12.2 General Principles for Port Administration, Management and Operation

12.2.1 Further Improvement of Port Administration System

(1) Classification of Ports

Vietnam has many ports, which will differ from its role and characteristic respectively. In such a situation, it is not realistic and effective that these ports equally are treated on the port administration.

In order to identify the importance of Vietnamese ports, to clarify the investment priority for those ports and to distribute effectively limited budgets on the national level, ports in Vietnam should be classified functionally with clear criteria, for instance, 1) function of ports, 2) contents and quantity of handling cargoes and 3) size of hinterland territory. And, the responsibility and the degree of commitment of the central government concerning the port administration need to be identified in each port category.

(2) Unification of Port Administration

In general, ports are regarded as public assets that are used equally by each member of a society. Ports as public assets, however, have dual dimensions in character, non-profitable facilities such as channels/waterway and profitable facilities such as berthing facilities.

Taking the importance of port infrastructure as public assets into consideration, the role of central government for port administration is very important. In the flow of a series of port administration, fundamental roles that have to be played by the central government and port management body respectively are shown in Table 14.1.2.

The lack of only one function of these may disturb the appropriate execution of nation-wide port administration. Moreover, these functions should not be shared each other among several ministries in order to avoid the occurrence of serious problems, namely, the overlap and the lack of consistency on policy-making, etc. As a result, all roles concerning to the central government should be played by one administrative line, namely, one main ministry or a combination of one ministry and one government agency. It would be detrimental to the country itself if planning at each port were done individually by various organizations. Without a unified administration system, it is difficult to make the best use of limited coastal areas, and the duplication of related infrastructure such as a road may result.

The port administration such as a policy-making and monitoring for port development and improvement should be performed by one administrative apparatus under a unified philosophy.

Table 14.1.2 Fundamental Roles of Central Government and Port Management Body

Items	Central government	Port management bodies
Policy formulation for the development and administration of nationwide ports	○	
Establishment of necessary laws and regulations	○	
Formulation of investment plan for nationwide ports	○	
Budget distribution and financial assistance to each port	○	
Establishment of technological standards for planning, design and construction	○	
Surveys and research concerning port technology	○	●
Taking environment preservation into consideration	○	●
Securing construction and maintenance of port infrastructure	○	●
Providing advice and guidance on port administration and management to port management bodies	○	
Authorization of port development/management plan and construction/land reclamation plan of each port	○	
Formulation of port development/management plan and construction/land reclamation plan of each port		●
Statistics collection for ports	○	●
Permission for and restrictions on facility use in port management districts		●
Leasing and management of port facilities		●
Setting and collecting fees for use of port facilities		●
Establishing conditions for providing port services		●
Marketing and promotion of ports		●
Maintenance of public peace on port management districts	○	●

Prepared by OCDI

(3) Improvement of Institutional Framework for Port Administration

Some functions that have never been performed until now or are not established as the system in Vietnam can be found within a series of functions shown in Table 12.2.1. It is necessary to improve the present institutional framework for port development and administration in order to smoothly and steadily be able to play the important roles for the central government and the port management body respectively.

The measures listed in Table 12.2.2 are worthy of being examined.

Table 12.2.2 Some Measures for Improvement of Present Framework

Measures	Explanation
①Formulation of port development plan of individual Major-port	Port development plan of Major-port needs to be formulated by each port management bodies on a legal basis. It is a master plan with a long term planning period (approximately 10-15 years) that includes the use and maintenance of ports, and examination on environmental impact, as well as port development.
② Formulation of short-term investment plan	In order to intentionally and steadily execute the development and maintenance of each Major-port, the short-term investment plan by year and by Major-port needs to be formulated by the government as a will of state.
③ Establishment of port development coordinating organization	The government needs to establish a "port development coordinating organization" in the ministry that is in charge of comprehensive port administration, which consists of staffs from the port-related ministries concerned.

For reference, the main items to be described in the port development plan are as follows:

- Basic policy
- Capacities of port (cargo handling volume at the target year and so on)
- Scale and arrangement of port facilities
- Environmental preservation in port area
- Others

(4) Establishment of Appropriate Port Management System

There are roughly two different types on the characteristic of the port management entity: namely, one is a public body, and the other is a private body. The representative ports under the latter type are Flelixtowe Port in the U.K., Tauranga Port in New Zealand. These ports are managed by private companies under no support by the central government, however, are belonging the minority group in the worldwide major ports. The greater part of those is managed under the former type; especially in developing countries this tendency is remarkable.

In the case of Vietnam that has to accelerate the national growth through the promotion of maritime international transportation, it is considered that port management by a public entity is more suitable. As shown in Table 12.2.1, there are some public functions in fundamental roles of port management body such as port planning and environment preservation, which differ from a business activity as a private sector. However, taking the present situation of the mixture of semi-public and private entities concerning Vietnamese port management bodies into consideration, it is a subject how could be installed the public characteristic to these enterprises.

The appropriate port management system including the following three countermeasures for Major-port or especially for Super Major-port has to be examined and established, as soon as possible.

- Establishment of supervising organization for port management body
- Addition of specific public responsibilities to port management body on itself

- Establishment of an independent organization installed specific public characteristics

(5) Establishment of Appropriate Port Tariff Base

It greatly is evaluated that the Vietnamese government has made an effort to bring down the base of port tariffs until now. However, at the present moment, the fact, which the great difference of the total entry due for the foreign vessels between the Sai Gon Port and neighboring Asian ports exists, shows that it is very difficult for Vietnamese major port to compete with these Asian ports. In order to increase calls of direct shipping line vessels and secure the growth of the national economy, further reduction of port tariff base is necessary. In addition, it is very important for the central government to make a further effort to establish a "time conscious tariff structure". This tariff structure will encourage shipping companies to leave the port as early as possible and cargo owners to receive the cargoes as soon as possible. This system also enables the port management body to reduce the berthing time of ships and promote quick turn-round of the cargoes.

12.2.2 Realization of Efficient Port Management/Operation

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

It is essential for Vietnam to consider the introduction of a more advanced information system for port/terminal management and operation. The relevant government agencies and port management bodies should make an effort to introduce a "one-stop service system" and a full-scaled EDI system, at least, in every Major-port. And, it is necessary for the government to implement EDI by using "widely accepted common terms (protocol)".

a) Outline of EDI
EDI system in port procedure makes it possible to apply for various procedures and exchange information quickly and accurately by linking the network to government agencies and outside users. Foe example, when the vessel enters the port, the shipping agencies have to submit a lot of applications and declarations to relevant government organizations (custom office, harbor master, quarantine, immigration, port management body, etc). If EDI system is implemented, users can submit these applications and receive permissions through computer network.

b) Merits of EDI
The merits of EDI can be summarized as follows:

- To enable port users to complete almost all procedures by submitting electronic application to only one authority
- To minimize paper flow resulting in elimination of errors in communication and faster response
- To share same data among different organizations and to retrieve data quickly
- To increase efficiency of documentation procedure through simplification and electronization of administrative procedure
- To improve the level of service for users by reducing total costs and minimizing entry/departure time
- To strengthen international competitiveness of ports

(2) Establishment of Port Statistics System

It is one of the most significant assignments for any government in the modern society to compile and publish reliable statistics on every sector of the country including natural and socio-economic conditions and situation of national assets and activities. Without a firm base of statistics, policies and plans of the country with a high reliability cannot be formed. Port statistics should be edited in a unified style so that they can be easily accessed and understood by all of the nation and concerned parties. At major ports of the world, port management bodies acting as a port operator are obligated to compile port statistics according to stipulated methods. And, a special agency or department comprehensively performs this task.

In the case of Vietnam, it is surmised that each of organization or entity individually control and accumulate a remarkable quantity of data and information concerned.
However, the port-related information and statistical data made public are markedly few in Vietnam. In order to improve this present situation concerning port statistics, it needs just from now to start the study towards building an appropriate port statistics system including the obligation by the regulation.

(3) Introduction of Appropriate Staff Training System

Staff training system for port sector should be designed and developed with comprehensive training program structure covering across various training demands of all relevant sub-sectors so that effective improvement of total power or capability of port sector could be expected. In other words, staff training for each port sub-sector needs to be conducted under well coordinated programs with constant exchange or relevant information, for instant, on new technologies for port operation or development, and recent trend of administrative or legal requirements.

In addition, the following matters also need to be considered for the implementation of effective staff training.

- Development of the training methods and manuals
- Evaluation of training effects
- Development of repeated training system to the same staffs

12.2.3 Promotion of Private Sector Participation (PSP)

(1) General Principles and Basic Requirements for PSP

It is important to establish a general principle and a basic requirement in order to promote the PSP for port projects.

a) General principle
Concerning a general principle, in particular, the following three concepts should be stressed by the government.

- "Fairness" and "Neutrality"
- "Certainty", "Transparency" and "Predictability"
- "Competitiveness" and "Creativity"

b) Basic requirement

Whether private sector will invest or not will depend upon the attitude of the government to PSP. In general, the following four basic requirements are necessary.

- Political Stability
- Administrative framework for PSP
- Legal framework for PSP
- Guideline for PSP

(2) Measures for Promoting PSP

a) Expansion of participation field of private sector

It is important that the participation field will be enlarged on not 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.

While the government and port management body should take responsibility for the whole management and operation, it is advisable for public sector to entrust the terminal operation to private sector based on "market principles".

Generally, port management is classified into three types ("Service Port", "Land-lord Port", "Private Port") by ownership. The respective names derive from the financial share of the public sector. Table 12.2.2 shows each characteristic of four types of port management and operation, which "Private Initiative Port" such as the port by BOT is added to above-mentioned three types. Among these, the "Land-lord Port" type is popular in major ports of the world including Japan and neighboring Asian ports, the port management bodies of these ports play the role only of "land-lord".

b) Review of possible forms for development and operation

BOT projects sometimes cause risks only to investors. In BOT port projects, in general, there are four risk categories pointed out from a viewpoint of private sector as listed below.

- Funding
- Financial risks
- Tariff
- Cargo volume

In this case, all kinds of risks should be allocated, avoided or minimized as much as possible by the government so that private sector will participate in them more easily.

In order to eliminate or minimize the market risks, it is necessary to balance the risks between public and private sector. Especially various kinds of government support are thought to be essential for large-scale projects based on BOT. The appropriate measures should be considered carefully by the related government agencies and port management bodies to avoid risks incurred to BOT participants.

c) Establishment of transparent procedure for PSP

It is desirable that the government should establish firm and concrete selection criteria of PSP applicants. For, the arbitrary use of the selection criteria is sure to create distrust among the investors. Furthermore, the government should make every effort to open the PSP-related information to the public as much as possible in order to upgrade the quality of PSP system.

d) Incentives through deregulation

Generally speaking, it is important to give appropriate incentives to domestic and foreign investors through promoting deregulation in order to attract more investment. Foreign investor's experience of PSP management, operational and financial skills will be indispensable to the quality and quick implementation of port projects.

The government should arrange the "well-organized and trustworthy institutional frameworks" and provide " certain incentive package" to attract more foreign capital.

Table 12.2.2 Type of Port Management and Operation

	Service Port		Landlord Port		Private Initiative Port		Privately - owned Port
Patterns	A	B	C	D	E	F	G
Making Port Development Plans	○	○	○	○	○	○ or ●	●
Construction							
Channel/Anchorage	○	○	○	○	○	○	●
Breakwater	○	○	○	○	○	○	●
Berthing Facilities	○	○	○	○	●	●	●
Yard Area	○	○	○	○	●	●	●
Transit Shed	○	○	○	●	●	●	●
Cargo Handling Equipment	○	○	○	●	●	●	●
Ownership							
Land	○	○	○	○ (Lease)	○	●*)	●
Terminal Facilities	○	○	○	●	●*)		●
Terminal Operation	○	●	●	●	●	●	●
Tug and Pilot	○ or ●						
Remarks		Service Contract	With Equip-ment	Without Equip-ment	Concession/BOT		

Notes : 1) ○: Public Sector, ●: Private Sector
2) *) Transferred to public sector after contract period

Chapter 13 Master Plan upto Year 2020

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

13.1.1 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: (Refer to Figure 13.1.1)

(i) SFEA container traffic is to be examined by major shipping routes and will be possibly assigned ship sizes; and

(ii) SFEA's other dry cargoes shall be examined by classifying ports' roles into exclusive and general as well as the shippers' accessibility to general ports.

With regards to passenger shipping, only oceangoing cruise ships need substantial port infrastructure. It is not necessary to discuss the traffic share between the two port groups in the section since cruise shipping lines definitely prefer the HCMC ports due to their proximity to city tourism and the Tan San Nhat International Airport. Moreover, one cruise terminal with one or two dedicated berths is sufficient to meet the forecast demand.

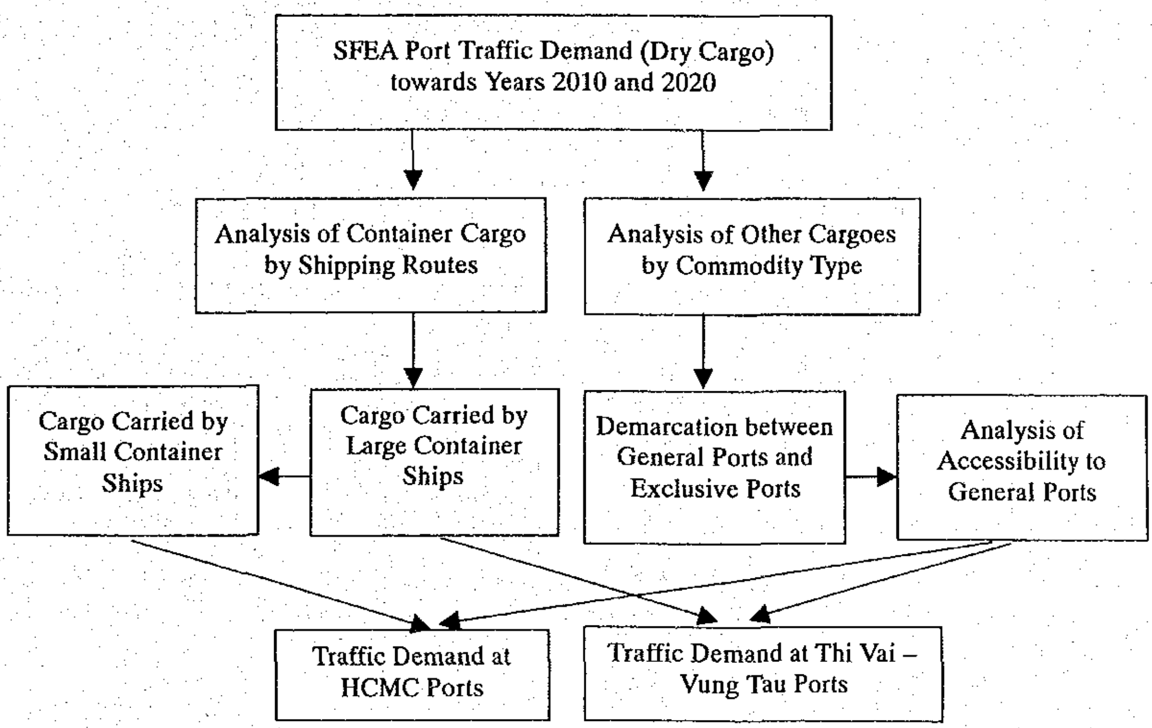


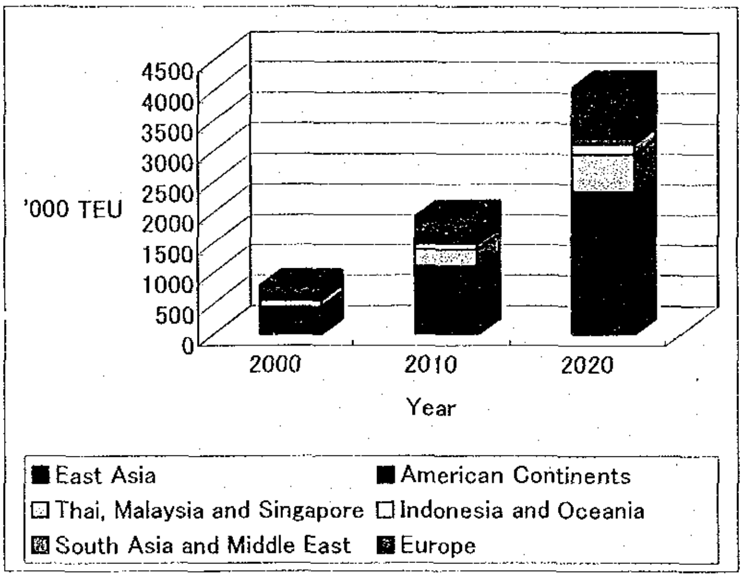
Figure 13.1.1 Detailed Traffic Demand Work Flow

13.1.2 Container Cargo

(1) Container Movement by Shipping Routes

In 2000, the SFEA general ports handled approximately 860 thousand TEU to/from numerous trading partners. The largest trading region was East Asia (330 thousand TEU or 38%) while the second largest was Europe (221 thousand TEU or 26%). Although Vietnam's trading partners are scattered worldwide, actual shipping services are provided by feeder container ships which serve only between a regional hub port and nearby feeder ports.

According to the overall SFEA traffic demand forecast, Vietnam will increase its container traffic with foreign ports by 5.1 times between 2000 and 2020, except goods in both transshipment and transit. 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. (Refer to Figure 13.1.2 and Appendix 13-A)



Note: Study Team's estimates except transshipment and transit containers

Figure 13.1.2 SFEA Container Traffic by Trade Group

(2) 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. They are traveling within Asia and load/unload several hundred containers at any of the four HCMC general ports per ship call. Due to the rapid increase of container traffic from some tens of thousand containers in 1990, container-shipping traffic on HCMC's limited waters is becoming congested. However, the present maritime infrastructure limits the shipping operator's intention to assign larger container ships.

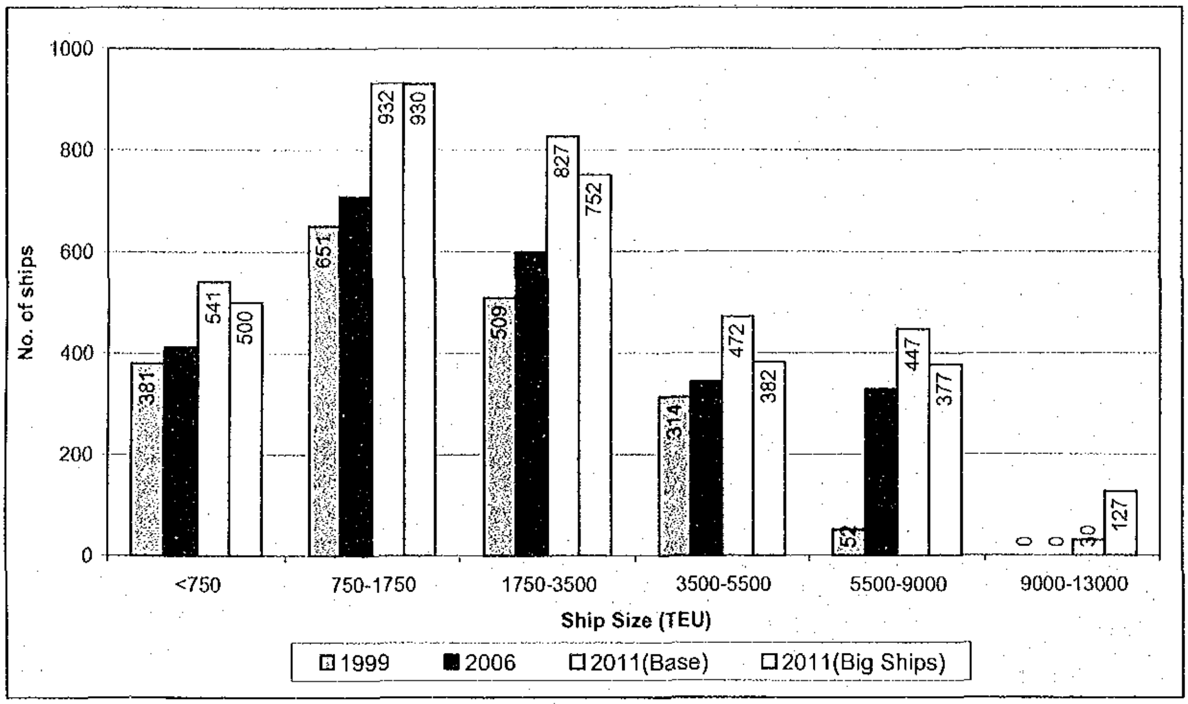
Outside Vietnam, average sizes of container ships involved in foreign trade have been expanding from 15,100 dwt in 1970 to 21,000 dwt in 1980 and 31,300 dwt in 1995 (Fearnley Review estimates). Shippers have had the benefit of using larger container ships because of the reduction in shipping costs. UN ESCAP provides quotable projections regarding future container fleet based on its Maritime Policy Planning Models (MMPM) which have been developed to study the prospects for container shipping and port development in Asia and the Pacific. The projections indicate that:

(i) There will be an increase in any sizes of container ships in the 2000s. Many very large ships of over 5,500 TEU will be newly constructed and assigned on long-distance main routes such as trans-Pacific and Asia-Europe (refer to Figure 13.1.3); and

(ii) Small ships below 1,500 TEU will still be the more dominant ships within Asia in the mid-2000s while substantial large ships ranging from 1,500 TEU to 4,000 TEU will be mainly reassigned from inter-regional routes (refer to Figure 13.1.4).

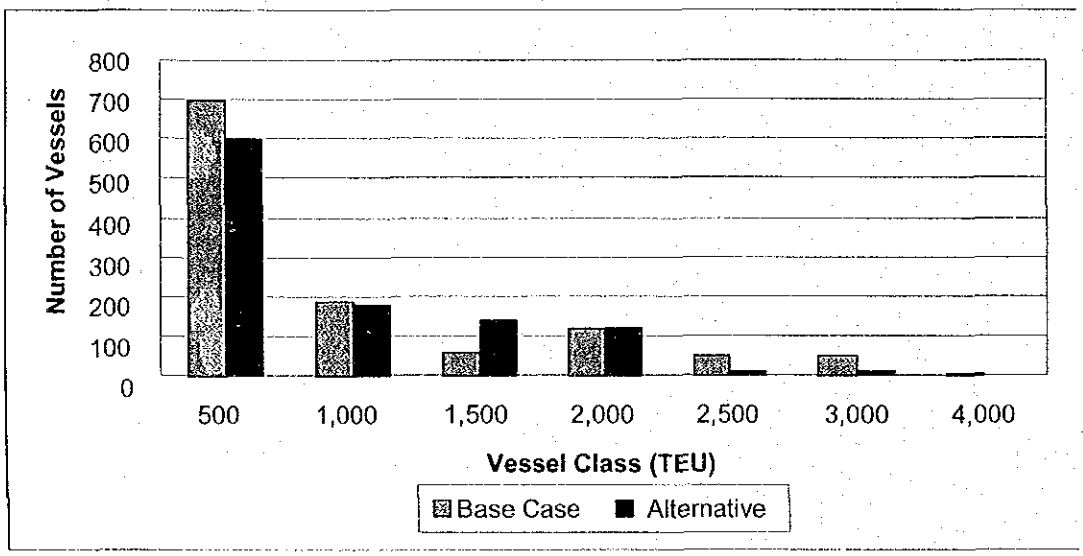
As for international container shipping industry, the current structure is characterized by the concentration of container-carrying capacity in the hands of a small number of "mega-carriers". It is understood that the top ten container lines now own about half of the total world capacity. As an indication of the extent of the carrier concentration, the top three of the six alliances serving the Asia/Europe and Mediterranean trade routes provided nearly two thirds of the annual container carrying capacity on these routes. The formation of mergers and alliances has helped the carriers to better withstand the effects of trade recession and to apply a strategic approach to the utilization of the existing shipping capacity and to place investment on additional capacity.

Taking the above-mentioned 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. Table 13.1.1 shows the Study's assumptions regarding container ship size by shipping route and shipping industry structure.



Source: UN ESCAP "Regional Shipping and Port Development Strategies 2001"

Figure 13.1.3 Required Number of Containerships by Size (1999-2011, Base and Big Ships Case)



Source: UN ESCAP "Intra-regional Container Shipping Study 1997"

Note: Base Case – Conservation assumption on the future trade pattern and shipping services

Alternative – A less concentrated pattern than the Base Case

Figure 13.1.4 Distribution of Vessel Sizes: Intra-Asian Services, 2006

Table 13.1.1 Assigned Container Ships by Shipping Route

	Year 2000	Year 2010	Year 2020	Assumed Industrial Structure
Intra-Asia - Trunk Routes - Feeder Routes	 750 – 1,750 <750	 1,750 – 3,500 < 1,750	 1,750 – 5,500 < 1,750	At least 5 major operators which provide trunk route services up to a half of total containers. Numerous local operators will take the other half.
Asia – Middle East	750 – 3,500	1,750 – 3,500	1,750 – 5,500	Around 5 major operators to handle 70% of the cargo.
Asia – Europe	1,750 – 7,000	3,500 – 9,000	5,500 – 13,000	At best, 5 megacarriers (alliances/conferences) to handle 90% of the cargo
Trans-Pacific	1,750 – 7,000	3,500 – 9,000	5,500 – 13,000	At best, 5 megacarriers (alliances/conferences) to handle 90% of the cargo

(3) Possible Assignment of Trunk/Direct Ships

At present, the container ships which regularly call at SFEA ports serve intra-Asia shipping. A deep seaport provides an opportunity to attract large ships to directly connect with worldwide ports beyond East Asia and Southeast Asia.(Refer to Figure 13.1.5) However, international shipping lines decide on their ship assignment programs to maximize their profits, taking into account the SFEA container demand under competitive business environments. The Study preliminarily examines whether SFEA will have the sufficient container demand to attract direct ships with its trading groups or not.

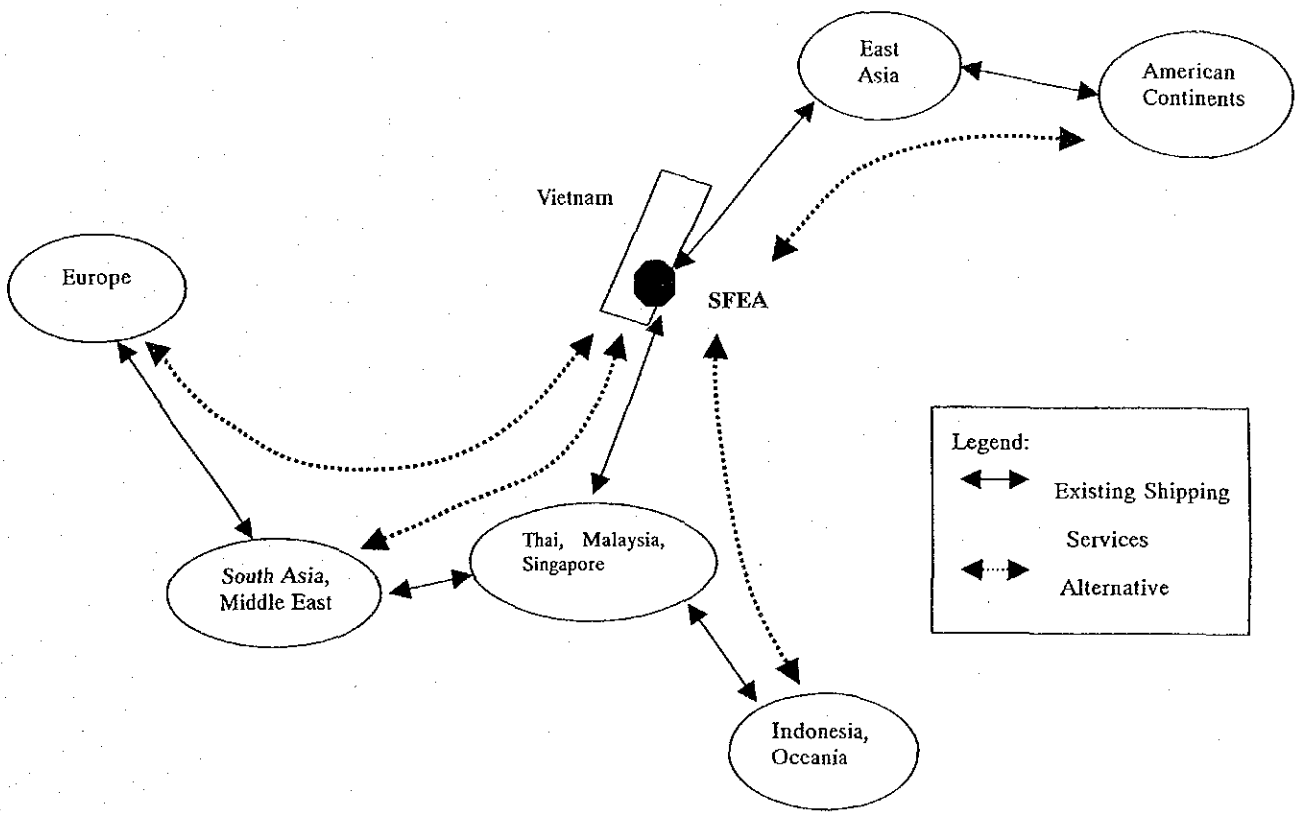


Figure 13.1.5 Existing Shipping Services and Alternative Direct Services

At present, container operators provide regular shipping services according to a weekly schedule. Their foremost concern on SFEA is its weekly container volume. Table 13.1.2 indicates the comparison between the SFEA's weekly container traffic and the required traffic volume to attract trunk/direct ships regularly by each trading group. In this exercise, future direct ship sizes by trading group (2,625TEU, 4,500 TEU, 7,250 TEU), required container carrying volume per ship capacity (50%) and competitive ship assignment by major line haul operators (5 ships weekly) and their market shares depending on shipping distance (50%, 70%, 90%) are all adequately set based on the assumption of future shipping business environments.

The exercise has obtained the following indications:

- 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 Hongkong, Kaohsiung and Shanghai.

- 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 the average), provided that the number of weekly shipcalls are three or four.

(3) Container Traffic Shares Between HCMC Ports and Thi Vai – Vung Tau Ports

Despite new port sites being developed such as Cat Lao 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.

Table 13.1.2 Preliminary Shipping Market Analysis to Connect SFEA Gateway Port by Trunk/Direct Ships

(Unit: TEU)

SFEA's Trade Groups	Year 2000			Year 2010			Year 2020		
	SFEA Weekly Traffic	Trunk/ Direct Ship Size (Average)	Required Traffic to Attract Trunk/Direct Ship[1/]	SFEA Weekly Traffic	Trunk/ Direct Ship Size (Average)	Required Traffic to Attract Trunk/Direct Ship[1/]	SFEA Weekly Traffic	Trunk/ Direct Ship Size (Average)	Required Traffic to Attract Trunk/Direct Ship[1/]
East Asia	**8,111**	750-1,750 (1,250)	6,250	**20,362**	1,750-3,500 (2,625)	13,125	**43,413**	1,750-5,500 (4,500)	22,500
American Continents	771	1,750-7,000 (2,625)	7,292	1,657	3,500-9,000 (4,500)	12,500	3,301	5,500-13,000 (7,250)	20,139
Thailand, Malaysia and Singapore	2,295	750-1,750 (1,250)	6,250	5,920	1,750-3,500 (2,625)	13,125	12,495	1,750-5,500 (4,500)	22,500
Indonesia and Oceania	771	750-1,750 (1,250)	6,250	1,721	1,750-3,500 (2,625)	13,125	3,278	1,750-5,500 (4,500)	22,500
South Asia and Middle East	739	750-1,750 (1,250)	4,464	1,466	1,750-3,500 (2,625)	9,375	2,252	1,750-5,500 (4,500)	16,071
Europe	3,168	1,750-7,000 (2,625)	7,292	7,654	3,500-9,000 (4,500)	12,500	16,421	5,500-13,000 (7,250)	20,139

Note1: 1/ = (average trunk/direct ship size: 1,250-7,250) x (required loading & unloading containers per ship capacity: 0.5) x (no. of weekly shipcalls: 5) x (major line haul operators' share by shipping route: 0.5-0.9)

Note2: Excluding transshipment and transit containers

Both 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 given its cheaper total freight cost particularly when their large cargo needs long-haulage.

Under such competitive port business environments, domestic shipping containers are considered as regular cargo among the HCMC ports. On the other hand, the Thi Vai – Vung Tau ports will monopolize the containers of direct shipping services beyond Asia and most of transshipment and transit cargoes.

The forecast result (Figure 13.1.6) illustrates the container traffic growth of the two port groups. The two port groups will handle from 1.1 to 1.2 million TEU each in 2010. From then on, however, more containers will be concentrated at the Thi Vai –Vung Tau port group.

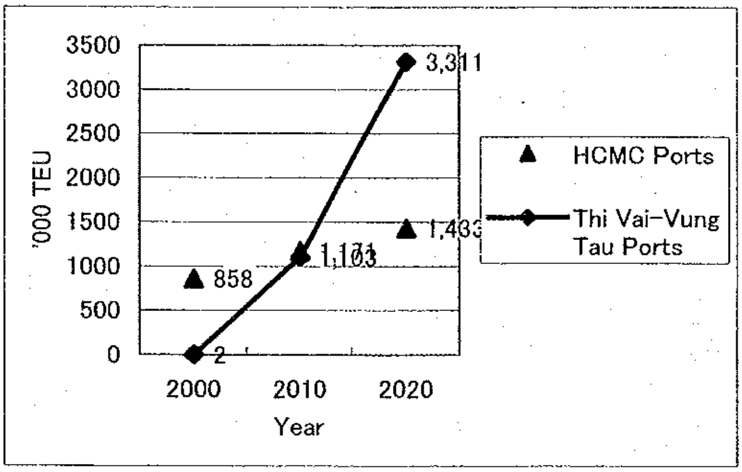


Figure 13.1.6 Container Traffic Growth at HCMC Ports and Thi Vai – Vung Tau Ports

(5) Estimated Empty Containers

In principle, empty containers happen when the number of inbound fully loaded containers differs from that of outgoing ones. Those empty containers are one of the factors to worsen shipping profitability and thus it sometimes leads to expensive tariff setting. It is particularly true in Brunei Darussalam where Brunei importers are forced to pay a surcharge of 50% on basic container tariff since the country has limited export cargoes in container. Therefore the efforts to balance inbound and outgoing containers have been paid at many port places by shipping operators and local agents. Under such circumstances, the coverage of containerized cargoes is sometimes adopted in a broad term.

Today's container shipping can be characterized by ship size enlargement particularly on inter-regional main line vessels. It expects substantial reduction in shipping costs. It is observed that major carriers resort to circulating thicker container flows by bigger container box ships to gain both profits and competitiveness rather than reducing empty containers at each port-of-call.[1]

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1 The following comment represents one typical perception among mega carriers: "By switching from 2,500 TEU to 4,400 TEU, costs could be cut by 50%. Between the 6,000 TEU vessel and the 4,400 TEU one, cost saving come down to about 10-15% due to high construction costs. But the cost-saving potential is still attractive." (by Jurgen Dipner, Hapag-Lloyd, 2000)

In Thailand, the number of empty containers has jumped up since 1998. The year 1998 was remarkable because Laem Chabang Port firstly handled much more containers than Bangkok Port. More ship calls of larger container ships to the deep seaport of Laem Chabang seems to coincide with increasing empty containers.

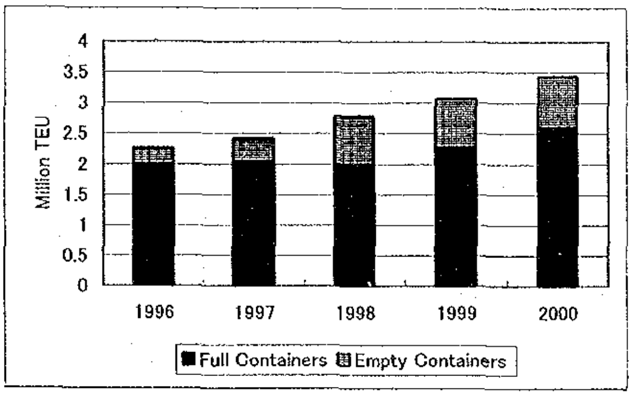


Figure 13.1.7 Change in Thailand Container Traffic (Full and Empty)

The shares of empty containers in the container traffic in Vietnam's neighboring countries in 2000 are indicated as follows:

- Malaysia 24.7% (the total container traffic: 4.80 million TEU)
- Thailand 24.2% (the total container traffic: 3.44 million TEU)
- Philippines 27.5% (the total container traffic: 3.13 million TEU)

Those countries have many of empty containers at inbound flow, and around one-fourth of the handling containers in total are empty. But such empty container shares are likely acceptable since no tariff surcharge happens.

As a result of the Study, SFEA ports anticipate to handle 2.27 million TEU (10 tons per TEU on the average) which will be loaded and unloaded by small to large container ships (up to 50,000 DWT). Although the present data of empty containers among SAFE container traffic are not available precisely, it is deemed adequate to be forecast at 25% in the future container traffic.

13.1.3 Other Cargoes

(1) Cargo to Be Handled at Exclusive Ports

The Study has identified 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 the future, the Study assumes that the present situation is going to continue. Thus, the following exclusive ports will be in operation in SFEA:

- For wood chips: VITAICO Port, Phu Dong Port, VICO WOCHIMEX Port, all located in HCMC
- For cement and clinker: Morning Star Cement Port and Nhgi Son Cement Port located in HCMC, and Chin Fon Cement Port to be located along the Thi Vai River
- For other industrial goods: VEDAN Port and Long Thanh Port located along the Thi Vai River

(2) Cargo to Be Handled at General Ports

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.

The forecast results show that many shippers may gain access to HCMC general ports to ship out their non-containerized cargo during the planning period as indicated in Table 13.1.3.

Table 13.1.3 SFEA' Other Dry Cargo to be Handled by General Ports

(Unit: '000 tons)

	Year 2010			Year 2020		
	SFEA's Cargo Volume	HCMC Ports 1/	Thi Vai – Vung Tau Ports 2/	SFEA's Cargo Volume	HCMC Ports 1/	Thi Vai – Vung Tau Ports 2/
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

13.1.4 Summary

The above-mentioned forecasting works are summarized in Table 13.1.4. 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. In addition, when the Thi Vai – Vung Tau port group plays a significant role as projected, the traffic inflow across the Dong Nai River to HCMC central area will be substantially mitigated.

Table 13.1.4 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

13.2.1 General Understanding on Waves in Ganh Rai Bay

Waves in the sea and on the coast, along with tides and tidal currents, constitute the most fundamental phenomena among various natural conditions in planning and design of a port. However, the available quantitative information on usual and unusual waves in and off Ganh Rai Bay is, as described in 3.2.2 (2), very limited to some visually observed data collected by the Vietnamese Hydro-Meteorological Center (1995), the U.S. Navy (1976), etc., and few measured data for limited periods of time by an oil-related company (1986), etc.

There are three specific major subjects relating to waves 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 on the above major subjects, it is necessary to take account of the following waves, depending on their causes and locations:

Type-A) Daily offshore waves generated by wind on the South China Sea (at an offshore point), and propagated into the in-bay area (especially at the entrance of the Ben Dinh Sao Mai Port),

Type-B) Daily waves generated by wind locally in Ganh Rai Bay, and

Type-C) Unusual waves due to tropical storms and typhoons on the South China Sea (at an offshore point), and propagated into the in-bay area (especially at the entrance of the Ben Dinh - Sao Mai Port),

13.2.2 Methods and Results of Wave Hindcast

(1) Daily offshore waves generated by wind on the South China Sea (Waves of Type-A)

The offshore waves generated in the South China Sea are hindcast for the past 5 years from 1995 to 1999 by means of an energy wave spectral method named "Global Wave Forecast." It is a method to calculate waves with intervals of 6 hours at fixed grid points on the sea, utilizing records of actual wind data at the grids, of which arrangement is shown in Figure 13.2.2-1. The grid point where the output is withdrawn is located at an offshore point (Longitude: 107° 30' 00" E, Latitude: 10° 00' 00" N).

The frequency distribution of the waves hindcast at this point is shown in Table 13.2.2-1.
The forecast waves are propagated theoretically into the selected point at Vung Tau (Longitude: 107° 03' 30" E, Latitude: 10° 23' 40"N).

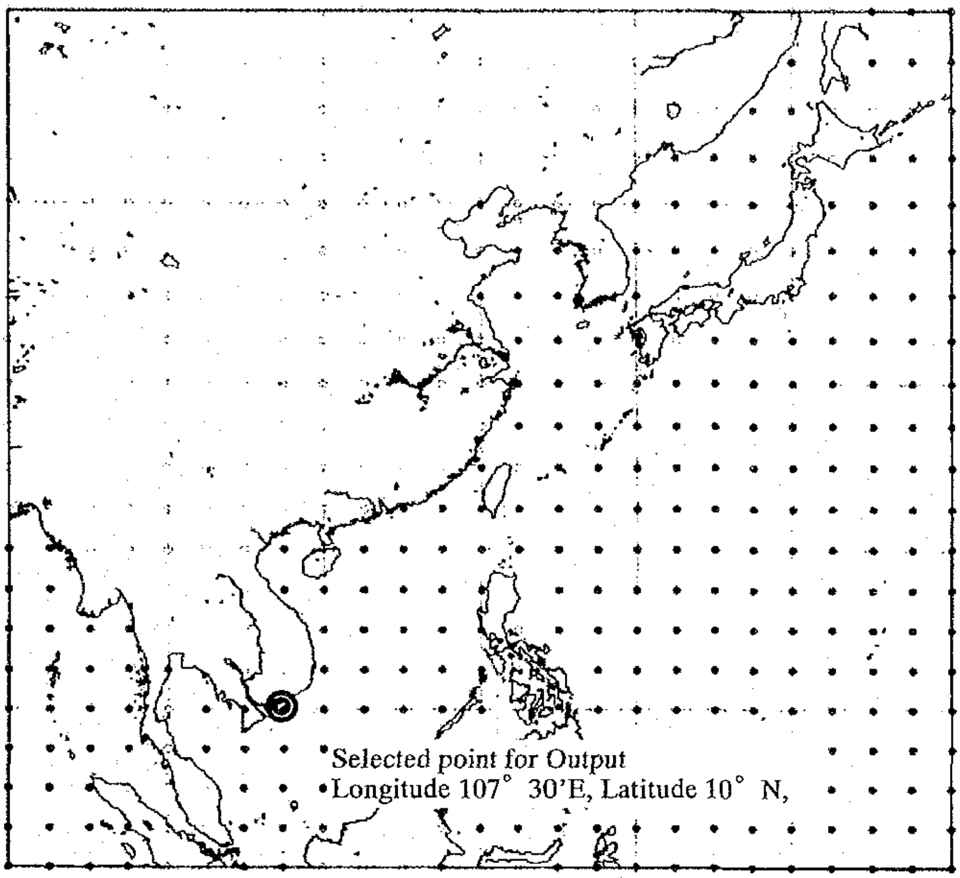


Figure 13.2.2-1 Grid Arrangement of Global Wave Forecast

Table 13.2.2-1 Frequency Distribution of the Waves by Global Wave Forecast (1995-1999)

Wave height (m)	Wave Direction																Total
	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	N	
0 -	0	0	23	0	51			0	0	0	0	0	0	0	0	0	74
0.25 -	0	205	352	212	984			11	0	0	5	35	0	0	0	0	1804
0.50 -	12	583	197	75	92			59	0	7	44	193	0	0	0	0	1262
0.75 -	34	543	124	56	2			63	0	0	59	127	1	0	0	0	1009
1.00 -	6	420	107	39				16	1	0	31	105		0	0	0	725
1.25 -	2	305	102	30				12	3	3	10	88		0	0	0	555
1.50 -	0	290	72	51				1	5	2	6	75		0	0	0	502
1.75 -	2	269	47	15					1	0	5	33		0	0	0	372
2.00 -	1	336	70	2					4	3	0	68		0	1	1	486
2.50 -		209	19						2	1	2	34		1	1	0	269
3.00 -		131	1								1	4					137
3.50 -		72										1					73
4.00 -		33										1					34
4.50 -												0					0
5.00 -												0					0
5.50 -												0					0
6.00 -												1					1
6.50 -																	0
Total	57	3396	1114	480	1129	0	0	162	16	16	163	765	2	1	2	1	7303

Source: Study Team

(2) Daily waves generated by wind locally in the Ganh Rai Bay (Waves of Type-B)

The Study Team collected the local wind data, which were taken at the Vung Tau Meteorological Observatory for the same past 5 years from 1995 to 1999. The frequency distribution of wind speed by direction is shown in Table 13.2.2-2.

The local waves generated by these winds are calculated by a classical significant wave method named "Sverdrap-Munk-Bredschneider Method."

(3) Combined waves of offshore and local waves (Waves of combined Types-A and B)

The waves of Types-A and B hindcast at the above selected point in Ben Dinh-Sao Mai Area are superimposed energetically. The result of the frequency distribution of the combined waves is shown in Table 13.2.2-3. It revealed that more than 11% of time wave height is higher than 0.5m.

(4) *Unusual waves due to typhoons on the South China Sea* (Waves of Type-C)

The waves generated by tropical storms and typhoons can constitute the extreme events for planning and design of protective facilities of a coastal port in Viet Nam. In this Study 30 typhoons which most affected the Vung Tau area are selected among the typhoons occurred from 1951 to 2000. Or, the statistical period of the data is taken as 50 years. The list and characteristics of the 30 typhoons are summarized in Table 13.2.2-4(1). The tracks of these typhoons are shown in Figure 13.2.2-2 (1), (2), and (3).

The records of their tracks and atmospheric pressure on the surface are applied to calculate the waves at the offshore point of Vung Tau (Longitude: 107° 45' 00" E, Latitude: 9° 09' 36" N). The method to assess the waves is an energy spectral model named "MRI-JWA Model." The calculations are done on the three fields by means of so-called "zooming method" for accuracy sake of the assessment. The large field has a grid interval of 100 km, covering the whole South China Sea and a part of the west Pacific. The medium field with a grid interval of 50 km covers the south-western part of the South China Sea. The small field extends just offshore area of Vung Tau with a grid interval of 5 km. The point of wave hindcast in the small field, which is located at the above-mentioned longitude and latitude, is shown in Figure 13.2.2-3.

The method of hindcast and parameters of the equations in the model were calibrated with the records of actual waves generated by two typhoons in 1997, i.e. Typhoons No. 9721 (*Fritz*) and No. 9726 (*Linda*), which were measured at Da Nang and Ky Ha by two directional wave recorders installed under a technical cooperation by JICA.

The results of wave hindcast are presented in Table13.2.2-4(2). The most extreme result of wave hindcast is shown in Figure 13.2.2-4 for the case of Typhoon No. 9726 (*Linda*). The hindcast wave has the maximum significant wave height of 8.2m with its period of 11.5 seconds from the east.
Immediately after this peak time, waves of more than 5m in height arrive from the south-west direction.

Table 13.2.2-2 Frequency Distribution of Wind Speed by Direction
(at Vung Tau Meteorological Observatory, 1995-1999)

Direction Speed (m/s)	Calm	N	NNE	NE	ENE	E	ESE	SE	SSE
Calm	595								
- 4.9		333	63	301	50	**753**	192	618	99
5.0 - 9.9		16	1	15	1	**723**	137	253	26
10.0 -						**13**	1	1	1
Total	595	349	64	316	51	**1,489**	330	872	126
%	8.2	4.8	0.9	4.3	0.7	**20.4**	4.5	11.9	1.7

Direction Speed (m/s)	S	SSW	SW	WSW	W	WNW	NW	NNW	Total	%
Calm									595	**8.2**
- 4.9	346	41	**802**	61	514	46	482	82	4,783	**65.5**
5.0 - 9.9	92	12	**365**	14	145	6	94	2	1,902	**26.0**
10.0 -	2		**1**		2		1		22	**0.3**
Total	440	53	**1,168**	75	661	52	577	84	7,302	**100.0**
%	6.0	0.7	**16.0**	1.0	9.1	0.7	7.9	1.2	100.0	

Source: Hydro-Meteorological Center, Hanoi (Measurement is at 6-hour intervals. There are 2 data lacking.)

Table 13.2.2-3 Frequency Distribution of the Combined Waves Hindcast
(at Vung Tau, 1995-1999)

Wave height (m)	Wave Direction																Total
	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	N	
0 -	1	80	16	1017	233	232	77	115	73	40	391	152	17	126	36	8	2614
0.25 -		8		243	14		1	26	92	168	61	42	30	54	14		753
0.50 -			1					16	80	271	18	1	1	2	3		393
0.75 -									42	209	4						255
1.00 -									29	109							138
1.25 -									7	44	1						52
1.50 -										1							1
1.75 -																	0
2.00 -										1							1
2.50 -									1								1
3.00 -										1							1
3.50 -																	0
Total	1	88	17	1260	247	232	78	157	324	844	475	195	48	182	53	8	4209

Source: Study Team

Table 13.2.2-4(1) Characteristics of Selected Typhoons in the South of Viet Nam (1951-2000)

No.	Typhoon No.	Name	Track type*	Place landed latitude(°)	longitude(°)	Date	Pc* (hPa)	Wind* V(m/sec)	Speed* U(km/hr)
1	5218	Vae	N	11.3	108.8	20 Oct 19:00	980	35	34
2	5422	Tilda	N	11.5	108.4	02 Dec 07:00	1000	23	10
3	5923	Harriet	S	–	–	–	1006	18	18
4	6225	Harriet	S	–	–	–	1004	20	7
5	6229	Lucy	S	9.8	106.7	30 Nov 19:00	990	30	35
6	6531	Elaine	O	–	–	–	1006	18	5
7	6820	Hester	N	11	107.8	20 Oct 07:00	1002	22	18
8	6825	Mamie	N	11.6	108.8	24 Nov 01:00	1002	22	20
9	6826	Nina	S	–	–	–	1004	20	29
10	7023	Nora	S	–	–	–	1000	23	22
11	7024	Opal	N	–	–	–	1002	22	19
12	7026	Ruth	S	–	–	–	998	25	21
13	7136	Judy	O	–	–	–	1006	18	9
14	7229	Sally	S	–	–	–	990	30	22
15	7320	Thelma	S	9.8	106.4	16 Nov 19:00	996	26	13
16	7432	Kit	S	–	–	–	1004	20	21
17	7919	Sarah	N	13.0	109.0	15 Oct 07:00	1008	16	16
18	8315	Kim	N	11.2	109.0	17 Oct 07:00	1000	19	48
19	8525	Gordon	O	12.5	108.8	25 Nov 19:00	1006	18	20
20	8527	Irving	S	–	–	–	1000	25	15
21	8628	Marge	S	–	–	–	1010	13	18
22	8830	Tess	N	11.8	108.7	06 Nov 19:00	996	25	25
23	9101	Sharon	N	–	–	–	1008	16	27
24	9125	Thelma	S	–	–	–	1008	16	20
25	9229	Forrest	S	–	–	–	1000	25	21
26	9327	Manny	S	–	–	–	1002	22	26
27	9430	Teresa	N	–	–	–	1006	18	4
28	9625	Ernie	S	9.8	107.0	16 Nov 13:00	1008	16	22
29	9726	Linda	S	8.8	104.8	02 Nov 19:00	985	28	33
30	9816	Gil	S	–	–	–	996	22	17

Source: Pacific Typhoon Center, Japan Meteorological Agency

(Note)

Track type: Direction to which the typhoon passed (N: to the North, S: to the south, O: others)

Pc: *Air Pressure at the center of the typhoon*

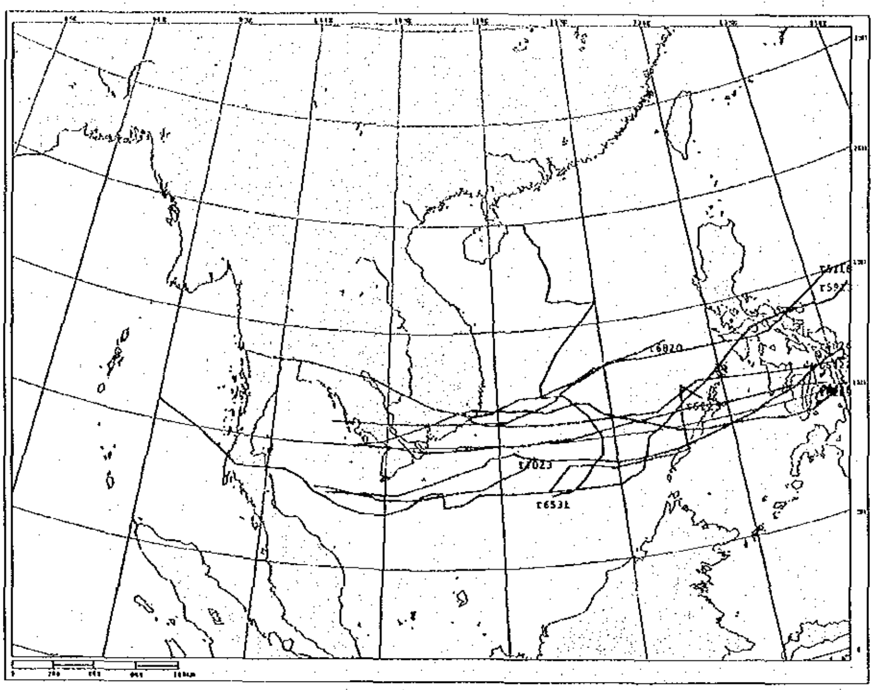
Wind: Maximum wind speed near the typhoon center

Speed: Speed of typhoon movement when the typhoon was strongest

Table 13.2.2-4(2) Selected Typhoons and Maximum Hindcast Waves (1951-2000)

No.	Typhoon No.	Typhoon Name	Time (Local time)		Wave Height (m)	Wave Period (sec)	Wave Direction
1	5218	Vae	10/20	14:18	3.0	8.4	NE
2	5422	Tilda	12/01	22:54	1.8	9.4	ENE
3	5923	Harriet	01/03	23:00	2.0	9.1	E
4	6225	Harriet	10/22	23:12	3.6	8.5	E
5	**6229**	**Lucy**	**11/30**	**14:06**	**5.1**	**10.3**	**ENE**
6	6531	Elaine	11/08	22:54	1.0	6.9	NE
7	6820	Hester	10/20	00:54	2.5	7.7	NE
8	6825	Mamie	11/23	19:12	3.2	8.9	NE
9	**6826**	**Nina**	**11/28**	**11:00**	**5.4**	**9.4**	**ENE**
10	7023	Nora	11/02	10:48	3.0	7.6	ESE
11	**7024**	**Opal**	**11/17**	**14:36**	**5.1**	**9.3**	**NE**
12	**7026**	**Ruth**	**11/27**	**15:18**	**6.0**	**9.8**	**ENE**
13	7136	Judy	11/19	01:48	4.0	8.5	SE
14	7229	Sally	12/02	00:48	4.9	9.2	ESE
15	**7320**	**Thelma**	**11/15**	**22:18**	**5.6**	**9.7**	**NE**
16	**7432**	**Kit**	**12/24**	**14:30**	**5.1**	**9.2**	**ENE**
17	7919	Sarah	10/13	21:30	1.9	9.6	NE
18	8315	Kim	10/17	11:12	2.3	9.0	ENE
19	8525	Gordon	11/23	20:30	1.6	6.9	ENE
20	**8527**	**Irvint**	**12/20**	**23:54**	**5.0**	**9.2**	**ENE**
21	8628	Marge	12/25	23:00	2.3	7.7	NE
22	8830	Tess	11/06	12:18	2.3	11.0	ENE
23	9101	Sharon	03/16	11:00	2.5	10.5	ENE
24	9125	Thelma	11/08	17:00	3.0	8.5	ENE
25	**9229**	**Forrest**	**11/14**	**01:36**	**5.7**	**9.7**	**ENE**
26	**9327**	**Manny**	**12/14**	**19:00**	**5.3**	**9.4**	**ENE**
27	9430	Teresa	10/25	04:48	2.8	9.4	ENE
28	9625	Ernie	11/16	07:24	3.8	8.3	NE
29	**9726**	**Linda**	**11/02**	**04:48**	**8.2**	**11.5**	**E**
30	**9826**	**Gil**	**12/10**	**17:12**	**6.1**	**9.7**	**SE**

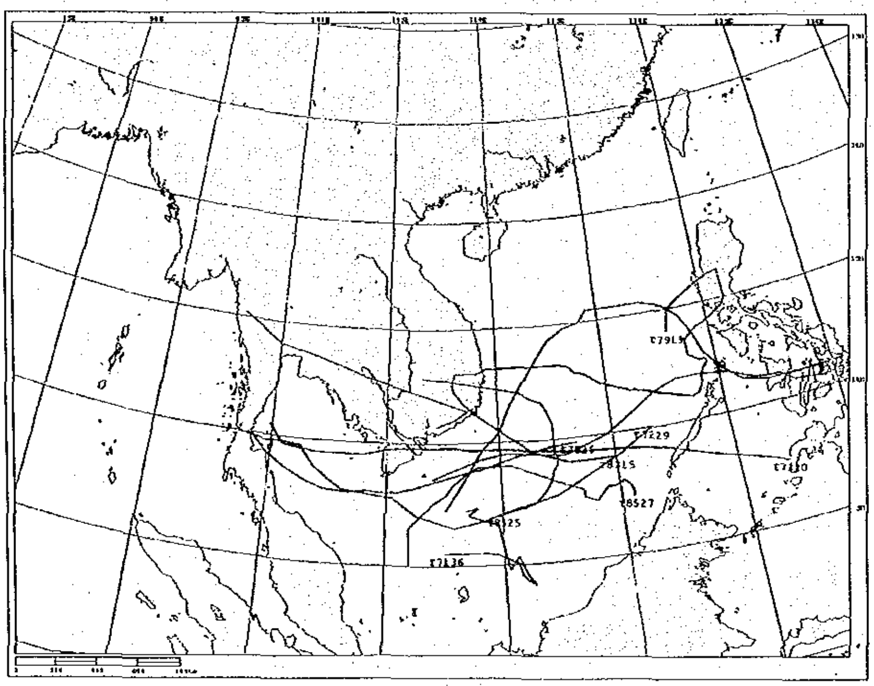
Source: Study Team



TYPHOON map

● ~980 ● 980 ~1000 ● 1000 ~ (hpa)

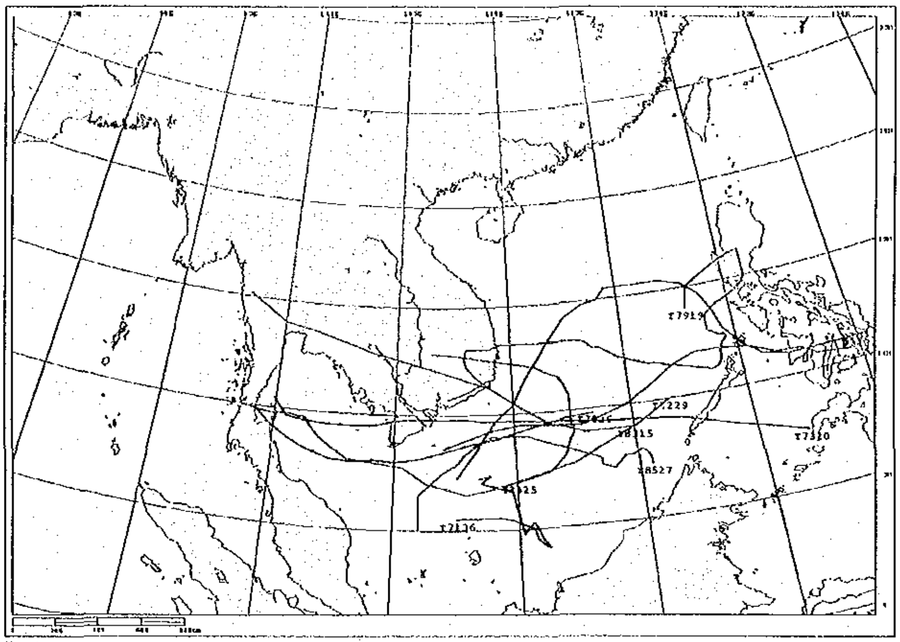
Figure 13.2.2-2 (1) Tracks of Selected Typhoons (No.1 -10)



TYPHOON map

● ~980 ● 980 ~1000 ● 1000 ~ (hpa)

Figure 13.2.2-2 (2) Tracks of Selected Typhoons (No.11 -20)



TYPHOON map

● ~980 ● 980 ~1000 ● 1000 ~ [hpa]

Figure 13.2.2-2 (3) Tracks of Selected Typhoons (No.21 -30)

Source: Study Team

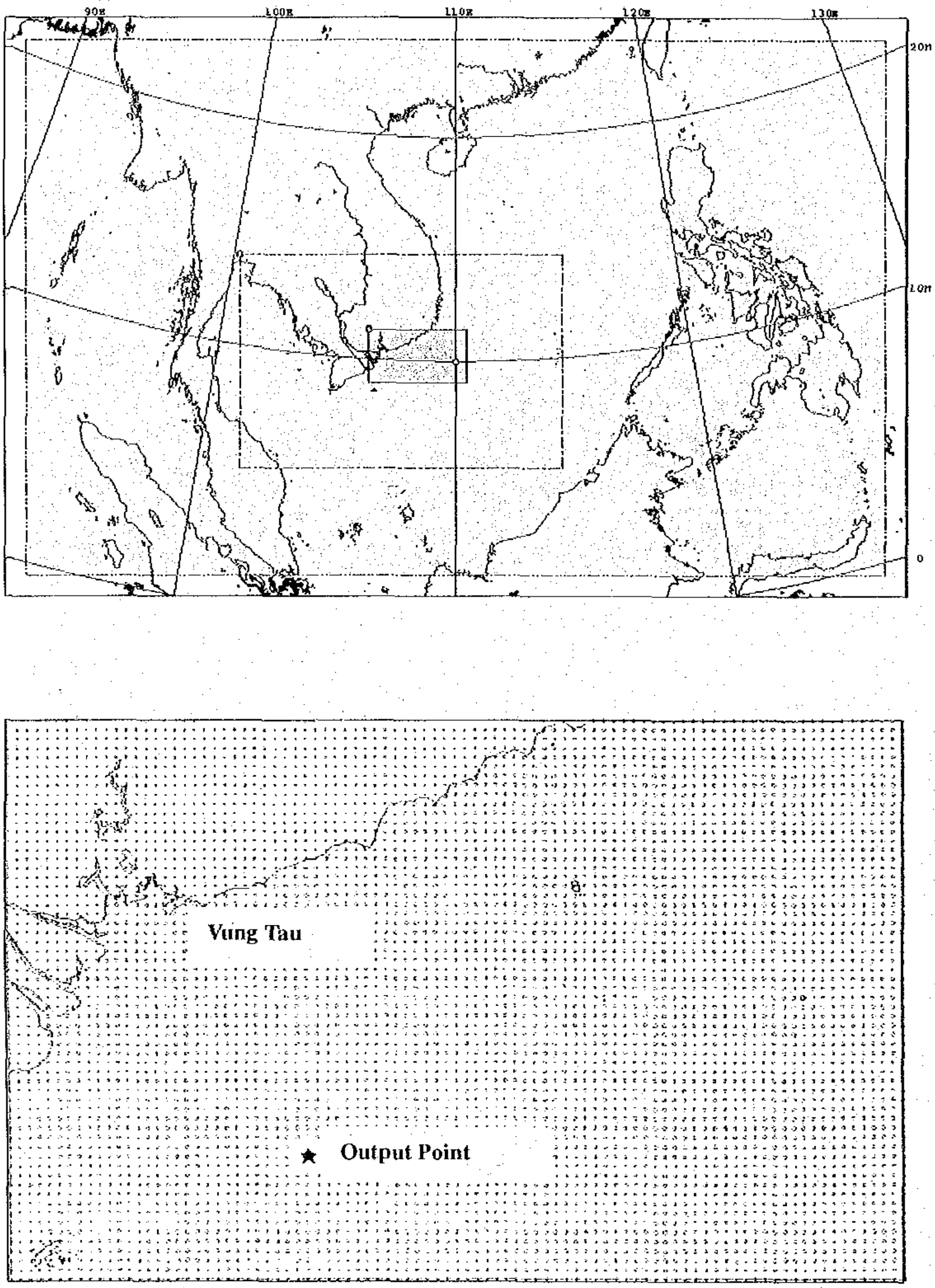
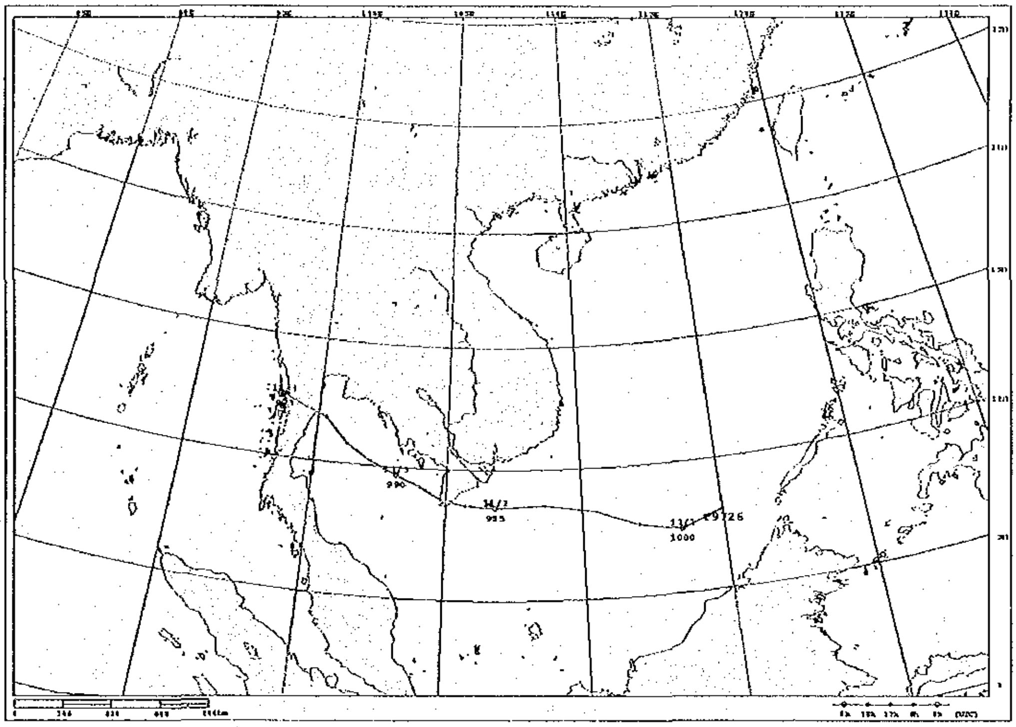


Figure 13.2.2-3 Grid Arrangement for Hindcast of Unusual Waves due to Typhoons



TYPHOON 9726

980 hPa -- 1000 hPa

1000 hPa --

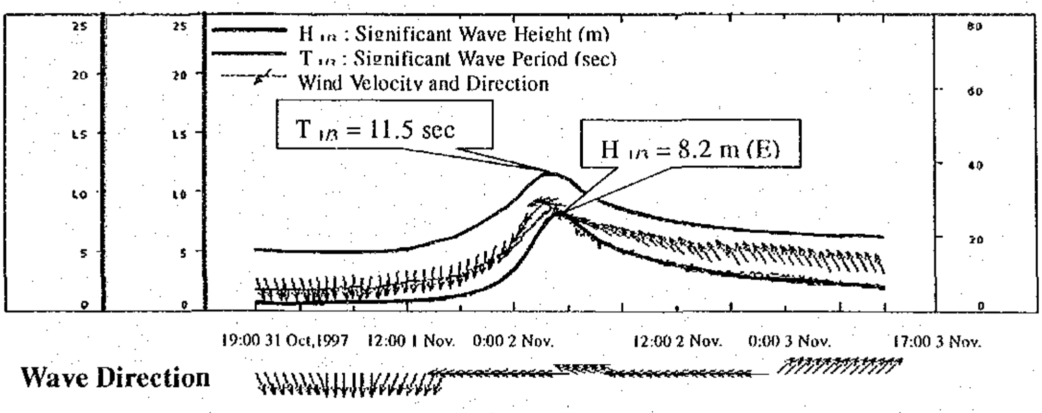


Figure 13.2.2-4 Result of Wave Hindcast for the Case of Typhoon No. 9726 (*Linda*)

13.2.3 Waves for Planning and Design of Port Facilities

(1) Calmness of harbor basin at Ben Dinh-Sao Mai Port

The calmness of basins at the proposed layout plan of Ben Dinh-Sao Mai Port is examined, referring to the required norm of more than 97.5% of time to be less than 0.5m in significant wave height, and applying the directional wave frequency distribution of the combined Types-A and B waves shown in Table 13.2.2-3 to wave diffraction analyses. An example of the analysis is shown in Figure 13.2.3-1 for the case of incident wave direction from the south-west.

The result of the assessment on the percentage at 5 berths for all the wave directions is summarized in Table 13.2.3-1. It indicates that the percentage falls to an order of 95% at the outer-most berth, which suggests the need of a breakwater from the tip of the quaywall. It is assessed that a breakwater with a length of 100m is necessary to secure the above calmness requirement.

(2) Design waves for protective facilities at Ben Dinh-Sao Mai Port

The Type-C waves generated by typhoons are treated statistically to decide the design offshore wave with a recurrence period of 50 years. The statistical analysis is carried out, employing the extrapolation method by means of Weibull Distribution:

$$P[H \leqq x] = 1 - \exp[-\{(x-B)/A\}^{k}], \quad (1)$$

$$r_v = (x-B)/A = [-\ln\{1-P[H \leqq x]\}]^{1\cdot k}, \quad (2)$$

where H is wave height, A and B are parameters, and r_v is the reduced variate. The wave heights are selected from the result of wave assessment, of which wave directions are between NE and SW. The design wave period can be determined based on the correlation between wave heights and wave periods.

The result of the analysis is shown in Figure 13.2.3-2. The design wave height for the return period of 50 years is 8.0m with the wave period of 13.3 sec.

Then, the offshore design wave is to propagated to Vung Tau area to establish the design wave at the site of facilities, for example, the breakwater at Ben Dinh-Sao Mai Port. The design wave height is approximately equivalent to the breaking wave height at the place of interest, because of the shallow depth relative to the extreme wave height created by the strong typhoons analyzed above.

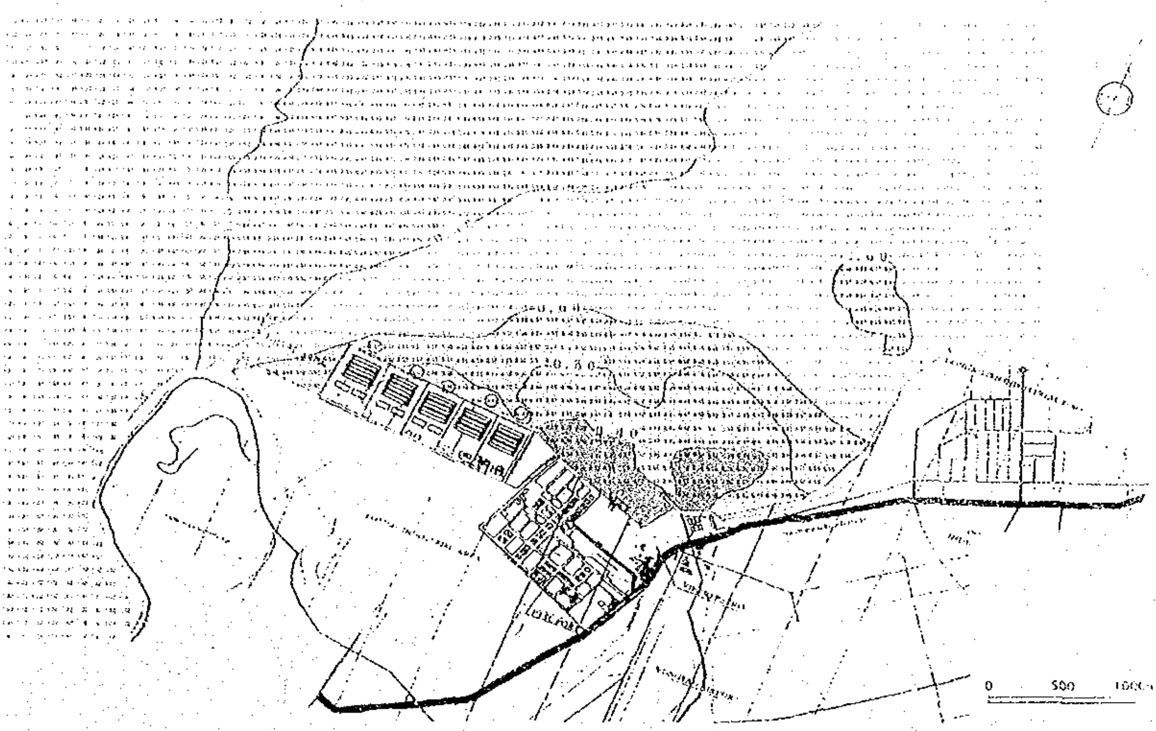
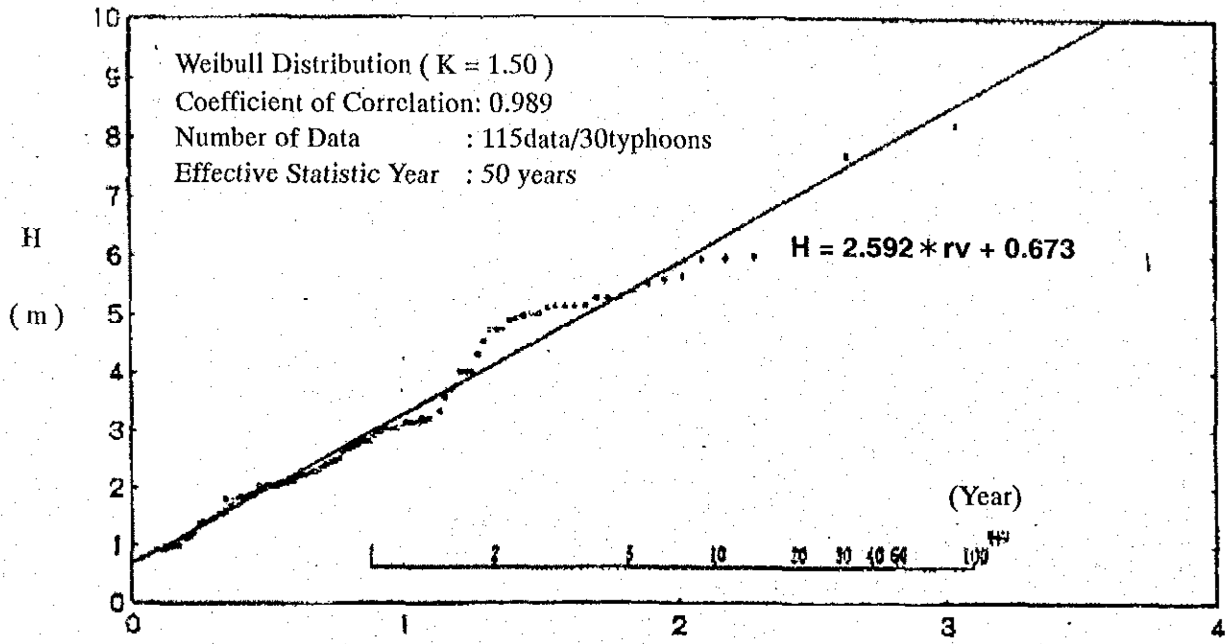


Figure 13.2.3-1 An Example of the Harbor Calmness Analysis at Ben-Dinh Sao Mai Port (Incident Wave Direction : South-west)

Table 13.2.3-1 Result of Analysis of Harbor Calmness at Ben-Dinh Sao Mai Port

Wave Direction	Percentage of Disturbance due to the Wave in the year(%)				
	Berth No.1	Berth No.2	Berth No.3	Berth No.4	Berth No.5
SSW	0.002	0.010	0.010	0.007	0
SW	3.513	1.900	1.600	2.020	2.140
WSW	0.195	0.166	0.147	0.176	0.137
W	0.010	0.010	0.010	0.058	0.010
WNW	0.092	0.108	0.125	0.141	0.125
NW	0.237	0.267	0.296	0.326	0.326
NNW	0.101	0.101	0.108	0.108	0.108
N	0	0	0	0	0
NNE	0	0	0	0	0
NE	0	0	0	0	0
ENE	0.004	0.002	0.002	0.002	0.001
E	0	0	0	0	0
(Total)	4.17	2.56	2.30	2.84	2.85
Availability of Berth in the year (100-Total)	95.83	97.44	97.7	97.16	97.15

Location : Vung Tau (Wave direction: NE-SW)
Statistical Period : Jan, 1951 ~ Dec, 2000



Return Period (year)	Non-exceeding Probability	Reduced Variate, rv	Wave Height (m)	Wave Period (sec)
100	0.99565	3.0924	8.7	13.8
50	0.99130	2.8237	8.0	13.3
40	0.98913	2.7345	7.8	13.1
30	0.98551	2.6172	7.5	12.8
20	0.97826	2.4474	7.0	12.4
10	0.95652	2.1423	6.2	11.7
5	0.91304	1.8136	5.4	10.9
2	0.78261	1.3255	4.1	9.5
1	0.56522	0.8852	3.0	8.1

Figure 13.2.3-2 Statistical Analysis of Deepwater Waves Generated by Typhoons
Source: Study Team