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.

13.4.2 Target Vessel Size

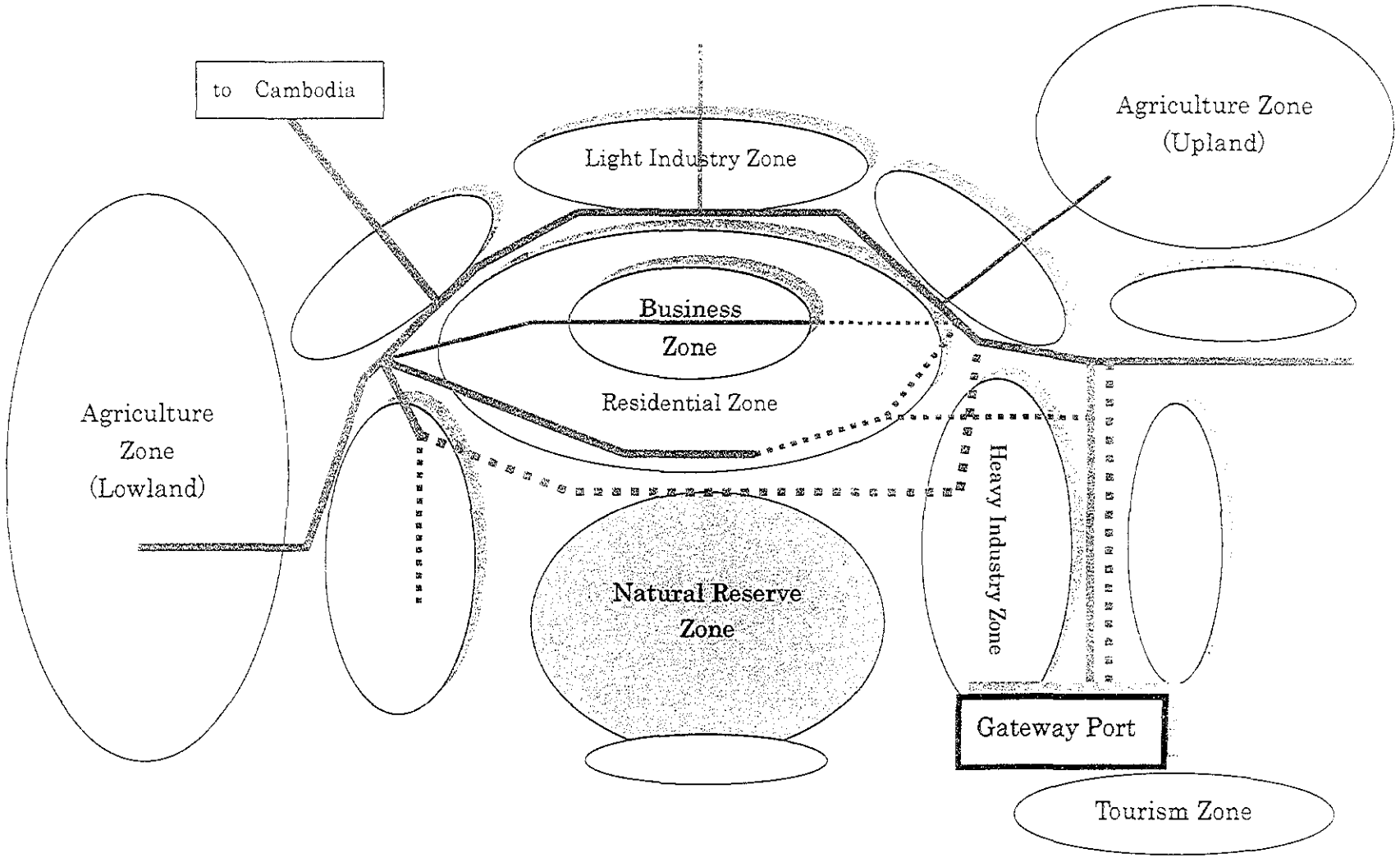
(1) Container Vessels

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.

Table 13.4.1 Container Vessel Size

DWT	LOA (m)	LPP (m)	Beam (m)	Draft (m)
80,000	300	284	42.8	14
50,000	267	253	32.2	12.5
30,000	210	200	30	10.7
20,000	174	165	26.5	9.2

Fig 13.4.1 Conceptual Regional Development Zoning
in SFEA and its Hinterland



(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.

Table 13.4.2 Cargo Vessel Size

DWT	LOA(m)	LPP(m)	Beam(m)	Draft (m)
50,000	212	201	32.2	12.6
30,000	188	179	27.7	11.3
20,000	166	158	24.5	10.0
15,000	152	145	22.6	9.2
10,000	133	127	19.8	8.0
50,00	105	100	15.8	6.4

(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.

Table 13.4.3 Passenger Ships

GRT	LOA(m)	LPP(m)	Beam(m)	Draft (m)
50,000	234	199	32.2	7.1

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 Required Scale of Port Development

In this section, the forecast of cargo volume handled at SFEA Ports by the year 2020 is formulated as a basis for planning, considering the functional allotment of port activity among ports in SFEA. An analysis is performed on the prospects of the future development plan in HCMC, reflecting the past trend and the overall cargo volume forecast. Finally, the development plan of port facilities is proposed as the master plan.

(1) 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 13.4.5.1, based on the Table 13.1.3 and 13.1.4 in Chapter 13. The commodities such as wood chip, cement and clinker, which have been handled in the specialized port, are not included in the cargo volume below.

Table 13.4.4 Cargo Distribution by Ports in the Year 2020

Port Name	Dry Cargo (x 1,000 ton)	Container Cargo (x 1,000 TEUs)
(HCMC Port Group)		
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 Phouc Container Port	800	380
Hiep Phuoc General Port	5,800	-
Sub-total	19,300	1,440
(Thi Vai – Vung Tau Port Group)		
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
Total	28,800	4,750

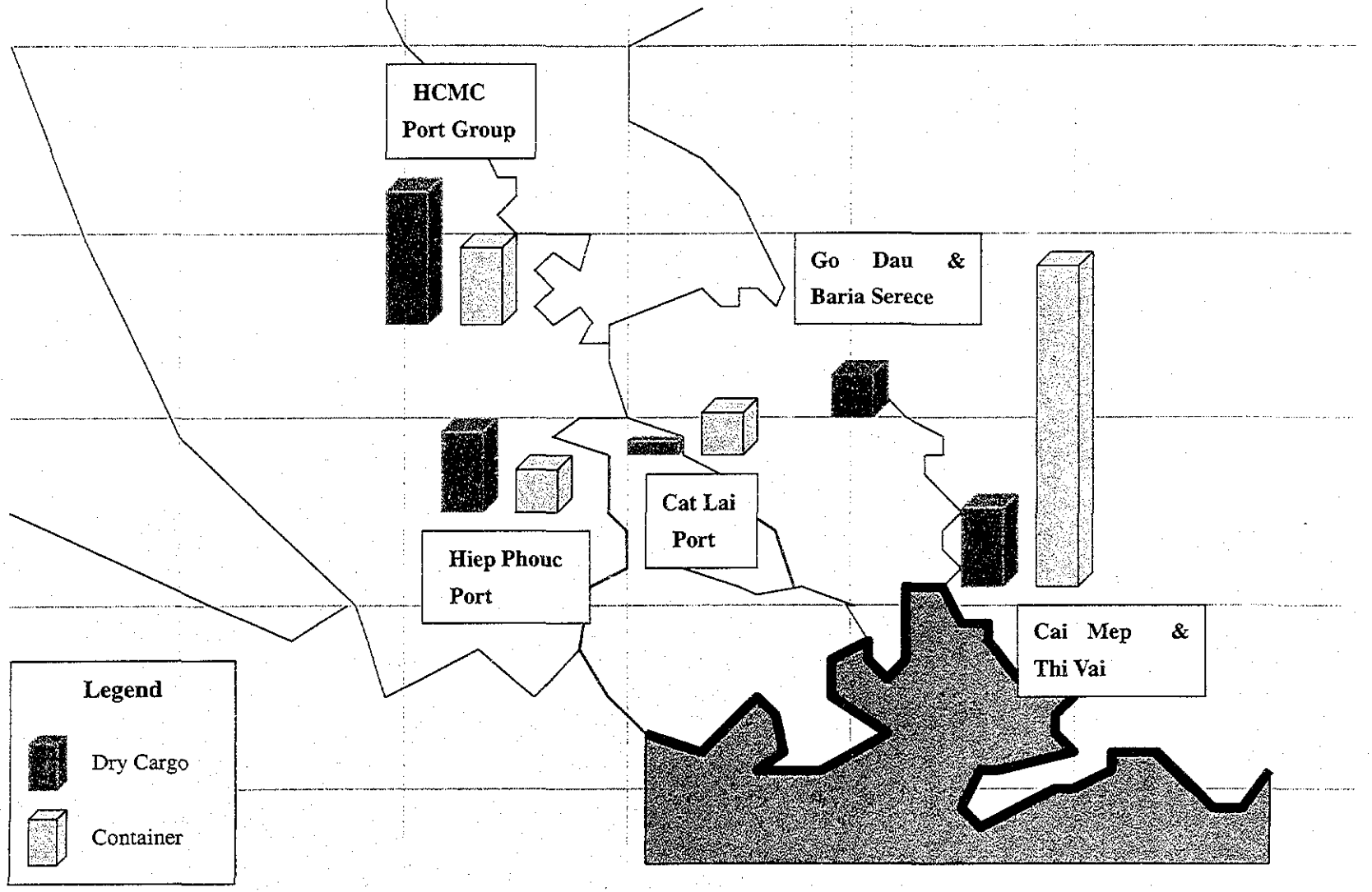
(Source: JICA Study Team)

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

- On 15th June 2000, the HCMC People's Committee issued Announcement No.62/TB-VP-CNN on the conclusion of the People's Committee at the meeting about investment projects in Cat Lai IZ, which said that 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 industrial zone with a size of 53 hectares to serve the Cat Lai IZ and the hinterland. Port construction, which is composed of 3 nos. of container berths and 2 nos. of general cargo berths, will be completed by 2010, according to the Feasibility Study on Cat Lai Industrial Zone Port by People's Committee of HCMC.
- In 1998, Sai Gon Military Port implemented the feasibility study of the 2nd phase Cat Lai Port Expansion Project to submit 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 10th 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.

Figure 13.4.2 Cargo Handling Volume by Ports at 2020



(2) Required Scale of New Ports

One of the most important factors in determining the scale of a port is the size and the number of its berths. An examination of port statistics is a first work in order to determine how much cargo will be handled on the berths under study and what was the mix of the cargo, whether predominantly general cargo in break-bulk form or a sizeable proportion of bagged goods, or increasing quantities of unitized consignments and containers which may require special facilities. In addition, a review of the statistics will allow one to determine what phase of traffic development in the general cargo zone has been reached, and whether port extension plans should provide for the construction of additional conventional general cargo berths, or a multi-purpose terminal, or whether traffic increase and technological change have been so rapid that the time is ripe for the construction of specialized terminals for containers and dry bulk cargoes.

The proposed scale under the master plan (2020) should be in accordance with the volume of cargoes handled. The port facilities necessary to handle these cargoes are determined by referring to the past performance at the existing ports.

1) General Cargo Terminal
(a) Cat Lai IZ Port
Planned mooring facilities are shown in Table 13.4.5.

Table 13.4.5 Mooring Facilities at Cat Lai Port

Planned Berth	Length (m)	Depth (m)	Objective Vessel (DWT)	Cargo Type
No.1	200	-11	20,000	General

The required number of general cargo berths is calculated based on the procedures as shown in Table 13.4.6.

Table 13.4.6 Calculation of Required Number of Berths

	Item		Unit	Calculation	General Cargo
a	Cargo Volume Handled		'000 tons		400
b	Average Cargo Volume Handled		Tons/vessel		5,000
c	Number of Vessel Calls		Calls/year	a/b	80
d	Cargo Handling Productivity		Tons/hour/vessel	40t/hx4Gx0.7	112
e	Total Berthing Hours		Hours/year	(b/d+6) x c	4,051
f	Available Hours for Using Berths		Hours/year	(24x365x0.95)hrs	8,322
g	Berth Occupancy		%	e/(f x B)	
	B (Number of Berths):	1			48.7

According to the UNCTAD Report "Port Development, a Handbook for Planners in Developing Countries", the occupancy ratio should be set so as not to exceed the following figures on ordinary berths.

Table 13.4.7 Upper Limit of Adequate BOR

Number of Berth	Upper Limit of adequate BOR (%)
1	40
2	50
3	55
4	60
5	65
6~10	70

Table 13.4.7 is referred. Considering availability for utilization of container berths (2 nos.) in the Cat Lai IZ Port, it is assumed that number of objective berths will be two (2). Therefore, one (1) berth is reasonable, judging from the berth occupancy rate of 48.7 % shown in the table.

(b) Hiep Phuoc Container Port

Planned mooring facilities are shown in Table 13.4.8.

Table 13.4.8 Mooring Facilities at Hiep Phuoc Container Port

Planned Berth	Length (m)	Depth (m)	Objective Vessel (DWT)	Cargo Type
No.1	200	-11	20,000	General
No.2	200	-11	20,000	General

The required number of general cargo berths is calculated based on the procedures as shown in Table 13.4.9.

Table 13.4.9 Calculation of Required Number of Berths

	Item		Unit	Calculation	General Cargo
a	Cargo Volume Handled		'000 tons		800
b	Average Cargo Volume Handled		Tons/vessel		5,000
c	Number of Vessel Calls		Calls/year	a/b	160
d	Cargo Handling Productivity		Tons/hour/vessel	40t/hx4Gx0.7	112
e	Total Berthing Hours		Hours/year	(b/d+6) x c	8,103
f	Available Hours for Using Berths		Hours/year	(24x365x0.95)days	8,322
g	Berth Occupancy		%	e/(f x B)	
	B (Number of Berths):	2			48.7

Table 13.4.7 is referred. Two(2) berths are reasonable, judging from the berth occupancy rate of 48.7 % shown in the table.

(c) Hiep Phuoc General Port

Planned mooring facilities are shown in Table 13.4.10.

Table 13.4.10 Mooring Facilities at Hiep Phuoc General Port

Planned Berth	Length (m)	Depth (m)	Objective Vessel (DWT)	Cargo Type
No.1	200	-11	20,000	General
No.2	200	-11	20,000	General
No.3	200	-11	20,000	General
No.4	200	-11	20,000	General
No.5	200	-11	20,000	General
No.6	200	-11	20,000	General
No.7	200	-11	20,000	General
No.8	200	-11	20,000	General
No.9	200	-11	20,000	General
No.10	200	-11	20,000	General

The required number of general cargo berths is calculated based on the procedures as shown in Table 13.4.11.

Table 13.4.11 Calculation of Required Number of Berths

	Item		Unit	Calculation	General Cargo
a	Cargo Volume Handled		'000 tons		5,800
b	Average Cargo Volume Handled		Tons/vessel		5,000
c	Number of Vessel Calls		Calls/year	a/b	1,160
d	Cargo Handling Productivity		Tons/hour/vessel	40t/hx4Gx0.7	112
e	Total Berthing Hours		Hours/year	(b/d+6) x c	58,746
f	Available Hours for Using Berths		Hours/year	(24x365x0.95)hrs	8,322
g	Berth Occupancy		%	e/(f x B)	
	B (Number of Berths):	10			70

Table 13.4.7 is referred. Ten (10) berths are reasonable, judging from the berth occupancy rate of 70 % shown in the table.

(d) Thi Vai International General Cargo Terminal (TVG)
Planned mooring facilities are shown in Table 13.4.12.

Table 13.4.12 Mooring Facilities at TVG

Planned Berth	Length (m)	Depth (m)	Objective Vessel (DWT)	Cargo Type
No.1	300	-14	50,000	General
No.2	300	-14	50,000	General
No.3	300	-14	50,000	General
No.4	300	-14	50,000	General
No.5	300	-14	50,000	General
No.6	300	-14	50,000	General

The required number of berths for TVG is calculated based on the procedures as shown in Table 13.4.13.

Table 13.4.13 Calculation of Required Number of Berths

	Item		Unit	Calculation	General Cargo
a	Cargo Volume Handled		'000 tons		5,800
b	Average Cargo Volume Handled		Tons/vessel		15,000
c	Number of Vessel Calls		Calls/year	a/b	387
d	Cargo Handling Productivity		Tons/hour/vessel	60t/hx5Gx0.7	210
e	Total Berthing Hours		Hours/year	(b/d+6) x c	29,965
f	Available Hours for Using Berths		Hours/year	(24x365x0.95)hrs	8,322
g	Berth Occupancy		%	e/(f x B)	
	B (Number of Berths):	6			60

Table 13.4.7 is referred. Six (6) berths are reasonable, judging from the berth occupancy rate of 60 % shown in the table.

2) Container Cargo Terminal

Container ships are generally 'generations' as having characteristics typical of certain stages in container development and container shipbuilding. To keep operating costs to a minimum, the maximum utilization of large modern vessels should be achieved. Thus there has been a move to reduce the number of ports of call of the mother ships and to introduce feeder vessel services to the ports with smaller volumes of trade. Feeder ships have the task of relieving the long-haul container ships from making the extra calls which greatly increase the total time they spend in ports. The major trade routes between highly industrialized countries have been containerized. At the same time, there is an increasing trend towards containerization of certain specific services linking developing and developed countries.

(a) Cat Lai IZ Port

Planned mooring facilities are shown in Table 13.4.14.

Table 13.4.14 Mooring Facilities at Cat Lai IZ Port

Planned Berth	Length (m)	Depth (m)	Objective Vessel (DWT)	Cargo Type
No.1	200	-11	20,000	Container
No.2	200	-11	20,000	Container

The required number of container cargo berths is calculated based on the procedures as shown in Table 13.4.15.

Table 13.4.15 Calculation of Required Number of Berths

	Item		Unit	Calculation	Container Cargo
a	Number of Containers		'000 TEUs		300
b	Average Cargo Volume Handled		TEUs/vessel		450
c	Number of Vessel Calls		Calls/year	a/b	667
d	Cargo Handling Productivity		TEUs/hour/vessel	35TEU/hx2Gx0.7	49
e	Total Berthing Hours		Hours/year	(b/d +4)x c	8,794
f	Available Hours for Using Berths		Hours/year	24x365x0.95hrs	8,322
g	Berth Occupancy		%	e/(f x B)	
	B (Number of Berths):	2			52.8

Two (2) berths are planned in order to cope with future demand in the Cat Lai IZ Port.

(b) Hiep Phuoc Container Port
Planned mooring facilities are shown in Table 13.4.16.

Table 13.4.16 Mooring Facilities at Hiep Phuoc Container Port

Planned Berth	Length (m)	Depth (m)	Objective Vessel (DWT)	Cargo Type
No.1	200	-11	20,000	Container
No.2	200	-11	20,000	Container
No.3	200	-11	20,000	Container

The required number of container cargo berths is calculated based on the procedures as shown in Table 13.4.17.

Table 13.4.17 Calculation of Required Number of Berths

	Item		Unit	Calculation	Container Cargo
a	Number of Containers		'000 TEUs		380
b	Average Cargo Volume Handled		TEUs/vessel		450
c	Number of Vessel Calls		Calls/year	a/b	844
d	Cargo Handling Productivity		TEUs/hour/vessel	35TEU/hx2Gx0.7	49
e	Total Berthing Hours		Hours/year	(b/d +4)x c	11,127
f	Available Hours for Using Berths		Hours/year	(24x365x0.95)hrs	8,322
g	Berth Occupancy		%	c/(f x B)	
	B (Number of Berths):	3			44.6

Three (3) berths are planned in order to cope with future demand in the Hiep Phuoc Container Port.

(c) Lower Cai Mep International Container Terminal (LCC)
Planned mooring facilities are shown in Table 13.4.18.

Table 13.4.18 Mooring Facilities at LCC

Planned Berth	Length (m)	Depth (m)	Objective Vessel (DWT)	Cargo Type
No.1	350	-16	80,000	Container
No.2	350	-16	80,000	Container
No.3	300	-14	50,000	Container
No.4	300	-14	50,000	Container
No.5	300	-14	50,000	Container
No.6	300	-14	50,000	Container

The required number of container cargo berths is calculated based on the procedures as shown in Table 13.4.19(1) and (2).

Table 13.4.19(1) Calculation of Required Number of 80,000DWT Container Berths

	Item		Unit	Calculation	Container Cargo
a	Number of Containers		'000 TEUs		1,100
b	Average Cargo Volume Handled		TEUs/vessel		2,500
c	Number of Vessel Calls		Calls/year	a/b	440
d	Cargo Handling Productivity		TEUs/hour/vessel	40TEU/hx3.5Gx0.7	98
e	Total Berthing Hours		Hours/year	(b/d +4)x c	12,984
f	Available Hours for Using Berths		Hours/year	(24x365x0.95)hrs	8,322
g	Berth Occupancy		%	e/(f x B)	
	B (Number of Berths):	2			78

Two (2) berths are planned, considering an adequate berth occupancy rate for the container cargo terminal.

Table 13.4.19(2) Calculation of Required Number of 50,000DWT Container Berths

	Item		Unit	Calculation	Container Cargo
a	Number of Containers		'000 TEUs		1,480
b	Average Cargo Volume Handled		TEUs/vessel		1,500
c	Number of Vessel Calls		Calls/year	a/b	987
d	Cargo Handling Productivity		TEUs/hour/vessel	37TEU/hx2.5Gx0.7	65
e	Total Berthing Hours		Hours/year	(b/d +4)x c	26,725
f	Available Hours for Using Berths		Hours/year	(24x365x0.95)hrs	8,322
g	Berth Occupancy		%	e/(f x B)	
	B (Number of Berths):	4			80

Four (4) berths are planned, considering an adequate berth occupancy rate for the container cargo terminal.

(c) Upper Cai Mep Container Terminal (UCC)
Planned mooring facilities are shown in Table 13.4.20.

Table 13.4.20 *Mooring Facilities at UCC*

Planned Berth	Length (m)	Depth (m)	Objective Vessel (DWT)	Cargo Type
No.1	300	-14	50,000	Container
No.2	300	-14	50,000	Container

The required number of container cargo berths is calculated based on the procedures as shown in Table 13.4.21.

Table 13.4.21 Calculation of Required Number of 50,000 DWT Container Berths

	Item		Unit	Calculation	Container Cargo
a	Number of Containers		'000 TEUs		730
b	Average Cargo Volume Handled		TEUs/vessel		1,500
c	Number of Vessel Calls		Calls/year	a/b	487
d	Cargo Handling Productivity		TEUs/hour/vessel	37TEU/hx2.5Gx0.7	65
e	Total Berthing Hours		Hours/year	(b/d +4)x c	13,186
f	Available Hours for Using Berths		Hours/year	(24x365x0.95)hrs	8,322
g	Berth Occupancy		%	e/(f x B)	
	B (Number of Berths):	2			79

Two (2) berths are planned, considering an adequate berth occupancy rate for the container cargo terminal.

3) Number of Required Berths

Number of future container berths and general cargo berths is shown in Table 13.4.22.

Table 13.4.22(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 13.4.22(2) Number of Future General Cargo 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 13.4.22(3) Number of Future Passenger Berths

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

4) Turning Basin

The size and depth of the turning basin is determined based on the size of a objective vessel for the port, as shown in Table 13.4.23.

Table 13.4.23 Turning Basin for New Ports

Port Name	Radius of Turning Basin (m)	Depth (m)
Thi Vai General Port	535	-14
Container Port(Cai Mep)	600	-16
Container Port(Ben Dinh-Sao Mai)	600	-16

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 13.4.24.

Table 13.4.24 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:

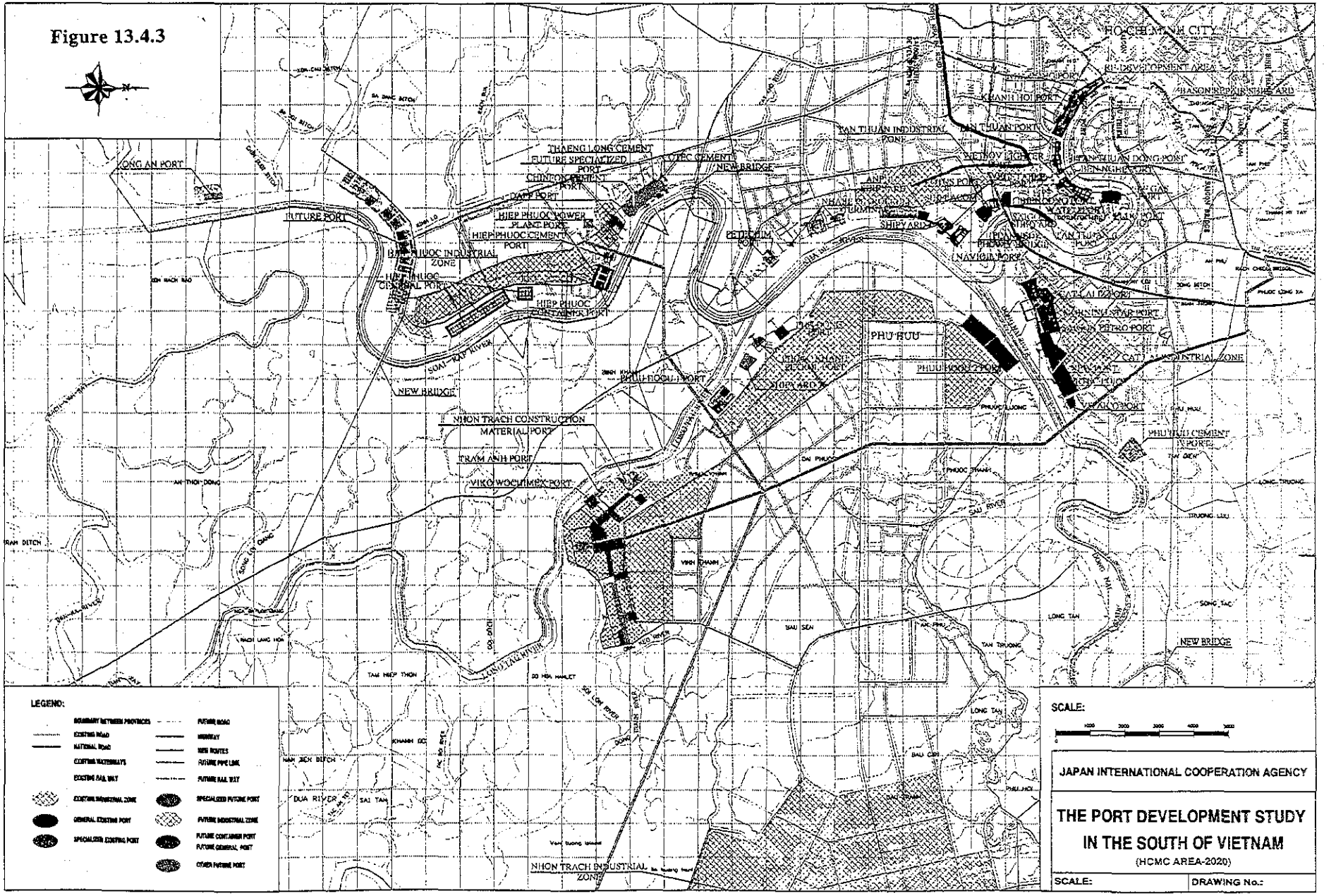
Table 13.4.25 Forecasted Vessel Traffic

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

Table 13.4.26 Channel Parameter

Traffic Way	Vessel	one	two	one	two	one	two	One	Two
DWT (container)		80,000		50,000		20,000		5,000	
LOA		300		267		174		105	
LPP		284		253		165		100	
Beam		42.8		32.2		26.5		15.8	
Draught(T)		14		12.5		9.2		5	
Basic Manoeuvring Lane		1.5	3	1.5	3	1.5	3	1.5	3
Vessel Speed (knot)	10knot	0	0	0	0	0	0	0	0
Cross wind (20sin30)	10	0.4	0.8	0.4	0.8	0.4	0.8	0.4	0.8
Cross Current (knot)	0	0	0	0	0	0	0	0	0
Longitudinal Current (knot)	4	0.2	0.4	0.2	0.4	0.2	0.4	0.2	0.4
Significant Wave Height (m)	2	0	0	0	0	0	0	0	0
Aids to Navigation	poor visibility	0.5	1	0.5	1	0.5	1	0.5	1
Bottom Surface	smooth and soft	0.1	0.2	0.1	0.2	0.1	0.2	0.1	0.2
Depth of Waterway	1.2/1.15	0.2	0.4	0.2	0.4	0.2	0.4	0.2	0.4
Cargo Hazzard Level	med	0.5	1	0.5	1	0.5	1	0.5	1
Bank Clearance	shoals	1	1	1	1	1	1	1	1
Passing Distance	mod mod	0	1.8	0	1.8	0	1.8	0	1.8
Channel With	B*	4.4	9.6	4.4	9.6	4.4	10	4.4	9.6
Channel With		188	411	142	309	117	254	70	152
Vietnamese Standard				134	266	106	209		
PIANC Standard		190	420	150	310	120	260	70	160
Japanese Standard	1L, 1.5L	300	450	270	400	180	270	110	160
Raduius of Turn	4LPP20d1.5	1,136	0	1,012		660		400	
Width of Swept Track	1.7B	73	146	55	109	45	90	27	54

Figure 13.4.3


HO CHI MINH CITY
LONG AN PORT
FUTURE PORT
THAENG LONG CEMENT FUTURE SPECIALIZED PORT
CHINFON CEMENT PORT
DAFF PORT
HIEP PHUOC POWER PLANT PORT
HIEP PHUOC CEMENT PORT
HIEP PHUOC INDUSTRIAL ZONE
HIEP PHUOC CENTRAL PORT
HIEP PHUOC CONTAINER PORT
NEW BRIDGE
NHON TRACH CONSTRUCTION MATERIAL PORT
TRAM ANH PORT
VIKO WOOTIMEX PORT
NHON TRACH INDUSTRIAL ZONE
TAN THUAN INDUSTRIAL PORT
TAN THUAN PORT
KHANH HOI PORT
PHU HUU
PHU HUU CEMENT PORT
CAT LAI INDUSTRIAL ZONE
LEGEND:
SCALE:
JAPAN INTERNATIONAL COOPERATION AGENCY
THE PORT DEVELOPMENT STUDY IN THE SOUTH OF VIETNAM
(HCMC AREA-2020)
SCALE:
DRAWING No.:

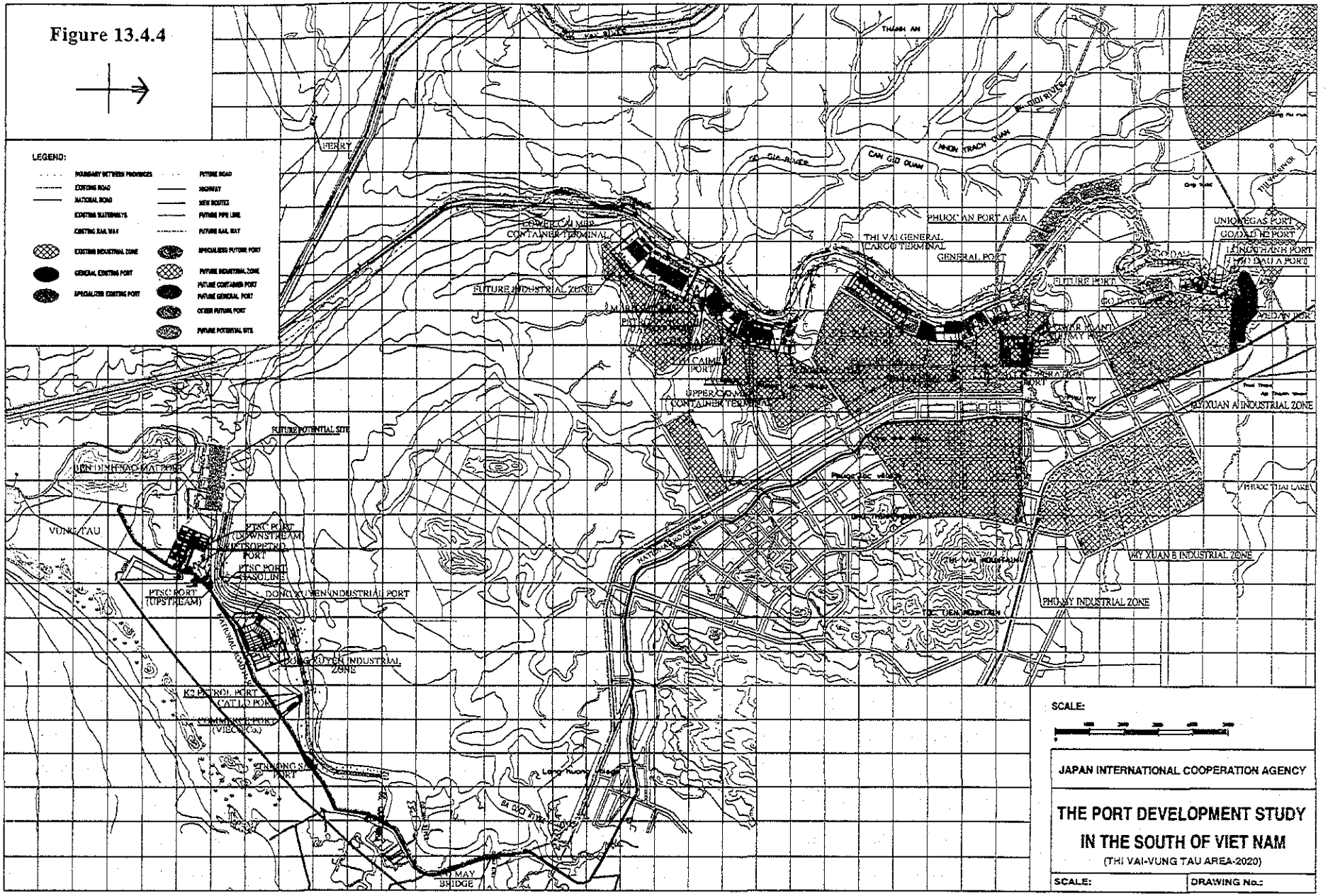


Figure 13.4.4
LEGEND:
PHUOC AN PORT AREA
THI VAI GENERAL CARGO TERMINAL
GENERAL PORT
FUTURE PORT
FUTURE INDUSTRIAL ZONE
FUTURE POTENTIAL SITE
CAI MEP PORT
PTSC PORT (DOWNSTREAM)
PETROPETRO PORT
PTSC PORT GASOLINE
PTSC PORT (UPSTREAM)
DONG XUYEN INDUSTRIAL PORT
DONG XUYEN INDUSTRIAL ZONE
KO PETROL PORT
CAT LO PORT
THI VAI MOUNTAIN
PHU MY INDUSTRIAL ZONE
MY XUAN B INDUSTRIAL ZONE
PHUOC THAI LAKE
VUNG TAU
SCALE:
JAPAN INTERNATIONAL COOPERATION AGENCY
THE PORT DEVELOPMENT STUDY
IN THE SOUTH OF VIET NAM
(THI VAI-VUNG TAU AREA-2020)
SCALE:
DRAWING No.:

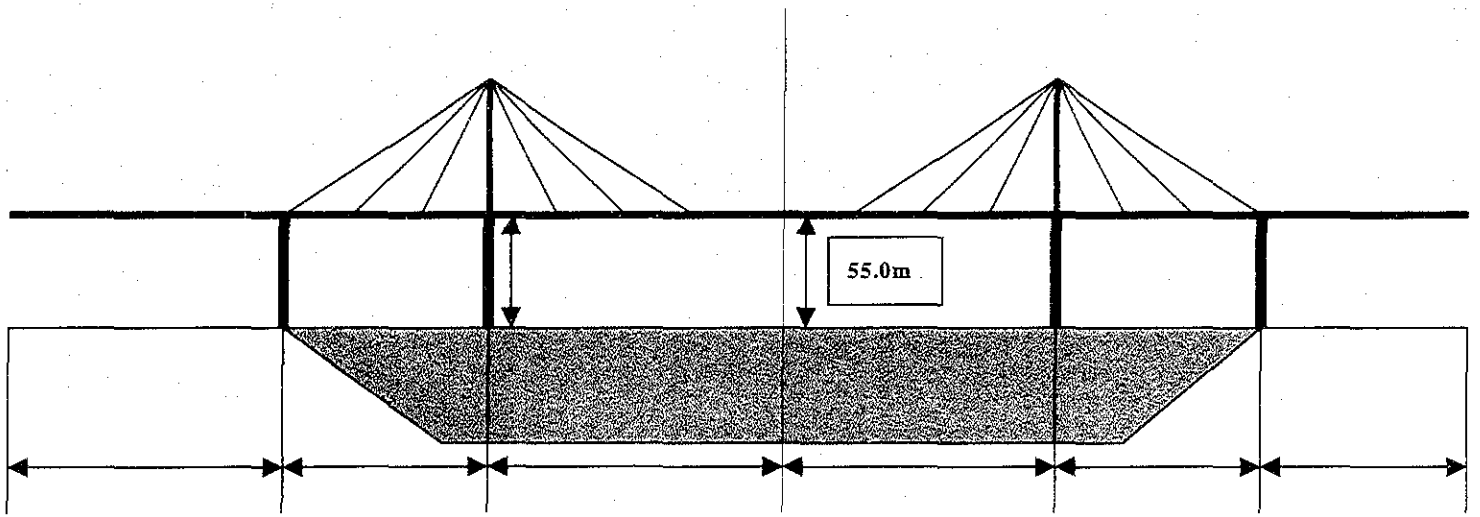


Fig 13.4.5 Under Clearance of Bridges over the Main Channel

13.4.6 Transportation System up to the Target Year

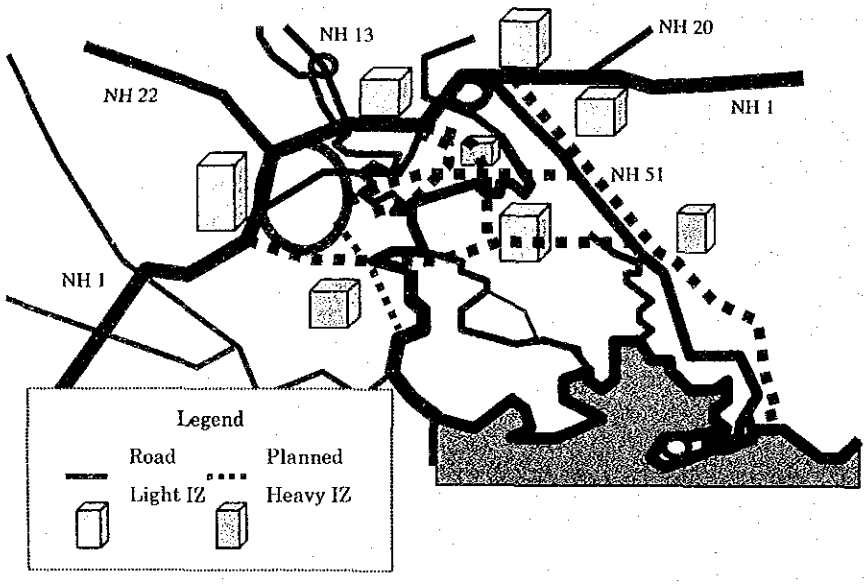
The main transportation networks in the southern Vietnam consist of roads and waterways. In parallel with the development of urban areas and establishment of industrial zones in SFEA, the major transportation networks have been planned as priority projects to form the artery of commodity circulations.

(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.

National highway No. 1 (NH 1) which is the trunk route in SFEA connects with NH 51 in Bien Hoa City. NH 1 linking with other major national highways such as NH 13, NH 20 and NH 22 in the outskirts of HCMC functions as the artery of cargoes transportation between ports in Thi Vai River and SFEA, Mekong Delta, Central Highland as well as Cambodia. (See the Figure 13.4.6).

Figure 13.4.6 Major Road Network in SFEA



The East-West Expressway planned to traverse HCMC from the east to the west via Thu Thiem tunnel (6 lanes) that runs under Saigon River is now at the initial stage of construction. This expressway, planned to be completed in 2004, with the road widths of 45m, 60m and 100m is expected to ease the traffic congestion in the city and to help the flow of cargoes between HCMC and ports in Thi Vai River.

A Korean enterprise once planned to construct HCMC - Vung Tau Expressway to link HCMC with Baria - Vung Tau under BOT scheme. But, the enterprise declined to pursue the project due to their financial difficulties caused by the Asian economic crisis. This Expressway is expected to contribute

not only to the mitigation of traffic congestion on NH 1 but also to the regional economic development because it will connect HCMC with Dong Nai and Baria - Vung Tau provinces by a short-cut route. Especially the early completion of the portion between District 2 in HCMC and the connecting point with NH 51 in Dong Nai province will much contribute to the speedy transportation between Thi Vai areas, Dong Nai province and HCMC.
Both provincial governments of HCMC and Dong Nai are planning to connect this expressway with the existing NH 51 as a top priority project in their transport sector by 2005.

Nguyen Van Linh Highway (NVLH or Saigon South Parkway, 17.8km) is the artery of new urban development in Saigon South. NVLH has already been opened to the traffic in the full route although most of the route have not the designed width of 6 lanes. And it will take at least several years to develop the vast areas along NVLH where marshlands and paddy fields still remain.

HCMC government is now planning to construct a bridge (Phu My Bridge) across Saigon River that connects Saigon South and District 2. This bridge designed as a suspension bridge with a 55m clearance (alternative design: 42m) will link NVLH and the East - West Expressway in District 2. The construction work will be done under BOT scheme and is planned to be completed in 2006.
After the completion of this bridge, this VNLH will function as another vital route to traverse HCMC besides East-West Expressway. VNLH 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.

New provincial road No.34, which is the relocation road of the existing one, will connect NVLH and East-West Expressway with Hiep Phuoc Industrial Zone in the south of HCMC. Provincial government of HCMC has already started the construction work of some bridges in the route and plans to complete the route as a priority project by 2005. Hiep Phuoc IZ planned to specialized in heavy industry on a 2,000ha site is one component of the Saigon South Development Plan.

Another 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.

In case a deep-water port is constructed along Thi Vai River, access road between the port and NH 51 is required. In Phu My area, the distance will be 3km and in Cai Mep area, it will be 9km. Both areas are newly developed areas or under-developed areas so that the construction work will be easily executed from the social aspect.
In the case of Ben Dinh-Sao Mai area, the distance will also be 3km. However, the construction work of access road may require the resettlement of a considerable number of residents and the frequent traffic of heavy vehicles may adversely affect the tourism industry in the adjacent areas.

In Mekong Delta, National Highway No. 1 has been upgraded by the World Bank finance in the section of HCMC - Can Tho - My Xuyen - Ca Mau - Nam Cam, and will be completed in 2005. And Can Tho Bridge by the JBIC finance is also planned to be completed in 2004. Upgrading or rehabilitation works of other major national highways such as NH 22, NH 1 in Central Region and

HCM Highway leading to SFEA are also under way.

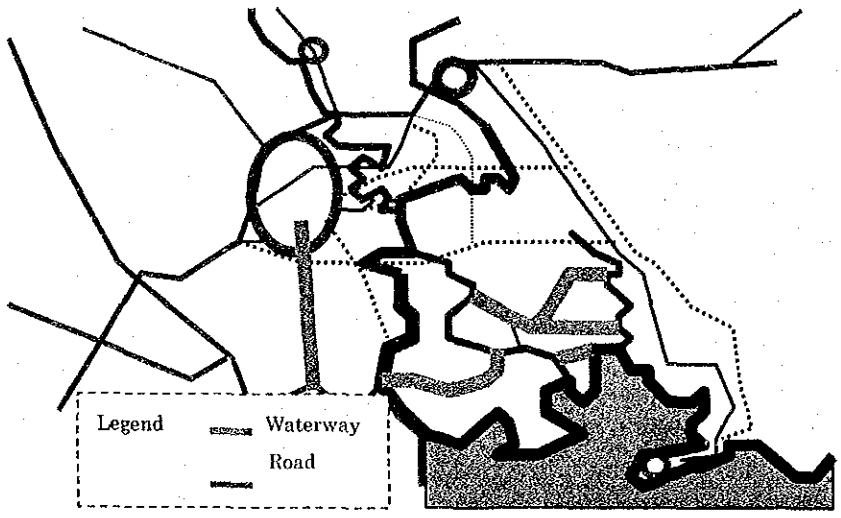
(2) Inland Waterway

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 (See Tables A13.4.6-1, A13.4.6-2 in the appendices).

There are two trunk routes of inland waterways to link HCMC and Mekong Delta. One is HCMC - Long Xuyen - Kien Luong route (318km), and the other one is HCMC - Can Tho - Ca Mau route (330km). Currently, a project to upgrade and rehabilitate the waterways in Mekong Delta is progressing under World Bank financing. This project aims to develop Can Tho City as a core of the transportation networks in the Delta in order to mitigate the over-concentration of cargoes to HCMC. Under the project, the two trunk routes and Can Tho port will be improved to shorten the navigation time between the destinations, and Bassac River mouth will be dredged to let 10,000DWT vessels navigate down to the sea and up to Phnom Penh in Cambodia by 2010.

Can Giuoc River connects HCMC and Mekong Delta via Rach Cat River near the mouth of Soi Rap River (See the Figure 13.4.7). 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. The details of the project is shown in the appendices (See the Table A13.4.6)

Figure 13.4.7 Inland Waterway in SFEA



Four routes of inland waterways have been established between Soi Rap River and Thi Vai River(See the Figure 13.4.7). 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 to provide navigation aids by 2010.

(3) Railway

Only the Reunification Line between the north and the south is the 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.
After the completion of these railway networks in the region, they 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 cargoe 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 its' 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

a) Objective

In order to ease the notorious 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 13.4.8)

b) Facilities

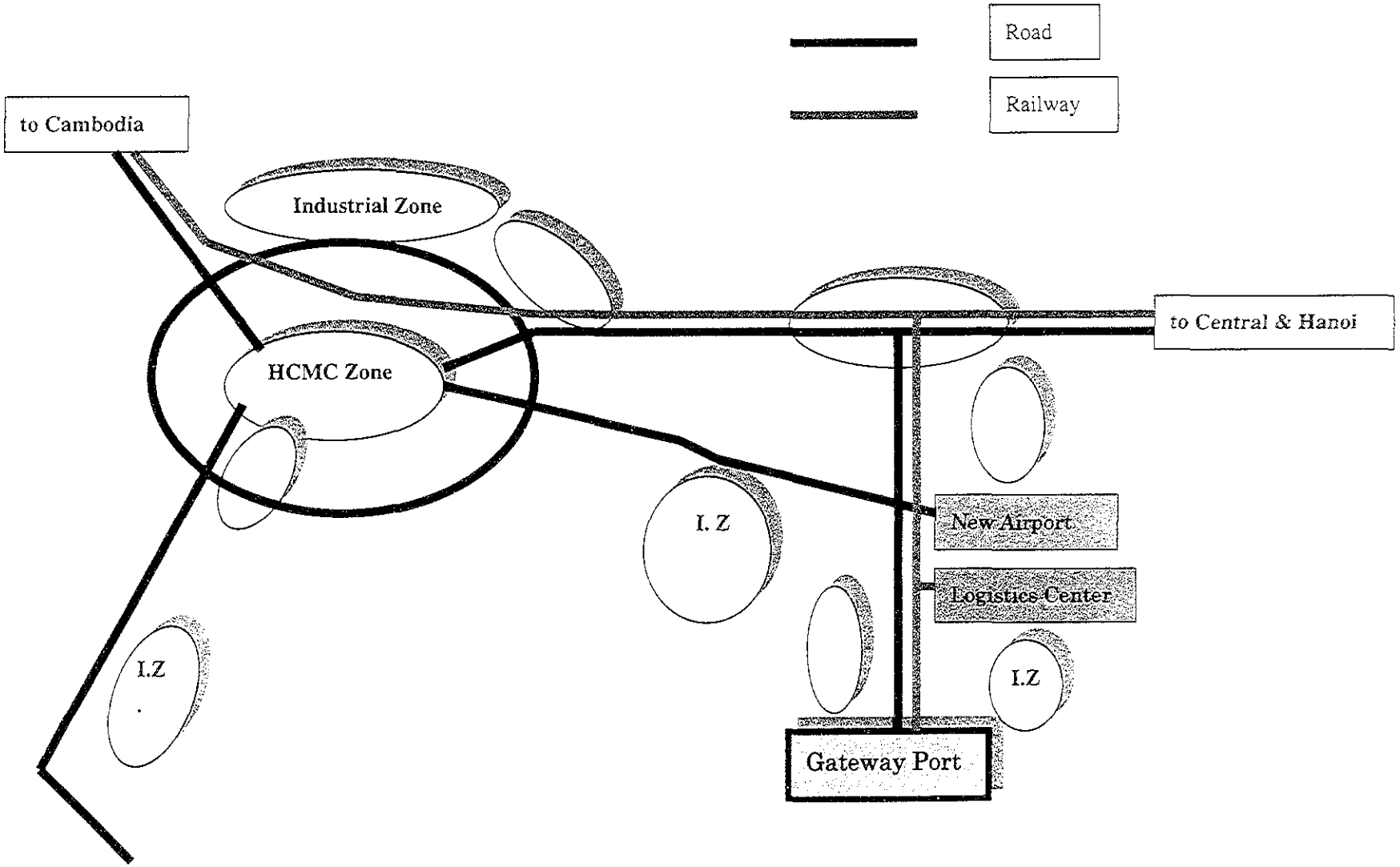
The ICD/freight terminal will have container depots furnished with a container freight station, a container yard, a work shop, a office building, parking spaces etc. Railways should be laid inside the freight terminal in order to link to the new port as a supporting transportation system besides road transportation.
It is recommended that project implementation and management for the freight terminal be assigned to the Vietnam National Railways (Vinarail) due to its public interest.

Advantages of the ICD/freight terminal are as follows:
- Cost and time saving for long-distance cargoes,
- One stop service (customs formalities, cargo delivery etc),
-All devanning requirements for both LCL and FCL can be accommodated,
- Dangerous and chemical cargoes can be accommodated,
- Better cargo handling through own operation and control, assuring efficient and economical delivery, in case that the freight station is operated by private sector.

c) Overall Strategy

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 13.4.8 Transportation System in the South of Vietnam



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 13.4.9 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 to116 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 temporally. It is recommended to use temporally the existing berth for the cruise demand under redevelopment works period.

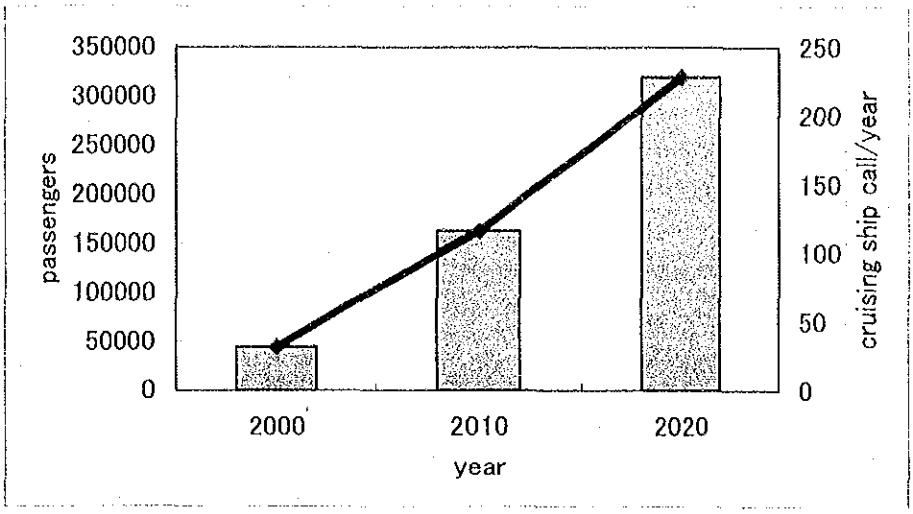


Figure 13.4.10 Demand Forecast for Cruise Passenger and Ship Call

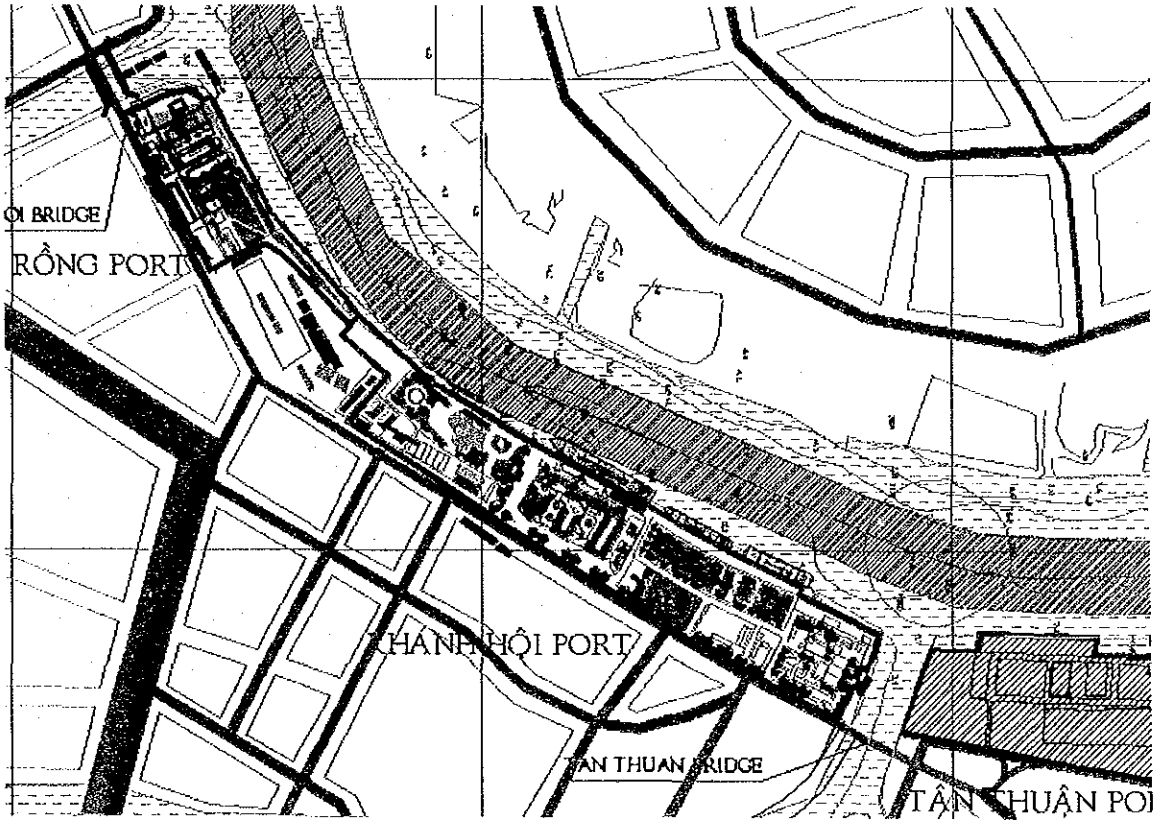


Figure13.4.11 Nha Rong and Khan Hoi Terminal Area in 2020

(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. Fort this port redevelopment, **6 new berths** need to be developed in the Cat Lai and Soai Rap Area.

Table 13.4.27 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 down stream 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.

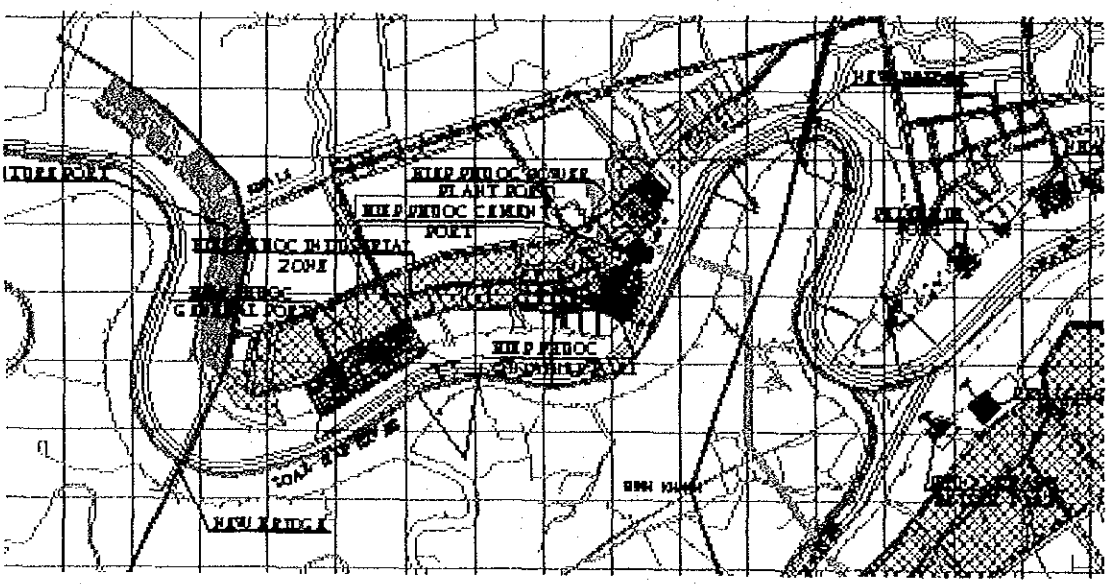


Figure 13.4.12 Hiep Phuoc Port in 2020

(5) Main Issues 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

14.1 Terminal Operation

In the target year, 2020, improved existing ports and new modern ports will be well balanced. Existing ports except VICT will still continue multi-purpose system and new modern ports could be transitionally constructed from small to large scale as special ports with the increase of cargo volume year by year to the target year. The Study is examined about terminal operations for the target year with existing and future modernized special ports separately.

14.1.1 Existing Ports

As mentioned before, the most rigid bottleneck for cargo transportation to / from ports comes from heavy traffics in HCMC. Therefore, in the future, not only road infrastructure, but also port transfer to other appropriate areas such as Cat Lai and Hiep Phuoc would be considered to resolve the bottleneck and to transform HCMC into a modern and beautiful town. No matter how such port relocation will happen, basic operation system for the existing ports will not be changed.

(1) Necessary Measures to Achieve the Targeted Productivity

In order to improve cargo-handling productivity and accept increasing cargo up to their maximum port capacities, the basic common measures from the point of view of terminal operation and facilities are as follows.

1) To use existing port area more efficiently
   - To segregate cargo-stacking area by kind of cargoes such as same lot of cargo, import and export cargo
   - To consider distance between berth and yard for cargoes to be stacked: for instance, export cargo shall be stacked near berth, and import and long staying cargoes may be far from berth.
   - To use idle area in port effectively, if any.
2) To improve cargo handling productivity on ship and in cargo stacking area.
   - For general cargo operation
     ① Bagged cargoes shall be palletized and / or containerized.
     ② In case of ship operation, cargoes shall be directly delivered and loaded on / from truckand ship as much as possible to decrease the times of cargo-handling and dwelling time.
     ③ To use more cargo operation tools such as portable aluminum conveyor with roller for bagged cargoes, forklift, etc.
     ④ Steel product such as steel angles and pipes in bulk for import shall be bundled and pre-slinged in loading port, if possible, to make high productivity for discharging operation.
   - For container operation
     ① To increase or introduce number of container equipment, especially RTG and quayside container crane in order to use container yard efficiently and improve handling productivity. The cost of the installation of quayside container crane including

rehabilitation of existing pier must be very high. Then anticipated increasing cost and benefit by introducing crane shall be deeply considered.

② To reduce container dwelling time in port, for instance, by means of additional charge for long staying container except a port like Ben Nhge Port as a Entrepot Port.

3) To convert general cargo stacking yard including warehouse and shed into container yard, because considerable volume of general cargoes for import and export will be containerized in the near future.

4) To decrease cargo dwelling time in port for every cargoes.
Provided a port could reduce cargo dwelling time in the port by half, the port capacity would become twice of the previous one as far as cargo capacity in the port concerned.

5) To minimize the breakdown time of cargo handling operation and avoid unforeseen accident during operation, periodical inspection and maintenance of cargo equipment, cargo slings and other handling apparatus must be carried out.

(2) Introduction of Advanced Technology including Computer System

1) Rationalization by computer
In case of conventional terminal, there would not be specially advanced technology and would be only the improvement of present cargo handling system. But in addition to the above-mentioned measures to improve cargo-handling productivity, further utilization of computer shall be required like the following items.

+Identification of all cargoes by import, export and domestic
+Consignee or consigner, details of cargo and scheduled shipment / delivery
+The position of cargo stockyard
+The time when cargo stowed in yard and taken out from the yard (how long cargo stayed in port)
+Custom clearance of cargo
+Result of cargo handling operation in the yard and on ship (productivity, idle time for operation)
+Calling ship movement record
+Statistic of the above record

As a result of the statistics, port management shall analyze the data and improve operation for coming generation.

2) Introduction of EDI system

Even multi-purpose ports, EDI system for container shall be introduced, which will improve vessel's handling and container yard operation, and cargo flow by linking with custom office, shipping lines, etc. Duration on custom clearance for import and export cargo is a bottleneck for cargo flow. It is one of the most important factors for cargo flow to improve custom clearance system by means of EDI.

(3) Others
Maintenance system of terminal equipment is mentioned in 14.1.2.

14.1.2 Future Modern Ports

Future ports to cope with increasing cargo volume in the target year shall be specialized to handle container, general cargo and bulk cargo exclusively to operate port (terminal) effectively.

Terminal operation shall be considered about the following principles: ①Simplicity, ②Safety, ③ Flexibility,④Efficiency, ⑤Cost-effectiveness, ⑥Selectivity, ⑦Land Availability, ⑧Handling Ability, ⑨Stowage Capacity, ⑩Terminal Productivity

(1) Basic Plan of Future Container Terminal

1) Scale of Berth, Yard and Handling Capacity

① 80,000 DWT Class Berth (Vessel's LOA: 300m, Breadth: 42.8m and Draft: 14.0m)

- Length of berth: 350m and depth: -16 m
- Yard depth (width): 650m and berth width (apron) in case of detached pier: 60m (span of quayside container crane and back space) and two (2) bridges for each berth and width: 30m
- Number of ground slots: about 4,200 TEUs
- Maximum Handling Capacity 500,000 to 550,000 TEUs / year (Container @ 3 tier stacks and dwelling time @ 6 days)

② 50,000 DWT Class Berth (Vessel's LOA 265m Breadth 32m Draft 13m)

- Length of berth: 300m and depth: -14 to 15m
- Yard depth: 550m and berth width (apron) in case of detached pier: 50m and two (2) bridges each berth and width: 20m
- Number of ground slots about 2,800 TEUs
- Maximum Handling Capacity 350,000 to 370,000TEUs / year (Container @ 3 tier stacks and dwelling time @ 6 days)

③ 20,000 DWT Class Berth (Vessel's LOA 174m Breadth 26.5m Draft 9.2m)

- Length of berth: 200m and depth: -11m
- Yard depth: 350m and apron 30 to 40m
- Number of ground slots about 950 TEUs
- Maximum Handling Capacity 150,000 to 160,000TEUs / year (Container @ 3 tier stacks and dwelling time @ 6 days)

2) Container Operation System

① Combined operation system with transfer crane (Rubber tyred gantry crane) and tractor with chassis shall be introduced from the following viewpoints.

- To minimize work force
- To utilize space efficiently
- To make container operation safely
- To minimize maintenance cost of container and equipment

② Vessel should make fast to berth on the same side (in case of river side, vessel direction should be head in), because all container on board vessel will load the door after and yard container must be placed to same direction. If container is placed on the yard at random direction, the flow of tractor to take container will be into disorder.

③ Flow of tractor with chassis operation in the yard must always be same circulation from a safe operational point of view.

④ Due to river current, vessel will sometimes come alongside to berth on her opposite side. To return the flow to the original circulation, a special adjusting road space (the width: about 15 to 20m) for yard tractor with chassis may be prepared.

3) Terminal Facilities

① Following facilities are required: Main Gate, Container Gate, Administration Office, Amenity Block with parking, Container Freight Station, Container Equipment Yard, Maintenance Shop, Power Station, Water Supplying Facility, Fuel Station, Container Washing Area, Reefer Plug / Reefer Monitoring Stand, Weighbridge, Terminal Fence, etc.

② In case of one operator with more than two continuous terminals, some of facilities will be commonly used such as Administration Office, Amenity Block , Container Freight Station and maintenance shop.

4) Equipment

① Quayside container crane: Two (2) to three (3) units for each berth, Post-Panamax. Crane for 80,000 DWT Berth and Panamax. Crane for 50,000 DWT Berth

② Rubber Tyred Gantry Crane (RTG): (Four (4) stacks and one (1) over, and six(6) lanes for stacking containers, and also one lane for tractor traffic within its span): 15 to 18 units for each terminal.

③ Yard Tractor / Chassis for 40 footer: 30 to 35 units for each terminal

④ Other equipment: Side lifter, Top Lifter, Reach Stacker, Fork Lift, Mobile Crane, etc.

5) Computer System

As well as the promotion of quick delivery of container and paperless system of container documentation by means of EDI, a new vessel / yard operation system by using GPS shall be introduced here.

① Real and accurate position of handling equipment and containers can be traced by host computer connected with GPS Station in the terminal.

② Vessel container operation, yard decking operation, container delivery operation can be executed by a branch computer of on-line system.

③ This system has a merit to get accurate and real data immediately.

④ For the target year, it may be used for new modern terminal operation.

6) Maintenance System of Terminal Operation

It is futile and in vain for improvement of cargo handling efficiency and safe operation for workers that breakdown of equipment suspend cargo operation. The following issues are necessary countermeasures as terminal management against the breakdown of cargo handling equipment.

a. Fostering and training service engineers

Each terminal shall prepare service engineers to keep sound conditions of equipment. Equipment supplier will usually provide the training and education about the maintenance of them.

b. Preparation of Maintenance Shop

c. Periodical Inspection of Equipment (daily and periodical inspection)

For instance: Daily Inspection of gantry crane as follows:

Table 14.1 An Example of Check List for Container Equipment

	Item	Condition		Item	Condition
1	Engine				
	(1) Fuel Oil Tank	Supply oil		(5) State of engine	Sound ,etc.
	(2) Engine Oil Pan	Oil level/Dirty oil		(6) Exhaust gas	Function Check
	(3) Radiator (Cooling water)	Supply water		(7) Low and high speed	Function Check
	(4) Fan belt	Tension and Damage			
2	Electric Apparatus				
	(1) Battery liquid	Specific Gravity		(5) Alarm	Function Check
	(2) Dynamo, magnetic switch	Charging Function Check		(6) Instrument	Indicator Check
	(3) Each light	Function Check		(7) Each Switch	Function Check
	(4) Direction light	Function Check			
	Item	Condition			
3	Transmission	Condition check of transmission, propeller shaft and lub. oil			
4	Wheel/Suspension	Condition check of wheel, suspension, etc.			
5	Handle	Condition check handle slack and hardness, etc.			
6	Braking System	Check of air pressure, etc.			
7	Operation System	Check of operation lever, handle, gauge, back mirror, etc.			
8	Handling System	Function check of hoist, side shift, twist lock, kick out, etc.			
9	Air system	Check of air tank, air horn, air pressure, etc.			
10	Body	Check of leaking oil, air, water and safe condition			

d. Equipment Management System and Increase of Operation Ratio of Equipment

Equipment maintenance management should prepare the inventory of spare parts and control optimum number of spare parts by computer, keeping close relationship with equipment makers. It is the most important management that each equipment and its spare parts are duly controlled by computer and then operation ratio is greatly improved by analyzing the result and decreasing times of breakdown.

(2) General Cargo Terminals (Multi-Purpose Terminals)

1) Break Bulk Cargoes

In the target year, kind of main cargoes for multi-purpose vessels will be non-containerized cargo (unable to put in container) such as steel products (pipes and angles), machines, construction materials etc. and bagged cargo such as rice, flour, coffee, fertilizer, grain, etc. But almost bagged cargo can be containerized. On the other hand, clean bulk cargo such as fertilizer will be packed in bags at the terminal on consignee's request after discharged it in bulk. Therefore basic operation system will not change compared with the existing general ports as mentioned in the above Item.

2) Dry Bulk Cargoes

Dry bulk cargo terminals shall be separated dirty bulk cargo like coal, cupper, phosphate, and other mining products, from clean bulk cargo like fertilizer, rice, coffee, flour, other agriculture products, etc.

Small amount of clean bulk cargo will be handled at multi-purpose ports with general cargo, but large amount of bulk cargo (more than 10,000 tons per load) shall be handled at a specialized terminal. The terminal including dirty bulk cargo usually handles import cargo or export cargo individually. The followings are a kind of typical specialized bulk terminal for common users.

① Clean Dry Bulk Terminal for import

- A few units of rail-mounted overhead unloader grabbing cranes or pneumatic unloaders (extractors) per berth will be installed on quayside.
- Airtight hoses with pneumatic unloaders or hoppers with cranes to receive cargo discharged from vessel will connect with covered belt conveyor to vertical silos with weighing and distribution tower or bulk warehouses. The silos or warehouses stock cargo until cargo delivery to consignees.
- A special attention shall be paid for the contamination of different cargoes for operation.

② Dirty Dry Bulk Terminal for import

- A few units of rail mounted overhead unloader grabbing cranes per berth will be installed. And the cranes will usually equip water sprinkler to protect emission of cargo.
- Hoppers with cranes will connect with open belt conveyor to open stockyards.
- There are a number of stackers / reclaimers in the stockyard to stow bulk cargoes.
- Road vehicles or rail trains led in the yard will be used for delivery of cargoes.
-

3) Basic Plan of General Cargo Terminal (Multi-purpose Terminal)

① 50,000 DWT Class Berth (Vessel's LOA: 212m, Breadth: 32.2.8m and Draft: 12.6m)

- Length of berth: 300m and depth: -14 m
- Terminal depth (width): 450m
- Maximum Handling Capacity 600,000 to 1,000,000 tons / year (cargo dwelling time @ 20 days)

② 20,000 DWT Class Berth (Vessel's LOA 166m Breadth 24.5m Draft 10.0m)

- Length of berth: 200m and depth: -11m
- Yard depth(width): 250m and berth width apron in case of detached pier :30 to 40m and two bridges for each berth with length of 60 to 70m and the width of 20m
- Maximum Handling Capacity 400,000 to 500,000 tons / year (cargo dwelling time @ 15 days)

③ Facilities

Following facilities are required: Warehouses, Transit Sheds, Open Yard, Administration Office, Amenity Block, Gate, Power Station, Lighting Tower and so on.

④ Numerous Equipment

Detailed equipment for general cargo terminal is mentioned in Chapter 26.

14.2 Channel Operation

Necessary factors for the study of channel operation might consist of the following issues which shall be managed by competent authorities concerned.
(1) Determination of channel depth and width for required maximum size of vessel
(2) Installation of aids to navigation
(3) Natural condition such as current and wind force/direction
(4) Maintenance of water depth, width and aids to navigation in the channel
(5) Management of vessel movement in port and channel (Establishment of VTS)
(6) Capacity of channel for vessel traffic

14.2.1 West Bound Channel Operation of the SFEA Waters

(1) Sai Gon River Channel

1) Capacity of the channel
The Sai Gon River is presently the most important channel for vessel traffic operation because 70 percent of number of calling vessels in the SFEA ports came to HCMC ports in 2000. Some of called vessels to these ports made second or third call to another port in the area, according to the statistics by each port. The movement of vessels in Sai Gon River Channel might be very complicated. The regulation stipulates about the channel control as follows:

4) Navigation restriction in the turning basins of the Sai Gon River Channel for vessels to come through the channel (There are four tuning basins in the channel). (Regulation of Sai Gon Sea Port, Article 12 & 13)
5) Speed restriction (5 to 6 knots) of vessel in the channel. (The regulation, Article 11)

Therefore vessels, which call HCMC ports, shall be required to wait somewhere or adjust speed when other vessels are berthing, unberthing, and coming in or through turning basins.

Study Team examines possible vessel traffic capacity through the Sai Gon River Channel in case of both vessel arrival at regular interval and at random. (See Appendix A14)

As a result, ① In case of vessel coming in the channel with regular interval, more than 11 thousand vessels a year can come through the channel without waiting. ② In case of random distribution, some number of vessels will , of course, wait at berth and in the channel or adjust speed.

As far as the capacity of the Sai Gon River Channel, about 10 thousand calling vessels (20 thousand vessels in and out) could be maximum capacity under the condition that competent authority can control vessel movement in the channel.
As mentioned in Chapter 10, the capacity of Long Tau River Channel is about 20 thousand vessels (in and out). In conclusion, the channel capacity between Vung Tau and HCMC ports might be about 20 thousand vessels, provided VTS could provide appropriate management.

In the target year, vessel traffic Sai Gon River Channel is expected to become smoother flow with

VTS as some of HCMC Ports will be relocated to Cat Lai and or Heip Phuoc Areas.

2) Channel Operation for the target year

① Existing turning basins for major ports should be transferred to the front of the ports and existing mooring buoys and other obstacles adjacent the basins be withdrew to make them clear.

② Control center of VTS (VTS Station) shall surveille and control vessel movement in the channel for vessel not to meet each other at the turning basin and channel bent.

③ The control center shall announce the information to every vessels concerned about necessary notices, large vessel movement and so on by VHF Channel 16.

(2) Soai Rap River Channel

The Study Team investigated the Soai Rap River Channel by boarding the boat of Sai Gon Port Authority on Oct. 28, 2001 and verified that navigational aids such as light buoys and beacons were strictly installed in the channel up to Latitude 10° 38'North from Pointe du Lazaret, the confluence of the Long Tau River and Soai Rap River to Hiep Phuoc. The buoys are marked remarkably with painted number from No. one (1) to 12 (stipulated in the Government Decree No. 24/2001/ND-cp). Therefore the channel will be safely navigable until Hiep Phuoc Ports. But the channel from the entrance (mouth) of the Soai Rap River to Latitude 10° 38'North is not safely navigable because navigational aids are not reliable though they are existing somewhere, but very old and not marked.

In conclusion

1) Soai Rap River channel can be used for vessel navigation northward from Latitude 10° 38' North. Therefore all vessels (5,000 to 20,000 DWT) coming to Hiep Phuoc Ports shall transit the confluence between Long Tau River and Soai Rap River. In this case, an attention should be paid for air clearance, 33m (+safe clearance 2m) of power cable crossing the channel.

2) The channel from the mouth of the river to Latitude 10° 38' North cannot be used at this moment. But according to the latest survey in 1999, the minimum channel depth is more than –5m above CDL. On the other hand, the channel configuration is relatively straight and wide for navigation. But it is said that in the bank of the river (in Ganh Rai Bay) numerous fish traps and stakes exist, and the depth is not stable. Therefore, provided that condition of the channel will be prepared for vessel traffic, especially installation of aids to navigation, completion of depth survey over the channel, and strict survey for siltation and current of the bank, this channel will become to be useful for vessel navigation through the channel up to HCMC ports.

   The required minimum width of the channel for two (2) ways: 150m
   Maximum size of vessel: 5,000 DWT, LOA 105m, Breadth 15.8m, Draft 5.0m (to be used for tide)

3) The distance to HCMC ports from the mouth buoy of Soai Rap River Channel and from Vung Tau Pilot Station through Long Tau River Channel is not very different (Soai Rap River Channel is about one mile shorter than Long Tau River). But the distance between the mouth buoy of Soai Rap River and Vung Tau pilot station is about 16 miles. Apart from vessels which

do not require pilots, all foreign vessels, regardless of size, and Vietnamese sea-going vessels, which is more than 2,000 GRT must come to Vung Tau Pilot Station to pick up pilot, when the vessels go through Soai Rap River Channel. Then in the target year, pilot station boat shall be prepared at the mouth buoy of Soai Rap River Channel when the channel will be ready for navigation and many vessels require for pilots to pass through the channel.

(3) Long Tau River Channel

1) The channel is narrow and has many bents. Then there is a plan to make separation zone to divide the main channel into Long Tau River Channel and Dua River Channel. Dua River Channel (five (5) miles in length) installing navigational aids is six (6) miles shorter than the main channel (Long Tau River) and currently used for small vessel transportation such as Jet-Foil between Vung Tau and HCMC. But the upper stream part of Dua River (An Thit to Pointe du Lombard) is very narrow and shallow. It will be too narrow to use the channel for large vessel navigation (20,000DWT) and then required to widen and deepen, that the main channel will become shallow and cause environmental destruction. Therefore separation zone system will not be recommended. For the target year, present navigation system shall be maintained.
2) VTS Station shall manage vessel movement not to meet vessels each other at bent channel.
3) VTS Station shall manage vessel movement not to meet each other at the confluence of Nha Be, Long Tau and Soai Rap River Channel.

14.2.2 East Bound Channel Operation of the SFEA Waters

Number of ship-calls in 2000 was about 2 thousand in the ports of Thi Vai River and Vung Tau, which shares 30 percent out of all SFEA ports. Then vessel traffic management in these waters has been made by manual under the control of Pilot Enterprise following to the jurisdiction of Port Authorities concerned (Vung Tau Port Authority and Dong Nai Port Authority). But for the target year, as increasing number of new deep seaports, further improved traffic management shall be required.

(1) Thi Vai River Channel

For the target year, numerous large size of vessels will call Cai Mep, Thi Vai and Phu My Ports. The width and depth of the channel and navigational aids must be prepared for the safe navigation of 50,000 to 80,000 DWT vessels.

1) VTS Station shall control for large vessels not to meet each other at the 'S' shape bent channel between Thi Vai and Cai Mep Ports (existing Buoy No. 11 to 15).
2) Additional navigational aids for the above bent channel, which must be leading lights, shall be installed for deep draft vessel to be able to pass through night time.
3) VTS Station shall control for vessel coming through the channel not to meet with another vessel each other, which is turning in the basins in front of deep seaports.

(2) Vung Tau Access and Dinh River Channel

1) Vung Tau Access Channel

There are presently 57 anchorages in Vung Tau Water for vessels waiting for pilot in order to go to the ports in HCMC, Thi Vai, Dong Nai, Mekong Delta, transiting Cambodia, etc. On the other hand, number of vessels going through Vung Tau Access Channel between Buoy No. Zero (0) and Buoy No. five (5) will increase in the target year. Therefore the VTS control for vessel movement in this water is indispensable for the year. Vung Tau Port Authority is currently in charge of the anchorage control for vessels. On September 7, 2001, oil spill accident caused at the Vung Tau Anchorage position B13 due to the collision between a Vietnamese Tanker and a Taiwanese ship. The strict control of vessel movement in this area must be required.

2) Deep Seaport Channel

Depending on cargo demand in the target year, it is possible new deep seaports for 80,000 DWT vessels might be constructed inside the peninsula. In that case, the approach channel to the deep seaport shall be required.

The channel shall be separated at around 1,000m SSE from Vung Tau Channel Buoy No.5 toward the direction 096 degrees with the radius of curvature of not less than 2,000m. And the depth and width must be –16m and 420m with two-way navigation respectively. In this area, control by VTS Station must be necessary to avoid collision of large vessels at the turning point of Vung Tau Approach Channel (Connecting with Dinh River Channel). On the other hand, strong wind of NE and SW monsoon will prevail in this area compared with inland ports such as HCMC Ports, Phu My, Thi Vai and Cai Mep sites. Therefore in this area, more powerful tugboats will be prepared than inland ports for deep draft vessels.

3) Dinh River Channel

In the target year, it is possible though depending on increase of cargo that a channel for 20,000 DWT for Dong Xuyen ports in the Dinh River will be prepared, and the depth and width shall be –8.5 m (to be used for tide) and 120m respectively. There are many existing special ports relating to oil production. For the target year, this channel will become busier and VMS shall control vessel movement.

14.2.3 The Whole Waters in SFEA

(1) The total management of vessel traffics in the whole waters in SFEA

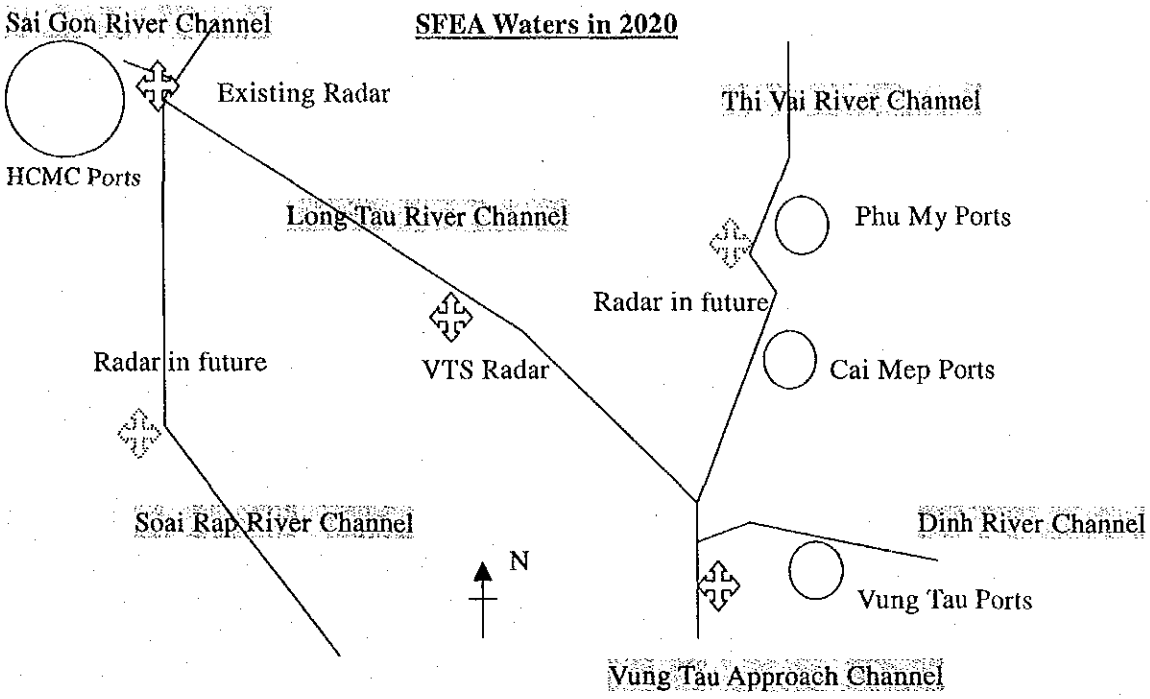
In consideration of the above-mentioned various matters, channel operation for the target year shall be consequently as follows:

1) The management of vessel movement in the SFEA Waters shall be implemented by one (1) competent body, because, for instance, such ship movement as a vessel will go to HCMC Ports to load cargo after discharged cargo at Phu My port from Vung Tau Anchorage will happen so often. HCMC Port Authority is going to commence VTS in the waters between Vung Tau and HCMC through the Long Tau River, probably starting from 2002.

The Authority started test operation at the operation center (VTS Center) in the head office (3F) and sub-office (VTS Station) in Vung Tau, and there are three (3) radars for maritime surveillance

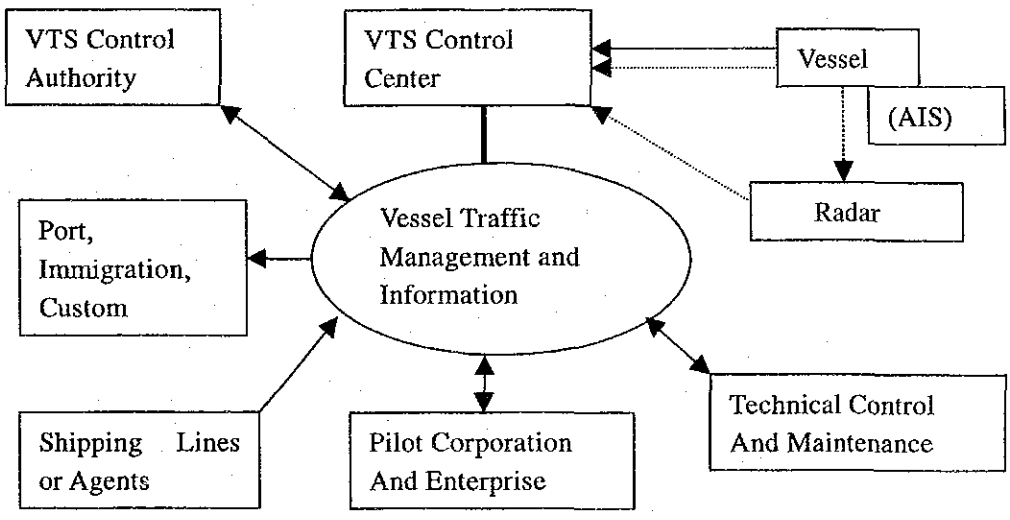
(10° 42' N, 106° 45' E in the west side of the Nha Be River, 10° 35' N, 106° 50' E in the south side of the Long Tau River and 10° 22' N, 107° 04' E in Vung Tau).

Figure 14.1 Vessel Traffic Service in the SFEA Water



2) VTS operation shall be executed by one competent authority as mentioned in the above. And to cover the whole area by VTS, another VTS Stations and other two (2) or three (3) radars shall be installed in the Thi Vai and the Soai Rap River in the future.
3) VTS system for safety, efficiency and environment: for instance

Figure 14.2 A Flowchart of VTS System



4) As mentioned in the Chapter 10, International Maritime Organization (IMO) decided to recommend for the following vessels to install AIS (Automatic Identification System) and VDR(Voyage Data Record) (SOLAS ChapterⅤ).

- For the vessel of more than 300 GRT which services in international water until July 1,2008
- For the vessel of more than 500 GRT which services in domestic water until July 1,2008

+ AIS is a system that the identified information of vessel (ship's name, position, speed, course, etc.) is automatically sent from the vessel by VHF (frequency) to the stations and other vessels. VDR on board vessel is an instrument to record the above-identified information by itself such as flight recorder.

In the target year when the above system will come into worldwide use, VTS system will improve more, but basic system shall be maintained to make vessel movement efficiently, to ensure traffic safety and to protect environment, because this system has a week point that small vessels of less than 300-500 GRT cannot be covered.

(2) Improvement of Channel operation for the target year

1) For the channel between Vung Tau and HCMC Ports through the Long Tau River Channel, maximum size of calling vessels shall be maintained basically to be LOA 230m and draft 9.5 to 10m from the viewpoint of channel configuration and environment (to maintain present natural conditions). But navigation restriction at night can be repealed, because VTS will improve in the target year. In a special case such as more larger vessels or vessels with high dangerous goods shall be specially permitted by relevant authority by each case. For the larger vessels more than LOA 230m and Draft 9.5m, the authority and its technical section (pilot corporation) shall determine whether possible to enter by taking account of tide, current, weather, berth length / depth, etc. In the past, passenger boat, Superstar Leo (LOA 268m) came alongside to Vegetable Berth in the Sai Gon River Channel using slack tide. So far the above technical section and navigator concerned must consider about the vessel sinking of draft in fresh water (Draft will deepen more than 15cm for 20,000DWT) and in case of vessel moving (Squart: draft will deepen more than 70cm) in the inner water.

2) Compulsory pilot
After establishment of VTS, it will be recommended that master of vessel who calls the same port area frequently can be exempted to take pilot except vessel berthing and unberthing.
This system is being put in operation in some ports of developed countries such as Southampton, Hamburg, Rotterdam, Le Harve, ports in Japan and so on, though the qualifications are different by port. The following merits for the system are considered:

① To reduce traffic congestion at pilot station and save vessel navigating time
② To reduce pilotage charge for channel operation and to be attractive for shipping companies

To establish this system, further study will be required about times and period of master's experience, nationality of master (for instance: in the beginning, it starts from Vietnamese captain) and so on.

(2) Approach water to Vung Tau Pilot Station from South China Sea

The mouths of the Mekong River including Ganh Rai Bay are shallow, spreading 20m depth contour about 25 miles off the coast line, and even more off shore, there are some patches and banks with less than 10m in depth according to the British Admiralty Chart No.3986 and 3482. Therefore a special attention for deep draft vessel to approach to Vung Tau Pilot Station shall be paid. And long and high swell will be expected especially in December and January in NE Monsoon, and August and September in SW monsoon (Source: British Admiralty Sailing Direction). In the target year, an approach light beacons or tall buoys should be installed at the location around 15 to 20 miles SE from Vung Tau Light House in order to assist for deep draft vessel to be able to approach Vung Tau Pilot Station safely.