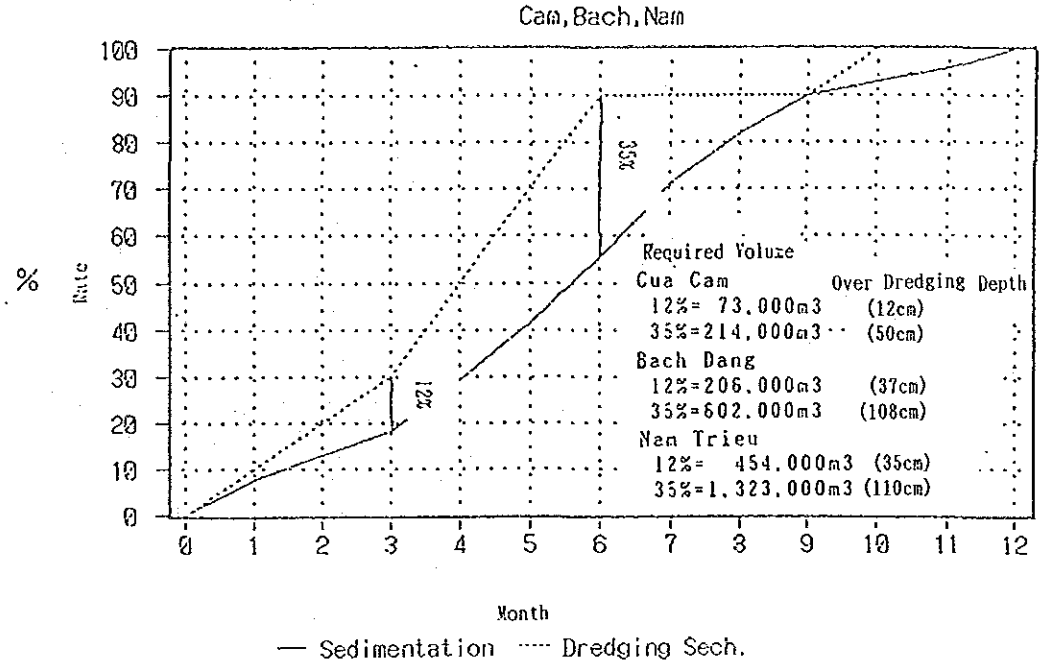


Figure 6-6 Applicable Relation Rate of Sedimentation and Dredging in Basin, Cua Cam, Bach Dang and Nam Trieu (Maintenance Dredging)

Table 6-8 Schedule of Maintenance Dredging Work

Maintenance Dredging -6.0 m		1996 -1998								1996 -1998			
Description	Quantity	1	2	3	4	5	6	7	8	9	10	11	12
	×1000m3												
Nam Trieu		==========									======		
Sedimentation	3,780	294	420	420	420	420	420				378		
					440	440	128						
Bach Dang		======		==========							======		
Sedimentation	1,720	166		350	350	350	332				172		
Song Cam		========			==========						==		
Sedimentation	610	28	155		155	155	56				61		
Basin		==					======						
Sedimentation	190	45					145						
Total	6,300	533	575	770	1,365	1,365	1,081	0	0	0	611	0	0

6-5-2 Proposed Maintenance Dredging System

Figure 6-7 is a flowchart showing proposal for the maintenance dredging system.

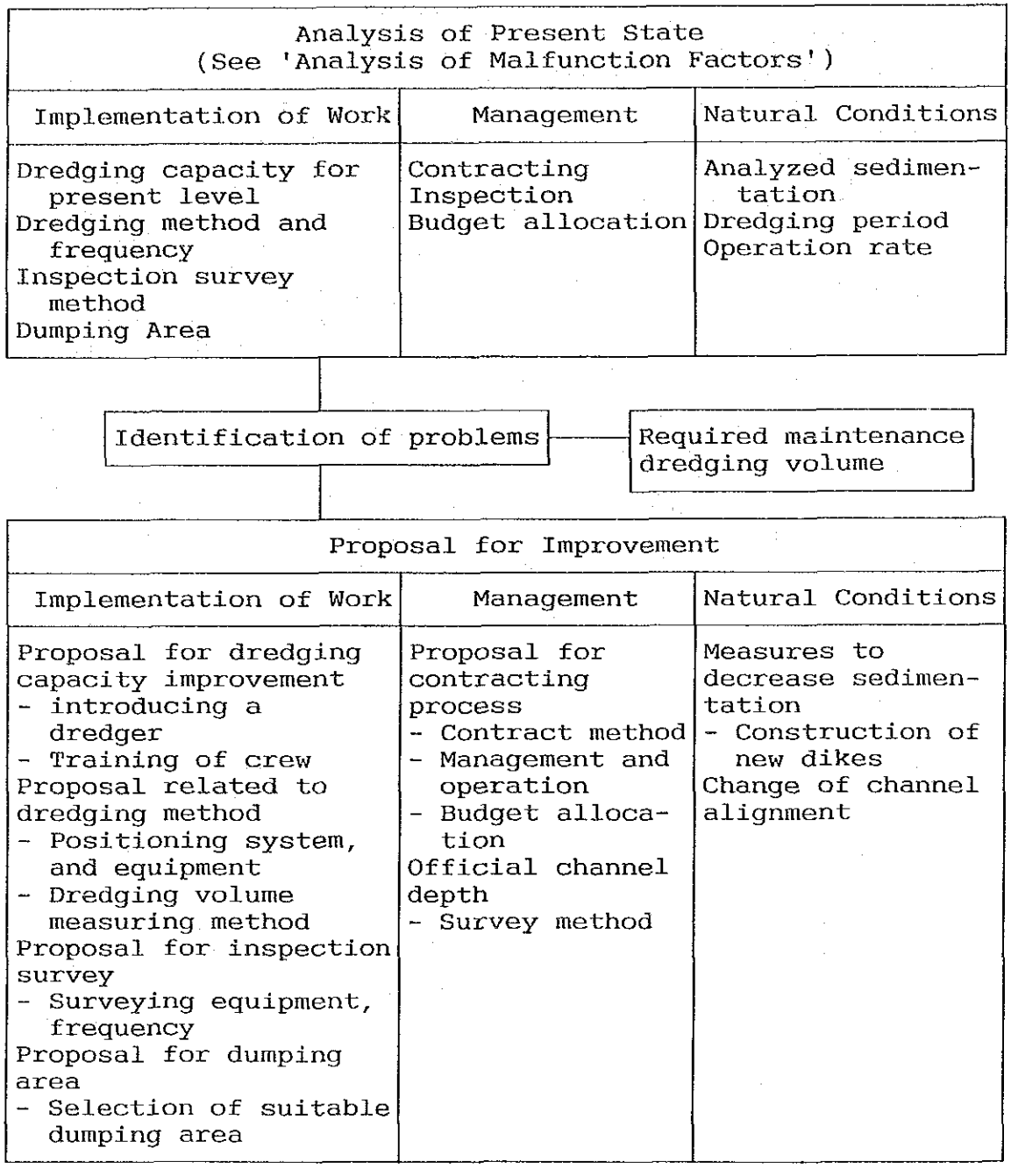


Figure 6-7 Flowchart of Maintenance Dredging System

(1) Proposal for improvement

1) Proposal to introduce new dredger.

In the maintenance dredging plan, maintenance dredging volume has to cover 6,300,000m3 every year from now on in order to maintain a channel depth of -6m. this means that a maximum dredging volume of about 1,365,000m3/month is required for the

four-month predredging. If two dredgers in the same class as Vietnam's largest trailer suction hopper are used simultaneously, they can dredge 880,000m3/month a short of 485,000m3. Thus, another dredger of the same type has to be introduced or an order has to be placed with outsider for the work.

If such dredger is introduced, it is appropriate for the Hai Phong Port Authority, the project implementing body of the dredging work between 1989 and 1992, to take charge of its management.

2) Implementation of work
a) Proposals related to dredgers
i) To install an automatic positioning system to decrease over-dredging volume and improve dredging accuracy
ii) To provide two tide stations in the access channel for improving the accuracy of actual readings of dredging depth
iii) To file daily dredging reports, i.e., daily reports on matters concerning dredging and engines
iv) To collect and identify data for obtaining the characteristics of individual dredgers, so as to eventually increase the volume of dredged.

b) Proposals related to survey
i) the pitch of survey lines is in every 50m on same pre and post survey line.
ii) Introduction of automatic positioning survey and diagrammatic device systems.
iii) Introduction of a survey boat.
iv) The planned survey line should be extended making a right angle with channel alignment.
v) The channel depth should be surveyed each month.

c) Proposals related to inspection survey
i) For a inspection survey extend of the dredging area should be divided into areas. Thereafter the inspection survey immediately carried out upon its completion of dredging work.
ii) For the acceptance of contract volume, the same process should be used including tolerance.

3) Management
a) Proposals related to contract
i) The Hai Phong Port Authority should order and take charge of management and operation by forming a new division.
ii) To necessary dredged 90% of coming sedimentation volume by June, contract should be awarded at the beginning of each fiscal year.
iii) Before awarding, the volume of sedimentation should be analyzed from dredging reports and the access channel surveys.
iv) A budget should be allocated before articles number ii) and iii).

b) Proposals related to management and operation
i) Based on daily dredging reports submitted by the dredging contractor, pertinent data should be maintained and filed for use in analyzing sedimentation volume.

ii) To maintain a channel depth, the proposed depth is analyzed from the data of article i).
If necessary, its depth is to be readjusted in March-May.

iii) The acceptance of contract volume is done through same process including tolerance.

6-5-3 Proposal for Measures to Decrease Sedimentation

1) Construction of dikes

In 1912, 15 numbers of dikes were constructed in the Dinh Vu area. Since then, no dredging work has been carried out in the area. With the advantages being realized, nine dikes constructed in the Cua Cam River in 1991-1992. Two additional dikes are blueprinted to construct in the bends (ST.1 and ST.2) of the Cua Cam River for easing the curvature, and four more dikes in the bends (ST.9 and St.10) of the Bach Dang River for increasing the current speed and its effect as follows;

When the block type of dike is constructed in a fair and/or counter current river, cross sectional dimension is rather small and the average velocity of current does not change. However, there is a 1.2 to 1.5 fold increase in the velocity of bottom current, which forces loose material to flow.

Structurally, dikes do not function alone.
There are no restrictions on their placement and combination. Several of them are constructed on both sides where a change of river channel is intended. (The information has been obtained from an interview with Mr. Dao Nguyen Kim, former director of the TEDI investigations and design office.)

The study on the effect of dikes, to decrease the sedimentation volume in the river area. Thus, the dike project planned by the Vietnamese side will be promoted.

2) Change of Nam Trieu channel
(New alignment)

The present alignment (N303) of the channel is planned to consider to N325-N335.

UNDP and TEDI have been studying the sedimentation of the access channel and Ha Long Bay since 1988. The results of these investigations have contributed to the concept of the sedimentation mechanism stated in this study.

The final report is scheduled to be published around March 1994. In the meantime, UNDP and TEDI are said to be collecting additional data. The change of the existing alignment might be referred to, and the simulation results for predicting sedimentation volume might be included.

Such being the situation, the draft plan for new alignment which under pre-studied by Vietnam side, is expected to be fully discussed in a next study. This study covers only some considerable points required in determining the direction of alignment as follows;

i) Data should be collected in a short period of time say, 1992

to 1993.

ii) The pocket function of the Bach Dang River must be taken into consideration.

iii) The necessity of the parallel dikes along the new alignment should be considered.

iv) A barrier dike should be considered to protect against the sediment transport caused by the coastal current of Cat Hai.

v) The feasibility of the above items in decreasing sedimentation efficiently, and introducing dredger capacity, should be considered.

The dredging volume at a depth of -6.0m near the new alignment (N328) and its sedimentation assumed by using the analyzed figures of Chapter 6-3-2 'Sedimentation Volume in Various Depth ' and shown in Table 6-9.

Table 6-9 Balance Volumes of Existing and New Alignment

Existing Alignment

A -6.0 M	EXISTING		UNIT:	1,000M3
AREA		NET	SEDIMENTA	TOTAL(I)
Basin		920	190	1,110
SONG CAM	ST0-ST 7	290	610	900
BACH DANG	ST7-ST14	770	560	1,330
NAM TREU(I)	ST14-ST15	540	1,160	1,700
NAM TREU(II)	ST15-END	2,120	3,780	5,900
TOTAL		4,640	6,300	10,940

New Alignment

B -6.0 M	NEW CHANN		UNIT:	1,000M3
AREA		NET	SEDIMENTA	TOTAL(II)
Basin		920	190	1,110
SONG CAM	ST0-ST 7	290	610	900
BACH DANG	ST7-ST14	770	560	1,330
NAM TREU(I)	ST14-ST15	540	1,160	1,700
NAM TREU(II)	ST15-END	3,320	3,220	6,540
TOTAL		5,840	5,740	11,580

Initial Dredging Balance Volume

C:B-A -6.0 M	BALANCE A-B		UNIT:	1,000M3
AREA		NET	SEDIMENTA	TOTAL(II)
Basin		0	0	0
SONG CAM	ST0-ST 7	0	0	0
BACH DANG	ST7-ST14	0	0	0
NAM TREU(I)	ST14-ST15	0	0	0
NAM TREU(II)	ST15-END	1,200	-560	640
TOTAL		1,200	-560	640

Chapter 7 Main Port Rehabilitation Plan

7-1 Premise of planning

Cargo handling capacity of Main Port without expansion case has been estimated over 3 million tons by the analysis of berth occupancy rate and other factors. It has been also confirmed that annual throughput of 3 million tons at Main Port can be achieved from the scheduled number of ship calls because of the deepen channel. Therefore the allocation plan of annual cargo handling volume has been set as around 3 million tons, and according to the planning principle mentioned in Chapter 5, the Rehabilitation Plan has been formulated in the following Chapter.

7-2 Cargo handling volume in target year

According to the demand forecast mentioned in Chapter 4 and the planning principle in Chapter 5, total cargo throughput in the year of 1998 in Main Port is 2,770 thousand tons in which 600 thousand tons is container, 900 thousand tons is bulk cargo and 1,270 thousand tons is general cargo (including bagged cargo).

The allocation of cargo throughput in the year of 1998 to each berth is planned as follows:

Container Cargo	Berth No.1 to No.3
Bulk Cargo	Berth No.4 to No.6
General Cargo	Berth No.7 to No.11

7-3 Cargo Handling System

(1) Cargo handling capacity

The forecast cargo volume excluding container is 2,770 thousand tons for 8 conventional berths.The cargo handling capacity at 8 conventional berths is calculated as follows.

For general cargo and bagged cargo: 1,461,000 tons
(forecast cargo: 1,270,000 tons)

For steel product and bulk cargo: 1,855,000 tons
(forecast cargo: 900,000 tons)

The cargo handling capacity at 8 berths is more than forecast cargo volume.

(2) Necessary equipment and their price

The new equipments for purchase and their price are as follows.

Equipment	unit	price(million us$)
Forklift Truck	31	4.10
Truck	35	2.26
Tractor/Tracer Head	20/10	1.90
Bulldozer	8	0.48
VHF	12	0.003
Pallet	11,538	0.80
Total		10.543

(3) Electric power sub station

(a) Container terminal

A new electric sub station is necessary to settle on the backyard of CFS (container freight station) when the berth No.1 to berth No.3 are converted to one container terminal. The necessary power for transformers in the sub station will be as follows:

Reefer container:	150 KVA
Lights for container yard:	75 KVA
Lights for C.F.S.and control center:	150 KVA
Power for C.F.S. and control center:	150 KVA

The price of electric apparatus and cables are 2.05 mil.us$

(b) Conventional berths

The electric powers for the conventional berths are supplied from the remained four sub stations. All electric apparatus and cables are very old and need replacement. For introducing the new apparatus, further investigation and study by experts must be conducted.

7-4 Facilities Rehabilitation Plan

(1) Berth in Main Port

It is planned that berth No.1 to berth No.3 are integrated to a specialized container terminal with expansion of marshalling yard and introducing necessary cargo handling equipment. When berth No.2 and No.3. are converted to container berths, bulk cargo handling shall be shifted to No.4,No.5,and No.6 berth.General cargo including bagged cargo will be handled at berths No.7-11. (cf. Fig.7-2)

(2) Bonded transit warehouse

It is planned that No.13 warehouse is converted to a bonded transit warehouse for quick treatment of custom clearance and smooth cargo flow between EPZ or China. This plan also includes arranging the layout plan of access road to No.13 warehouse area.

(3) Demolition and improvement of warehouses

No.1 warehouse behind berth No.2 which has an area of 4,000 m2 will be demolished. And No.12A warehouse which has an area of 3,600 m2 will be converted to CFS. No.2 warehouse which has an area of 4,000 m2 and No.3 warehouse which has an area of 3,704 m2 behind berth No.3 also will be demolished to enlarge the container marshalling yard. (cf. Fig.7-1)

(4) Road in Main Port

In the near future, it seems to be no need to distinguish the roads so a layout plan for roads is not prepared.
It is planned to lay green fringes along main roads and buildings (actual layout shall be planned in detailed design phase.)

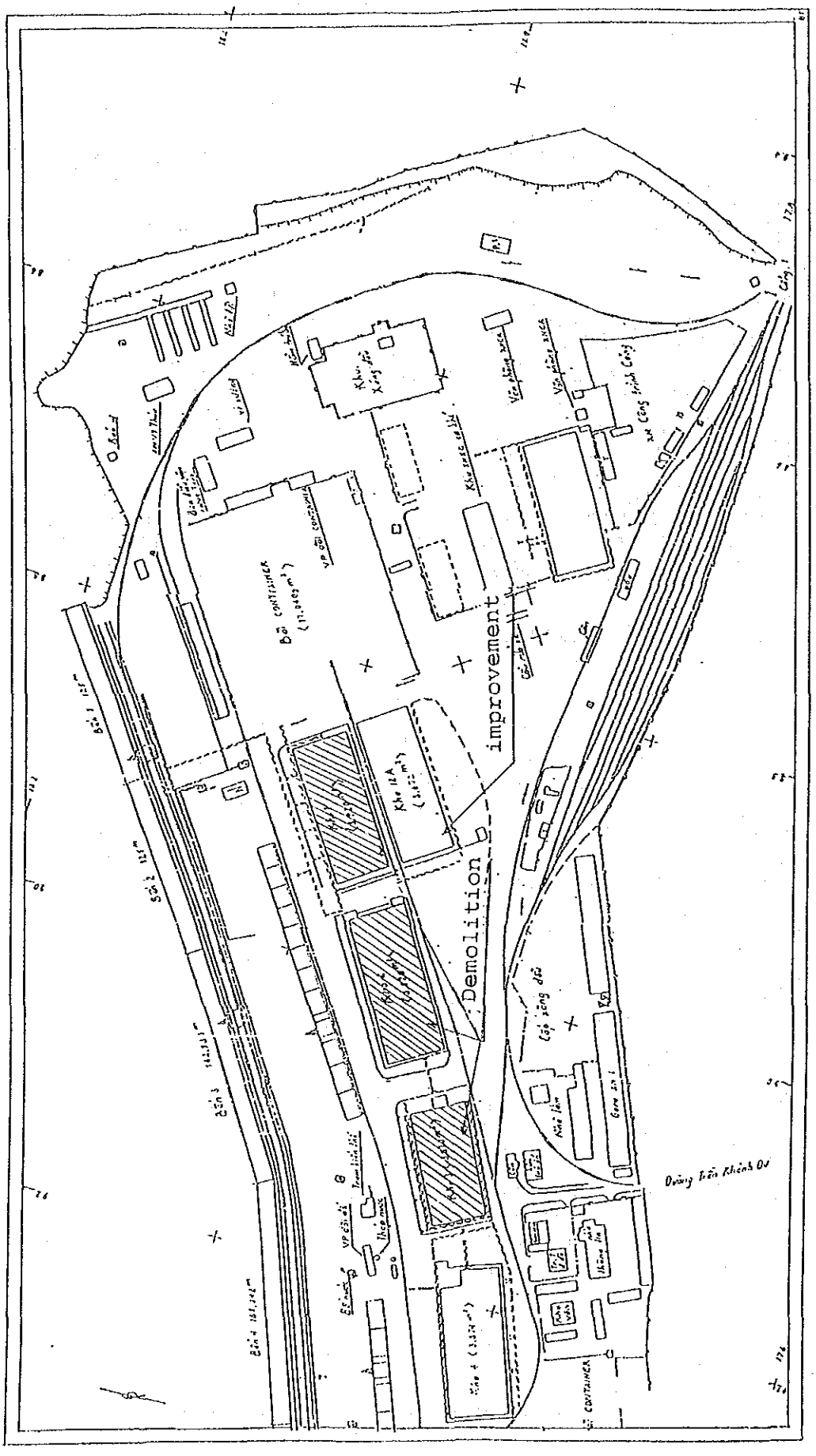


Fig. 7-1 Location of Warehouses in Main Port Area

(5) Work vessel basin

If there is a necessity to lengthen the berth No.1, the existing work vessel basin should be removed. On the opposite side of Cam river where is also planned for damping place for dredging soil.

(6) Building except warehouses

A new intensive office building near the outside area about 200m from main gate No.4 is planned to raise management efficiency for the execution of the Rehabilitation Plan.

When berth No.1-3 are converted to a specialized container terminal, it is necessary to construct a new integrated management and operation office building, area of which is calculated as 800 m2 .

(7) Other facilities

As other facilities, it is necessary to improve water supply and electricity facilities. Water supply system in Main Port is planned after the completion of the feasibility study by Hai Phong City with the assistance of Finland.

As far as electricity is concerned, power is supplied from out side and an improvement plan of sub station and other apparatuses is made as in Chapter 7-3 mentioned.

(8) Tug boat

It is planned to procure four 1,000 horse power tug boats, two for use in Main Port, the others in Chua Ve in order to assist ship maneuvering.

7-5 Plan for Main Port

As results of the study, berth use plan, bonded transit warehouse layout plan and work vessel basin plan are made and shown in Figure 7-2, 7-3 and 7-4 respectively.

Fig. 7-2 BERTH USE PLAN

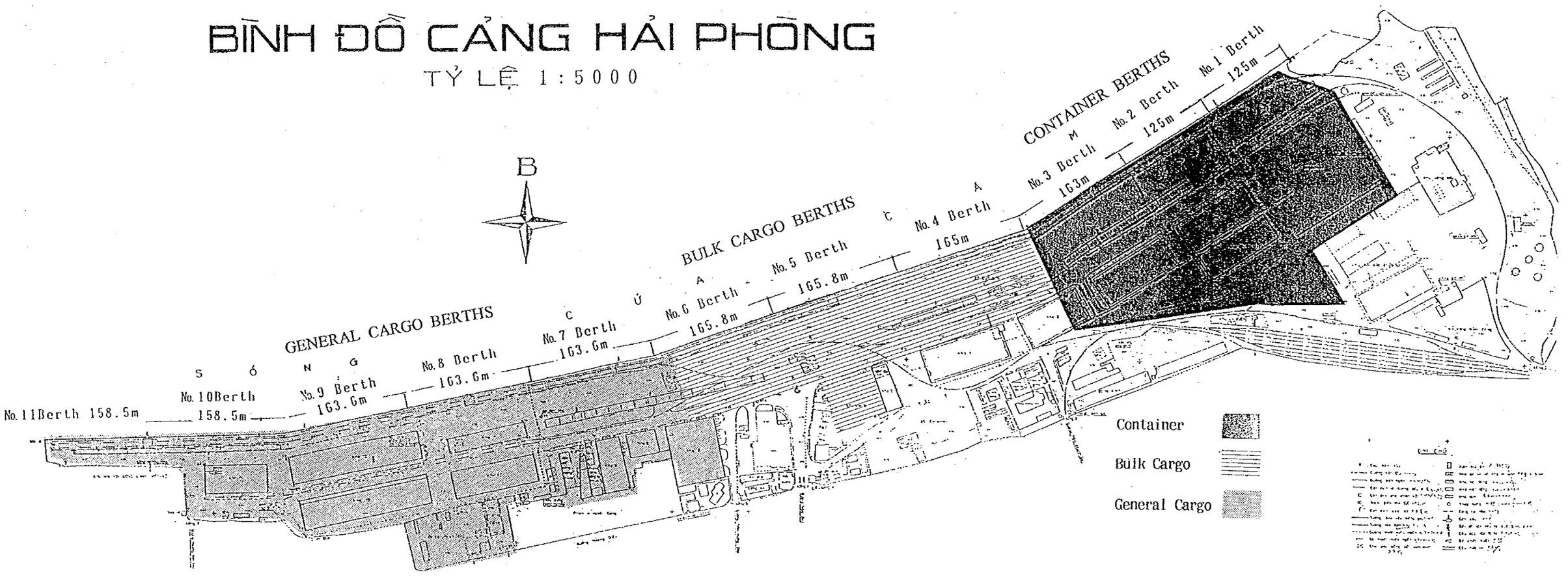
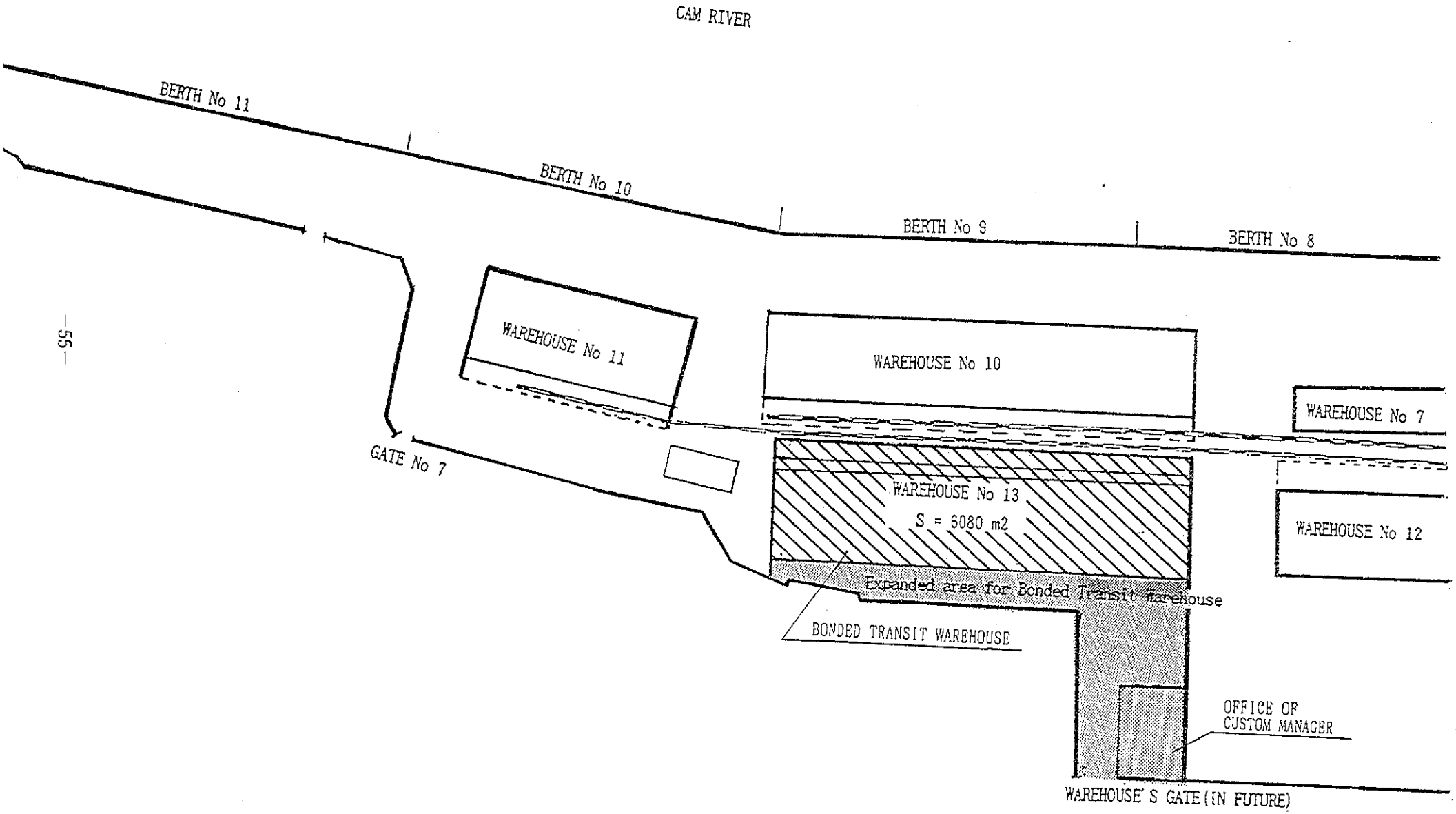


Fig. 7-3 PLAN OF BONDED TRANSIT WAREHOUSE AT HAIPHONG PORT



Reclamation Area

Damping Area for
Dredging Soil

Work Vessel Basin

Main Port

360m

350m

520m

180m

100m

110m

-2.0m

SÔNG CỬA CẤM

Fig. 7-4 PLAN FOR WORK VESSEL

Chapter 8 CONTAINER TERMINAL IMPROVEMENT PLAN

8-1 CONTAINER TRAFFIC CHARACTERISTICS IN HAI PHONG PORT

Container cargo in Hai Phong Port is handled at Berth No. 1 and Berth No. 7 in Main Port and also in Chua Ve Container Port. The container shipment in both ports was 34,111 TEU in 1992 and is expected to reach 49,800 TEU in 1993. The container cargo experienced a higher growth, compared to conventional cargo, posting an annual average growth rate of about 38% for the past three years.

The container shipment in Berth No. 1 (Main Port) is operated by GEMANTRAN that is a joint venture company between Vietnam and French, who allocates one container ship named "TRICOR SON" in 9 day cycle from Hai Phong via Hong Kong/Taiwan and back to Hai Phong. In Berth No. 7, the Korean shipping line "H-A LINE" is in service. In Chua Ve Port, three (3) shipping companies are now in operation; EAC (MAERSK LINE), CIS and SGA. EAC operates container service, covering two sea routes, one is Hai Phong - Hong Kong - Taiwan - Hai Phong and another is Hai Phong - Saigon - Singapore - Hai Phong.

8-2 CONTAINER TERMINAL CHARACTERISTICS

8-2-1 Berth No. 1 (Main Port)

Berth No. 1 holds about 17,000 m^2 marshalling yard inshore of the 40 m wide open storage yard that is located immediately behind the apron. Most of 40 foot import/export containers are stacked maximum two (2) tiers in the open storage yard. 20 foot containers, mostly stuffed, are stacked in the marshalling yard, handled by fork-lift trucks and top-lifters. Significant amount of empty containers, both 20-foot and 40-foot, are stacked, surrounding the marshalling yard, two (2) tiers and five to six rows, face to face. This is mainly attributed to imbalance of foreign trade between import and export. Another reason is that comparatively low stowing charge for empty containers in Hai Phong Port draws many shipping companies' interests, gathering empty container that idle in many container terminals in south Asia. No 1 Berth handles container by use of ship's gear, with an average productivity of 10 TEU per hour. The marshalling operation is carried out mainly by fork-lift trucks and top-lifters, and transport between the yard and quayside by trucks and low-body trailers.

The dwell times are 9-10 days for export and 20 days for import, while empty container seem to be stowed more than 1 to 2 months. Further noteworthy points in container characteristics, 40 foot containers have recently been growing up.

8-2-2 Berth No. 7 (Main Port)

Berth No. 7 has a marshalling yard of about 10,000 m^2, which is located close to the apron and small in space. As a result, many containers overflow into the neighboring Berth No. 6 as well as partly into Berth No. 8, so that the actual yard

space used for the container storage at Berth No. 7 would be more than 15,000 m^2.

The containers, after unloaded by quayside jib crane or ship's crane, are stacked in the marshalling yard. Some containers are stacked by quayside crane near the apron and once again rehandled by two (2) yard cranes and restacked into the shorside marshalling yard that is located behind the yard jib cranes. Making full use of jib cranes, both at the quayside and at the marshalling yard, container are stacked up to three tiers, closely located each other, leaving little space for yard trucks to pass through.

8-2-3 Chua Ve Port

Chua Ve Port has a 25,000 m^2 container yard, larger than at container berths of Main Port, and slot plans in the container terminal is comparatively well aligned. The field survey reveals that each crane handles 17-18 container per hour. This terminal capacity is much greater than Main Port's. Most of 40 foot containers are stowed four tiers just behind the quaywall, because 40 foot containers can be only handled by jib cranes. 20 foot containers are handled by mobile cranes and stowed two tiers at maximum. The container unloading/ loading along the quayside seem so high, causing significant imbalance between quayside operation and marshalling yard operation.

8-3 CONTAINER TERMINAL CAPACITY

8-3-1 Berth No. 1 (Main Port)

The container handling capacity of the terminal, as a whole, is governed by the smaller of the two, either stowing capacity of marshalling yard or container unloading/loading capacity at quayside. The quayside capacity at Berth No. 1 has been estimated at 29,980 TEU/year. In the meantime, the annual marshalling capacity in the yard, has been calculated at 19,000 TEU, which is far less than quayside productivity. Berth No. 1's container handling capacity, therefore, is being controlled by the marshalling yard capacity.

8-3-2 Berth No. 7 (Main Port)

The same analysis on the terminal capacity has been made for Berth No. 7, where both ship's gear and quayside crane handle container shipment. The annual berth capacity has been estimated at 23,184 TEU. The marshalling yard capacity has been figured out at 15,400 TEU/year. The quayside capacity surpasses the marshalling yard capacity, so that the terminal capacity, as a whole, turn out to be 15,400 TEU/year.

8-3-3 Chua Ve Port

The quayside capacity of Chua Ve Port has been estimated at 73,900 TEU per year. The marshalling capacity, in the meantime, has been calculated at 31,750 TEU/year, so that the current terminal capacity at Chua Ve Port is about 32,000 TEU/year.

8-4 CONTAINER TERMINAL IMPROVEMENT PLAN

8-4-1 Premise for Improvement Plan

The traffic demand of container cargo in 1998 has been projected at 150,000 TEU. The existing berths (No. 1, No. 2 and No. 3) in Main Port will be redeveloped into one integrated container terminal with a total marshalling yard of 80,000 m^2, while Chua Ve Port's yard will be also expanded to a total marshalling space of 77,000 m^2. Both terminal will become almost even in yard space. As such, it has been planned that both container terminals will care for 75,000 TEU per year each.

8-4-2 Container Marshalling System

The marshalling system in Hai Phong Port varies terminal by terminal. Berth No. 1 in Main Port employs fork-lift/top-lifter system, Berth No. 7 in Main Port jib cranes system and Chua Ve Port mobile crane system. The current size of container traffic can be handled by these existing systems.

However, it is impractical to handle planned 75,000 TEU containers per year in the same conventional system. More efficient container handling system shall be introduced. There are several container handling systems now employed in many container ports worldwide. Among the most popular system like transfer crane system (T/C) and straddle carrier system (S/C), T/C system has been selected mainly due to low operation cost and higher stowing capacity and has been compared with fork-lift system (F/L) system that is currently used in Haiphong Port. In case of F/L system, 40 times of annual turnaround could produce 79,520 TEU of annual handling capacity, while T/C system will be easily clear the goal of 75,000 TEU/year in 20 times turnaround a year pace. Mainly due to this higher container handling capacity, T/C system has been proposed for both terminals in the study. Nevertheless further review on the selection of container handling equipment is essential reflecting on the shipper's opinions.

In the port rehabilitation plan, CFS operation has been positively taken into account and top-lifter (25 ton), chassis and fork-lift trucks has been included in the project component. As a result, full set of T/C system on each terminal including CFS equipment are tabulated below.

Equipment	Specification	Number of Equipment
T/C (RTG)	6 plus 1 3 over 1	5
Yard Chassis		10
Yard Tractor		10
Top-lifter	25 ton	2
CFS Chassis		6
Fork Lift Trucks	3 ton	3
Fork Lift Trucks	2 ton	2
Reach Stacker		1
Total		39

8-4-3 Improvement Plan of Civil and Building Facilities.

(1) Main Port

The existing yards at berths (No. 1, No. 2 and No. 3) will be upgraded and expanded to 76,000 m^2 and the existing transit sheds No. 1, No. 2 and No. 3 will be demolished. The power substation and utilities facilities like water and drainage will be realigned. The yard lighting, reefer facilities and terminal operation building will be also included in the work component of Main Port Improvement Plan.

(2) Chua Ve Port

In connection with the container terminal expansion of Chua Ve Port, the existing container yard (25,000 m^2) will be upgraded and another new marshaling yard (52,000 m^2) will be constructed. In addition, the port road will be also improved. The upstream section of 66 m will require reinforcement to allow container cranes traveling. CFS facilities and weighing system will be also provided.

Chapter 9 Implementation Plan

9-1 Urgent Rehabilitation Plan

The entire Urgent Rehabilitation Plan proposed in the previous chapters is summarized in Table 9-1 including the planned figures given by Vietnamese Government as well.

The required items for the implementation have been selected after consideration of their priorities in the table.

Table 9-1. Summary of Rehabilitation Plan

	Rehabilitation Plan	Vietnamese Side Plan
1. Target Year	1994 - 1998	Phase I 1994 - 1995 Phase II 1996 - 2000 Phase III 2001 -
2. Forecast of Handling Cargo	Year 1994 1998 2000 Export 630 1,050 1,653 Import 1,144 1,485 1,712 Domestic 1,314 2,152 2,407 TOTAL 3,088 4,687 5,772 Container (TEU) 74,000 154,000 199,000 Increasing cargo volume in trade with China is not included, but is considered as an extra element. The planned volume is 4.7 million ton and 150 thousand TEU in 1988.	Year 1994 1998 2000 Export 1,100 1,550 2,200 Import 1,400 1,600 2,500 Domestic 1,500 1,850 2,300 TOTAL 4,000 5,000 7,000 Container= 40% of total cargo volume (TEU)= Container Volume / 10 ton 7,000 * 0.4 / 10 = 280,000 TEU (by 2000)
3. Dredging Plan	Water Depth is decided as -6m. Vessels of 10,000DWT can enter in accordance with tidal operation. Dredging vessels for maintenance shall be examined at detail stage. Initial mil m3 / Maint. (1yr) mil m3 Dredging -5.0 m 1.0 3.5 -6.0 m 3.7 6.1 -7.0 m 7.6 8.2 Turning Basin -6.0 m 0.9 0.2 Thu $ Dredging -6.0 m 10.9 mil m3 51,572 Dikes 6 Nos. 3,300 Dredging Vessels 3,000 m3 cap. 15,000 Dredging management system 1,500 Survey 1,500 TOTAL 72,872 Alignment change is determined according to another detailed survey. Sand groins and dikes are requisite.	1st. Phase Water Depth -7 m Target Vessel Type 10,000DWT, Draft 8.3 m Survey & Design 500 thu$ Dikes 6 Nos. 3,300 thu$ Dredging 5.0 mil m3 6,000 thu$ Dredging Vessels (3,500 m3 capacity) 15,000 thu$ TOTAL 24,800 The alignment of Nam Trieu Access Channel is to be altered.

Table 9-1. Summary of Rehabilitation Plan (Con't)

	Rehabilitation Plan	Vietnamese Side Plan
4. Plan at Chua Ve Area	Present: 2 Berths 264 m; Yard 25,000 m2 Plan: 2 Berths 264 m; New Yard 52,000 m2 Although additional berth is examined, the cargo volume in 1998 can be handled by the extension of Yard behind the present berth. Present Yard and handling equipment are also improved. New Yard 5,200 m2 — 2,080 thu$ Improv. Yard 2,500 m2 — 500 thu$ Equipment Transfer Crane 35-45t: 5 Nos., 8,500 thu$ Yard Chassis: 10, 300 Yard Tractor: 10, 900 Top Lifter 25t-35t: 2, 600 CFS Chassis: 6, 180 Forklift 2t-3t: 5, 170 Reach Stacker: 1, 400 sub TOTAL: 11,050 New Berth Plan The new birth will be introduced considering the situation until 1998, but presently it is not on the priority list. However, reinforcement of present berth and new CFS, roads, and pavement are planned. Reinforcement of Berth: 66 m, 3,300 thu$ Improvement of Road: 1Ls, 200 Construction of CFS: 1Ls, 800 Weighing System: 1Ls, 400 sub TOTAL: 4,700 2 Tugboats for Berthing Tug Boat 1,000 HP: 2 Nos., 4,000 TOTAL: 22,330	Present: 2 Berths 264 m; Yard 25,000 m2 Plan: 3 Berths 564 m; New Yard 135,000 m2 Improvement of present berth (1st. Phase) Improvement of Yard and handling equipment is planned. Yard 25,000 m2 - 75,000 m2 Av. 50,000 m2 = 1,000 thu$ Equipment Quay Crane: Present 4, Plan 0, 0 thu$ Mobile Cran: 4, 1, 1,070 Forklift: 1, 5, 100 Trucks: 5, 5, 205 Tracterhead: 3, 330 Chassis 40': 2, 60 20': 5, 100 Phase I TOTAL: 2,865 New Berth Plan (2nd. Phase) Construction: Nos., thu$ Berth 300*1: 7,500 Yard 60,000 Equipment Gantry Crane 30t: 3, 15,600 Transfer Crane: 3, 3,210 Forklift 2t: 5, 100 Tug Boat 1000 HP: 2, 3,000 Phase II TOTAL: 29,410 TOTAL: 32,275

Table 9-1. Summary of Rehabilitation Plan (Con't)

	Rehabilitation Plan	Vietnamese Side Plan
5. Rehabilitation Plan of Main Port Area	No. 1 - No. 3 berths are set specifically for container berths. Expansion of Yard and necessary handling equipment such as Transfer Crane are introduced. CFS is improved and the introduction of quaywall crane is postponed. General handling equipment on berths is improved. General Plan Container 3 berths Others 8 berths Warehouse 10 Yard Pavement 76,000 m2 Main Port Area Plan 65m extension of quaywall and quay crane are improved. Equipment / Plan / thu$ Top Lifter 25 - 30t: 2 / 600 Tracterhead: 10 / 300 Chassis: 10 / 900 Forklift: 5 / 170 Transfer Crane: 5 / 8,500 CFS Chassis: 6 / 180 Reach Chassis: 1 / 400 Yard Pavement: 76,000 m2 / 1,520 Sub TOTAL: 12,570 Electric Power Supply: 1 / 1,700 Light: 4 / 1,252 Reefer: 20 / 70 Sub TOTAL: 3,022 Warehouse Demolition: 3 / 400 Operation Office: 1 / 600 Tug Boat 1,000 HP: 2 / 4,000 Sub TOTAL: 5,000 TOTAL: 20,592 Handling equipment of general berth of Main Port Area shall be replaced and/or reinforced. Present / Plan / thu$ Truck: 32 / 35 / 3,255 Tracterhead: 32 / 10 / 1,100 Chassis: 9 / 20 / 1,400 Forklift 2t-10t: 40 / 26 / 1,092 Bulldozer 2t: 0 / 8 / 480 Pallets: 0 / 1 set / 150 TOTAL: 7,477	No. 1 and No. 7 berths are combined into one container terminal. Cranes for heavy load are introduced. Handling equipment and Yard are improved. Handling efficiency of general berth is improved. General Plan Present / Future Plan Container: 2 berths / 2 Others: 9 berths / 9 Warehouse: 13 / 12 Yard: 53,000 m2 / 56,500 m2 Main Port Area Plan 1st. Phase / Present / Plan / thu$ Tracterhead: 3 / 3 / 330 Chassis 20': 3 / 4 / 80 Chassis 40': 3 / 2 / 60 Forklift 2t-32t: 6 / 4 / 80 Truck: 5 / 205 Tug Boat 1000ph: 2 / 3,000 Pavement 3,500 m2: 1,000 Sub TOTAL: 4,755 2nd. Phase Gantry Crane 30t: 2 / 10,400 Translainer 30t: 2 / 2,140 Forklift 42t: 1 / 800 Sub TOTAL: 13,340 General berth of Main Port Area (1st. - 2nd. Phase) Equipment / Superannuation Truck IFA: 6 UNITS KAMAZ: 3 Mobile Crane: 2 Forklift 5t: 14 Jib Crane: 6 Tracterhead: 5

Table 9-1. Summary of Rehabilitation Plan (Con't)

	Rehabilitation Plan	Vietnamese Side Plan
6. Water and Electric Supply	Detail design is required. Water and Electric Supply TOTAL 2,000 thu$	(1st. - 2nd. Phase) Water Supply to Chua Ve Area Water and Electric Supply Plan to Main Port Area Electric Supply 1,500 thu$ Water Supply 1,500 thu$ TOTAL 2,000 thu$
7. Communication Network System for Operation	Introduced based on priority. Office Automation for handling container requires guidance. Nos. thu$ Computer Network for Operation 1 1,000 Hand Talky 12 3 TOTAL 1,003	thu$ Computer Network for Operation TOTAL 1,000
8. Training	12,000US$/Month/Person * 50 persons TOTAL 600 thu$	Technical Training TOTAL 600 thu$
9. Others	Management sections, presently spread through narrow port areas, are collected outside and efficiency of management is improved. Remaining sites are also utilized effectively. 6,200 m2 = 1,845 thu$ Regarding the extension of berth No.1, a basin for working vessels is required. 4,000 m2 = 600 thu$ TOTAL 2,445 thu$	Office Building 6,200 m2 TOTAL 1,845 thu$ (Compensation cost included)
10. Summary	1994-1998 (thu$) / Phase II (thu$) Dredging 72,872 / 15,000 Chua Ve Port Area 22,330 / 23,200 Main Port Area 24,069 / 7,250 Others 1,003 / 4,445 Training 600 TOTAL 120,874 / 49,895 (Tentative) Phase II of Main Port Area includes the extension of No.1 berth (65m, 3.25 mil$).	1994-1995 (thu$) / 1996-2000 (thu$) Dredging 24,800 Chua Ve Port Area 2,865 / 29,410 Main Port Area 4,755 / 13,340 Others / 5,445 TOTAL 32,420 / 48,195

9-2 PRELIMINARY DESIGN OF MAIN FACILITIES

(1) Main Port

The Urgent Rehabilitation Project consists of pavement for the container yard expansion, relocation of water supply, power supply and drainage facilities ,etc.

For the pavement of the container yard, the asphalt macadam type with Telford subbase is recommended considering not only it's reasonable cost but also the experience of local people in this type of construction.

(2) Chua Ve Port

The improvement of the existing yard (25,000 m^2) will be overlayed and the expansion of the container yard (52,000 m^2) will be newly paved and the tie rods will be installed for reinforcement in the disqualified section 66 meter long of the existing pier traveling heavy cranes.

CFS (2000 m^2) and Weighing Equipment will be furnished in the area behind these piers.

9-3 COST ESTIMATE OF THE PROJECT

The quantity of construction works for the Project is calculated for each site and the Project works are divided into the following parts;

- Pavement of the container yard;
- Construction of CFS;
- Dredging works of channel;
- Installation of port handling equipments.

The Project construction will be carried out by a contractor selected through international competitive bidding. Therefore, the Project cost was estimated taking based on the financing condition, scale of the Project, and detailed background of the local construction industry.

The following exchange rate effective at the beginning of this Feasibility Study is applied in July 1993.

1 US$ = 10,680 VND = 108 Yen

The total project cost is estimated 138,960,000 US$.

By work items:

Civil Works	:	12,822,000 US$ (9.2%)
Dredging Works	:	54,872,000 US$ (39.5%)
Equipment Supply	:	51,080,000 US$ (36.8%)
Others	:	600,000 US$ (0.5%)
Engineering Fee	:	9,781,000 US$ (7.0%)
Contingency	:	3,385,000 US$ (2.4%)
Price Escalation	:	6,420,000 US$ (4.6%)
Total		138,960,000 US$

By sites:

Chua Ve Port Area	:	22,330,000 US$ (16%)
Main Port Berth No.1-No.3	:	16,592,000 US$ (12%)
Main Port Berth No.4-No.11	:	9,080,000 US$ (7%)
Channel Area	:	71,372,000 US$ (51%)
Other	:	19,586,000 US$ (14%)
Total		138,960,000 US$

The physical contingency is considered 5 % value against direct construction cost of dredging works, civil and building works for the adjustment of the quantity accuracy.

The price escalation rate is set at 3.3 % per year present economic condition into consideration.

Table 9-3-1 shows the budget for urgent rehabilitation plan.

9-4 IMPLEMENTATION PROGRAM

(1) Schedule before Construction Works

The government of Vietnam shall prepare Tender Documents such as Detailed Design, Drawings, Bill of Quantity and Technical Specifications. The period for the detailed design stage will take 1 year requirement of early commencement of the project into consideration.

(2) Schedule of Construction Works

The Project can be divided several parts, channel dredging, pavement of yard and improvement of existing wharves, and installation of handling equipments.

Due to special character of channel dredging which required work execution in the sea area, the dredging works should be undertaken by marine contractors.

The pavement and building works on land will be entrusted to general contractors.

Table 9-2 Budget for The Hai Phong Port Urgent Rehabilitation Works

LOCATION	REHABILITATION ITEMS ITEM & SPEC	QUANT'TY	UNIT	UNITRATE 1000US$	AMOUNT 1000US$	RANK
CHUA VE	YARD EXPANSION	52,000	m2	0.04	2,080	A
	YARD IMPROVEMENT	25,000	m2	0.02	500	A
	REINFORCEMENT OF BERTH	66	m	50.00	3,300	A
	IMPROVEMENT OF ROAD	1	LS		200	A
	CONSTRUCTION OF CFS	2,000	m2	0.40	800	A
	WEIGHTING SYSTEM	1	LS		400	A
	(EQUIPMENT)					
	-Transfer Crane 35-40t	5	Nos	1,700	8,500	A
	-Chassis	10	Nos	30	300	A
	-Tractor	10	Nos	90	900	A
	-Toplifter 25-35t	2	Nos	300	600	A
	-CFS Chassis	6	Nos	30	180	A
	-Forklift 2-3t	5	Nos	34	170	A
	-Reach Stacker	1	Nos	400	400	A
	-Tug Boat 1000HP	2	Nos	2,000	4,000	A
	Sub Total				22,330	
MAIN PORT CONTENER NO1-NO3	EQUIPMENT					
	-Transfer Crane 35-40t	5	Nos	1,700	8,500	A
	-Yard Chassis	10	Nos	30	300	A
	-Tractor	10	Nos	90	900	A
	-Top Lifter 25-35t	2	Nos	300	600	A
	-CFS Chassis	6	Nos	30	180	A
	-Forklift 2-3t	5	Nos	34	170	A
	-Reach Stacker	1	Nos	400	400	A
	YARD PAVEMENT	76,000	m2	0.020	1,520	A
	Electrical Work					
	Power Supply	1	LS	1,700	1,700	A
	Light	4	Nos	313	1,252	A
	Reefer	20	Nos	4	70	A
	Warehouse Demolish	1	LS		400	A
	Office Construction	800	m2	0.750	600	A
	Sub Total				16,592	
MAIN PORT NO4-NO11	EQUIPMENT					
	-Truck	35	Nos	93	3,255	A
	-Tractor Head	10	Nos	110	1,100	A
	-Chassis	20	Nos	70	1,400	A
	-Forklift 2-10t	26	Nos	42	1,092	A
	-Bulldozer	8	Nos	60	480	A
	-Pallets	1	LS		150	A
	-VHF Handy Talky	12	Nos		3	A
	Sub Total				7,480	
OTHER	Computer Network	1	LS		1,000	A
	Technical Trainning	1	LS		600	A
	Sub Total				1,600	
CHANNEL	INITIAL DREDGING(-6M)					
	-Basin Area -6m	1110,000	m3	0.007	7,770	A
	-Cua Cam Area -6m	900,000	m3	0.004	3,600	A
	-Bach Dang Area -6m	2490,000	m3	0.0058	14,442	A
	-Nam Trieu Area -6m	6440,000	m3	0.004	25,760	A
	DIKES	1	LS		3,300	A
	S-Hopper Dredger *1) (Capacity 3000m3)	1	Nos		15,000	A
	Survey System	1	LS		1,500	A
	Sub Total				71,372	
	Total (Const'n Cost)				119,374	
ENGINEERING FEE*2)					9,781	
	Total				129,155	
PHISICAL CONTINGENCY (5%)					3,385	
	Grand Total				132,540	
G.T INCLUDED PRICE ESCALATION(3.3%)					138,960	

*1) Capacity of S-Hopper Dredger may be changed to 1000m3-1500m3 according to the further study result of channel realignment.

*2) The Cost of Further Study & Investigation is included in the Engineering Fee.

YARD EXPANSION.,etc mean Civil Facilities.

As the Project is to be completed within a concentrated period of 2 years in 1995 and 1996, it is recommended that the dredging works and civil works be carried out by several contractors under separate contracts with the Government of Vietnam.

This will allow to ensure the quality and the timely completion of the new facilities in such a short construction period.

The schedule of whole construction works is shown in Table 9-3.

Table 9-3 Work Schedule of Hai Phong Port Urgent Rehabilitation Project

LOCATION	REHABILITATION ITEMS ITEM & SPEC	Q'ty	UNIT	1st 1994	2nd 1995	3rd 1996	4th 1997	5th 1998
CHUA VE	YARD EXPANSION	52,000	m2					
	YARD IMPROVEMENT	25,000	m2					
	REINFORCEMENT OF BERTH	66	m					
	IMPROVEMENT OF ROAD	1	LS					
	CONSTRUCTION OF CFS	1	LS					
	WEIGHTING SYSTEM	1	LS					
	(EQUIPMENT)							
	-Transfer Crane 35-40t	5	Nos					
	-Chassis	10	Nos					
	-Tractor	10	Nos					
	-Toplifter 25-35t	2	Nos					
	-CFS Chassis	6	Nos					
	-Forklift 2-3t	5	Nos					
	-Reach Stacker	1	Nos					
	-Tug Boat 1000HP	2	Nos					
MAIN PORT CONTAINER No.1-3	EQUIPMENT							
	-Transfer Crane 35-40t	5	Nos					
	-Chassis	10	Nos					
	-Tractor	10	Nos					
	-Top Lifter 25-35t	2	Nos					
	-CFS Chassis	6	Nos					
	-Forklift 2-3t	5	Nos					
	-Reach Stacker	1	Nos					
	YARD PAVEMENT	76,000	m2					
	Electrical Work							
	Power Supply	1	LS					
	Light	4	Nos					
	Reefer	20	Nos					
	Warehouse Demolish	1	LS					
	Office Construction	1	LS					
MAIN PORT No.4-11	EQUIPMENT							
	-Truck	35	Nos					
	-Tractor Head	10	Nos					
	-Chassis	20	Nos					
	-Forklift 2-10t	26	Nos					
	-Bulldozer	8	Nos					
	-Pallets	1	LS					
	VHF Handy Talky	12	Nos					
OTHER	Computer Network	1	LS					
	Technical Trainning	1	LS					
CHANNEL	INITIAL DREDGING(-6M)							
	-Basin Area -6m	1110,000	m3					
	-Cua Cam Area -6m	900,000	m3					
	-Bach Dang Area -6m	2490,000	m3					
	-Nam Trieu Area -6m	6440,000	m3					
	DIKES	1	LS					
	S-Hopper Dredger 3000m3	1	Nos					
	Further Study & Invest'n	1	LS					
	Survey System	1	LS					

: Civil works.

Chapter 10 Management and Operation System

10-1 Port Management System in Viet Nam

The Vietnam National Maritime Bureau(VINAMARINE) is in charge of and supervises the planning, construction and management/operation of the major ports in Viet Nam.

Organizationally, it has such supervisory organs as the Ministry of Transport and Communication and the State Planning Committee.

The port authorities take care of the improvement, management and operation, and stevedoring of seven ports under the direct supervision of the Vietnam National Maritime Bureau (hereinafter referred to as VINAMARINE).

The harbor activities in Hai Phong Port are carried out by the entities concerned, with the Hai Phong Port Authority being the central figure.

(1) Ship Navigation Control

Foreign ships planning to enter the port give notice through the Hai Phong Port Authority Communication Station so that the information reaches the Port Authority 10 days in advance.

Port entry and departure, navigation in the port, and mooring at an anchorage need to be approved by the harbormaster who belongs to VINAMARINE. To be assigned an anchorage and a berth, a ship communicates with the Haiphong Port Authority Operation Department and complies with its instructions.

(2) Examination

Foreign ships entering the port go through various inspections near the no.0 buoy.

Generally, a team of six--a member of the harbormaster's staff, police officer, customs officer, doctor, quarantine officer and maritime procedure commission agent--inspect the ship, and then the harbormaster issues a permit for port entry.

(3) Pilotage

Foreign ships entering or leaving the port or moving within the port receive instructions for pilot at the no.0 buoy. A pilot sent from VINAMARINE Pilot Company boards each ship, usually at an anchorage off Hon Dau. He may board the ship inside the navigation channel, depending on the weather,

(4) Mooring and loading/unloading

Cargo handling work on piers is done by the Haiphong port stevedoring organizations, each taking responsibility for a pier.

There are five such organizations, which are allotted berths no.2- 5 and no.6 and berths no.8-11 of the main port, the Chua Ve container terminal, the Vat Cach area, and nos. 1 and 7 container berths.

(5) Service system

The harbormaster, pilots, customs officers, quarantine officers and stevedores work in a 24-hour service system. They are off on New Year's holidays, old calendar New Year's holidays and national holidays, totaling 7.5 days each year.

10-2 Present State of Management and Operation System

The Haiphong Port Authority has the Operation Department which belongs to the Cargo Handling Operation Division. This section assigns berths to all ships in the port, plans stevedoring, and plans port entry and departure.

Stevedoring work is performed by five cargo handling enterprises under the guidance of the Port Authority.

The five cargo handling enterprises offer many services as follows:

-Tug service
-Line handling
-Ship repair
-Freight forwarding
-Warehousing
-Inland transportation
-Water,Electricity,and Fuel service
-Cleaning

The assignment of berths is planned to meet conditions specific to Hai Phong Port such as the need to await the turn of the tide and the difficulty of ships passing each other on a single channel. Facility operation meetings of interested parties are held regularly to discuss schedules of port entry/departure, anchoring and berth assignment.

For berth assignment, the ships included in the plan are given priority. There are cases in which a ship under contract for the use of a berth is given priority, but this is rare.

As can be guessed from the English term, 'enterprise', harbor stevedoring was earlier carried out by independent companies; but at present it is almost directly operated by the Port Authority. Although various improvement plans have been

introduced for raising the efficiency and modernizing the stevedoring work, there are still a number of problems to be solved.

In the port of Haiphong, stevedoring work is carried out in four-shift on a 24-hour basis. When the interruptions from meals, breaks, and changing time are taken into account, the actual stevedoring time is between 16 and 18 hours.

The extent to which yard equipment is used at Haiphong port is shown in Table 10-1.

The Port Authority director operates a workshop for trouble shooting, minor repair and maintenance of these machines, but a lack of parts and deterioration of loading/unloading machines themselves is apparent.

These machines are not used very frequently, their operation rate reaching only 20-30%. Some pier cranes have capacities of 50-75 tons per actual operating hour. It seems possible to increase efficiency by using them in combination with yard machines. Nevertheless, there are some that have deteriorated considerably and spare parts cannot be easily provided. Remedial measures are urgently required.

Table10-1 Equipment and Boats

	Actual Operate (UNITS)	Rest Ratio (%)	Operating Ratio (%)	Actual Capacity (TON/Hour)
1. Crane				
Quay Crane	24	25.5	26.4	34.9
Mobile Crane	7	17.3	29.8	19.9
Yard Crane	10	30.1	22.2	28.1
Floating Crane	2	63.0	30.4	(75.5T)
2. Traffic				
Folk Lift	28	17.3	14.6	16.8
3. Tug Boat	17	5.5	43.2	(2x300HP)
4. Lighter	18	8.4	37.2	(250GRT)

Source: Hai Phong Port

One of the two floating cranes is a heavy duty type and the other is mounted on a dredger or used for the loading or

unloading of clinkers, etc. The heavy duty crane is very old, having been built in 1944. Something should be done for the loading/unloading of heavy cargoes.

The majority of tugboats are small, ranging from 200 to 300 horse powers. Tugboats with about 1,000 horsepower are required to take care of large ships.

The lighters were built mostly in 1977 and 1987.

Cargo is stored at Haiphong Port for only a brief period of time. The major portion of it is for direct shipment.

10-3 Data Processing

Haiphong Port has just begun processing data on ships and the loading/unloading of cargoes.

There are several activities requiring data processing, such as stevedoring at the container terminal, planning for the use of berths, calculation of employees' salaries, etc. Timely investigations, study and introduction of data processing are necessary.

The process begins with the establishment of a policy toward the introduction. Then, the types of service that need data processing should be identified, followed by analyses of the contents of the service and clerical procedures. Only after this should the advantages and disadvantages of the introduction be discussed.

Once it has been judged as effective in solving a problem, a new EDP system should be designed.

A system is put in operation after introduction, education and training periods. For this port, the automation of clerical processes related to the loading/unloading of containers seems indispensable.

10-4 Speculation of Hai Phong Port

(1) Low efficiency of cargo handling

Between enterprises, there is a good cooperation during busy times. Enterprises can send workers and equipments from one to the other. There will be enough personnels to handle the increasing cargo when enterprises introduce the mechanical handling system.

Four shifts per day is good for container ships but three shifts per day is suggested for conventional ships.

(2) Customs Operation

There must be customs everywhere but a good way to reduce

checking time and prevent waste time will be suggested.

(3) New Machine

Each enterprise will have a new machine enterprise should be able to pay a depreciation by their own.

(4) Maintenance

For the repair of new machines ,it is better to have training courses. In Hai Phong Port, preliminary exercise has been taken for two years by port authority.

(5) Business of New Service

Transport forwarding on cargoes for all the customers should be introduced especially for container.

Substantial maritime service should be developed and supplied for all the ships coming into or out of port.

Repair services for all ships and facilities within the port will be conducted, later, this service can expand beyond the port.

10-5 Recommendation on Management and Operation System

The Urgent Rehabilitation Project of Hai Phong Port consists of many kinds of works and quick decisions for implementation are required. The executive agency should have strong function for carrying out the project smoothly.

The establishing new organization is follows:

Coordination Committee	Upper organization is consisted of relative organization concerned (SPC,MOTAC,VINAMARINE)
New Rehabilitation Project Office	VINAMARINE is executive agency. Practical executive organization should be established as New Rehabilitation Project Office parallel with Haiphong Port Authority
Dredging Department	Executive organization for maintenance dredging should be established under Haiphong Port Authority

Management and Operation

(1) The cargo handling operations should be carried out under three shift system.

(2) For the time being quay side operation at Main Port Container Terminal will use ship's gear. In the future, when new equipment is procured, the same number of workers will be used terminal operation but efficiency should increase.

(3) It is recommendable to keep the same number of shifts and workers after The Rehabilitation Project is implemented as at present. But some reorganization and repositioning of officers should be made by the Port Management in order to be in line with than port facilities.

(4) Math handling method is recommended for quay side cargo handling operation instead of the existing handling system which produces very low efficiency by directly loading (or unloading) cargo from to or trucks or wagons.

(5) The cargo volume through the port is expected to increase, therefore new, good equipment will be procured.
Port efficiency depends very much on equipment availability. So, suitable training should be given to the future managers as well as equipment operators and the maintenance workers.

(6) A computer management network is recommended at container terminals to enhance delivery.

(7) The existing port working offices are scattered throughout the Port area. The offices that are able to be moved should be gathered in one quarter for a better communication and integrated management.

Chapter 11 Economic Analysis

11-1 Economic Analysis

This chapter evaluates the feasibility of implementing the urgent rehabilitation project of Hai Phong Port . The rate of return was roughly estimate at 13.3%.

By using the cost-benefit analysis, the economic internal rate of return is calculated to assess economic effectiveness.

For evaluation, the expected costs and benefits are measured and economic prices are amended according to the concept of the removal of transfer items and economic price (border prices); EIRR is then calculated.

The evaluation of economic analysis covers the 34 years from 1994 to 2027.

The exchange rate used is US$1 = VND 10,680 (calculated from the average rate in the first half of 1993).

11-2 Concept

(1) 'With' case

It is assumed that container berths and general cargo use berths in the Vat Cach section, excluding those on the wharf, at that time will show an occupancy rate of 90% or more, and the rate is believed to reach almost a limit of a handling capacity . Accordingly, the volume of cargo is kept at that fixed level in and after 1998. An increase in cargo thereafter will be taken care of in an another future project. Other basic concepts are as follows.

1) The channel depth is -6.0m.

2) Funds are invested for raising the loading/unloading capacity.

3) Maintenance dredging is carried out to maintain the water depth.

(2) 'Without' case

If the volume of cargo increases without improving the present water depth, 1998's occupancy rate of general use berths for freight will exceed 90% and ships will have to wait for a longer time. Without cargo going to an other mode of transport or other ports, the estimated volume of cargo is the same as in the 'with' case. Other basic concepts are:

1) The channel depth of Hai Phong port remains unchanged (- 4.1m).

2) No investment is made to step up the capacity of existing berths.

3) Maintenance dredging for maintaining the present capacity is carried out.

Maintenance of dredging volume in future is an important factor in the economic analysis. In the study, the maintenance volume of 4 million m3 per year is adopted. This value is maximum capacity for Dredging Company in Viet Nam.

11-3 Benefit

Following are the measurable benefits expected from the implementation of this project:

1) Saving of waiting cost (decrease in time spent waiting for turn of the tide)

2) Saving of cost incurred for large ships entering the port

3) Saving of time for cargo transportation owing to reduced time for stevedoring

4) Saving of time for cargo transportation owing to increased speed of navigation.

A rough calculation is made for 1), 2) and 3).

If the project is not implemented, several ships will have to wait for the turn of the tide and vacant berths in Hai Phong port, and economic activities in the background zone of the port and in the metropolitan area will be substantially impaired.

The implementation of this plan will enable the background zone in general to develop industries, distribution business, etc., and contribute to the promotion of economic development in the background zone by upgrading income and living standards.

From the viewpoint of national economic development, it will offer great benefits.

11-4 Cost

Construction cost, management operation cost(maintenance dredging cost, maintenance repair cost and other operating costs) and replacement investment are included in the cost-benefit analysis.

(1) **Construction Cost**

The annual investment figures estimated in Chapter 9 'Cost Estimation' are changed to economic prices and assumed.

(2) Management/operation Costs

1) Maintenance Dredging Cost

Maintenance dredging volume is 2.3 million m^3 each year.

2) Maintenance and Repair Cost

Maintenance costs for the new yard and the installed handling machinery are considered at economic prices. 5% of the total construction cost, excluding dredging cost, is assumed to be maintenance cost.

3) Other Operating Cost

Fuel, power, lighting and other expenses are summed up.

After the depreciation of loading/unloading machines, etc., the amount of initial investment is taken as cost.

11-5 Economic Price

There are several ways of converting market price to economic price. In this report, benefit and cost are divided into five items of tradable goods, non-tradable goods, skilled labor power, unskilled labor power, and transfer item; various transportation variables are applied to each of them for conversion.

(1) Elimination of transfer items

Taxes, construction interest, etc., are not direct cost (consumption of resources) originated from investment when viewed from the standpoint of state finance; they are simply transfer of money and so these are eliminated from cost and benefit.

(2) Conversion Factor

Standard Conversion Factor(SCF) is 0.993.

Conversion Factor for Consumption Goods (CFC) is 0.986.

(3) Conversion Factor for Labor

Conversion Factor for Skilled Labor is 0.986.

Conversion Factor for Unskilled Labor is 0.247.

11-6 Result of Calculation

On the above premises, EIRR computed by the above equation becomes 13.34 % as shown in Table 11-1.

11-7 Evaluation

Although there are different ways to evaluate the feasibility of the project, the most common way is to determine if the above EIRR exceeds the nation's opportunity cost of capital(OCC) or not. Since OCC in developing countries is said to be about 10%, the EIRR of this project, above 10%, shows that the project is feasible.

11-8 Sensitivity Analysis

1) Case A: 10% increase in cost

2) Case B: 10% decrease in benefit

3) Case C: 10% increase in cost and 10% decrease in benefit

The result of sensitivity analysis are shown in Table 11-7.

Table 11-2 Results of Sensitivity Analysis

CASE:	Case A	; EIRR =	11.4 %
	Case B	; EIRR =	11.2 %
	Case C	; EIRR =	9.3 %

The EIRR of this project reaches levels about 10% both in the basic case and in the sensitivity analysis cases.

Further, in a comprehensive assessment in which uncountable benefits in are included, the urgent rehabilitation project of Haiphong port is found to be fully worthwhile from the viewpoint of the national economy.

Table 11-1 Cost Benefit (Economic Price)

YEAR	COST ($1,000)							BENEFIT ($1,000)				
	INVEST-MENT (1)	OPERATING COST (2) DREDGING	MAINTE-NANCE	MANAGE-MENT	REPLACE-MENT (3)	RESIDUAL VALUE (4)	TOTAL (5)	SAVING OF WAITIN (6)	SAVING HANDLING (7)	CHANGE TO LARGE (8)	TOTAL (9)	(9)-(5) = (10)
1994	6,934						6,934				0	-6,934
1995	71,867						71,867				0	-71,867
1996	35,526						35,526				0	-35,526
1997	14,630						14,630				0	-14,630
1998	0	8,251	3,390	255			11,896	11,227	10,515	12,780	34,522	22,626
1999		8,251	3,390	255			11,896	11,227	10,515	12,780	34,522	22,626
2000		8,251	3,390	255			11,896	11,227	10,515	12,780	34,522	22,626
2001		8,251	3,390	255			11,896	11,227	10,515	12,780	34,522	22,626
2002		8,251	3,390	255			11,896	11,227	10,515	12,780	34,522	22,626
2003		8,251	3,390	255			11,896	11,227	10,515	12,780	34,522	22,626
2004		8,251	3,390	255			11,896	11,227	10,515	12,780	34,522	22,626
2005		8,251	3,390	255			11,896	11,227	10,515	12,780	34,522	22,626
2007		8,251	3,390	255			11,896	11,227	10,515	12,780	34,522	22,626
2008		8,251	3,390	255			11,896	11,227	10,515	12,780	34,522	22,626
2009		8,251	3,390	255			11,896	11,227	10,515	12,780	34,522	22,626
2010		8,251	3,390	255	0		11,896	11,227	10,515	12,780	34,522	22,626
2011		8,251	3,390	255	11,352		23,248	11,227	10,515	12,780	34,522	11,274
2012		8,251	3,390	255	20,443		32,339	11,227	10,515	12,780	34,522	2,183
2013		8,251	3,390	255			11,896	11,227	10,515	12,780	34,522	22,626
2014		8,251	3,390	255			11,896	11,227	10,515	12,780	34,522	22,626
2015		8,251	3,390	255	0		11,896	11,227	10,515	12,780	34,522	22,626
2016		8,251	3,390	255			11,896	11,227	10,515	12,780	34,522	22,626
2017		8,251	3,390	255	18,531		30,427	11,227	10,515	12,780	34,522	4,095
2018		8,251	3,390	255	0		11,896	11,227	10,515	12,780	34,522	22,626
2019		8,251	3,390	255	0		11,896	11,227	10,515	12,780	34,522	22,626
2020		8,251	3,390	255	0		11,896	11,227	10,515	12,780	34,522	22,626
2021		8,251	3,390	255	0		11,896	11,227	10,515	12,780	34,522	22,626
2022		8,251	3,390	255			11,896	11,227	10,515	12,780	34,522	22,626
2023		8,251	3,390	255			11,896	11,227	10,515	12,780	34,522	22,626
2024		8,251	3,390	255			11,896	11,227	10,515	12,780	34,522	22,626
2025		8,251	3,390	255			11,896	11,227	10,515	12,780	34,522	22,626
2026		8,251	3,390	255			11,896	11,227	10,515	12,780	34,522	22,626
2027		8,251	3,390	255		-11,119	778	11,227	10,515	12,780	34,522	33,744
TOTAL	128,957	239,293	98,310	7,395	50,326	-11,119	513,162	325,583	304,935	370,620	1,001,138	487,976

EIRR 0.133

(1)+(2)+(3)+(4)=(5)

(6)+(7)+(8)=(9)

Chapter 12 Financial Analysis

12-1 Object and Procedure of Financial Analysis

Financial analysis is carried out to assess project feasibility from the financial point of view.

For this purpose, the profitability of the project is reviewed by the discount cash flow method, one of the assessment methods of profitability of investment. In addition, the business performance of the Haiphong Port Authority as the execution body is analyzed based on its financial statements.

12-2 Accounting System of Port Authority

The Port Authority's accounting is taken care of mainly by two sectors: the Port sector and Other Business sector.

The port sector is divided into the management section and production section. The port management section produces no profit; income comes from the Cargo Handling Division, etc., of the production section.

Investment and repayment of loans is taken care of by this department.

All financial conditions are reported to the central government through VINAMARINE every three months. Accordingly, the fan of financial statements is unified for all ports of the nation. Expenses are divided into 12 items and work is divided into 10 types.

Profits made by the production sector are distributed as follows:

1) 50% of profit is submitted to the state.

2) 33% of profit is appropriated as fund for port construction and other investment.

3) 17% of profit is accumulated as staff's welfare and bonus.

As expense forecasting is done constantly and rates are revised as often as possible, there is no major borrowing.

As stated earlier, the cost needed to build new facilities and major facilities is appropriated by the nation and VINAMARINE. Any shortage is the responsibility of the Port Authority. So far, however, money has been invested only within

the limit of the budget.

Dredging belongs to a separate accounting system and part of the state budget is distributed to a state-managed corporation specializing in dredging. Some drawbacks are seen in this system: limited budget, unsuitable period of project execution, incomplete supervision of execution, etc.

Decisions on other investment and business are taken by the Director of the Port Bureau.

In Viet Nam, port tariffs are unified throughout the country by 'THE PORT DUES AND CHARGES TARIFF (divided into two categories; one for foreign ships and the other for domestic ships). While revisions had been made by the National Economic Committees, etc., in the past, it has become possible to revise the rates simply by reporting thanks to VINAMARINE's new policy of responding promptly to changes in economic conditions.

First, the Port Authority calculates the necessary expenses and the rates are reviewed so as to meet the expenses. When a ship enters the port, $0.3/GRT is collected as channel charge.

12-3 Method of Financial Analysis

As for the profitability of the project, a financial internal rate of return (FIRR) is calculated on all expenses and income. From the standpoint of checking financial soundness of the management/operating entity, the Port Authority also becomes an object of the study.

The period of study extends to 30 years after the commencement of general use and for a 4-year working period.

Prior to the financial analysis, the following premises for calculation are set.

(1) Amount of Investment

In terms of this project, the port of Haiphong is the primary beneficiary of loading/unloading machines, and many will receive the benefit of dredging. When the cost of channel dredging and maintenance that has a large number of beneficiaries is excluded.

To take these into account, the principal and interest of dredging and maintenance are subsidized by the government and VINAMARINE are assumed to be the fundamental case.

Table 12-1 Investment

Subsidies from Government	56,372	x US$1,000
Hai Phong Port	72,783	x US$1,000
Total	129,155	x US$1,000

(2) Price Level

All income and expenses are assessed at the price level in 1993 when the survey was made. Inflation and a nominal rise of wage during the review period are not taken into account.

(3) Facility Opening Schedule and Volume of Cargo Handling

The execution plan stipulates that the facilities will be made available for use partly in 1997 and fully in 1998. For the volume of cargo used for financial analysis, 4.7 million tons in 1998 is regarded as the upper limit.

(4) Port Charges

Calculation is made on the basis of the current port charge level, i.e., $0.9/ton and container $75.0/TEU. This corresponds to the port income for 1993 computed by the Port Authority.

(5) Staff and Personnel Cost

The Port Authority is presently making a plan to reduce employees to a suitable level in 5 years.

The ratio of personnel cost to overall cost is set as 25%-28%.

(6) Cost

Maintenance and management cost, repair cost, water/electricity/fuel charges are set on the basis of actual amounts recorded by the Port Authority. As expenses for related operations, levels at which appropriate profit is expected were set while taking estimated income into consideration.

(7) Taxes and Appropriation of Profit

The capital tax is 3.6% of the amount of the assessed amount of capital and the land use tax is set at a fixed level. Profits

are totally appropriated for construction funds.

(8) Replacement Investment

At the end of the life of facilities, the same amount of replacement investment is made.

(9) Procurement of Funds

Funds necessary for the urgent rehabilitation project are mainly procured as a lot of the foreign country's official funds at a low interest rate, while the rest are procured from state funds.

Official loan from foreign country:129,155,000$(interest 1.0%,period of repayment:30 years,grace period: 10 years)

Of the fund to be reimbursed by the Port Authority, state funds (to be appropriated for the repayment of official loan) are dredging cost and interest .

(10) Residual Value

For analyzing the profitability of the project itself, residual value is considered at the termination year of the project life.

12-4 Analysis Method and Evaluation Technique

(1) Profitability of Project

The financial internal rate of return (FIRR) of the project is 2.6 %, which is above the average acquisition interest including national subsidies of 1.0 %.

(2) Financial Soundness of Management/Operating Entity

The financial indexes of the basic case are as shown in 12-2.

1) Profitability

It is 3.9 % in 1998 when the channel is in full use and thereafter a level about 4.0-9.0 % is maintained.

Considering that the average acquisition interest on the fund which is 1.0%, the net fixed asset profit ratio should exceed it.

2) Safety

Up to 2006 when full-scale repayment of the official loan

from a foreign country begins, the debt service coverage ratio is above 2.0, and in other periods a level above 1.0 or so is maintained, indicating no financial shortage.

3) Efficiency of Operations

Operating ratio remains at a level of 100 % or so. It is a low level. The working ratio is a low level of 80 %.

Table 12-2 Financial Indexes of Basic Case

FIRR	2.6 %			
	Return on net fixed assets	Debt service coverage	Operating ratio	Working ratio
1998	4.0%	-	101%	82%
2006	7.9%	2.1	95%	77%
2011	8.6%	1.7	95%	77%
2012	4.9%	1.6	100%	82%
2017	4.1%	1.6	102%	84%
2027	9.0%	2.8	85%	78%

2006 : Start payment for official loan
2011-2017 : Replacement investment
2027 : End of project life

12-5 Sensitivity Analysis and Evaluation

(1) In the case of a 5% decrease in port revenue

(2) In the case of a 5% increase in construction cost

The sensitivity analysis results are shown in Table 12-3.

In the case of a 5 % decrease in port revenue, financial internal rates of return down to average acquisition interest of 1.0 %.

The debt service coverage does not go below 1.0; there is no problem with repayment of borrowed money or interest payment and there is no shortage of funds.

Both operating ratio and working ratio are at low levels.

Table 12-3 Result of Sensitivity Analysis

Case a)	5 % decrease in port revenue :	FIRR = 0.7 %
Case b)	5 % increase in construction cost :	FIRR = 1.6 %

	Return on net fixed assets	Debt service coverage	Operating ratio	Working ratio
1998	3.0% 3.5%	- -	105% 102%	86% 84%
2006	6.4% 6.8%	2.0 2.0	100% 97%	80% 78%
2011	7.0% 7.4%	1.6 1.6	100% 97%	80% 78%
2012	3.7% 4.2%	1.5 1.5	105% 102%	86% 83%
2017	3.0% 3.5%	1.4 1.5	107% 104%	88% 85%
2027	7.1% 7.6%	2.3 2.5	89% 87%	82% 80%

Upper Number : 5% decrease port revenue
Lower Number : 5% increase construction cost
2006 : start repayment of official loan
2011-2017 : replacement investment
2027 : end of project life

Both from the viewpoint of the profitability of the project itself and the financial statement of the management entity, this project can be regarded as feasible.

But it is very important to change the port tariff timely so as to generate sufficient revenue.

CONCLUSION
AND
RECOMMENDATION

CONCLUSION

This report is a result of investigations carried out to make an urgent rehabilitation/improvement plan for dealing with the problem of channel sedimentation in Hai Phong Port , Viet Nam, and superannuated port facilities.

1.Period of The Urgent Rehabilitation Plan

Project Term; 1994 to 1998

The Hai Phong Port Rehabilitation Project will be implemented from 1994 to 1998.

This project term may rather long for a urgent improvement plan, but there is an interim period until the commencement of operation including the introduction of funds and a training period for future managers as well as equipment operators and maintenance workers.

2.Traffic Demand Forecast

In 1998; cargo throughput 4.7 million tons
containers 1.2 million tons, 150,000TEU

In 2000; Cargo from/to China; 1.0 million tons

Cai Lan port; sharing be considered

It is estimated that containers will amount to 1.2 million tons and 150,000 TEU. Cargo demand of China (1 million tons) has also been taken into account.

In 2000, cargo will be shared with the Cai Lan port.

3.Target of Channel Planning

water depth; -6m, bottom width 80-100m
overall length; 38km
ship size; 10,000DWT class vessels under tidal operation

On the basis of knowledge of the present state of the channel, knowledge of the sedimentation mechanism, and estimates of sedimentation and maintenance dredging volume, the goals were set for urgent improvement; namely, to restore.

To a state which allows 10,000 DWT class ships to enter the port using tidal operations.

4.Rehabilitation of Container Terminal in Chua Ve area

expansion of yard installation of well mechanized yard equipment

After grasping the present condition and forecasting future freight demand, the yard will be expanded and paved, and yard equipment will be procured to restore the original function.

5.Rehabilitation of Main Port Area

renovation of container berths reinforcement of cargo handling equipment

To restore the original function, presently scattered container berths will be combined into one, the yard will be put into better order, and new cargo handling equipment will be introduced.

The capacity of handling general cargoes should be raised and the efficiency of stevedoring work will be enhanced.

6.Budget

whole plan; US$170,432 thousand urgent plan; US$138,960 thousand

The total cost estimated for the whole Rehabilitation Plan is US $170,432 thousand. After carefully prioritizing to each item, the Urgent Implementation Plan has been formulated at a cost of US $138,960 thousand.

7.Economic Analysis

EIRR; 13.3 %

The internal rate of return, using a calculation period of 34 years, is 13.3 %. It is generally considered that an EIRR of more than 10% is economically feasible for infrastructure or social service project.

8.Financial Analysis

FIRR; 2.6 %

The analysis shows that, throughout the entire period of the project life, the Hai Phong port Authority will show a good financial performance by the appropriate subsidies and the tariff.

The project can be regarded as feasible since FIRR is above the interest rate of the required founds.

9.Others

It is vital that the urgent improvement project be accomplished promptly and smoothly. For this purpose, the following measures are proposed:

Supervising, establishing organization to take care of the practical side of the project, and forming administrative and operating schemes to step up the efficiency of channel maintenance and stevedoring.

Recommendation

Although the rehabilitation of Hai Phong Port is judged a very significant project, it is not easy to implement from economic and financial points of views. Thoroughly considering and preparing the following matters are necessary for implementation of the project.

(1) The Urgent Rehabilitation Project of Hai Phong Port consists of many kinds of works and quick decisions for implementation are required. The executive agency should have strong function for carrying out the project smoothly.

(2) Existing old cargo handling equipment should be quite urgently replaced by necessity.

(3) Considering past trend of ship size entering Hai Phong Port, it is necessary accommodating 10,000 DWT class vessel as many as possible in point view of mass transportation. Therefore it is imperative to provide sufficient facilities for easily accommodating and quick despatching these vessels.

(4) This study was conducted on the existing channel alignment, however, further study such as observation of natural condition and estimation of sedimentation volume using mathematic model is going on and according to the results of these studies, it might be adopted new channel alignment for implementation phase. Generally speaking sedimentation problem is very difficult to get true solution, therefore the effectiveness of new channel alignment whether decreasing sedimentation or not should be carefully examined.

(5) The cost of initial and maintenance dredging of channel and basin is too high for Hai Phong Port Authority to promote port development and management, If total dredging cost would be paid by only Hai Phong Port Authority. Considering the fact that the channel is being used by many vessels entering the berths besides Hai Pong Port Authority, the major potion of the dredging cost should be paid by the Government.

(6) It is imperative to make various efforts to collect a large volume of cargo handled in order to increase the income of Hai Phong Port Authority.

JICA