

## Chapter 13 Master Plan up to Year 2020

### 13.1 Desirable Port Traffic Shares between HCMC Ports and Thi Vai - Vung Tau Ports

#### (1) Methodology

The overall SFEA port traffic has been forecasted in the two target years of 2010 and 2020 in Chapter 11 of this report. This section is aimed at identifying the roles of the two port groups, i.e., HCMC ports and Thi Vai - Vung Tau ports, in the light of this forecasted port traffic demand. To meet this objective, the Study undertakes the following detailed forecasting works:

- (i) SFEA container traffic is to be examined by major shipping routes and possibly assigned ship sizes; and
- (ii) SFEA non-containerized cargoes shall be examined by classifying ports' roles into exclusive and general as well as the shippers' accessibility to general ports.

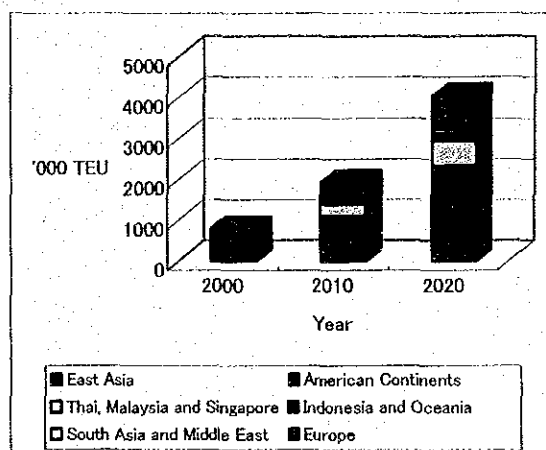
#### (2) Container Cargo

**Container traffic by trade group.** In 2000, the SFEA's largest trading region was East Asia (330 thousand TEU or 38%) while the second largest was Europe (221 thousand TEU or 26%). Provided that Vietnam continues to keep its trading partners by major commodity, Vietnam will expect faster container traffic growth with East Asia (5.4 times) and Thailand, Malaysia and Singapore (5.5 times) owing to its active trade in manufactured goods. On the other hand, there will be a moderate container traffic growth with South Asia and the Middle East (3.0 times) and Indonesia and Oceania (4.3 times) since their trading commodities are mainly primary products.

**Assignment of container ships by shipping routes.** There are at present 41 container ships regularly calling at four major HCMC general ports (Saigon, Tan Cang, Ben Nghe and VICT) every week. They are quite small in capacity, ranging from 246 TEU to 1,181 TEU as compared with the prevailing inter-regional mainline ships with about 2,500 TEU to 7,000 TEU. Taking international container shipping environments into account, the Study assumes future growth in ship size and simultaneous but not monopolized ship assignment by several "mega-carriers". At the same time, it is anticipated that local container operators will still play a vital role with small container ships to meet the more diversified needs particularly on short-distance routes.

Judging from the projected container traffic by shipping route, possible large container ships

Figure 13.1.1 SFEA Container Traffic by Trade Group



Note: the Study Team's estimate except transshipment and transit containers

to call at SFEA ports will be as follows:

- The trade with East Asia, which is anticipated to be the busiest trade during the forecast period, will have sufficient container volume to attract intra-Asia trunk ships (2,625 TEU in 2010 and 4,500 TEU in 2020 on the average). However, trans-Pacific container demand will be too small to enable direct shipping services between SFEA and the American continents. Thus, such demand will be transshipped at East Asia hub ports such as Hong Kong and Kaohsiung.
- The trade with the southward neighboring countries (Thailand, Malaysia, Singapore) will not generate sufficient container traffic to attract intra-Asia trunk ships. Combining the traffic of the trade groups located beyond Singapore such as 'Indonesia and Oceania', 'South Asia and Middle East', and 'Europe' at the regional transshipment ports such as Singapore and Tanjung Pelepas, however, will enable trunk ships to ply between those ports and the SFEA gateway port.
- Among the trade groups located beyond Singapore, Europe will hold the largest container traffic with SFEA which will enable long-distance direct shipping services (4,500 TEU in 2010 and 7,250 TEU in 2020 on average) provided that the number of weekly shipcalls are three or four.

**Demarcation of container port groups within SFEA.** Despite new port sites being developed such as Cat Lai and Hiep Phuoc, the HCMC ports will continue to suffer due to their shallow access channels thus allowing only less than 1,750 TEU of container ships in its ports. This will be further and adversely affected by the construction of the Thi Vai – Vung Tau ports to accommodate large container ships with more than 1,750 TEU. Thus, the two port groups within the SFEA will differ widely in their capacity. Both the port groups will receive many ships which will be plying and traveling within Asia. SFEA shippers may therefore conveniently choose from among the accessible ports when shipping small cargo out to near consignees. However, the shippers located at HCMC sometimes prefer the Thi Vai – Vung Tau ports, particularly when their large cargo needs long-haulage.

Table 13.1.1 Likely Container Ships to Enter into SFEA Ports

(Unit: TEU)

	HCM Ports	Thi Vai – Vung Tau Ports
2000 (actual)	246 – 1,181	Negligible
2010	Less than 1,750	1,750 – 3,500 * 3,500 – 5,500 **
2020	Less than 1,750	1,750 – 3,500 * 3,500 – 5,500 * 5,500 – 9,000 **

Note: \* The ships will pay frequent calls.  
\*\* The ships will pay occasional calls.

### (3) Non-containerized Cargoes

The Study has predicted that other dry cargo in SFEA will increase from 13.9 million tons to 31.3 million tons in 2020. Some of these cargoes are handled at exclusive ports while the rest are handled at general ports. To identify the role of general ports in future, the Study assumes future exclusive ports based on commodity-wise analysis.

Unlike in the container ships, the trend in ship capacity enlargement is not predominant among

bulk carriers and general cargo ships. Many of these bulk carriers will be able to enter into HCMC general ports. Given this situation, accessibility is a critical criterion among SFEA shippers in deciding which general port they prefer. The Dong Nai River is considered a practical boundary for the analysis of port hinterland between the two port groups within SFEA, i.e., HCMC ports and Thi Vai – Vung Tau ports. It implies that the shippers located in HCMC may choose HCMC ports because of their proximity compared with Thi Vai – Vung Tau ports which are 70 to 115 km away from HCMC. On the other hand, the shippers located in the Dong Nai and Ba Ria – Vung Tau provinces will not need to bear additional costs and time to pass through congested urban traffic and access to HCMC ports since their alternative Thi Vai – Vung Tau ports are available.

Table 13.1.2 SFEA' Other Cargoes to be Handled by General Ports

(Unit: '000 tons)

	Year 2010			Year 2020		
	SFEA's Cargo Volume	HCMC Ports <sup>1/</sup>	Thi Vai – Vung Tau Ports <sup>2/</sup>	SFEA's Cargo Volume	HCMC Ports <sup>1/</sup>	Thi Vai – Vung Tau Ports <sup>2/</sup>
Rice & Food Crops	3,290	3,290	0	3,920	3,920	0
Industrial Crops	140	0	140	292	0	292
Forest Products	80	80	0	80	80	0
Steel & Iron	1,050	704	346	4,067	2,725	1,342
Fertilizer	3,491	2,932	559	4,435	3,725	710
Manufactured Goods	4,104	2,197	1,907	8,926	4,270	4,656
Cambodian Transit Cargo	323	323	0	592	592	0
Overseas Other Dry	12,478	9,526	2,952	22,312	15,312	7,000
Domestic Other Dry	6,669	5,137	1,532	9,120	6,080	3,040
Other Dry Total	19,147	14,663	4,484	31,432	21,392	10,040
Liquid Cargo Total	8,230	6,750	1,480	16,566	12,425	4,141
Non-containerized Cargo Total	27,377	21,413	5,964	47,998	33,817	14,181

Note 1/: HCMC ports are expected to serve the shippers located in HCM City, Binh Duong, Binh Phuoc and Tay Ninh provinces and the Mekong Delta Region

Note 2/: Thi Vai – Vung Tau ports are expected to serve Dong Nai, Ba Ria – Vung Tau, Binh Thuan, Ninh Thuan and Lam Dong provinces and part of the Central Region

#### (4) Summary

The above-mentioned forecasting works are summarized in Table 13.1.3. This does not only show the balance between HCMC and Thi Vai – Vung Tau but also the balance between shippers' convenience and SFEA's economic competitiveness.

Table 13.1.3 Summary of Port Traffic Shares

	HCM City Port Group		Thi Vai - Vung Tau Port Group	
	Containerized (‘000 TEU)	Non-containerized (‘000 tons)	Containerized (‘000 TEU)	Non-containerized (‘000 tons)
Year 2000	858	18,222	2	2,384
Year 2010	1,171	21,413	1,103	5,964
Year 2020	1,433	33,817	3,311	14,181

### 13.2 Assessment of Waves and Effect of Current

With regard to waves, the following three specific subjects are analyzed in the Study Area:

- 1) Planning of harbor basins in terms of required calmness of the basin for securing safe and efficient port operations (in relation to daily waves),
- 2) Design and construction of a breakwater, if necessary (in relation to unusual waves), and
- 3) Assessment of sedimentation/siltation in basins and channels (in relation to daily waves and wave-induced current).

In evaluating wave conditions in Ganh Rai Bay for the above major subjects, the following three kind of waves are analyzed, depending on their causes and locations:

- A) Daily offshore waves generated by wind on the South China Sea were hindcast at an offshore point by means of the Global Wave Forecast for the past 5 years from 1995 to 1999. Then, they are propagated into the in-bay area, especially at the entrance of the Ben Dinh - Sao Mai Port.
- B) Daily waves generated by wind locally in Ganh Rai Bay were assessed by means of a Significant Wave Forecast Method based on wind data observed at Vung Tau Observatory for the same period of time. The waves are combined with the above A) energetically.
- C) Unusual waves due to typhoons on the South China Sea were hindcast by means of an Energy Spectral Method. In total 30 typhoons are selected for the past 50 years from 1951 to 2000. The highest wave hindcast at an offshore point of Vung Tau is 8.2m in significant wave height in the case of Typhoon No.9726 (Linda). The design waves at the offshore point are assessed to be 8.0m and 8.7m in significant wave height for the return periods of 50 and 100 years, respectively.

It is proved that, in order to secure enough calmness of the basin at the planned Ben Dinh - Sao Mai Port, a breakwater becomes necessary to protect the berth for safe and efficient operations.

Relating to current, effects of fast current speed are discussed on navigation of ships in the channel and operation of planned ports. In the Thi Vai River Approach Channel the maximum speed measured by the Study Team is 1.27 m/sec. The current direction is parallel to the channel alignment. Hence, it is judged that such current does not hinder navigation of ships in the channel.

The effect of current on berthing/un-berthing operations at the proposed ports is assessed to be minimal, when we consider the combined encounter possibility of both high-speed current and berthing/un-berthing operations.

The effect of current at around Buoy No.5, where the maximum current reaches to 1.3 m/sec four times a day at spring tide and crosses almost perpendicularly to the Dinh River Channel, should be taken account carefully for the safety of turning operation of the ships to/from BD-SM Port.

### **13.3 Analysis on Sedimentation**

In order to assess sedimentation quantitatively in the channels that are planned in Ganh Rai Bay, available bathymetric records measured in the past are first analyzed at the following channels:

- 1) **Thi Vai River Approach Channel:** No significant trend of change in the natural water depth is observed from the sounding data from 1997 to 2001 despite the action of strong tidal currents, which implies maintenance of the state of dynamic equilibrium.
- 2) **Long Tau River Approach Channel:** Significant scouring at hilly profiles and resultant sedimentation at the hollow portions are occurring due to strong tidal currents, according to the result of comparison of the sounding data from 1997 to 2000.
- 3) **Dinh River Channel:** Scouring of the right slope and sedimentation of the channel due possibly to the action of waves and currents are confirmed particularly at the mouth of the channel from comparison of sounding data in 2000 and 2001.

Quantitative assessment of sedimentation in the planned channel is carried out by means of a three-dimensional numerical simulation model, or the PHRI-JPC Model, which accounts for floating and settlement of suspended particles by tidal and wave-induced currents and waves. The data incorporated are measured bathymetry, tide and tidal current, particle size ( $d_{50}$ ) of seabed materials, discharge of water and suspended solids from rivers, and the above estimated waves B).

The current field and the present erosion/sedimentation conditions are reproduced fairly well. The estimated sedimentation volumes in the 16 m-depth channel are about 200, 600 and 400  $m^3$ /year at Vung Tau Approach Channel, Thi Vai River Approach Channel, and Dinh River Channel, respectively.

### **13.4 Port Development Plan up to the Target Year 2020**

#### **13.4.1 Regional Zoning for Port's Activities**

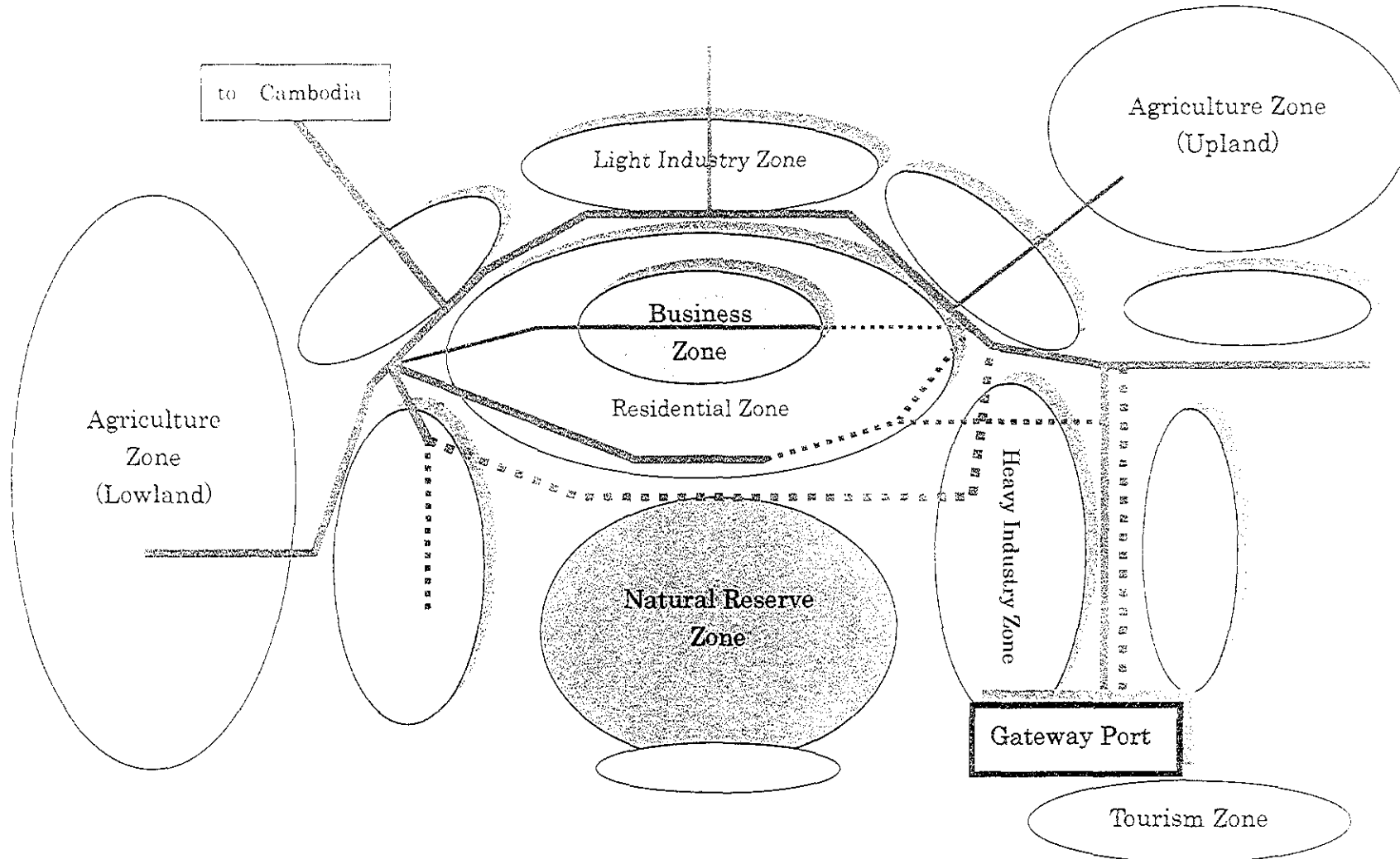
The SFEA and related regions should be developed on the basis of the zoning concept as below. Ports move away from the central city area to suburban areas for the smooth urban activities and for the improvement of urban environments. Port's activities in the city center should limit the freight handling necessary only for city activity and the waterfront re-development, which includes passenger ship terminals, and Waterfront Park for citizens should be done. Through these, the charm of Ho Chi Mine City will be raised more as an international port city. A center of a city

should be used as the international business and urban commercial zone.

The outskirts of the central city will be used as the high quality residential area. In the outside of a residential area, the light industries such as the clean high-tech industrial complex will be arranged. Heavy and chemical industries and logistics bases and ports will be developed in the downstream rivers where the land and maritime transportation will harmonize.

The industrial promotion should be balanced with the promotion of agriculture and fishery according to the characteristic of the regions. The discharge load from city and industrial activities should be regulated appropriately from an environmental viewpoint.

Fig 13.4.1 Conceptual Regional Development Zoning  
in SFEA and its Hinterland



### **13.4.2 Target Vessel Size**

#### **(1) Container Vessels**

Following container fleet is expected to be deployed on Vietnam routes in ten years. (For example ship size of 3,000 – 4,000 TEU container ship is 40,000-50,000 DWT, LOA of 250-300m and a draft of 11-13m). In Thi-Vai – Vung Tau area, maximum container ship size is set at 80,000 DWT in 2020, and 50,000 DWT in 2010. In Saigon area, maximum vessel size is set at 20,000 DWT in maximum.

Local routes in Vietnam have been used for cargo shipment from the North and Central Vietnam to the new port for transit to other countries. Considering features of ports in Vietnam, it is expected that 500-1000 TEU vessels, which are popular at present, will continue to be deployed.

#### **(2) General Cargo Vessels**

In general, cargo vessels do not represent a large portion of the total handling volume and no rapid growth (as in the case of container cargo) is expected. Therefore, increase in vessel size is also not expected.

Considering present ship size of cargo vessels in Vietnam, ships of 20,000-30,000 DWT capacities will continue to be deployed. In 2020, general cargo vessels up to 50,000 DWT will be able to be accommodated in ports along Thi Vai River.

#### **(3) Passenger Ships**

A passenger terminal will be planned in 2020. Ship dimensions such as length, draft and air draught are major constraints when passenger ships navigate the Long Tau River Channel. For example, only ships or boats with LOA, draft and air draft less than 230m, 9.5m and 45m respectively are permitted to come in and out the HCMC ports. It is expected that limited cruise ships in Intra-asia, which satisfy the above restrictions, will come into the HCMC ports. The largest passenger ship which will come into the HCMC ports in 2020 is 50,000 GRT.

### **13.4.3 Port Development Plan up to the Target Year 2020**

#### **(1) HCMC Port Group**

##### **+Saigon River Area**

In recent years, in the center of HCMC, the urban traffic jam becomes severe and the friction between the urban activity and the harbor activity becomes obvious. The ports should be also relocated from the viewpoint on proper urban development in the future. On this account, the expansion of the capacity of existing ports in the Saigon River side in a city center should be restricted and port facilities have to be markedly relocated to suburban areas. To put it concretely, port should move to the Cat Lai area and the Hiep Phuoc area step-by-step.

Tan Cang should be relocated urgently to the Cat Lai area before beginning construction of the under-river tunnel. The tunnel construction works will restrict the smooth operation of vessels. In addition, in the upper area from Tan Thuan Bridge in Saigon port, the traffic congestion is so severe that it is necessary to reduce the cargo handling volume.



Ports in this area should be relocated to the Hiep Phuoc and Cat Lai area. Some parts of the cargo handling function, for example in Tan Thuan area, can be maintained in harmonization with the urban activities. Port re-development to increase the charm and worldwide fame of HCMC will be done through the development of a passenger ship terminal and the waterfront park.

#### +Dong Nai River Area

New Industrial Zones are being developed in the Cat Lai area. On this account, new ports should be constructed in those areas to handle the cargo from the clean IZ behind. It is necessary to construct new ports urgently in the Cat Lai area to handle cargo from the Cat Lai industrial zone as well as cargo from the northeast area to reduce the traffic congestion in the city center. In this connection, the Dong Nai River channel should be improved.

#### +Soai Rap River Area

It is also necessary to develop Hiep Phuoc Port to handle the cargo from the surrounding industrial zone. In addition, cargo from the southern area should be handled to decrease the congestion of Nha Be River Channel and the urban traffic congestion in the city center. In this connection, the upper section of the Soai Rap River channel should also be improved. The lower section of the Soai Rap River should be used as the route for medium-size or small-size type ships by developing additional navigation aids.

Developing a large-scale port in this area depends on whether the channel can be developed downstream of Soai Rap River. It is necessary to formulate in detail the development plan on the lower of the Soai Rap River including investigating natural conditions and evaluating maintenance costs etc.

#### +Can Gio Area

The natural environment of Can Gio area such as beaches, estuaries and mangrove forests etc. should be well preserved and be used only for eco-tourism and waterfront amenity activities such as sea bathing, fishing, sailing, and camping, etc.

On the other hand, the connection of the port service such as the ferry and high-speed boats with the urban area including HCMC and Vung Tau is necessary to contribute the improvement of the local life and the development of tourism.

### (2) Thi Vai River Ports Group

#### + Go Dau and Thi Vai Area

Both Go Dau and Thi Vai areas are slightly far from the open sea. The channel route is flexure and its width and depth are small. Ports should be developed to support the industrial zone and handle the cargo there. It is necessary to urgently construct the general multi-purpose port to handle the import and export cargo of the industrial zone.

#### +Cai Mep Area

Cai Mep area is in the downstream of Thi Vai area and near the open sea. The water depth is sufficient for larger vessels. The social and environmental impact is not large. This site is adequate

for large-scale container port development. The port must be developed along with the development of industrial zones and the related infrastructure service. The port development in the upper area of the LPG Cai Mep Port should not interfere with vessels passing in the channel in the future.

**+Phuoc An Area**

Phuoc An port should be considered to harmonize with the development of Nhon Trach Industrial zone in the future.

**(3) Vung Tau Port Group**

There are some areas, which have a port development potential in SFEA. But the possible site for tourism development should be strongly limited only in the Vung Tau area. The large-scale port development should carefully be examined. In other words, the port development in this area is necessary to be thoroughly examined from viewpoints such as the possibility of the large amount of silt on the waterbed, and the natural and social environment impacts caused by the port development. In comparison with the Cai Mep site, Ben Dinh is the possible site, which will be examined on the long-term basis.

**13.4.4 Cargo Distribution by Ports**

The required scale in the master plan (2020) will be followed by the volume of cargoes handled at SFEA Ports. Summary of the cargo throughput at SFEA Ports is indicated in Table 13.4.1.

Table 13.4.1 Cargo Distribution by Ports at Year 2020

Port Name	Dry Cargo (x 1,000 ton)	Container Cargo (x 1,000 TEUs)
<b>(HCMC Port Group)</b>		
Sai Gon/Tan Cang/Ben Nghe/VICT	7,500	760
Other Ports in HCMC Port Group	4,800	-
Cat Lai IZ Port	400	300
Hiep Phuoc Container Port	800	380
Hiep Phuoc General Port	5,800	-
Sub-total	19,300	1,440
<b>(Thi Vai – Vung Tau Port Group)</b>		
Go Dau/Baria Serece etc	3,300	-
TVG	5,800	-
LCC	-	2,580
UCC	-	730
Dong Xuyen Port	400	-
Sub total	9,500	3,310
<b>Total</b>	<b>28,800</b>	<b>4,750</b>

(Source: JICA Study Team)

The bases for cargo allocation to the ports are as follows:

- In Announcement No.62/TB-VP-CNN issued by the HCMC People's Committee, the HCMC People's Committee agreed to assign Saigon Export Processing Zone and to formulate an investment project for the construction of a specialized port in the Cat Lai industrial zone.

- In 1998, Sai Gon Military Port implemented the feasibility study of the 2<sup>nd</sup> phase Cat Lai Port Expansion Project to submit to the authority concerned for approval under the approval of the Navigation Command and Ministry of National Defense due to the insufficient capacity of the existing port as well as the requirement of the next period to 2010.

- On 10<sup>th</sup> July 1998, the prime Minister promulgated Decision 123/1998/QD-TTg, which approved the Adjustment of the HCMC Master Plan up to 2020. According to the Master Plan, following directions were pointed out regarding transport and infrastructure planning.

- ① Restriction of extension and development of the existing inner city ports such as Sai Gon, Ben Nghe, Tan Thuan, Tan Cang and Bason,
- ② Construction of new ports in the suburban area.
- ③ Step by step renovation of the inner city ports for on-river tourism.

Number of future container berths and general cargo berths is shown in Table 13.4.2.

Table 13.4.2(1) Number of Future Container Berths

Container berths	Vessel Size	2020
Tan Cang Cat Lai	20,000 DWT	2
Cat Lai Container	20,000 DWT	2
Hiep Phuoc Container	20,000 DWT	3
Upper Cai Mep	50,000 DWT	2
Lower Cai Mep	50,000 DWT	4
Lower Cai Mep	80,000 DWT	2
Total		15

Table 13.4.2(2) Number of Future General Berths

General Cargo berths	Vessel Size	2020
Cat Lai	20,000 DWT	1
Hiep Phuoc Container	20,000 DWT	2
Hiep Phuoc General	20,000 DWT	10
Thi Vai General	50,000 DWT	6
Dong Xuyen IP	20,000 DWT	1
Total		20

Table 13.4.2(3) Number of Future Passenger Berths

Passenger Berths	Vessel Size	2020
Sai Gon	50,000 GRT	1

#### 13.4.5 Channel Development Plan up to the Target Year 2020

The main navigation channel from the entrance of Ganh Rai Bay to the Cai Mep site passing the offshore Ben Dinh site will be planned for the container vessel up to 80,000 DWT. This channel will be designed for 24-hour operation, which does not depend on the tidal fluctuation, and for the two-way traffic. There are some patches and banks with less than 10 m in depth in the approach water to Vung Tau Pilot station from South China Sea. Therefore a detailed survey is necessary to formulate the channel plan in this area. Dinh River channel will be developed for the 20,000 DWT vessels that call Dong Xuyen Industrial Port.

The channel from the Cai Mep site to the Thi Vai site will be planned for vessels up to 50,000 DWT. This channel will also be designed for tidal operation and for two-way traffic. There is a sharp S-shape bend between the Cai Mep site and the Thi Vai site. In this section, the vessel traffic should be restricted to one-way for vessels more than 30,000 DWT for safety navigation.

In the section from Thi Vai to Go Dau the one-way navigational channel will be planned for more than 15,000 DWT cargo vessels. This channel will also operate by taking into account the tidal height.

The navigation channel in the upper Soai Rap River will be developed for vessels up to 20,000 DWT in the new general port of Hiep Phuoc. At the same time, the height of the high-tension cable should also be raised to at least 55m above the highest water level. The sharp bend will be improved for 20,000 DWT vessels but it is not advisable to make a short cut excavation. If this section is cut short, the direction of river flow will change and the berth depth in front of power plant will become shallow. At the first stage, this channel will be used from the Long Tau River channel and will operate as the two-way traffic channel depending on the tidal height.

The large-scale channel development of downstream from the river mouth of Soai Rap cannot be drawn immediately the conclusion on the development possibility. On this account, vessels up to 5,000 DWT will navigate by utilizing the existing water depth and high tidal term combined with new navigation aids. The use of this channel section by vessels in high tidal term will contribute to reducing the congestion of Nha Be-Dong Nai route.

The traffic volume in the Long Tau river channel in 2020 is forecasted as 16,900 vessel / year. This is twice the present traffic volume. Therefore the sections that have sharp bends should be improved and the VTS should be introduced for safe navigation.

The under clearance of the bridges and the cables over the main channels should be kept more than 55m. In the case of the gas pile liens under the channel, the future depth of channels should be taken into account.

The basic channel parameters are shown in the table 13.4.3.

Table 13.4.3 Basic Channel Parameters

DWT	Depth (m)		Width (m)	
	Full	Tidal	Two-Way	One-Way
80,000	-16		420	200
50,000	-14	-12	310	150
20,000	-11	-9	260	120
5,000	-7.5	-5.5	160	70

Target vessel traffic in the year 2020 is calculated as below:

Table 13.4.4 Forecasted Vessel Traffic

Channel Name	Planning Vessel Number in 2020
Ganh Rai	26,100
Long Tau	16,900
Nha Be	12,700
Soai Rap	8,500
Dinh	300

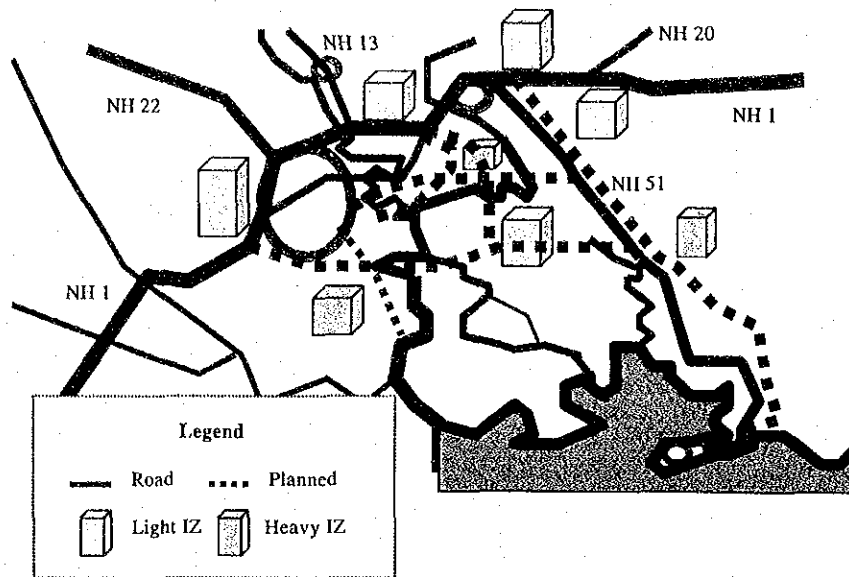
#### 13.4.6 Transportation System up to the Target Year

The main transportation networks in the southern Vietnam consist of roads and waterways. In parallel with the development of urban areas and establishment of industrial zones in SFEA, the major transportation networks have been planned as priority projects to form the artery of commodity circulations.

##### (1) Road

The most vital and adjacent road for the ports along Thi Vai River is National highway No.51(NH 51) connecting Bien Hoa with Vung Tau. This highway with 4 lanes plays an important role for the industrialization in SFEA and will be expanded to 6 lanes by 2020. Numerous industrial zones including Nhon Trach Industrial Zone with planned site areas of 2,700 ha are located along this highway.

Figure 13.4.2 Major Road Network in SFBA



HCMC government is now planning to construct a bridge (Phu My Bridge) across Saigon River that connects Saigon South and District 2. After the completion of this bridge, Nguyen Van Linh Highway (NVLH or Saigon South Parkway, 17.8km) will function as another vital route to traverse HCMC besides East-West Expressway. NVLH that does not pass through the urban center will greatly help the smooth circulation of commodities between Mekong Delta and Thi Vai - Vung Tau areas.

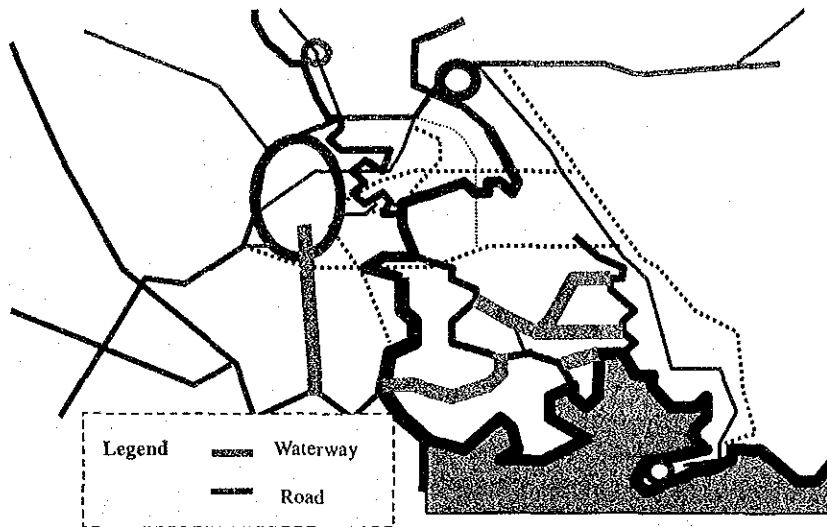
Long-term and huge highway project is to complete the outer ring road surrounding HCMC by 2020. This highway will pass through southern and eastern HCMC across Nha Be River, Long Tau Channel and Dong Nai River, thus will form a ring road by connecting with the existing NH 1. This route also functions as a by-pass highway to help the smooth transportation of cargoes between Mekong Delta, southern and eastern HCMC, Thi Vai - Vung Tau areas, and major industrial zones in Hiep Phuoc and Nhon Trach.

## (2) Inland Waterway

Mekong River, Dong Nai River and their tributaries form the major inland waterway networks in southern Vietnam. According to "Master Plan of Vietnamese Inland Waterways Transport Development by 2020", the government plans to develop river ports, cargoes terminals and to improve waterways.

Can Giuoc River connects HCMC and Mekong Delta via Rach Cat River near the mouth of Soai Rap River (See the Figure 13.4.3). In the city areas of HCMC there are 10 routes of inland waterways. A new river port capable of handling 2.5 million tons of cargo in 2020 will be constructed by 2008 at the crossing of Can Giuoc River and Cho Dem River in District 8.

Figure 13.4.3 Inland Waterway in SFEA



Four routes of inland waterways have been established between Soai Rap River and Thi Vai River (See the Figure 13.4.3). But currently the navigation in these routes is not easy due to complicated waterways in the area and the lack of navigation aids. Both provincial governments of HCMC and Baria - Vung Tau are planning to make a short-cut by digging a new canal and providing navigation aids by 2010.

### (3) Railway

The Reunification Line between the north and the south is the only existing railway line in SFEA. Bien Hoa - Vung Tau line (including the connection line with District 2 in HCMC), HCMC - Can Tho line and HCMC - Loc Ninh line are new long-term projects up to 2020. Access lines to the proposed ports along Thi Vai River will be easily constructed after the completion of the main line between Bien Hoa and Vung Tau.

The completion of these railway networks in the region will help the inhabitants commute to their working places and will also support the transportation of bulk cargoes from and to the ports.

### (4) Airway

The international airport in HCMC has now been expanded and upgraded using funds from JBIC. And in the future a new international airport will be constructed in Long Thanh district of Dong Nai province neighboring to HCMC, which will also enhance the economic development in surrounding areas. And even though the airway has not played a major role in cargo transport in the past, it is expected to transport highly value-added products as the industry in the surrounding areas develops to higher levels in the future.

## (5) Establishment of the New Logistics Center in the South of Vietnam

### 1) Railways' Role in Multimodal Transport

Railways have been an integral element that facilitates trade, domestically and internationally. Many countries of the world are connected extensively by railways. With globalization, there is a growing need for efficient and cost-effective transport. Over the last few years, many new development in the rail sector have been made to improve it's role in the world. These development have been mainly in two areas: investment and management.

In the area of investment in new links and infrastructures, a number of new links are being established in Asia. In China, in particular, a new service has been established connecting China with Europe. For example, a Rotterdam company is now offering rail transport for containers to north-west China, according to the Port of Rotterdam Municipal Authority.

In the area of management, organizational restructuring has been the most common trend in the sector over the past few years. In Australia, the privatization process has been recommended for all State and national-owned rail freight operations. This strategy aims at infrastructure investment funded by the private sector.

### 2) The Case of Vietnam

In order to ease the HCMC traffic congestion, especially heavy congestion adjacent to HCMC ports group, it is expected that railways will fulfill an important role in the field of cargo transportation, especially container cargoes. When the railway network is established in this region, a big public Inland Container Depot (ICD) will be also needed as a supporting facility and to promote the new container port.

The ICD should be located outside HCMC and as close to the new ports and industrial zones as possible in order to function as a logistics center in this region. In addition, it is planned that the ICD will be built adjacent to the new airport in order to enable sea and air transport links. (see Figure 13.4.6)

The ICD has also following functions as a logistics center in the south of Vietnam:

- Container transport to/from HCMC by rail in order to reduce traffic congestion inside HCMC,
- Gateway terminal to north and central Vietnam, and Cambodia for international container cargoes.



Figure 13.4.4 Transportation System in the South of Vietnam

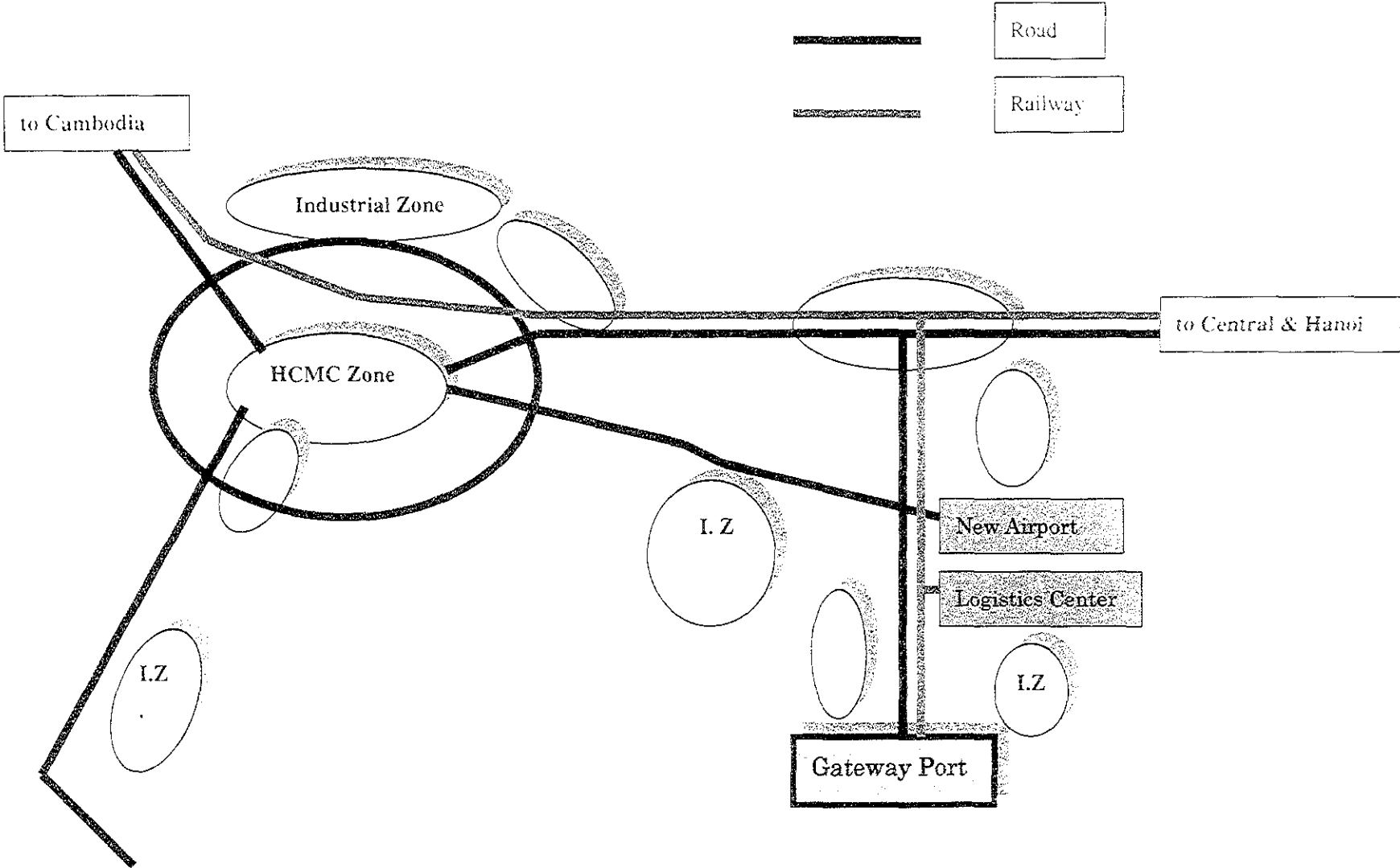
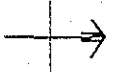
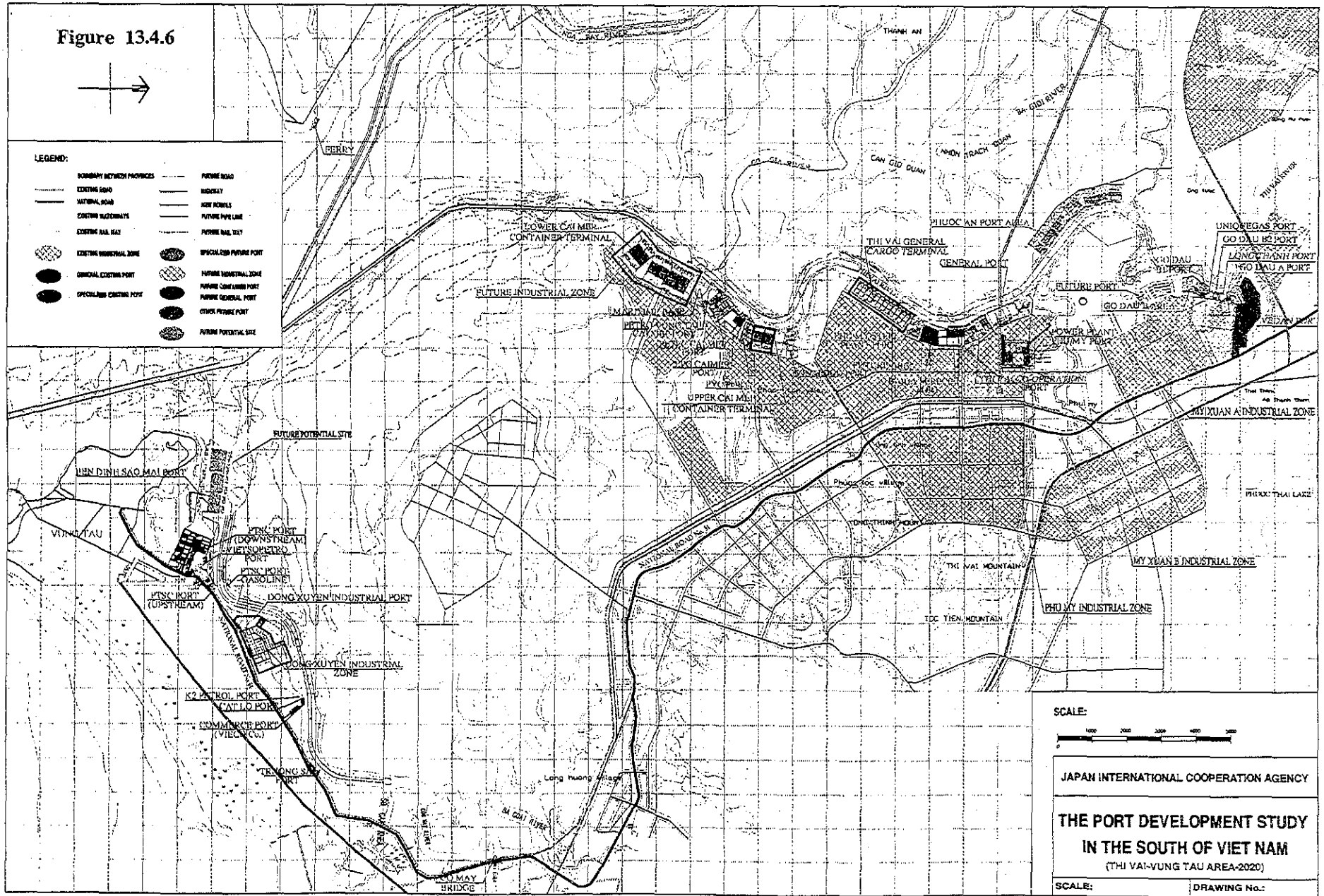




Figure 13.4.6



- LEGEND:**
- BOUNDARY BETWEEN PROVINCES
  - EXISTING ROAD
  - NATIONAL ROAD
  - EXISTING HIGHWAY
  - EXISTING RAIL LINE
  - EXISTING INDUSTRIAL ZONE
  - OFFICIAL EXISTING PORT
  - SPECIALIZED EXISTING PORT
  - FUTURE ROAD
  - HIGHWAY
  - HIGH POWER LINE
  - FUTURE PIPE LINE
  - FUTURE RAIL LINE
  - SPECIALIZED FUTURE PORT
  - FUTURE INDUSTRIAL ZONE
  - FUTURE COMMERCE PORT
  - FUTURE GENERAL PORT
  - OTHER FUTURE PORT
  - FUTURE POTENTIAL SITE



13-19

SCALE:  
  
 JAPAN INTERNATIONAL COOPERATION AGENCY  
**THE PORT DEVELOPMENT STUDY**  
**IN THE SOUTH OF VIET NAM**  
 (THI VAI-VUNG TAU AREA-2020)  
 SCALE:                      DRAWING No.:

### 13.4.7 Relocation and Redevelopment of the existing Ports in HCMC

#### (1) Basic Concept

Severe traffic congestion usually occurs in the neighboring area of Tan Thuan Bridge. Ports in the upstream of Tan Thuan Bridge in Saigon River should be also relocated to the Cat Lai and Hiep Phuoc area step-by-step. Some part of existing ports in the center of HCMC should be redeveloped as a high-amenity waterfront. Some parts of the cargo handling function should be maintained in harmonization with the urban activities. Accordingly, the capacity of existing ports in the Saigon River side in a city center should not be expanded

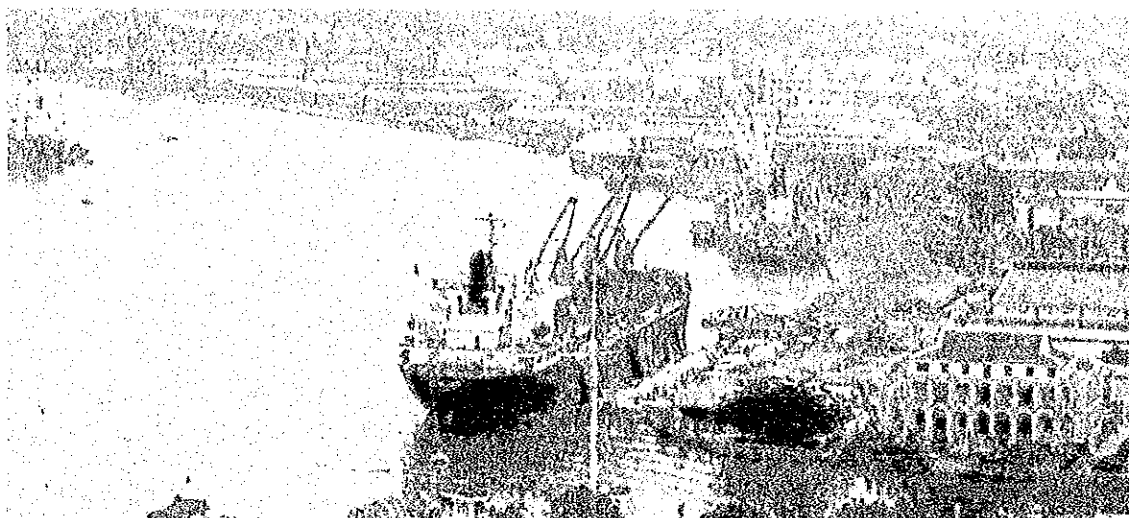


Figure 13.4.7 Nha Rong Terminal (2002)

#### (2) Development of Passenger Terminal

The SFEA ports received approximately 45,000 cruising passengers in transit in 2000. To identify a potential SFEA cruise market, the Study focuses on foreign visitors and local tourists. Their individual demands are analyzed as follows; Singapore has provided cruising opportunities to 2.5 % of its foreign visitors in 2000. It is assumed that cruising passengers are 0.5 % among the foreign visitors to SFEA in 2010 and 1.0 % in 2020. On the other hand, local cruising passengers are forecast to be negligible due to tour rates.

The annual cruising ship calls in SFEA area will be forecasted to increase to 116 in 2010 and to 229 vessels in 2020. In the center of the Khanh Hoi terminal one cruising berth with a passenger terminal for 50000 GRT passenger ships is proposed in 2020. In the redevelopment works, it is inevitable and economical to use the existing land and facilities temporarily. It is recommended to use temporarily the existing berth for the cruise demand under redevelopment works period.

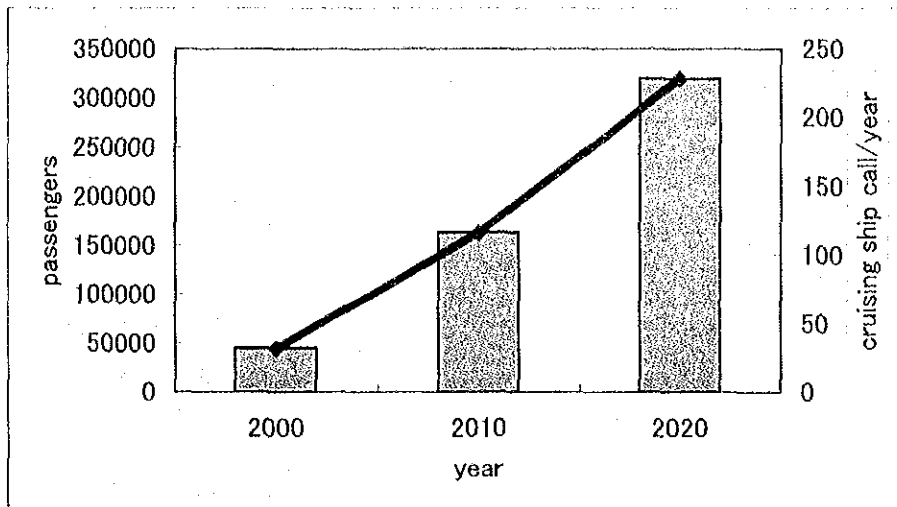


Figure 13.4.8 Demand Forecast for Cruise Passenger and Ship Call

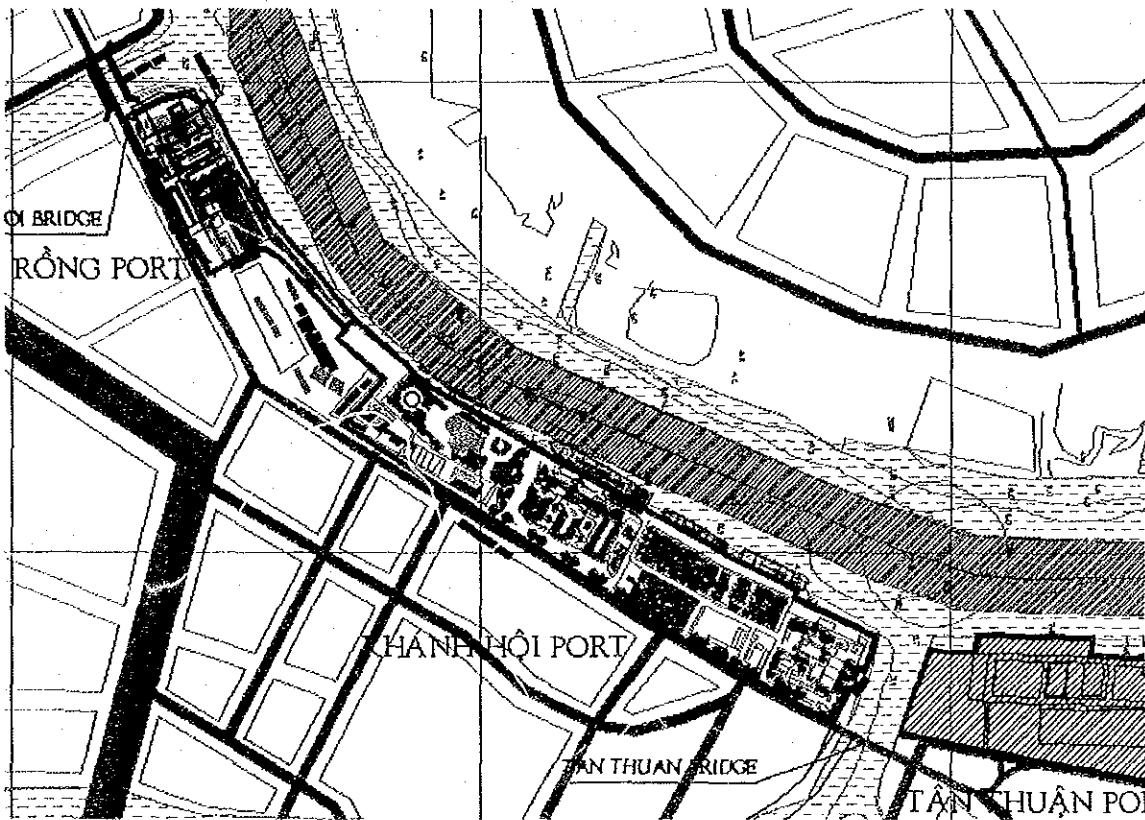


Figure 13.4.9 Nha Rong and Khanh Hoi Terminal Area in 2020

(3) Phased Relocation of the Existing Port

Phased relocation of the cargo terminal should be examined taking the construction works of the

under river tunnel and the cargo handling in the existing port into account. The phased relocation plan is shown as follows; Nha Rong terminal will be relocated in the first stage, and latter half of Khanh Hoi terminal (near the HCMC Port Authority Office) will be redeveloped in the second stage. Finally the center of the terminal well is developed for the passenger terminal. For this port redevelopment, 6 new berths need to be developed in the Cat Lai and Soai Rap Area.

Table 13.4.5 Relocation Schedule

Year	2010	2015	2020
Terminals under Saigon Port to be relocated	Nha Rong	Khanh Hoi (1)	Khanh Hoi (2)
Number of future berths to be developed at the new port site	2	2	2

(4) Development of Ports in Hiep Phuoc and Channel in Soai Rap River

It is necessary to develop Hiep Phuoc Port to handle the cargo from the industrial zone behind. In addition, cargo from the southern area should be handled to decrease the congestion of Nha Be and The River Channel and the urban traffic congestion in the city center. In this connection, the upper of the Soai Rap River channel connecting to the Long Tau River Channel should also be improved for vessel up to 20000DWT in the short/medium term.

The port development to the large scale in this area depends on the possibility of the channel development in the downstream of Soai Rap River. The large-scale route development of the downstream from the river mouth cannot immediately reach the conclusion on the development possibility. On this account, vessels up to 5000 DWT will navigate by utilizing the existing water depth and high tidal term combined with new navigation aids.

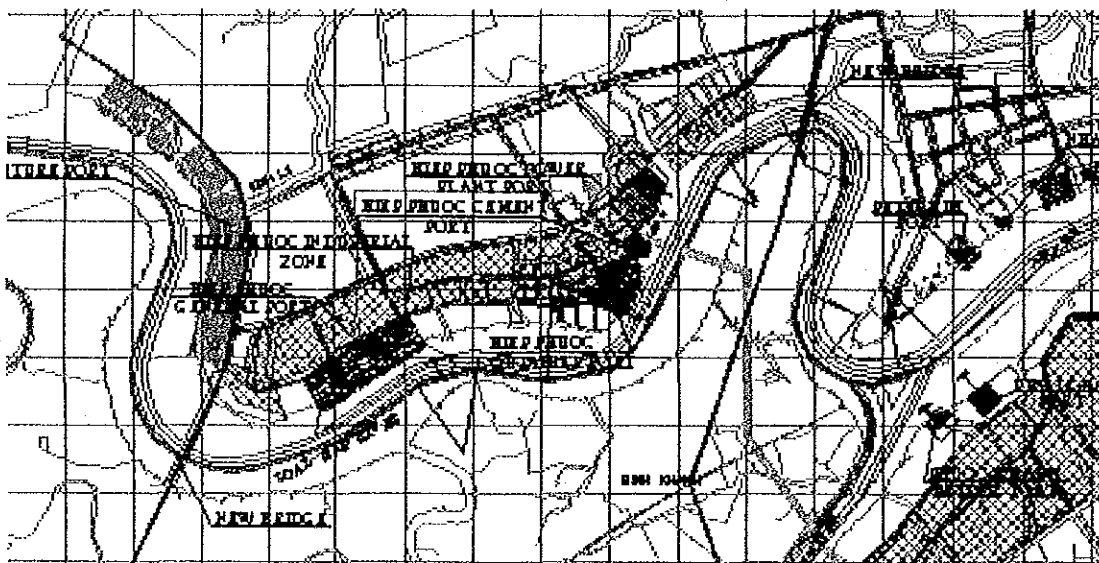


Figure 13.4.8 Hiep Phuoc Port in 2020

(5) Main Issuers to be cleared

It should be noted that there are 4 main issues to be arranged before the relocation of the center ports to outskirts area. The relocation of those ports should be done step-by-step discussing the related authorities.

- a) There is no technical conviction to excavate deeply in Soai Rap River channel.
- b) The Tan Thuan and VICT area is leased to foreign companies based on 50 years contract.
- c) Saigon Port has been investing for the new facilities using the ADB loans.
- d) The securement of the huge amount of budget for relocation and redevelopment will be necessary.

(6) Future Study Target

a) Port Relocation and Redevelopment Study in HCMC

It is necessary to do a port redevelopment study in this area in conjunction with the urban and transportation development study.

b) Technical Study for Soai Rap River Channel Development

The objective of the study is to pursue the possibility and to examine appropriate methods of developing and maintaining the channel at the mouth of the Soai Rap River for large ships in a technically and economically viable way.

## Chapter 14 Terminal and Channel Operations up to the Target Year

### (1) Terminal Operation

In the target year, 2020, improved existing ports and new modern ports should be operated with a well-balanced performance in the SFEA waters.

#### 1) Improved Existing Ports

- ① For general cargo operation, a greater quantity of equipment such as forklift, special loader/unloader, grab, bucket, hopper, conveyor and so on will be used.
- ② As containerization of general cargo proceeds, existing general cargo stockyard including warehouses will be converted into container yard and then container equipment like RTG and container handling equipment will be introduced.
- ③ Operation system by computer will be improved for cargo handling operation and planning, maintenance management of equipment, EDI and terminal management.

#### 2) New Modern Ports

New modern ports will basically handle container, general cargo and bulk cargo individually.

- ① Container terminal operation will be conducted by means of quayside container cranes (Panamax and post-Panamax.), RTGs and yard tractor / chassis system. And all operation in the terminal will be controlled by computer.
- ② Huge amount of bulk cargo will be handled in a specialized bulk terminal, which will be equipped with quayside gantry crane with grab or pneumatic unloader with hose connecting belt conveyor to warehouses, silo and stockyard.

### (2) Channel Operation

1) Long Tau and Sai Gon River Channel operation will not be basically changed as it is now and maximum size of vessel (LOA 230m, draft 9.5m) will become navigable through the night. On the other hand, Dua River Channel in Long Tau River will be still used for small boats like Jet Foil.

2) Northern parts in Soai Rap River will be used for the above size of vessels to call Heip Phouc Ports through Long Tau River, but southern parts will be used for small vessels (up to 5,000 DWT) after strict survey and installation of navigational aids.

#### 3) Thi Vai River Channel Operation

Though the depth and width of the channel will be deepened and widened for deep draft vessels to come through with both ways up to Thi Vai site, 'S' shape bent channel between Cai Mep and Thi Vai shall be one (1)- way for vessels more than 30,000 DWT.

4) VTS system must be introduced in all water of SFEA because the number of calling vessels in 2020 will be more than twice that recorded in 2000.

5) After establishment of VTS system, it will be recommended that captain of vessel who calls the same port area frequently can be exempted from taking pilot on board in order to reduce traffic congestion at pilot station and save navigation time.



## Chapter 15 General Assessment of the Major Port Project

### 15.1 Port Project in HCMC Area

Container feeder transport is mainly within Asia and local regions of Vietnam. Present data indicate that container feeder size for Asian route is from 500TEU to 1,400TEU. It is reasonable to choose vessel size from 1,000TEU to 2,000TEU for Asian routes. Cat Lai and Hiep Phuoc are candidate sites for this purpose. The existing four (4) major ports in HCMC should be relocated to the suburban areas. The existing port in the centre of HCMC should be developed with waterfront amenities.

#### (1) Cat Lai IZ Port

The construction of a new road from the NR1 to the Cat Lai Port has almost been completed. In addition, in the future, the construction of the under river tunnel and the bridge across Sai Gon River linking the main road through Cat Lai area will create an important access road for cargo transport from/to the East of the city.

The establishment of Cat Lai IZ and the related port which serves the IZ and the hinterlands is in line with the HCMC Master Plan which includes the relocation of ports along Saigon River and the improvement of urban transportation conditions in the area. The river channel in the expected port area is approximately wide and deep enough for the navigation of 20,000 DWT vessels. Therefore, this is an ideal location for the construction of port facilities serving Cat Lai IZ and the hinterlands.

#### (2) Hiep Phuoc IZ Port

It is necessary to develop a port in Hiep Phuoc area in order to reduce the traffic load in Nha Be and Sai Gon River Channel and to harmonize the development of the city and ports. Hiep Phuoc IZ Development Plan in the south of the city has been prepared for the relocation and expansion of the port sites in HCMC. Selection of the future permissible vessel size for this site is very difficult due to the nature of technical issues related to the dredging in the lower of Soai Rap River. Therefore, in the short-term, it is better to use the Long Tau-Soai Rap River Channel rather than the Long Tau-Sai Gon River Channel for up to 20,000DWT vessels. In this case, it is necessary to improve the Soai Rap Channel in the upper bend and the height of the cable.

#### (3) Re-Development and Rehabilitation of Existing Ports

Cargo Operation of Ports along Saigon River should be relocated to the outskirts of the city center step by step for the appropriate urban development and the urban environmental improvement. As a result, those port areas should be redeveloped as beautiful waterfronts with international business functions and an appropriate level of cargo handling function. A bridge crossing Sai Gon River will be constructed in Thi Vai, linking Binh Thuan Road to the outer ring road through Cat Lai. Such a bridge will restrict the navigation of many vessels to the

existing inner city ports. The under clearance of the bridge over the main navigational channel should be kept up to 55m.

## **15.2 Port Project Sites in Thi Vai - Vung Tau Area**

### **(1) The Port Site at Thi Vai**

Along the Thi Vai River, there are a few possible port development sites, all of which have been mentioned in the Vietnam Seaport System Development Master Plan up to 2010. In fact, some ports have already been constructed and put into operation such as ports at Phu My, ports at Go Dau and Cai Mep. Thi Vai General Port is planned in the downstream of Phu My area. Thi Vai is located between Bien Hoa and Vung Tau and about 50km from Bien Hoa City. The land area allocated for General Port in Thi Vai is 2km long and 500m wide each in the downstream and the upstream of Baria Serece Port. The port uses the water area in Ganh Rai Bay (about 30km from the port) as an anchorage area. Thi Vai site is only 3km from NR 51. The road embankment behind the port is already established.

The Thi Vai River Channel through Cai Mep accesses Thi Vai. There are two sharp bends, 800 m apart, and the radius of each is 920 m, which make it difficult to meet the international channel standards for large vessels more than 30,000 DWT. Therefore, the vessel traffic for vessels more than 30,000 DWT should be restricted to one-way in this section.

In Thi Vai area, the major roles of these new ports, if realized, will be to serve only for the potential cargo traffic to/from their limited direct hinterland, in other words, mainly cargo from the Phu My IZ.

### **(2) Potential Sites for Deep Container Ports**

The size of container vessels continues to rapidly increase. Currently, the Post Panamax Fleet represents over 30% of total container vessels in the world. When undertaking their services trans the Pacific, the Atlantic, and on Europe - Far-East routes, most shipping companies use Panamax or Post Panamax. The vessel size for intra-Asian feeder transport has also been increasing. Therefore, a new port should be able to accommodate vessels that ship cargo to European and American markets. Cai Mep and Ben Dinh-Sao Mai are candidate sites for this purpose.

#### **1) Port Site at Cai Mep**

As confirmed in the Vietnam Seaport System Development Master Plan up to 2010, the left bank area of Cai Mep is also a possible port site to be developed. Actually, Cai Mep is located about 10km downstream of Phu My, and just upstream from Thi Vai River Mouth. This area includes 100ha of land available for port facilities. The shoal exists in the upstream of Buoy B5. Cai Mep is only about 9km from National Highway 51. In the short term, the traffic system behind the port at Cai Mep site is not as advantageous, but there is no serious problem.

#### **2) Port Site at Ben Dinh- Sao Mai**

#### + General Character

Ben Dinh-Sao Mai is located in the northwest of Vung Tau City on the left bank of Dinh River. The project site of the port is at the tip of the Ben Dinh Peninsula. The land area allotted to the port has the elevation from -4.0m to +2.0m above CDL. The access channel to the Ben Dinh-Sao Mai area is located along Dinh River. Its parameters are 7.0m deep and 150m wide. The distance from Buoy 5 to Ben Dinh-Sao Mai is about 3.5km. This is the advantage of the Ben Dinh-Sao Mai site in comparison with other sites but winds and waves in the monsoon season are rather strong and thus investment in a breakwater is necessary.

#### +Maritime and Industrial Development Potential

The costal area in Ben Dinh-Sai Mai is limited and it is not appropriate for large-scale industry development due to the urban activities and tourism. If the new deep ports are developed in the Cai Mep and Thi Vai, the maritime industrial development potential upstream will be enhanced through the Development of New Thi Vai Navigation Channel

#### +Urban Development

Vung Tau is now a crowded city and so shall be the future Ba Ria city. That means if the port project site is planned inside the city, the same problems as in HCMC shall be generated here in future. Therefore, Cai Mep, which is on the outskirts of Vung Tau, is considered highly suitable in the long-term development of Ba Ria - Vung Tau province.

#### +Negative Impact on Natural Enviroment

The natural depth of water is insufficient and the volume of initial dredging work will be large. The huge amount of the disposal of dredging materials and the wide reclamation will cause negative influence on the natural environment in Ganh Rai Bay.

#### +Impact on Tourism

Currently, thousands of people visit Vung Tau City to enjoy maritime activities such as seafood restaurant, seaside hotel, sea bathing, fishing, etc. There are a few ways to access toward Vung Tau City. It would be unwise to have port related heavy traffic entering Vung Tau City through narrow 2 lanes road.

#### +Impacts on Fishery Activities

Along the east coast of the Vung Tau cape, there are coastal fishing activities, such as fishing by fixed net and troll fishing. Huge volume of dredging in Ben Dinh-Sao Mai is likely to cause negative impacts (increasing turbidity, changing natural current characters) on these activities.

#### + Relocation of Local Inhabitants

According to Traffic Volume Forecast from the New Ports, the related road needs four lanes in 2010. However, Vung Tau is already crowded city and National Road 51 inside Vung Tau city can provide only two lanes due to the narrow space caused by local inhabitants along the road. These inhabitants should move to another place in order to make space for extension of road or a new bypass be constructed.

Considering the above, the large-scale development in this area should be carefully examined.

## Chapter 16 Preparation of Port Administration and Management Program

### 16.1 Improvement Program on Port Administration

#### (1) Classification of Ports

In order to identify the importance of ports, to clarify the investment priority, and to distribute effectively limited budgets, ports in Vietnam should be divided functionally into the following three categories.

##### 1) "Major-port"

Major-port is a port that has been significantly contributing to the development of national economy and international trade, and that will certainly contribute to the future development of Vietnam.

##### 2) "Other-port"

Remaining ports in general ports are classified as "Other-port".

##### 3) "Specialized-port"

Ports, which are specializing in serving the needs of particular users or particular commodities, are classified as "Specialized-port".

This classification is just a relative classification. In addition, the role and responsibility of the central government concerning port administration and management need to be identified in each port category.

#### (2) Port Administration Policy for Major-ports

Major-ports will greatly contribute to regional and national economic growth by handling significant amounts of international container cargo, other cargo and passenger.

Port administration and management policy suitable for Major-ports needs to be established.

#### (3) Determination of One Administrative Apparatus for Port Administration

It is considered to be the most suitable that port administration in Vietnam be carried out by one administrative apparatus which consists of MOT and VINAMARINE.

#### (4) Improvement of Institutional Framework

##### 1) Formulation and Authorization of Port Master Plan for Individual Major-port

###### a-1) Significance of planning

To realize the ideal port condition, systematic port development and proper management are necessary. Therefore, it is very important to formulate a Port Master Plan for each Major-port. Moreover, this Plan needs to be reviewed periodically and revised when necessary. It should be made public.

###### a-2) Port planning body

It is desirable in principle that the Port Master Plan is originated by the individual PMB which is responsible for promoting regional prosperity through planning and developing ports in their region.

a-3) Authorization of the plan

The authorization of a Port Master Plan should be strict and open, and if possible, it is desirable that the mechanism such as a procedure is decided under law or regulation. Port Master Plan needs to be approved by the organization such as a council constituted by the persons concerned, persons of learning concerned, etc.

b) Formulation of short-term investment plan

In order to show the strict will of a country towards the port development and avoid the duplicated investment, it is very significant to formulate the short-term investment plan for the Major-ports. The short-term investment plan prescribes the amount of annual investment of all Major-ports during a specific period.

(5) Establishment of Good Relation between MOT/VINAMARINE and PMB

It is indispensable to establish and maintain the suitable and close relation between MOT/VINAMARINE and PMB of Major-port. For this, it is required to advance a further improvement of the whole port administration system, and to be in charge of daily port administration and management by using the improved system positively.

(6) Establishment of Appropriate Port Tariff Base

a) Efforts towards further reduction of port tariff base

The following two policies can be proposed to establish an appropriate port tariff base.

One is to perform a drastic reduction of port tariff base as a national policy in order to correct the gap which exists between the Sai Gon port and neighboring Asian ports concerning the charge of entry into port for foreign vessels.

The other is to raise the port tariff base for domestic vessels. According to a trial calculation, however, it is estimated that the effect of introducing this idea is not so large.

b) Introduction of "time-conscious" tariff structure

It is very important for the government to introduce a "time-conscious" tariff structure in order to become a "user-oriented" port. Ports in Vietnam always have to be conscious of time to encourage efficient and effective use of port facilities.

The Government should make a study of the introduction of this concept towards the port tariff structure of Vietnam to promote quick berthing and swift turnaround of cargoes.

## 16.2 Improvement Program on Port Management

(1) Introduction of EDI (Electronic Data Interchange) System

The Government is expected to show strong leadership in introducing EDI system. Its chief tasks in this regard would be as follows:

- to act to establish consensus and cooperation among concerned parties,
- to listen to the views of port users and users association as much as possible,

- to cooperate with related world organizations in order to establish EDI system based on world standard,
- to enact or amend relevant laws and regulations.

#### (2) Improvement of Port Statistics System

The establishment of port statistics system for Major-ports is desired as soon as possible.

#### (3) Introduction of Appropriate Staff Training System

Well-coordinated and appropriate training programs for the staffs and operators should be prepared by the port management body. In parallel with this training, it is useful to dispatch some personnel to major foreign ports. The further improvement of educational facilities for raising the professional level of instructors also is important.

#### (4) Port Sales Promotion

Sales promotion efforts are indispensable for any economic organization, regardless of whether it is public or private, to survive the hard competitive world of today. The following promotion activities can be recommended:

- a) Sales promotion seminar, b) The internet, c) Ports guide yearbook, d) Video and CD and e) Brochure.

### 16.3 New Organization Form of PMB

#### (1) Examination for Appropriate Port Management Organization

In the Master Plan, the type of Port Management Body can be recommended as a new port management organization. This Port Management Body is an independent organization body with the function of conducting entirely the management and operation of a port, and entirely differs from the Port Authority which is a special body under the VINAMARINE responsible for state management on maritime shipping. Henceforth in this report, in order to distinguish the both clearly, the new organization form of PMB is displayed as the Port Management Body. And the special body under the VINAMARINE is displayed as Port Authority (VINAMARINE). Port Management Body has an individual decision-making mechanism such as "the Board of Commissioners".

#### (2) Organization Form of PMB in the Master Plan

Each department of the new PMB has to be able to effectively respond to the changing demands in port management. For this purpose, the three-layer structure, which consists of three groups for the strategic management, the steady management and the support of organization, can be recommended. The organization chart of the new PMB in the Port Master Plan is shown in Figure-16.1.

(3) Idea for Establishment of PMB

- a) The new PMB under the Port Management Body system should at least be established at Major-ports.
- b) When Major-ports are located in close proximity to one another, it is desirable to establish one single PMB under the Port Management Body system to manage these ports.
- c) In the case of ports in Thi Vai-Vung Tau area, Phu My Port and Cai Mep Port (hereinafter referred to as "the New Port"), which will be designated, as a Major-port necessarily, should be managed by one Port Management Body because of their geographic nearness.

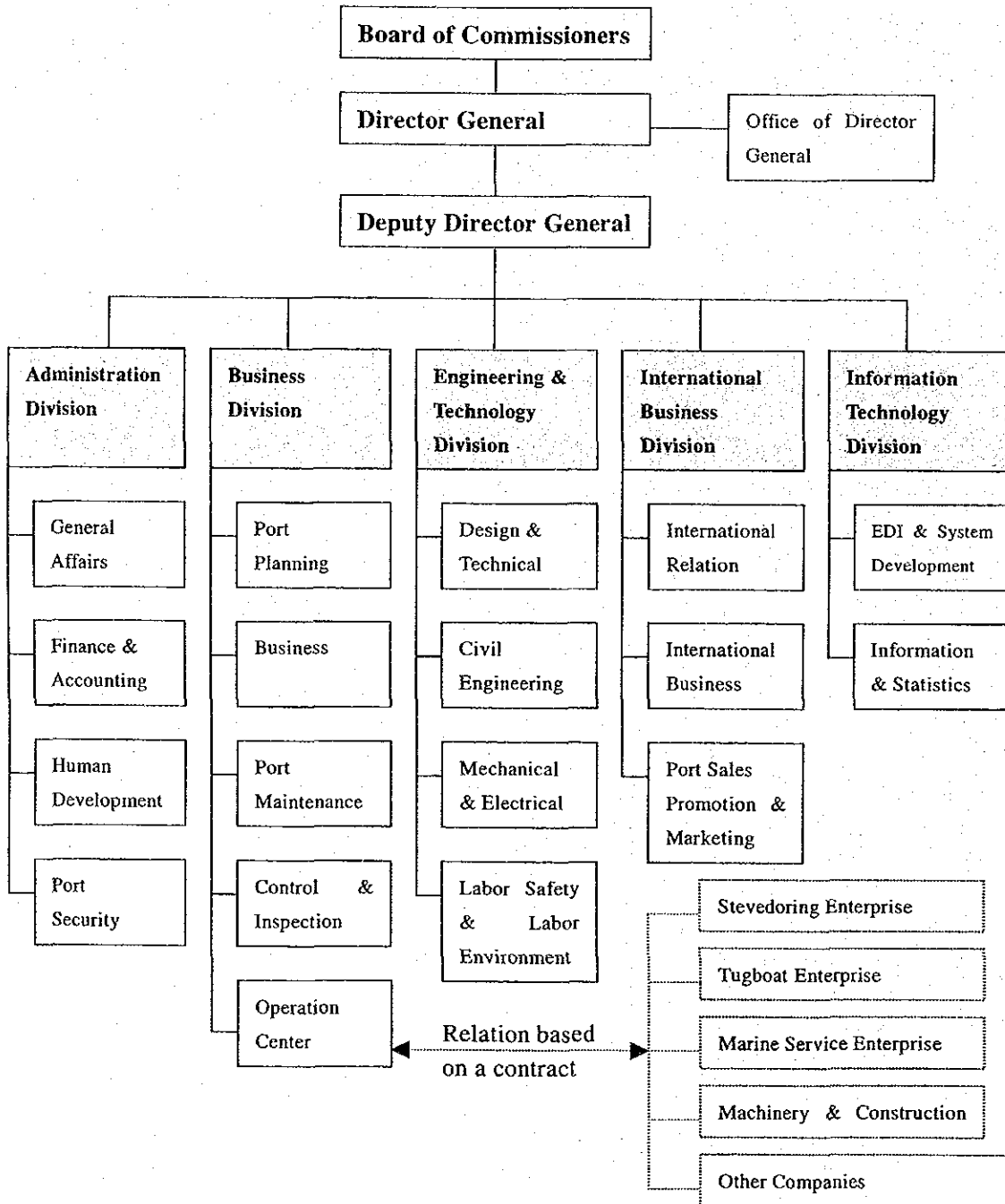


Figure 16.1 Organization Chart of Port Management Body of New Port

## **Chapter 17 Promotion Strategy of Private Sector Participation (PSP) for Port Development and Operation**

### **17.1 General Philosophy for Promoting PSP**

#### **(1) Necessity of Appropriate Control by Government**

With respect to PSP, there is a tendency that only merits are emphasized. But at the same time, more careful attention should be paid to the negative aspects such as the disregard of the public interest and the monopolization.

In this sense, appropriate control by the Government through "Port Master Plan" and regulations is strongly required.

#### **(2) Classification of PSP Types**

Typical PSP types are as follows.

- Management Contract
- Lease
- Concession/Joint Operation
- BOT
- Joint Venture

#### **(3) PSP for Port Development Project and Port Operation Project**

So far, progress has not been very rapid in introducing PSP into the port development projects.

Important infrastructure in the port field generally requires large-scale investment. Consequently, the investment risk accompanying the development naturally cannot but become large.

The government should carefully consider how to induce the private sector in port development through appropriate measures such as the establishment of risk-allocation measures.

On the other hand, as in neighboring major ports in Asian countries, container terminal services mainly have been provided by the private sector through lease, management and operation contract agreement.

A lease system as a contract type is common. However, in recent years, PSP combined with port development and operation by BOT style can be also observed as at Laem Chabang Port in Thailand.

### **17.2 Promotion Strategy of PSP**

#### **(1) Expansion of Participation Field of Private Sector**

It is important that the participation field will be enlarged to include only port development projects but also port service projects. The most effective way to make port activities more "market-oriented" is to introduce the private sector to port operation to a considerable extent.

Generally, port management system is classified into three types ("Service Port", "Land-lord Port", "Private Port") by ownership. And, types of container terminal operation in Vietnam are "Service



Port” type and “Privately-owned Port” type. It is desirable to shift the port management system gradually from “Service Port” to “Landlord Port”.

(2) Establishment of Risk Allocation Policy

Some examples of risk allocation policy are shown in Table 17.1.

Table 17.1 Some Examples of Risk Allocation Policy for BOT Projects

Item	Risk Allocation Policy
1. Funding and Financial Risks	+ Government’s borrowing on behalf of developer (for example, a long-term “soft loan” on “bond”)
	+ Allowing of issue of government “guaranteed bonds”
	+ Allowing of issue of bonds with “tax credit”
2. Tariff	+ Deregulation to tariff determination
	+ Allowing “different” tariff rates and tariff based on “Cost Accounting”
	+ Allowing tariff rate in line with “Inflation” (Accurate charge adjustment mechanism)
3. Cargo Volume	+ Providing guarantees of minimum cargo volume to private sector
4. Incentive for Private Sector	+ Offer of “Special Tax Concession”
5. Others	+ Government’s full responsibility for related infrastructure development
	+ Offering other profitable concession to private sector

Prepared by OCDI

The appropriate “risk allocation policy” including the further concession and the introduction of new incentives should be examined carefully among related government agencies from now on.

(3) Incentives through Deregulation

Appropriate tax incentive system for foreign investment and prioritized BOT projects needs to be carefully elaborated. Further simplification of licensing procedure for foreign investors also should be promoted.

17.3 Introduction of PSP in New Port Project

PSP types can be roughly bundled into the two following types from in terms of ownership and financial risk.

**BOT type:** The private sector is largely responsible for land and facilities and bears the greater financial risks.

**Lease type:** The public sector is the owner of land and facilities and bears the greater financial risks.

Both types have been introduced successfully in many neighboring Asian ports as stated before.

However, it is important to select the most appropriate form of PSP. In the case that public sector

can not obtain sufficient funds, the most effective method for realizing effective port development and efficient port management may be to introduce PSP of BOT system. However, it is fundamentally recommended that the port infrastructure of Vietnam should be developed and owned under the responsibility of a public sector. In the case that the Government can gain the low interest foreign loans, the promotion of the Lease type will be more suitable than the BOT type.

Consequently, the determination of the appropriate PSP type should be carefully conducted through the examination of national policy, financial situation of the country, volition of the private sector and so on.

**PART 2.2 PRELIMINARY STUDY ON MAJOR PROJECTS IN THI VAI-VUNG TAU AREA**

In order to examine the comparison between Thi Vai- Cai Mep site and Ben Dinh-Sao Mai site, an under-mentioned study is conducted based on the assumed components shown in the Table 18.1, in which 30,000 DWT general cargo berths are included.

Table 18.1 Major Projects Components in Thi Vai- Vung Tau Area

(1) Ben Dinh-Sao Mai Site

Site and facility	Vessel Size	Number
Container Berth	80,000 DWT	2
Container Berth	50,000 DWT	3
Breakwater		100 m
Channel (GRB-BDSM)	80,000 DWT	Two-way
Access Road		4 lanes 3 km

(2) Cai Mep Site

Site and facility	Vessel Size	Number
Container Berth	80,000 DWT	2
Container Berth	50,000 DWT	3
Channel (GRB-CM)	80,000 DWT	Two-way
Access Road		4 lanes 3 km

(3) Thi Vai Site

Site and facility	Vessel Size	Number
General Cargo Berth	50,000 DWT	2
General Cargo Berth	30,000 DWT	2
Channel (CM-TV)	50,000 DWT	One-way
Access Road		4 lanes 2 km

GRB: channel section in the entrance of Ganh Rai Bay

BDSM: channel section in the offshore of Ben Dinh -Sao Mai site

CM: channel section in the riverfront of Cai Mep site

TV: channel section in the riverfront of Thi Vai site

## Chapter 18 Preliminary Structural Design for Major Projects

### 18.1 Mooring Facility

The mooring facilities of Lower Cai Mep port and Thi Vai port will be constructed along the bank of the Thi Vai River. Therefore, the open-type quay structures are recommended so as not to disturb the flow of the river. All foundation piles are designed to be vertical piles in order to eliminate the negative influence of sub-soil settlement. But a possibility remains that structures consisting of vertical piles and coupled batter piles are more economical. Therefore, detailed comparative study will be conducted in the feasibility study stage.

The width of the Thi Vai River is very wide around Cai Mep port but the slope of riverbed is very gentle. Therefore, the wharf and terminal yard are constructed separately and trestles of 90m long are provided between them.

The mooring facility of Ben Dinh - Sao Mai port is situated in Ganh Rai Bay. The sub-soil condition around the port is better than that of Thi Vai port or Lower Cai Mep port, but it is still insufficient to adopt a gravity-type mooring facility. Thus, the open-type structure is also adopted in this design. However, the possibility to adopt closed-type structure such as a steel-sheet pile-pile type structure remains for this port. Therefore, if this port is selected for the project for feasibility study, the detailed comparative study will be conducted.

The calmness of basin at Ben Dinh - Sao Mai port is not sufficient. Therefore, a breakwater of 100m long is planned at the tip of quaywall. The water depths around the breakwater are 4.0m to 6.0m at high tide and the breaking wave height is estimated at 4.0m. Based on technical standards, the crown height of this breakwater was determined at CDL +6.5m. The structure of this breakwater is proposed to be rubble-mound type from the viewpoint of availability of local material, construction cost and flexibility for future rearrangement or modifications.

### 18.2 Terminal Yard

Very soft clay layers exist in all project sites and the fill material for land reclamation and surcharge will consolidate these layers. Based on consolidation analysis, the total settlements of Thi Vai, Lower Cai Mep and Ben Dinh - Sao Mai ports are estimated at 2.8m, 3.3m and 1.9m respectively. These settlement will occur gradually and continue for many years and will damage the structures and facilities on the land.

To cope with such a negative influence by this settlement, soil improvement using vertical plastic board drains (VPBD) is recommended. The relation between the time and degree of consolidation by the VPBD provided at an interval of 1.5m was calculated. It is known that the soil improvement work requires about 2 years period to obtain 70 to 80% of consolidation of sub-soil which allows removal of surcharged soil and commencement of construction works on the reclaimed land.

## Chapter 19 Preliminary Construction Plan and Cost Estimate

### 19.1 Preconditions on Construction Plan

Preconditions for construction plan such as number and capability of local construction companies, equipments available and materials supply for our project have been investigated. As the result comprehensive capability of marine works is enough for our project except some items.

As for construction material supply steel pipe piles or sheet piles and large-scale rubber fenders should be imported from foreign countries. In case of equipments for vertical drain works to improve soft foundation, existing plastic board pile drivers have not enough reach to the layers so that the contractor should purchase from abroad. PVECC, one of large construction companies, already expressed to take measures to meet the demand when it will be needed. It becomes clear that we have to dredge huge volume of soil for navigation channels. Then, we should procure large trailing (drag) suction hopper dredgers when they will be needed. As a whole, there is no problem to carry out implementation of project works.

### 19.2 Cost Estimate

Documents have been collected related to cost estimate regulations or norms and unit price issued by local government or prevailing unit price in the project areas. They are enough for this study. Rough cost estimates have been carried out on Master Plan of Major Projects up to the year 2020. The results are shown in Table 19.2.1. The cost includes value added tax, survey or consultant fee (engineering) and contingency.

Table 19.2.1 Rough Construction Cost Estimate for Master Plan in Thi Vai and Vung Tau

Port	Ship Size etc.	No.	Cargo	Length (m)	Depth (m)	Billion VND	Million USD	Million Yen
<b>Ben Dinh Sao Mai</b>								
Container (incl. Breakwater)	80,000DWT	2	Container	350×2=700m	-16.0	2,796.6	186.44	22,373
Container	50,000DWT	3	Container	300×3=900m	-14.0	2,948.6	196.57	23,589
Access Road				3,000×20m		104.8	6.99	838
Channel (BDSM&GRB)	52.0 Mill. m <sup>3</sup>			16,348×350m	-16.0	1,531.9	102.13	12,256
<b>Total</b>						<b>7,381.9</b>	<b>492.13</b>	<b>59,055</b>
<b>Cai Mep</b>								
Container	80,000DWT	2	Container	350×2=700m	-16.0	2,578.1	171.87	20,625
Container	50,000DWT	3	Container	300×3=900m	-14.0	2,795.5	186.37	22,364
Access Road				3,000×20m		100.9	6.73	807
Channel (CM&GRB)	31.3 Mill. m <sup>3</sup>			26,160×350m	-16.0	1,529.5	101.97	12,236
<b>Total</b>						<b>7,004.0</b>	<b>466.94</b>	<b>56,032</b>
<b>Thi Vai</b>								
General	50,000DWT	2	General	300×2=600m	-14.0	1,206.4	80.43	9,651
General	30,000DWT	2	General	250×2=500m	-12.0	867.2	57.81	6,937
Access Road				2,000×20m		60.6	4.04	485
Channel (Cai Mep-Thi Vai)	13.4 Mill. m <sup>3</sup>			12,000×310m	-14.0	669.9	44.66	5,359
<b>Total</b>						<b>2,804.1</b>	<b>186.94</b>	<b>22,433</b>

Note: 1.Exchange rate is VND15,000=USD1=JY120. 2.Excludes maintenance dredging cost.

## Chapter 20 Preliminary Economic Analysis

The economic analysis of the Project is carried out to verify the economic viability of the Project as a whole by analyzing the benefits accrued to the Project, which is equivalent to the difference of various costs between a With Project situation and a Without Project situation.

The Study has already identified two different configurations of port groups, which are planned to be developed newly as a major alternative port group for the Ho Chi Minh City port group in the Thi Vai area and the Vung Tau area, respectively. These are referred to as either the Cai Mep Port with the Thi Vai Port or the Ben Dinh Sao Mai Port with the Thi Vai Port. The preliminary economic analysis is prepared to compare the superiority of either group of ports in a view of national economic benefit, which is appeared as the rates of EIRR (Economic Internal Rate of Return), ENPV (Economic Net Present Value) and BCR (Benefit Cost Ratio) for respective package of port development plans.

The relevant economic feasibility criterion is derived from a procedure aimed at maximizing the overall objectives of the national economy. Economic feasibility is measured by comparing EIRR of the project, which is assumed to be minimum EIRR of ten (10 %) percent for infrastructure project in Vietnam. (ADB 1998) This 10 percent discount rate is used as the economic opportunity cost of capital and this rate is used to calculate ENPV and BCR as well.

### (1) Economic Benefits

The benefits are estimated based on the saved cost due to With Project situation from the same of Without Project situation. The quantifiable benefits considered to conduct the economic analysis are as follows:

- (A) Benefits from avoiding vessel waiting time due to increased port capacity;
- (B) Benefits from saving of vessel cost due to shortened channel navigation time;
- (C) Benefits derived from reduction of cost associated with maritime accident; and
- (D) Benefits from saving cargo transport costs on land or trucking costs;

### (2) Economic Cost

#### 1) Capital Investment

The economic cost used for the analysis of economic viability of the Project are obtained by means of converting the market or financial price to the economic price using the following standard conversion factors for each type of works after deducting transfer payment such as import duties, taxes and adjusted labor cost taking into account the seasonal fluctuation of labor cost.

Table 20.1 Economic Cost of the Project (US\$ Million)

	Cai Mep	Ben Din Sao Mai	Thi Vai
Port	294	324	111
Channel	36	58	3
Sub-total	330	382	114

Source: JICA Study Team

Note: The initial capital investment costs are estimated with a minor revision on July 2002.

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## 2) Operation Cost of the Port

The average cargo handling and port operation cost per metric ton of cargo handled is obtained as US\$1.99. Then, it is converted to the economic price (conversion factor: 0.80) at US\$ 1.60, which is used for the economic analysis in this report.

## 3) Maintenance Cost

The annual maintenance cost for port facilities and maintenance dredging works of channels are estimated at two (2%) percent and five (5 %) percent of the total amount of each capital investment amount, respectively.

### (3) Economic Viability

#### 1) Economic Benefit for the Project

The total economic benefits derived from the respective project ports are summarized in Table 20.2 below.

Table 20.2 Distributed Aggregated Economic Benefits (US\$ Million)

#### Cai Mep with Thi Vai Port

Year	A	B	C	D	Total
2010	8.5	1.7	2.5	3.1	15.0
2015	143.3	6.3	2.5	21.8	173.8
2020	413.9	13.73	2.5	47.46	477.58
Share	83.5%	3.2%	1.2%	11.1%	100%

#### Ben Dinh - Sao Mai with Thi Vai Port

Year	A	B	C	D	Total
2010	8.5	1.1	2.5	0.8	12.8
2015	143.3	7.0	2.5	5.4	158.2
2020	413.9	15.4	2.5	11.8	443.6
Share	91.8%	3.9%	1.3%	3.0%	100%

Legend:

- (A) Vessel's waiting time at the existing ports
- (B) Channel Navigation
- (C) Reduction of maritime accident
- (D) Vehicle operation costs for related land transport

## 2) Results of the Economic Evaluation

The benefits obtained using the formula described in foregoing leads to the annual saving cost accrue from the Project Port in total. Then, based on such estimation of costs and benefit flow throughout the project plan period, the economic viability was analyzed based on various assumptions of development sequence and schedule as shown in Table 20.3 for respective group of the port project at Cai Mep and Vung Tau area.



Table 20.3 Assumed Development Sequence and Schedule

Implementation Period	2006-2010	2010-2015
30000 DWT GC Berth	XXXXXXXX	
50000 DWT GC Berth	XXXXXXXX	
50000 DWT CC Berth	XXXXXXXX	
80000 DWT CC Berth		XXXXXXXX
Channel for Thi Vai GC	XXXXXXXX	
Channel for Cai Mep 50000 DWT	XXXXXXXX	
Channel for Cai Mep 80000 DWT		XXXXXXXX
Channel for Vung Tau 50000 DWT	XXXXXXXX	
Channel for Vung Tau 80000 DWT		XXXXXXXX

Legend:

GC means general cargo berth

CC means container cargo berth

The economic viability indicators analyzed are summarized in Table 20.4 below. As shown in this table, the economic viability of the Project as whole disregarding the configuration of project components and development timing indicates more than the criteria set out in the preceding section of this chapter when the net present value is discounted at ten (10%) percent. Thus, the Project as a whole is evaluated as viable from the national economic point of view.

Table 20.4 Summary of Economic Analysis

Cai Mep with Thi Vai Project

EIRR (%)	22.50
ENPV (US\$ Million)	1,100.0
B/C at 10% D.R.	2.71

Ben Dinh Sao Mai with Thi Vai Project

EIRR (%)	19.60
ENPV (US\$ Million)	888.20
B/C at 10% D.R.	2.23

As the above tables show clearly that both configuration of port development plans in the Thi Vai area and the Vung Tau area are considered as feasible as EIRR is more than 10%, and BCR is more than 1.0. These table clearly shows that the combination of the Cai Mep Port and Thi Vai Port is superior than that of Ben Dinh Sao Mai Port and Thi Vai Port in a view of national economic point-of-view as ENPV of the former is higher than the later. However, it is to be noted that this analysis is totally based on the mathematical calculation without taking into account of other development elements related to environment, socio-economic, industrial and urban development planning, etc.

## Chapter 21 Initial Environmental Examination (IEE)

Based on the information on local environment conditions collected in the survey areas, potential negative impacts at the three project sites selected in the Master Plan are initially examined.

The total number of each mark indicating the degree of negative environmental impacts in the IEE Check Lists are summarized in Table 21.1.

Table 21.1 Summary Table of IEE Check Lists

Mark	Thi Vai Site	Lower Cai Mep Site	Ben Dinh-Sao Mai Site
0	6	12	3
+	27	20	18
++	5	7	15
+++	1	0	3

Degree of impact: 0; Slight +; Moderate ++; Medium +++; Severe

It is noted that the mangrove forests in the planned port areas at Thi Vai and Lower Cai Mep Sites shall be deforested for the cargo handling yards. They are, however, located in the Industrial Zone where development activities are admitted by the government regulations.

The negative environmental impacts marked with +++ in the above Table are described below.

### (1) Thi Vai Site

- Erosion of the mangrove forest

The mangrove forest in the Can Gio district, which lies along the right bank of the Thi Vai River from its mouth toward the upstream, is eroded due to the waves generated by ships year by year. Increase of waterway traffic accompanied by the new port development, especially in the narrow upstream, may accelerate the erosion.

### (2) Ben Dinh-Sao Mai Site

- Socio-economic environment at the site

Relocation of local inhabitants along the existing road No.51 may be necessary to cope with increase of port related traffic. A certain negative reaction could arise from among the inhabitants.

- Adverse effects of dredging and reclamation

A large extent of the mud-land will disappear by the reclamation work. This means the destruction of natural self-cleaning system (disintegration of organic pollutants into inorganic

matters). In addition, there is a possibility of blockage of seawater circulation by the reclaimed land, which will accelerate the water pollution in front of Vung Tau Shipbuilding yard.

Benthos survey, which was conducted by the study team revealed that bio-diversity in Ben Dinh-Sao Mai site, is lower than that of Lower Cai Mep site. In other word, the eco-system in Ben Dinh-Sao Mai site could hardly receive further discharges directly from the land area.

Considering the above primary features of the negative environmental impacts in the sites, the new port development in the Ben Dinh-Sao Mai site might have relatively higher degree of unfavorable impacts on local environments than those of other sites.

## Chapter 22 Priority Port Development Project in Thi Vai – Vung Tau Area

The study on the priority port development project in Thi Vai and Vung Tau area focuses on the general cargo terminal for 50,000 DWT vessels and the container cargo terminal for 50,000 DWT and 80,000 DWT vessels.

### 22.1 General Comparison between Two Candidate Sites for the Deep Container Port

#### 22.1.1 General Approach and Methodology

Considering the above conditions for the additional analyses, the following methodologies are adopted for the general comparison between two candidate sites.

- 1) The two-selected development schemes are the focus of the comparison study without any other alternative cases.
- 2) In the comparison, it is assumed that the container terminals at both sites, namely LCM and BDSM, would be developed with the same function and scale.
- 3) The components of the schemes to be compared include both quantifiable and non-quantifiable items.

#### 22.1.2 Functions

The Study has identified three types of potential transshipment needs in Vietnam. These are

- (a) International Transshipment on an ad hoc basis
- (b) Domestic Transshipment from other Vietnamese ports
- (c) Transit cargo along the on-going Trans-Asia Highway Project (Phnom Penh –HCMC)

The transshipment and transit container cargo is forecasted 135 thousands TEUs in 2010 and 267 thousands TEUs in 2020. In such a small amount of transshipment and transit cargo volume, the transshipment port need not be constructed independently. Therefore the international container transshipment port concept is not the best selection for this region at least in short/medium-term period in this region.

Table 22.1 Transshipment / Transit Container Traffic Demand in SFEA (000 TEUs)

	2010	2020
International Transshipment	20	43
Domestic Transshipment	83	166
Cambodian Transit	32	59

Function and scale of the container port for the comparison study are as follows:

The basic port function to be developed at the candidate sites is so-called “International Gateway Container Port (IGCP)” with the functions to:

- 1) Support overall socio-economic development of the south of Vietnam
- 2) Serve mainly for international container traffic to/from SFEA with some domestic container transshipment
- 3) Promote industrial location at the direct hinterland of the port
- 4) Alleviate excess river/land traffic in and around HCMC/Saigon ports area
- 5) Promote and regulate various development activities on the water front area of Thi Vai River
- 6) Minimize possible development impacts on natural and socio-economic environment

### **22.1.3 Evaluation of Each Component of the Project**

The results of evaluation of each project component are as follows. It should be noted that the ratings on the evaluation items in the tables does not represent the absolute value of evaluation, since the ratings show only relative superiority of each item between two sites.

### **22.1.4 Overall Evaluation and Recommendations**

On the basis of the above comparison study, the overall evaluation and recommendations can be summarized as follows.

(1) On the basis of above discussions and the comparison analyses made in this paper, it can be said that LCM site is more advantageous in general than BDSM site for development of IGCP type of container port at least in short/medium term range. (For details of function of "International Gateway Container Port", see section 2.1. of this paper)

(2) On a long-term basis, however, BDSM site would have a fairly high potential for future expansion of container port capacity, since the available space of LCM site is rather limited for further expansion of container terminal development (i.e. a maximum of four more berths could be developed).

Table 22.2.1 Quantifiable Components

Components	LCM	BDSM
<b>Natural Conditions for Vessel Operation</b>		
Meteorological Conditions (wind)	1	--
Hydraulic conditions (wave, current)	1	-
<b>Natural Conditions for Structural design</b>		
Subsoil Conditions	-	1
Topographic Conditions	1	-
<b>Proximity for the Shippers and the Maritime Route</b>		
Distance from major origin/destination of container traffic	1	-
Distance from trunk maritime route	-	1
<b>Construction and Maintenance of the Project Components</b>		
Initial Capital Dredging	1	-
Maintenance Dredging	0	0
Quay Construction	0	0
All Construction Cost	1	-
<b>Economic Cost and Benefit</b>		
	1	-
<b>Investment Risk of BOT Based Development</b>	0	0

superior(1) even(0)

Table 22.2.2 Non-quantifiable Components

Components	LCM	BDSM
<b>General Character of the Sites</b>		
General Character of the Sites	1	-
<b>Natural Impacts</b>		
Mangrove Forest	-	1
Dredging and Reclamation	1	-
<b>Social Impacts</b>		
Relocation of Local Inhabitants	1	-
Impact on Tourism	1	-
Impacts on Fishery Activities	1	-
<b>Impacts on Future Regional Development</b>		
Urban Development	1	-
Maritime and Industrial Development Potential	1	-
<b>Availability of existing Public/Private Function</b>		
Availability of existing Public/Private Function	-	1

superior(1) even(0)

## 22.2 Alternatives of Priority Port Development Project Packages up to the Target Year 2020

The alternative priority project packages in the Thi Vai-Vung Tau area are proposed in the table below. The new container port project by the Vietnamese Government targeted for 2010 as an Intra-Asian maritime gateway in the south of Vietnam should be started in Cai Mep site. For the second stage of the project, there are two alternative project packages. The first one is to construct the new deeper depth of berths in Cai Mep and the second one is to construct new deeper berths in Ben Dinh-Sao Mai. It is necessary to determine the future project site for vessels of Post-Pnamax size after checking the following conditions.

- Overall economic growth of Vietnam
- Datum of natural condition (current, wave, siltation, etc)
- Increase of container traffic in the hinterland of ports
- Existence of constant container consignor / consignee
- Detail estimation on environmental and social impact

Table 22.3 Alternative Priority Port Project Packages

	Year 2010	Year 2020
Alternative Package 1	General Cargo Ship 50,000 DWT in Thi Vai (Tidal) Container Ship 50,000 DWT in Cai Mep (24 hrs)	General Cargo Ship 50,000 DWT in Thi Vai (Tidal) Container Ship 80,000 DWT in Cai Mep (24 hrs)
Alternative Package 2	General Cargo Ship 50,000DWT in Thi Vai (Tidal) Container Ship 50,000 DWT in Cai Mep (24 hrs)	General Cargo Ship 50,000 DWT in Thi Vai (Tidal) Container Ship 80,000 DWT in Ben Dinh- Sao Mai (24 hrs)

Particularly quick service is very important for container vessels. Therefore, the channel section up to Cai Mep should be determined as two-way traffic with the sufficient depth for the full draft of container vessel. On the other hand, the Thi Vai site should be developed as the general cargo port with the channel by taking account of tidal advantage.