,900	802	41	50,000	2,500	70%	29	113,000	2,500	70%	65
Other General Cargo	2,900		40								
Pitroleum	470,000	856	549	590,000	1,000	90%	656	910,000	1,000	90%	1,011
Non-trade (ship repair & Other)			155				160				160
Total Domestic Ships			789				853				1,256
TOTAL			1,650				1,801				3,096
Low Case											
Import											
Break Bulk Rice				79,000	20,000	70%	6	81,000	20,000	70%	6
Cement				90,000	10,000	70%	13	176,000	10,000	70%	25
Bulk Fertilizer				34,000	10,000	70%	5	42,000	10,000	70%	6
Soya Bean				154,000	38,000	70%	6	185,000	45,000	70%	6
Heavy Equipment (Lo/Lo, Ro/Ro)				47,000	7,000	20%	34	70,000	7,000	20%	50
Construction Materials				65,000	7,000	70%	13	80,000	7,000	70%	16
Other General Cargo				37,000	7,000	70%	8	50,000	7,000	70%	10
Export											
Heavy Equipment (Lo/Lo, Ro/Ro)				2,000	7,000	20%	1	3,000	7,000	20%	2
Re-export											
Heavy Equipment (Lo/Lo, Ro/Ro)				7,000	7,000	20%	5	13,000	7,000	20%	9
Cigarettes				9,000	300	10%	300	16,000	300	10%	533
Other General Cargo				4,000	7,000	70%	1	7,000	7,000	70%	1
Container Unit: TEU				218,780	1,200	70%	260	535,980	1,500	70%	510
Pitroleum				1,810,000	45,000	60%	67	2,890,000	45,000	60%	107
Non-trade (ship repair & Other)							120				120
Total Foreign Ships							838				1,403
Inbound Fertilizer				17,000	3,000	70%	8	30,000	3,000	70%	14
Outbound Heavy Equip /Soya				45,000	2,500	70%	26	81,000	2,500	70%	46
Other General Cargo											
Pitroleum				590,000	1,000	90%	656	910,000	1,000	90%	1,011
Non-trade (ship repair & Other)							160				160
Total Domestic Ships							849				1,232
TOTAL							1,688				2,635

7.4 Port Master Plan

7.4.1 Requirements for Port Development

(1) Evaluation of existing wharves

In Subic Bay Freeport, cargo handling wharves are found in six areas. Among these areas, Central Business Area (CBA) and Naval Supply Depot (NSD) area are the main areas for port activity.

The number of berths is 18 and the total length is 2,710 m excluding the private use piers (POL Pier, Marine Terminal East Bulkhead), piers which cannot be used due to deterioration (Rivera North Pier, Leyte Pier) and existing piers in the natural preservation area (Nabasan Pier, Camayan Pier).

"Deep Berth Equivalent Length (DBEL)", calculated by the following formula, is 2,635 m.

<Deep Berth Equivalent Length>

①For a berth with a depth of more than 7.5 m, the DBEL= actual length × 1.0

②For a berth with a depth from 4 m ～ 7.5 m, the DBEL= actual length × 2/3

Generally, the cargo handling productivity of one meter of DBEL is about 800～1,000 tons for conventional cargo, and adopting this productivity, the 2,635 m of DBEL in SBF means approximately 2 million tons capacity per year for cargo handling.

However, taking into consideration Kenzo Tange's Master Plan and the container terminal development plan in NSD area, only 411 m of the Boton wharf (including Lower Mau Ramp) will remain for non-container cargo handling in the future.

(2) Requirements for long term port development (target year: 2020)

Considering the need to be consistent with "Port Development Concepts (mentioned in chapter 7.1.2)" and "Roles and Functions of Subic Bay Freeport (mentioned in chapter 7.1.3)", the requirements for long term port development are pointed out as follows:

a) It is important to identify the future function of each wharf in 2020.

b) The container terminal must be operated up to 2020. In order to accommodate the future non-container cargo demand (non-containerized and indispensable cargo for development of SSEFZ), the necessary non-container cargo facilities (berth, transit shed, open storage yard) should be maintained or developed.

c) It is essential for realization of SBMA's vision that container shipping service should be more convenient, economic and effective. Therefore, it is paramount to construct a container terminal serving to gearless ship as soon as possible.

(3) Required berth size

Using results of the ship size forecast (mentioned in chapter 7.3.5), the required berth size is decided by the following formula:

Berth length = Ship length + Ship breadth
Berth depth = Ship draft × 1.1

Results are given in Table 7.4.1-1.

(4) Required number of berths

1) Cargo demand

Cargo demand forecast in SBF is mentioned in chapter 7.3.4 and summarized in Table 7.4.1-2 (1) , (2) for container and non-container cargo respectively (domestic out bound containerized cargo is excluded because it is transported by truck).

2) Number of berths required in 2020

Three groups are formed for determining the required number of berths: container berths, foreign trade berths and domestic trade berths.

In calculating the required number of berths, it is assumed that the handling efficiency shall be upgraded and the productivity will increase as shown in Table 7.4.1-3.

a) Container cargo berths

Assumptions for calculating required container cargo berths are as follows:

①Working time per day = 24 hours
②Actual working days per year = 365 days − (days lost to inclement weather)
= 300 days
③Average container ship size : 21,000 DWT (1,200 TEU container carrier) in 2005
25,000 DWT (1,500 TEU container carrier) in 2020
④Average number of loading / unloading containers : 450 boxes in 2005
600 boxes in 2020
⑤Share of 40 feet container = 70 %
⑥Target of berth occupancy rate = 80 %
⑦Idle time at ship berthing = 0.15 day

The number of berths for container cargo required in 2005 and 2020 is shown in Table 7.4.1-4. Table (1) indicates the middle case and Table (2) indicates the high case of the demand forecast.

b) Non-container cargo berths

Assumptions for calculating required non-container cargo berths are as follows:

①Two shift system will be changed to a three shift system and the actual working time per day will be 21 hours.

②Actual working days per year = 365 days - (days lost to inclement weather)
= 300 days

③Average load factor per ship = 70 %

④Target for berth occupancy rate = 70 %

⑤Idle time at ship berthing = 0.3 day

⑥Since re-export of cigarettes will be carried by small foreign boats, the berth for these vessels is excluded.

⑦Since the handling of domestic soya (outbound) is almost exclusively carried by barges at present and the soya handling is operated along the mother ship, the berth for handling of domestic soya is also excluded from the calculation.

The number of berths for foreign and domestic trade required in 2005 and 2020 is shown in Table 7.4.1-5 and Table 7.4.1-6 respectively. Table (1) indicates the middle case and Table (2) indicates the high case of the demand forecast.

c) Result of calculation

The result of calculation is as follows:

i) Container cargo

①In 2005 the number of required berths for container cargo is one (1) in the middle case and two (2) in the high case.

②In 2020 the number of required berths is three (3) in either demand forecast case.

ii) Foreign trade

①In 2005 the number of required berths is three(3) in either demand forecast case(high and middle).

②In 2020 the number of required berths is four(4) in either demand forecast case.

③In 2020 the volume of soya bean meal and cement will increase to about 200 thousand tons which means that a private company would be interested in constructing its own bulk terminal including wharves. This is not unrealistic idea.

④Consequently, in 2020 the number of necessary berths that SBMA would be responsible to provide is two (2) (middle and high case) based on the idea that the bulky cargo terminal for soya and cement is privatized. And two (2) berths is adequate to handle indispensable cargo for SSEFZ and other EFZ in 2020.

⑤If the small foreign boats carrying cigarettes for re-export need an additional berth, a wooden pier can be constructed easily and cheaply at Boton wharf.

iii) Domestic trade

①The required number of berth is one (1) for a fertilizer carrier ship.

②The required number of LCT ramp located in Lower Mau is around one (1) in 2020. And if the transportation of heavy equipment for domestic trade will require one more ramp, Ritchie Brothers Auctioneers Limited should construct the berth itself, since most such equipment originates from that company.

Table 7.4.1-1 Dimensions of Ship Size and Objective Berths

Type of Cargo	Commodity/ Ship Type	Maximum Size			70% of Total Ship Size Distribution			Average Ship Size		
		DWT	Berth Depth (m)	Berth Length (m)	DWT	Berth Depth (m)	Berth Length (m)	DWT	Berth Depth (m)	Berth Length (m)
Foreign Trade										
General Cargo	Heavy Equipment, General Cargo/ Cargo Tramper	33,000	10.0	200	9,000	7.5	140	7,000	7.5	130
Break-bulk	Cement,Fertilizer/ Bulk Carrier	26,000	11.0	200	14,000	10.0	170	10,000	9.0	160
	Rice/ Bulk Carrier	26,000	11.0	200	20,000	10.5	190	20,000	10.5	190
Bulk	Fertilizer/ Bulk Carrier	26,000	11.0	200	14,000	10.0	170	10,000	9.0	160
	Cement/ Cement Carrier	20,000	10.5	190	8,500	9.0	150	8,500	9.0	150
	Soya/Bulk Carrier Handy Size Base	45,000	13.0	220	38,000	12.0	210	38,000	12.0	210
	Soya/Bulk Carrier Panamax	60,000	13.0	250						
General Cargo	Heavy Equipment/ RO-RO	40,000	11.5	260	7,000	7.5	135	7,000	7.5	135
Container	Container 1,000TEU Base	18,000	10.0	180	12,000	9.0	160	12,000	9.0	160
	Container 1,500TEU	25,000	12.0	250						
	Container 2,000TEU	30,000	13.0	280						
Domestic Trade										
General Cargo/ Break-bulk	General Cargo/ Fertilizer	10,000	8.5	150	5,000	7.5	125	3,000	6.5	110
General Cargo	Heavy Equipment/ LCT	4,000	5.0	100	2,500	4.0	85	2,500	4.0	85

Table 7.4.1-2 (1) SBF's Cargo Demand : Container

(unit: TEU)

	2005			2020			Remarks
	Low case	Middle case	High case	Low case	Middle case	High case	
Import	108,150	137,250	164,650	265,750	359,850	457,500	
Loaded	108,150	137,250	164,650	265,750	359,850	457,500	7.9 ton/TEU
Empty	0	0	0	0	0	0	
Export	108,150	137,250	164,650	265,750	359,850	457,500	
Loaded	100,400	128,450	156,150	256,750	346,300	435,150	6.1 ton/TEU
Empty	7,750	8,800	8,500	9,000	13,550	22,350	
Total	216,300	274,500	329,300	531,500	719,700	915,000	
Loaded	208,550	265,700	320,800	522,500	706,150	892,650	
Empty	7,750	8,800	8,500	9,000	13,550	22,350	

Table 7.4.1-2 (2) SBF's Cargo Demand : Non-container

(unit: metric tons)

	2005			2020		
	Low case	Middle case	High case	Low case	Middle case	High case
Import	506,000	538,000	570,000	684,000	785,000	885,000
Rice	79,000	84,000	89,000	81,000	93,000	105,000
Cement	90,000	96,000	102,000	176,000	202,000	228,000
Fertilizer	34,000	36,000	38,000	42,000	48,000	54,000
Soya	154,000	164,000	174,000	185,000	213,000	240,000
Heavy Equip.	47,000	50,000	53,000	70,000	80,000	90,000
Const.Material	65,000	69,000	73,000	80,000	92,000	104,000
Others	37,000	39,000	41,000	50,000	57,000	64,000
Export (Heavy Equip.)	2,000	2,000	2,000	3,000	4,000	6,000
Re-export	20,000	23,000	25,000	36,000	51,000	71,000
Heavy Euip.	7,000	8,000	9,000	13,000	18,000	25,000
Cigarette	9,000	10,000	11,000	16,000	23,000	32,000
Others	4,000	5,000	5,000	7,000	10,000	14,000
Foreign Trade Total	**528,000**	**563,000**	**597,000**	**723,000**	**840,000**	**962,000**
Domestic Inbound	17,000	19,000	21,000	30,000	42,000	59,000
Fertilizer	17,000	19,000	21,000	30,000	42,000	59,000
Domestic Outbound	45,000	50,000	55,000	81,000	113,000	157,000
Heavy Equip.	18,000	20,000	22,000	32,000	45,000	63,000
Soya	27,000	30,000	33,000	49,000	68,000	94,000
Domestic Trade Total	**62,000**	**69,000**	**76,000**	**111,000**	**155,000**	**216,000**

Table 7.4.1-3 Estimated Cargo Handling Productivity by Commodity

	Ship's Gear		Gantry Crane	
	Productivity (t/day)	Formula	Productivity (t/day)	Formula
Discharging & Loading				
Container (conventional wharf)	270boxes/day	6.3boxes/h × 2gangs×21h	472.5boxes/day	25boxes/h×1×0.9 ×21h
Container (container terminal)	300boxes/day	6.3boxes/h × 2gangs×24h	960boxes/day	25boxes/h×2×0.8 ×24h
			1,260boxes/day	25boxes/h×3×0.7 ×24h
Discharging (foreign trade)				
Break Bulk				
Rice, Cement, Fertilizer	1,360	6.5slings/h × 50bags/sling × 50kg/bag × 4gangs×21h		
Bulk				
Fertilizer, Soya	1,950	15.5bags/m × 60m × 21h × 2bagging machines × 50kg/bag		
General cargo				
Heavy Equipment				
LO-LO	168units/day= 870t/day	4units/h × 2gangs×21h		
RO-RO	168units/day= 1,640t/day	4units/h × 2gangs×21h		
Construction Material	840t/day	20t/h/gang × 2gangs×21h		
Others	840t/day	20t/h/gang × 2gangs×21h		
Loading (foreign trade)				
General Cargo				
Heavy Equipment				
LO-LO	84units/day= 860t/day	2units/h × 2gangs×21h		
RO-RO	84units/day= 1,460t/day	2units/h × 2gangs×21h		
Others	840t/day	20t/h/gang × 2gangs×21h		
Discharging (domestic trade)				
Break Bulk				
Fertilizer	680t/day	6.5slings/h × 50bags/sling × 50kg/bag × 2gangs×21h		
Loading (domestic trade)				
General Cargo				
Heavy Equipment				
LCT	42units/day= 340t/day	2units/h × 1gang×21h		

Table 7.4.1-4 (1) Required number of container berth in 2005 and 2020 (Middle case)

Middle case	Cargo Vol. (TEU)	Avg. Ship Size (TEU)	Avg. Load/ Unload (boxes)	Avg. Load/ Unload (TEU)	Ship Calls	Handling Productivity (boxes/day/ berth)	Work Time (day/ship)	Berth Time (day/ship)	Total Berth Time (day-berth)	No.of Required Berth
								0.15		
2005	274,500	1,200	450	765	358.8	960	0.47	0.62	222.0	0.93
2020	719,700	1,500	600	1,020	705.6	960	0.63	0.78	546.8	2.28

Table 7.4.1-4 (2) Required number of container berth in 2005 and 2020 (High case)

High case	Cargo Vol. (TEU)	Avg. Ship Size (TEU)	Avg. Load/ Unload (boxes)	Avg. Load/ Unload (TEU)	Ship Calls	Handling Productivity (boxes/day/ berth)	Work Time (day/ship)	Berth Time (day/ship)	Total Berth Time (day-berth)	No.of Required Berth
								0.15		
2005	329,300	1,200	450	765	430.5	960	0.47	0.62	266.3	1.11
2020	915,000	1,500	600	1,020	897.1	960	0.63	0.78	695.2	2.90

Table 7.4.1-5 (1) Required number of berth for foreign trade in 2005 and 2020 (Middle case)

2005 Middle case	Cargo Vol (ton)	Avg Ship Size(DWT)	Load Factor	Avg. Loaded	Ship Calls	Handling Prod. (t/day/ berth)	Work Time (day/ ship)	Berth Time (day/ ship)	Total B.T. (day-berth)	No. of Required Berth	Required Berth with Limited Volume of Bulk Cargo
(1) Import	538,000							0.3			
1) Break Bulk											
a) Rice	84,000	20,000	0.7	14,000	6.0	1,360	10.29	10.59	63.6	0.30	0.27
b) Cement	96,000	10,000	0.7	7,000	13.7	1,360	5.15	5.45	74.7	0.36	0.31
2) Bulk											
a) Fertilizer	36,000	10,000	0.7	7,000	5.1	1,950	3.59	3.89	20.0	0.10	0.08
b) Soya Bean	164,000	38,000	0.7	26,600	6.2	1,950	13.64	13.94	86.0	0.41	0.36
3) General Cargo											
a) Heavy Equipment	50,000										
LO/LO	20,000	7,000	0.2	1,400	14.3	870	1.61	1.91	27.3	0.13	0.13
RO/RO	30,000	7,000	0.2	1,400	21.4	1,640	0.85	1.15	24.7	0.12	0.12
b) Construction Material	69,000	7,000	0.7	4,900	14.1	840	5.83	6.13	86.4	0.41	0.41
4) Others	39,000	7,000	0.7	4,900	8.0	840	5.83	6.13	48.8	0.23	0.23
(2) Export	2,000										
a) Heavy Equipment	2,000										
LO/LO	800	7,000	0.2	1,400	0.6	860	1.63	1.93	1.1	0.01	0.01
RO/RO	1,200	7,000	0.2	1,400	0.9	1,460	0.96	1.26	1.1	0.01	0.01
(3) Re-export	23,000										
a) Heavy Equipment	8,000										
LO/LO	3,200	7,000	0.2	1,400	2.3	860	1.63	1.93	4.4	0.02	0.02
RO/RO	4,800	7,000	0.2	1,400	3.4	1,460	0.96	1.26	4.3	0.02	0.02
b) Cigarette	10,000										
c) Others	5,000	7,000	0.7	4,900	1.0	840	5.83	6.13	6.3	0.03	0.03
Total	563,000				96.9				448.6	2.14	2.00

2020 Middle case	Cargo Vol (ton)	Avg.Ship Size(DWT)	Load Factor	Avg. Loaded	Ship Calls	Handling Prod. (t/day/ berth)	Work Time (day/ ship)	Berth Time (day/ ship)	Total B.T. (day-berth)	No. of Required Berth	Required Berth with Limited Volume of Bulk Cargo
(1) Import	785,000							0.3			
1) Break Bulk											
a) Rice	93,000	20,000	0.7	14,000	6.6	1,360	10.29	10.59	70.4	0.34	0.34
b) Cement	202,000	10,000	0.7	7,000	28.9	1,360	5.15	5.45	157.2	0.75	
2) Bulk											
a) Fertilizer	48,000	10,000	0.7	7,000	6.9	1,950	3.59	3.89	26.7	0.13	0.13
b) Soya Bean	213,000	45,000	0.7	31,500	6.8	1,950	16.15	16.45	111.3	0.53	
3) General Cargo											
a) Heavy Equipment	80,000										
LO/LO	32,000	7,000	0.2	1,400	22.9	870	1.61	1.91	43.6	0.21	0.21
RO/RO	48,000	7,000	0.2	1,400	34.3	1,640	0.85	1.15	39.6	0.19	0.19
b) Construction Material	92,000	7,000	0.7	4,900	18.8	840	5.83	6.13	115.2	0.55	0.55
4) Others	57,000	7,000	0.7	4,900	11.6	840	5.83	6.13	71.3	0.34	0.34
(2) Export	4,000										
a) Heavy Equipment	4,000										
LO/LO	1,600	7,000	0.2	1,400	1.1	860	1.63	1.93	2.2	0.01	0.01
RO/RO	2,400	7,000	0.2	1,400	1.7	1,460	0.96	1.26	2.2	0.01	0.01
(3) Re-export	51,000										
a) Heavy Equipment	18,000										
LO/LO	7,200	7,000	0.2	1,400	5.1	860	1.63	1.93	9.9	0.05	0.05
RO/RO	10,800	7,000	0.2	1,400	7.7	1,460	0.96	1.26	9.7	0.05	0.05
b) Cigarette	23,000										
c) Others	10,000	7,000	0.7	4,900	2.0	840	5.83	6.13	12.5	0.06	0.06
Total	840,000				151.4				671.7	3.20	1.92

Table 7.4.1-5 (2) Required number of berth for foreign trade in 2005 and 2020 (High case)

2005 High case	Cargo Vol.(ton)	Avg.Ship Size(DWT)	Load Factor	Avg. Loaded	Ship Calls	Handling Prod. (t/day/ berth)	Work Time (day/ ship)	Berth Time (day/ ship)	Total B.T. (day-berth)	No. of Required Berth	Required Berth with Limited Volume of Bulk Cargo
(1) Import	570,000							0.3			
1) Break Bulk											
a) Rice	89,000	20,000	0.7	14,000	6.4	1,360	10.29	10.59	67.3	0.32	0.25
b) Cement	102,000	10,000	0.7	7,000	14.6	1,360	5.15	5.45	79.4	0.38	0.30
2) Bulk											
a) Fertilizer	38,000	10,000	0.7	7,000	5.4	1,950	3.59	3.89	21.1	0.10	0.08
b) Soya Bean	174,000	38,000	0.7	26,600	6.5	1,950	13.64	13.94	91.2	0.43	0.34
3) General Cargo											
a) Heavy Equipment	53,000										
LO/LO	21,200	7,000	0.2	1,400	15.1	870	1.61	1.91	28.9	0.14	0.14
RO/RO	31,800	7,000	0.2	1,400	22.7	1,640	0.85	1.15	26.2	0.12	0.12
b) Construction Material	73,000	7,000	0.7	4,900	14.9	840	5.83	6.13	91.4	0.44	0.44
4) Others	41,000	7,000	0.7	4,900	8.4	840	5.83	6.13	51.3	0.24	0.24
(2) Export	2,000										
a) Heavy Equipment	2,000										
LO/LO	800	7,000	0.2	1,400	0.6	860	1.63	1.93	1.1	0.01	0.01
RO/RO	1,200	7,000	0.2	1,400	0.9	1,460	0.96	1.26	1.1	0.01	0.01
(3) Re-export	25,000										
a) Heavy Equipment	9,000										
LO/LO	3,600	7,000	0.2	1,400	2.6	860	1.63	1.93	5.0	0.02	0.02
RO/RO	5,400	7,000	0.2	1,400	3.9	1,460	0.96	1.26	4.9	0.02	0.02
b) Cigarette	11,000										
c) Others	5,000	7,000	0.7	4,900	1.0	840	5.83	6.13	6.3	0.03	0.03
Total	597,000				102.9				475.1	2.26	2.00

2020 High case	Cargo Vol.(ton)	Avg.Ship Size(DWT)	Load Factor	Avg. Loaded	Ship Calls	Handling Prod. (t/day/ berth)	Work Time (day/ ship)	Berth Time (day/ ship)	Total B.T. (day-berth)	No. of Required Berth	Required Berth with Limited Volume of Bulk Cargo
(1) Import	885,000							0.3			
1) Break Bulk											
a) Rice	105,000	20,000	0.7	14,000	7.5	1,360	10.29	10.59	79.5	0.38	0.22
b) Cement	228,000	10,000	0.7	7,000	32.6	1,360	5.15	5.45	177.4	0.84	
2) Bulk											
a) Fertilizer	54,000	10,000	0.7	7,000	7.7	1,950	3.59	3.89	30.0	0.14	0.08
b) Soya Bean	240,000	45,000	0.7	31,500	7.6	1,950	16.15	16.45	125.4	0.60	
3) General Cargo											
a) Heavy Equipment	90,000										
LO/LO	36,000	7,000	0.2	1,400	25.7	870	1.61	1.91	49.1	0.23	0.23
RO/RO	54,000	7,000	0.2	1,400	38.6	1,640	0.85	1.15	44.5	0.21	0.21
b) Construction Material	104,000	7,000	0.7	4,900	21.2	840	5.83	6.13	130.2	0.62	0.62
4) Others	64,000	7,000	0.7	4,900	13.1	840	5.83	6.13	80.1	0.38	0.38
(2) Export	6,000										
a) Heavy Equipment	6,000										
LO/LO	2,400	7,000	0.2	1,400	1.7	860	1.63	1.93	3.3	0.02	0.02
RO/RO	3,600	7,000	0.2	1,400	2.6	1,460	0.96	1.26	3.2	0.02	0.02
(3) Re-export	71,000										
a) Heavy Equipment	25,000										
LO/LO	10,000	7,000	0.2	1,400	7.1	860	1.63	1.93	13.8	0.07	0.07
RO/RO	15,000	7,000	0.2	1,400	10.7	1,460	0.96	1.26	13.5	0.06	0.06
b) Cigarette	32,000										
c) Others	14,000	7,000	0.7	4,900	2.9	840	5.83	6.13	17.5	0.08	0.08
Total	962,000				179.0				767.4	3.65	2.00

Table 7.4.1-6 (1) Required number of berth for domestic trade in 2005 and 2020 (Middle case)

2005 Middle case	Cargo Vol (ton)	Avg Ship Size(DWT)	Load Factor	Avg. Loaded	Ship Calls	Handling Prod (t/day/berth)	Work Time (day/ship)	Berth Time (day/ship)	Total B.T. (day-berth)	No. of Required Berth
								0.3		
(1) Domestic (Inbound)	19,000									
Fertilizer	19,000	3,000	0.7	2,100	9.0	680	3.09	3.39	30.7	0.15
(2) Domestic (Outbound)	50,000									
a) Heavy Equipment	20,000									
LCT	20,000	2,500	0.2	500	40.0	340	1.47	1.77	70.8	0.34
b) Soya	30,000									
Total	69,000				49.0				101.5	0.48

2020 Middle case	Cargo Vol (ton)	Avg Ship Size(DWT)	Load Factor	Avg. Loaded	Ship Calls	Handling Prod. (t/day/berth)	Work Time (day/ship)	Berth Time (day/ship)	Total B.T. (day-berth)	No. of Required Berth
								0.3		
(1) Domestic (Inbound)	42,000									
Fertilizer	42,000	3,000	0.7	2,100	20.0	680	3.09	3.39	67.8	0.32
(2) Domestic (Outbound)	113,000									
a) Heavy Equipment	45,000									
LCT	45,000	2,500	0.2	500	90.0	340	1.47	1.77	159.4	0.76
b) Soya	68,000									
Total	155,000				110.0				227.1	1.08

Table 7.4.1-6 (2) Required number of berth for domestic trade in 2005 and 2020 (High case)

2005 High case	Cargo Vol (ton)	Avg Ship Size(DWT)	Load Factor	Avg. Loaded	Ship Calls	Handling Prod. (t/day/berth)	Work Time (day/ship)	Berth Time (day/ship)	Total B.T. (day-berth)	No. of Required Berth
								0.3		
(1) Domestic (Inbound)	21,000									
Fertilizer	21,000	3,000	0.7	2,100	10.0	680	3.09	3.39	33.9	0.16
(2) Domestic (Outbound)	55,000									
a) Heavy Equipment	22,000									
LCT	22,000	2,500	0.2	500	44.0	340	1.47	1.77	77.9	0.37
b) Soya	33,000									
Total	76,000				54.0				111.8	0.53

2020 High case	Cargo Vol (ton)	Avg Ship Size(DWT)	Load Factor	Avg. Loaded	Ship Calls	Handling Prod. (t/day/berth)	Work Time (day/ship)	Berth Time (day/ship)	Total B.T. (day-berth)	No. of Required Berth
								0.3		
(1) Domestic (Inbound)	59,000									
Fertilizer	59,000	3,000	0.7	2,100	28.1	680	3.09	3.39	95.2	0.45
(2) Domestic (Outbound)	157,000									
a) Heavy Equipment	63,000									
LCT	63,000	2,500	0.2	500	126.0	340	1.47	1.77	223.1	1.06
b) Soya	94,000									
Total	216,000				154.1				318.3	1.52