JAPAN INTERNATIONAL COOPERATION AGENCY

MINISTRY OF FISHERIES
SOCIALIST REPUBLIC OF VIETNAM

BASIC DESIGN STUDY REPORT
ON
THE PROJECT FOR THE CONSTRUCTION OF FISHING PORT FACILITIES AT VUNG TAU
IN
THE SOCIALIST REPUBLIC OF VIETNAM

DECEMBER 1994

Fisheries Engineering Co., Ltd.

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PREFACE

In response to a request from the Government of the Socialist Republic of Vietnam, the Government of Japan decided to conduct a basic design study on the Project for the Construction of Fishing Port Facilities at Vung Tau and entrusted the study to the Japan International Cooperation Agency (JICA).

JICA sent to Vietnam a study team headed by Mr. Akira KASAI, Technical Special Assistant to the President, JICA and constituted by members of Fisheries Engineering Co.,Ltd., from June 8 to July 13, 1994.

The team held discussions with the officials concerned of the Government of Vietnam, and conducted a field study at the study area. After the team returned to Japan, further studies were made. Then, a mission was sent to Vietnam in order to discuss a draft report, and as this result, the present report was finalized.

I hope that this report will contribute to the promotion of the project and to the enhancement of friendly relations between our two countries.

I wish to express my sincere appreciation to the officials concerned of the Government of Socialist Republic of Vietnam for their close cooperation extended to the teams.

December, 1994

Kimio Fujita
President
Japan International Cooperation Agency

December, 1994

Mr. Kimio Fujita
President
Japan International Cooperation Agency
Tokyo, Japan

Letter of Transmittal

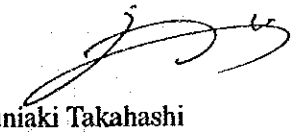
We are pleased to submit to you the basic design study report on the Project for the Construction of Fishing Port Facilities at Vung Tau in the Socialist Republic of Vietnam.

This study was conducted by Fisheries Engineering Co.,Ltd., under a contract to JICA, during the period May 30, 1994 to December 9, 1994. In conducting the study, we have examined the feasibility and rationale of the project with due consideration to the present situation of Vietnam and formulated the most appropriate basic design for the project under Japan's grant aid scheme.

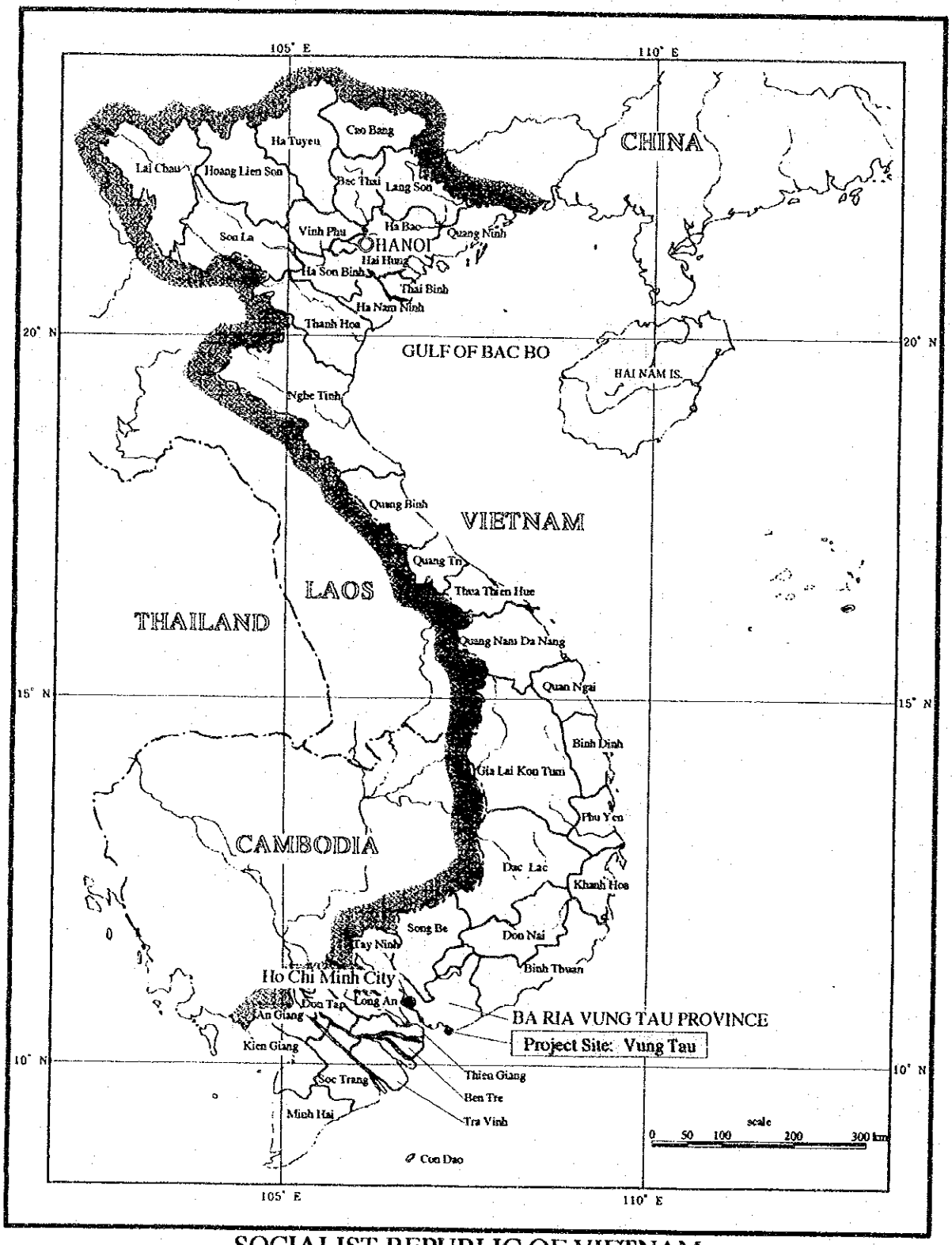
We wish to take this opportunity to express our sincere gratitude to the officials concerned of JICA, the Ministry of Foreign Affairs, and Fishery Agency. We would also like to express our gratitude to the officials concerned of the State Planning Committee, the Ministry of Fisheries, the Embassy of Japan in Vietnam for their cooperation and assistance throughout our field survey.

Finally, we hope that this report will contribute to further promotion of the project.

Very truly yours,



Kuniaki Takahashi
Project Manager,
Basic design study team on the Project for
The Construction of Fishing Port Facilities
at Vung Tau
Fisheries Engineering Co., Ltd.



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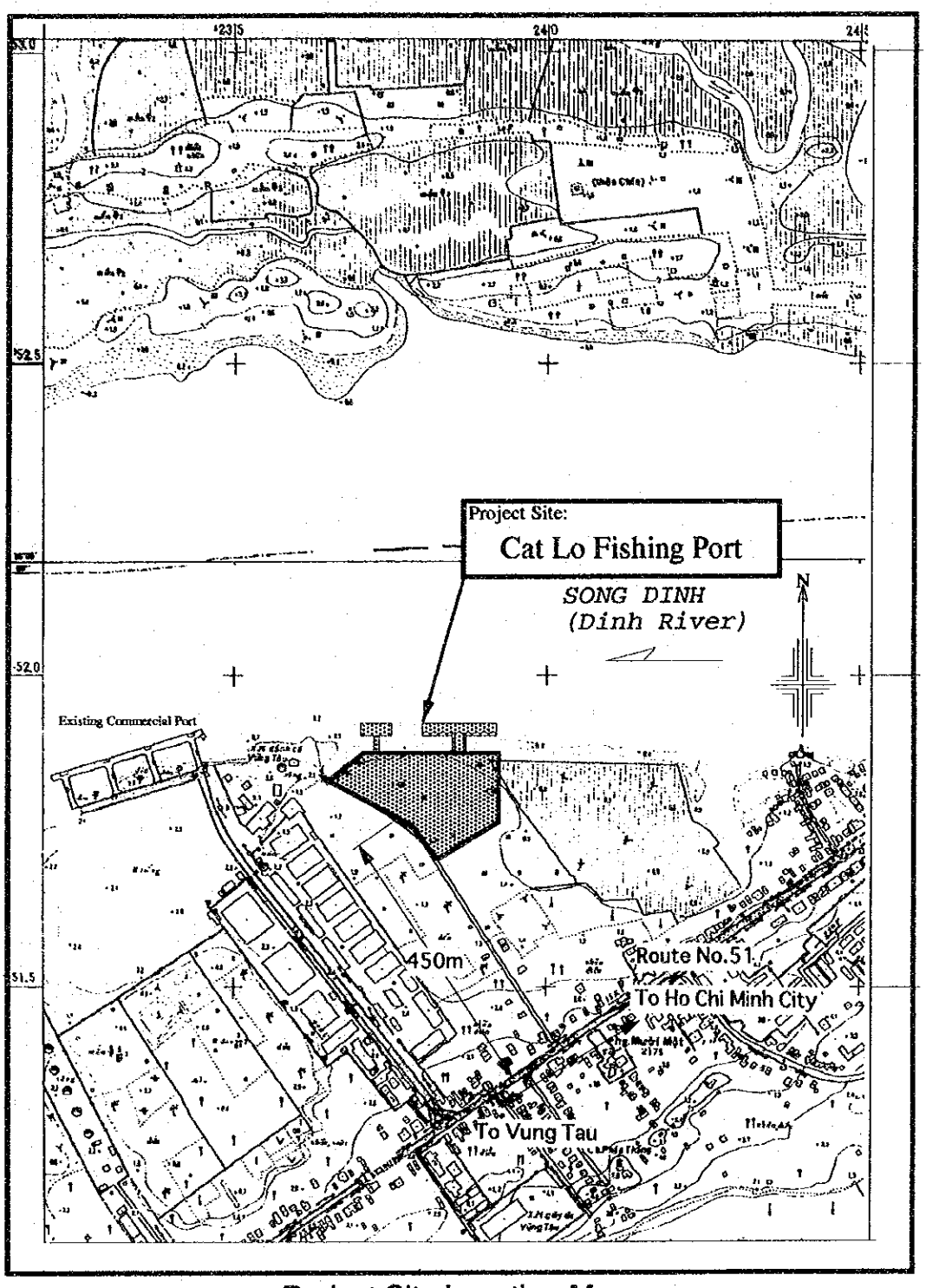
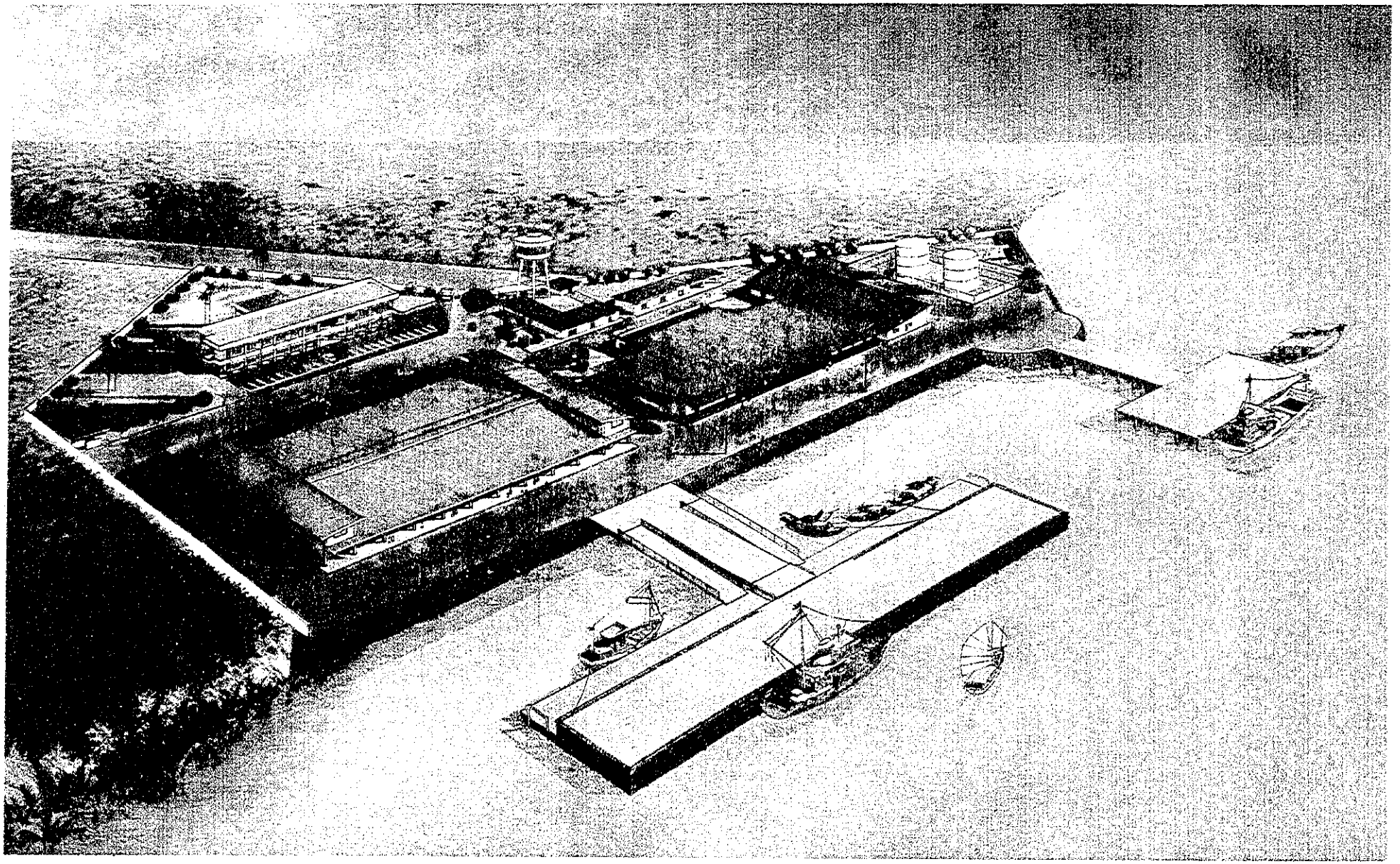


Project Site Location Map S= 1 : 10000



PERSPECTIVE OF THE VUNG TAU FISHING PORT FACILITIES

SUMMARY

The fishing industry in Vietnam plays a major role in the national economy as a source of animal proteins for the Vietnamese people, foreign exchange, and employment. Fish production has been growing steadily since 1986, reaching almost 1,100,000 tons in 1992. Some 70% of this production is generated by the marine fisheries, with 95% of the marine output said to be accounted for by private fishermen. The fishing fleet has expanded by 50% over this period, which has led to a marked growth in overall vessel capacity, though individual vessel size has not increased. As a result, the range of vessel operations remains limited, with fishing effort increasingly concentrated in waters close to shore with a depth of 20 m or less, which has engendered concern over the decrease of inshore fishery resources due to overfishing. On the other hand, it is believed that Vietnam's 200 mile Exclusive Economic Zone is endowed with abundant offshore fishery resources. However, the small size of the country's fishing vessels and the corollary lack of landing port facilities have been major deterrents to expanding vessel size. Thus, only a small fraction of the offshore resources has yet been exploited.

In an effort to clear this obstacle and further develop Vietnam's fisheries, the Government of Vietnam has drawn up "Directions and Objectives for Vietnam Fisheries Development During 1991-2000 Period". Projects have been formulated to achieve the sustainable development of coastal fisheries, based on resource conservation, improvements in fishing techniques, and a strengthening of fishery infrastructure along with a major growth of the offshore fisheries through an expansion of vessel size and the construction of offshore fishing bases. The shortage of fish landing facilities is chronic throughout the country, but fishing port facilities are particularly deficient in southeast Vietnam, where excellent fishing grounds are formed, notably by the Mekong River, and rich untapped pelagic resources are believed to exist.

To help meet this critical need, the Government of Vietnam has developed a Project for the Construction of Fishing Port Facilities at Vung Tau (hereinafter called "the Project") and has formulated a Request to the Government of Japan for a grant-aid to realize this Project.

The Japan International Cooperation Agency (JICA) dispatched a Project Formation Study Team to Vietnam in September, 1993 to conduct a fishery sector study including on the appropriateness of and priority accorded the items for fisheries development projects requested by the Government of Vietnam. This study was designed to evaluate the future directions of Japan's medium- and long-term cooperation in the fisheries area, appraise current conditions in this sector, and collect and analyze up-to-date information thereon.

The Project Formation Study Team found that there is an urgent need for a fishing port at Vung Tau, based on the large latent demand for fishing port facilities and the critical shortage of them in the surrounding area. At the same time, the team recommended that the new port should not be operated merely as a business of a state company, as proposed in the original Request, but should be fully opened to the area's fishing industry; and that the design of the jetty at the port should not be geared solely to offshore fishing vessels but should accommodate coastal vessels as well. The Government of Vietnam concurred with the views of the Project Formation Study Team on operation and administration of the proposed port facilities.

After reviewing the Request from the Government of Vietnam and the findings of the Project Formation Study, the Government of Japan decided to conduct a Basic Design Study on the Project for the Construction of Fishing Port Facilities at Vung Tau. Then JICA sent a Basic Design Study Team to the Socialist Republic of Vietnam from June 7 to July 14, 1994.

In order to validate the contents of the Request for the Construction of of Fishing port at Vung Tau, and assess the appropriateness of the Project and the scope of the Project facilities and equipment, the Basic Design Study Team conducted a study on the current state of Vietnam's marine fisheries, the condition of landing and supply facilities for fishing vessels, operating rates at related facilities, the project implementing structure, and the management plan for the port facility. Field surveys were also carried out on the topographical, geological, and river conditions at the Project site for the proposed project. In particular, detailed discussions were held with the Vietnam government on the management organization for the Project facilities. The result of these discussions were summarized in the Minutes of Discussions.

Upon returning home, the Study Team carefully considered, on the basis of its field survey, the appropriateness of the Project, while further examining the nature, types, and scale of the port facilities. A Basic Design was then prepared on the design of the jetties and shore facilities as well as the scope and estimated cost of the construction program, including a project evaluation. These findings have been compiled into a Basic Design Study Report (Draft). JICA also sent another team in October, 1994, for consultation on the contents of the draft report.

Following is an outline of the facilities and equipment that will be necessary and optimal as Japan's contribution to Project implementation.

1. Coastal Civil Engineering Facilities:

a)	Fish landing jetty (for large coastal vessels)	15m x 120m, with a depth of 6.5 m
b)	Pontoon jetties (for small coastal vessels)	6m x 50m x 2 units
c)	Shore protection	290m

2. Building Facilities:

a)	Ice-making plant	RC construction, single-story	1,966.0 sq.m
b)	Fish handling cum market building,	RC construction, single-story, with a portion 2-story,	3,720.0 sq.m
c)	Chilling and cold storage facilities	RC construction, single-story	627.5 sq.m
d)	Workshop	RC construction, single story	210.0 sq.m
e)	Administration building	RC construction, 2-story	868.0 sq.m
f)	Warehouse	RC construction, single-story	196.0 sq.m
g)	Public lavatory	RC construction, single-story	40.0 sq.m
h)	Substation	RC construction, single-story	42.0 sq.m
i)	Shed for fire fighting pumps & waste water treatment equipment	RC construction, single-story	48.0 sq.m
j)	Elevated water tank		50.0 cu.m
		(Total Floor Area	7,717.5 sq.m)

3. Plant Facilities:

a)	Ice-Making Plant	200 tons/day, 50 kg block ice, 1,000 ton ice storage
b)	Fuel supply facility	1,000 kl x 2 tanks
c)	Quick freezing Machine	1.2 ton/6hrs x 2 units
d)	Cold storage	-25 degree C, 135 tons
e)	Chilling storage	-5 degree C, 100 tons
f)	Waste water treatment facilities	120 cu.m/day

4. Equipment and Vehicles:

1)	Radio equipment	
	a) SSB	1 unit
	b) VHF	1 unit
	c) Portable VHFs	2 units
2)	Transport vehicles:	
	a) Truck	1 unit
	b) Van	1 unit
	c) Truck crane (5 ton)	1 unit
	d) Forklifts (2 ton)	3 units
	e) Forklifts (1 ton)	2 units
3)	Fish/ice handling equipment:	
	a) Belt conveyors	18 units
	b) Roller conveyors	18 units
	c) Forklift pallets	15 units
	d) Pull cars	14 units
	e) Platform Scales	12 units
	f) Hand trucks	31 units
	g) Plastic containers	1,000 units

4)	Supply equipment:	
	a) Ice crushers	15 units
	b) FRP shooters	15 units
	c) Freshwater hose reel (4 inch)	1 reel
	d) Freshwater hose reel (2 inch)	2 reels
5)	Workshop equipment:	1 set
6)	Environmental protection equipment:	
	a) Oil fence	600 m
	b) Adsorbent materials	160 boxes
	c) High-pressure washing equipment	3 units
7)	Fire extinguishers:	
	a) Mobile marine extinguishers	5 units

The net construction time needed to complete the Project is estimated at 18 months, including the jetty work, which requires the longest construction time. Accordingly, we deem it most logical to divide the construction work into two phases.

Phase 1 would include the dredging and shore protection work, construction of the Administration building, pilling work for the Oil tanks, and construction of the Shed for fire fighting pumps and waste water treatment equipment, Workshop, Warehouse, Substation, and Elevated water tank.

Phase 2 would comprise construction work on the main and pontoon jetties, the Fish handling cum market building, Ice-making plant, Chilling/Cold storage, Oil tanks, Waste water treatment facility, exterior work, and procurement of equipment and vehicles.

On this basis, we estimate that, for Phase 1, 7 months would be required for the detailed design, including construction approvals from the Government of Vietnam, and 7 months for the construction work; for Phase 2, 7 months for the detailed design work, 11 months for the construction work, and 10 months for equipment and vehicle procurement.

The total cost for the the Vietnam portion of the Project would be estimated at approximately US$ 132,000.

The executing agency for this Project will be the Ministry of Fisheries. Management of the fishing port facilities will be undertaken by a Vung Tau Fishing Port Authority, which is to be established as an independent body under the auspices of the state company, SOWESFOOD, the implementing organization for fishery development in South Vietnam. In addition, an Advisory Committee for the Vung Tau Fishing Port Authority will also be formed as an advisory body for Port operations. This Committee will be composed of representatives of the Ministry of Fisheries, SOWESFOOD, the Fisheries Department of Ba Ria-Vung Tau Province, as well as of fishermen's associations and Fisheries Departments of other major provinces whose fishing vessels use the new

Vung Tau facilities. Project operating costs are expected to be covered by revenues from the sale of ice, fuel, and freshwater.

The facilities and equipment specified for the Project do not include any highly sophisticated items that would require special technical guidance or training in operating or handling methods. Operating personnel can be adequately recruited from among the pool of experienced technicians working at existing facilities in the area.

This Project has been positioned as a priority project under the Government of Vietnam's National Fisheries Development Plan: "Directions and Objectives for Vietnam Fisheries Development During 1991-2000", and its implementation will play a major role in the country's future fisheries development. By raising the efficiency of catch landings, post harvest loss ratio will be improved. While achieving effective utilization of coastal fishery resources, the Project will also contribute importantly to the development of offshore fisheries, thereby helping significantly to solve the critical environmental problems that Vietnam now faces in the form of environmental damage from uncontrolled exploitation of inshore resources.

The Project facility will be Vietnam's first full-scale fishing port serving both the offshore and coastal fisheries on a compatible basis. It is hoped, therefore, that the new facilities will not only provide a powerful stimulus for the nation's fisheries development but also serve as an effective model for the construction of future fishing ports throughout the country.

The estimated number of fishing vessels operating in the Vung Tau area that could potentially make use of the Project facilities presently comprise 84 offshore, 1,595 large coastal, and 2,364 small coastal vessels. When the new port is completed, it should satisfy the demand for fishing port facilities from 9.25% of these offshore vessels, 9.78% of the large coastal vessels, and 8.12% of the small coastal boats. The benefits that are expected to be generated by Project implementation include a shortening of the time required for landing operations and port entry, an increase in catch volume through improved vessel operating rates, improved freshness control, larger supplies of fish products, expanded distribution volume, enhanced employment opportunities, and accelerating the introduction of larger and more modern fishing vessels.

Based on the above considerations, implementation of the subject Project can be expected to contribute importantly to fishery development through the quantitative and qualitative development of fish distribution channels, based on the improved freshness of coastal catches, increased offshore fishery production, and expansion of employment opportunities. In addition,

the Project should help to solve the urgent environment problems addressed in the National Development Plan. The Team has, therefore, concluded that there will be considerable significance in implementing this Project under a grant-aid from Japan.

In connection with Project implementation, the Team feels that performance could be further enhanced if the following suggestions were adopted:

1) Fair and efficient administration:

While admittedly imperfect, a few fish landing facilities do exist in the Vung Tau area, all of which supply ice and fuel. Given this competition, appropriate rate schedules and equitable administrative practices must be established at the Project facilities in order to attract the projected complement of user vessels and fulfill the targets that have been set with respect to catch landings and ice and fuel supply. The targets for operating revenues can be achieved solely on the basis of anticipated utilization by coastal vessels, thereby assuring normal operations. At the same time, so as to hold operating costs within projected revenues, the Port Authority must maintain efficient operations, based on suitable cost controls. Clearly, fair and effective management will be a vital key to project success.

2) Developing management capabilities at the Port Authority:

The management organization for this Project, the Port Authority, will seek to administer the facilities in a fair and efficient manner, in association with users and government agencies, while faithfully reflecting the views of the users. In order to smoothly implement this management system, which is still quite new to Vietnam, the management skills of the Port Authority must be developed and administrative techniques fully mastered.

3) Rationalization of distribution:

Facilities and equipment for modernizing fish distribution within the fishing port will be provided under this Project, but it would be desirable, during the implementation stage, for the Port Authority, on its own initiative, to go beyond the donated facilities and institute its own improvement programs to further rationalize fish distribution in accordance with local conditions.

4) Environmental protection:

The Port Authority should develop regulations and systems for treating drainage from bilge and fish hold cleaning operations, while stimulating concern and awareness of environment protection among fishermen through public information and extension programs.

5) Improvements in statistics:

In order to bring about sustainable development of the coastal fisheries, it will be necessary to establish detailed resource protection programs by estimating resources in particular fishing grounds on the basis of changes in catch volumes. Improvement is, therefore, required in statistical collection methods so as to clarify catch volume by species in individual fishing grounds. The Port Authority is urged to contribute actively to the collection and analysis of catch and landing statistics through improvements in data collection methods.

6) Encouraging a shift from coastal to offshore operations:

A shift from the coastal to the offshore fishery is a central theme in the Directions and Objectives for Vietnam Fisheries Development During 1991-2000 and so constitutes one of the objectives of the Project. The infrastructure to support this offshore shift will be provided under this Project but, in order to achieve an effective transition, there will be a need not only to build new fishing vessels for offshore use but also to encourage existing coastal vessels to transfer to the offshore fishery through an attractive program of incentives.

7) Maintaining Orderly Jetty Use:

Judging by the latent demand for the fishing port facilities among fishing vessels operating in the vicinity, it is possible that, once the facilities are completed, there will be a severe concentration of small-size coastal boats seeking to use the Plan jetty at a given time. In anticipation of such congestion, it is essential that the Vung Tau Fishing Port Authority develop rules, with the consent of the Advisory Committee, to ensure small fishermen equal access to the facilities, with due consideration being given a vessel's port of registry.

CONTENTS

SECTION ONE: BACKGROUND OF THE REQUEST

1.1 History:

Fishery production in Vietnam in 1992 increased 1.2 times higher than in 1988, while exports expanded 1.83 times. As a result, marine products are now the country's third largest source of foreign exchange, after oil and rice. However, despite an overall growth in national fishing fleet, the size of individual fishing vessel remains small, incapable of shifting to offshore fisheries, where untapped resources exist. It is believed that, under present conditions, the expansion of fishing fleet capacity is only serving to increase catch pressure in inshore waters, leading to a decline in fishing resources or a contraction in catch growth rates.

Virtually all fishing vessels are of wood construction, with engine horsepowers small in relation to hull size, while fishing gear has not yet been modernized. This situation forces the bulk of the fleet to concentrate in fishing grounds with a depth of 20m or less. Some 1,300,000 tons of annual potential yield are estimated to exist in Vietnamese waters, of which only 700,000 tons in coastal waters are presently being taken. Thus, almost all of the remaining unexploited resources are found in offshore waters. Vessel motorization is expected to continue, creating the very real prospect of resource decrease based on an excess concentration of fishing effort in coastal waters. It is therefore vital, in terms of the future development of Vietnam's fishing industry, that the unexploited pelagic resources be tapped through both sustainable utilization of coastal resources and the development of an offshore fishery in depths of 50m or more.

In the fishery sector as well, the weak infrastructure is seriously handicapping fishery development, with fish landing and fishing port facilities particularly deficient. In southeast Vietnam, which is endowed with abundant fishery resources and thus expected to play a major role in offshore fishery development, there is a lack of public fishing ports capable of berthing large vessels and providing adequate fish landing and supply services. Even in areas with a thriving coastal fishery, the number of jetties and landing facilities is small, while their capacities are inadequate to handle even the present fishing boat population. Most vessels, therefore, waste much valuable time and effort in connection with landing and supply operations. Given these circumstances, the Government of Vietnam has formulated a plan to construct a fishing port for offshore vessels at Vung Tau, a major fishing base in southeast Vietnam.

The Project for construction of the fishing port at Vung Tau is one of the projects incorporated in the Vietnam Government's "Directions and Objectives for Vietnam Fisheries

Development During 1991-2000 Period", geared to the development of fish landing areas, workshop repair facilities, and other infrastructure improvement. The Vietnam Government has requested a grant-aid from the Government of Japan for implementation of this Project, "Project for the Construction of Fishing Port at Vung Tau", of which implementing organization for the Government of Vietnam was proposed to be SOWESFOOD, a state company established to implement fishery development in southern Vietnam.

1.2 Outline of the Request : Main Components

The contents of the original Request from the Government of Vietnam may be summarized as follows :

(1) Objective :

a) Short-term Objectives

In order to contribute to the accomplishment of the national objectives, short-term objectives of the Project are :

- to increase efficiency in landing catches and preparing for fishing,
- to supply sufficient volume of fresh marine products to processing factories in the city, and
- to provide adequate port services to fishing boats such as ice, fuel, water supply, and boat repairing and maintenance.

b) Medium and Long Term Objectives

The objectives in medium and long term is to develop Vietnam modern and integrated fisheries. Modernization will aim to ensure sound activities in the fisheries sector.

(2) Plan Site :

The plan site is located adjacent to the commercial port at Cat Lo. The site is situated 450m from National Highway 51, which links Ho Chi Minh City and Vung Tau, within a total area 10 ha of parcel allocated by the Government of Vietnam for use as a fishing port facility to SOWESFOOD.

(3) Executing and Operating Organization :

The executing and operating organization for the subject Plan was supposed to be SOWESFOOD, a state corporation belonging to the Ministry of Fisheries, which is the implementing organ for fishery development in south Vietnam.

(4) Contents of the Request :

A) Facilities :	
a) Landing jetty with access	2,120 sq.m
b) Slipway (incl. winch)	2,250 sq.m
c) Shore protection	275 m
d) Administration Building	450 sq.m
e) Fish handling shed and Fish market	750 sq.m
f) Cold Storage Building	800 sq.m
g) Guardhouse	25 sq.m
B) Related Supporting Facilities	
a) Ice Making Machine w/Ice Storage	10 t/day x 2 units
b) Cold Storage (-25 degree C)	20 cu.m x 4 units
c) Quick Freezer	1 ton x 3 units
d) Water Tank	20 tons x 2 units
e) Fuel tank	10 kl
C) Equipment and Vehicles	
a) Refrigeration Trucks	2 tons x 2 units
b) General Truck	5 units

1.3 Other Aid Programs from Individual Countries and International Organizations

During the 1980s, the great bulk of foreign aid to Vietnam was provided by member countries of the CMEA (Committee of Mutual Economic Assistance). In the Fisheries sector, these funds were used to construct fishing vessels and fish processing plants. However, owing to political and economic agitation by CMEA member countries, all of these programs were stopped in 1992, and so no further aid can be expected from this source.

Very little aid has been received from Western nations, as a result of the economic sanctions. However, the UNDP has conducted Master Plan surveys in association with the World Bank in two key areas: the Mekong and Red River deltas. While the fishing industry was included in both these Plans, the primary focus was on inland and aquaculture fisheries; the surveys did not touch upon marine fisheries. The UNDP has also carried out several projects in the fisheries field, including a research plan for freshwater fish, a technology transfer plan for artificial breeding, and a plan for artisanal fishing villages. However, this organization has no plans for specific fishery-related projects during the 1992-1996 period.

The ADB (Asia Development Bank), in collaboration with the FAO, has been conducting a sector study in the fisheries field since 1990. While no light has been shed to date on the projects being planned by ADB, but, according to the Ministry of Fisheries in Vietnam, the intent is to provide funding, on the basis of sector loans, to develop aquaculture and promote conversion to large-size fishing vessels, as well as to build fishing bases in the islands close to offshore fishing grounds. We understand, though, that the Bank has no plans to assist for building a fishing port at Vung Tau.

SECTION TWO: OUTLINE OF THE PROJECT

2.1 Conditions in the Project Area:

2.1.1 State of the Fishing Industry and Fishing Fleet in the Vung Tau Area:

(1) Fishery production:

Total production by the marine fisheries in 1992 in the Ba Ria-Vung Tau Province came to 70,000 tons. However, since Vietnam catch statistics are based on place of registry, this total excludes catches by vessels from other provinces that fish in Ba Ria-Vung Tau waters. Also, published catch figures have been reported with taxes in mind and so do not necessarily reflect actual catches and landings in the Ba Ria-Vung Tau area. In this report, therefore, we shall look at fishery production trends rather than absolute values.

Table 2.1.1 Fish Production by Vessels Registered in Ba Ria-Vung Tau Province (unit: ton)

	1985	1990	1991	1992
Provincial State Companies				
Fish	12,833	2,320	2,470	3,008
Shrimp	212	58	75	82
Cuttlefish & Squid	2,104	435	472	564
Others	35	87	133	106
Sub Total	15,184	2,900	3,150	3,760
Private Fishermen				
Fish	11,419	29,120	34,187	43,392
Shrimp	2,617	3,575	3,375	3,418
Cuttlefish & Squid	8,001	12,540	13,528	13,936
Others	3,199	4,065	4,572	5,494
Sub Total	25,236	49,000	55,662	66,240
Total Production				
Fish	24,252	31,440	36,657	46,400
Shrimp	2,829	3,633	3,450	3,500
Cuttlefish & Squid	10,105	12,975	14,000	14,500
Others	3,234	4,152	4,705	5,600
Grand Total	40,420	51,900	58,812	70,000

(Source : Fisheries Department of Ba Ria-Vung Tau Province)

Marine fishery output has shown an increase of about 73% over the past 7 years, with particularly sharp gains in fish production. The driving force behind this growth has been private fishermen, who registered an increase of some 3.8 times in fish production during this period. Against the stellar performance recorded by private fishermen, production by provincial state fishing companies fell considerably. Production by provincial state companies had dropped

sharply by some 80% from 1985, just prior to start of the economic reform program, but the subsequent rebound was held to only about 30% from this low. As a result, provincial state company production during 1992 remained at only 25% of the 1985 level.

(2) Fishing Vessels:

1) Vessel types:

Fishing vessels in Vietnam may be classified into the following groups : large vessels for the offshore fishery belonging to state companies : large and small private wooden boats operating in the coastal fisheries ; and artisanal boats fishing very close to shore.

a) Large offshore vessels

Typical examples in this vessel category would be the large steel vessels of state companies, with vessel lengths of 30 - 35m, breadths of 7 - 8 m, draft of about 3.2 m, and gross tonnage ranging from 60-150 GT. Engine outputs vary widely from 200-750 PS. While fish hold capacities are about 130 cu.m, only a few vessels are equipped with refrigeration facilities. Fuel tank capacity runs 23 cu.m, and freshwater tanks about 21 cu.m.

Eight of the 10 vessels belonging to SOWESFOOD conduct trawling, purse seine net, and drift net operations concentrated around Kien Hai in the Gulf of Thailand, while the other two mount tuna longline operations in the South China Sea. Other state companies, such as Halong Fiscom, also own large fishing vessels. Following is the general arrangement plan for a typical large offshore fishing vessel.

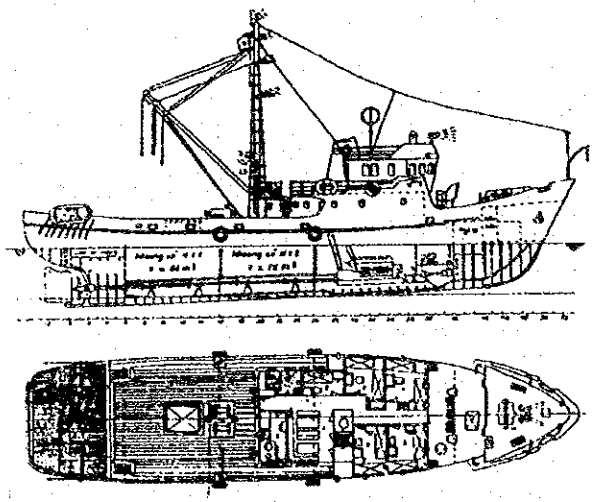


Figure 2.1.1 General Arrangement of a Typical Offshore Vessel
(Source : Nguyen Dang Cuong "Tuyen Tap Mau Tau Ca Vietnam")

b) Large coastal vessels

The typical principal particulars for large-size coastal fishing boats show lengths of 15-18m, breadths of 3.5-4 m and drafts of 1.5-1.7 m, with gross tonnage ranging from 25-40 GT. Hold capacity runs generally 20-30 cu.m, but there is no refrigeration equipment on board. Fuel tank capacity is 4 cu.m, and freshwater capacity 3 cu.m. The following chart shows the general arrangement plan for a typical large coastal vessel.

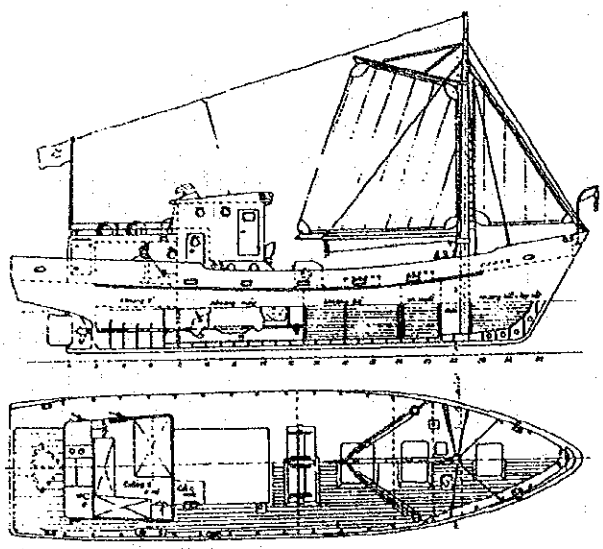


Figure 2.1.2 General Arrangement of a Typical Large Coastal Boat
(Source : Nguyen Dang Cuong "Tuyen Tap Mau Tau Ca Vietnam")

c) Small coastal vessels

Typical principal particulars for small coastal vessels show lengths of 7-11 m, breadths of 2.5-3.5 m, and drafts of 0.8-1.2 m. Fish hold capacity runs 2-3 cu.m, but the vessels have no refrigeration equipment. Freshwater tank capacity is about 0.5 cu.m., but only a few of these boats carry fuel tanks. The following chart presents the general arrangement plan for a typical small coastal fishing vessel.

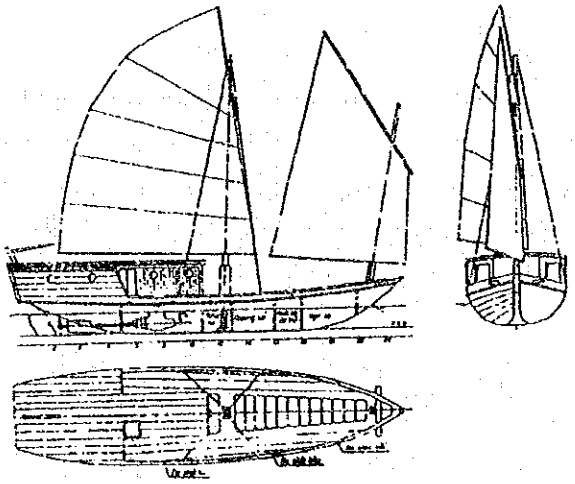


Figure 2.1.3 General Arrangement of Typical Small Coastal Boat
(Source : Nguyen Dang Cuong "Tuyen Tap Mau Tau Ca Vietnam")

d) Artisanal coastal boats

Artisanal coastal fishing boats are not over 7m in length and are generally not motorized. Even motorized boats carry engines of extremely low horsepower. Virtually none have decks.

2) Fishing Vessel Population in the Ba Ria-Vung Tau Province:

Table 2.1.2 shows the total fishing fleet, classified by vessel length, registered in the Ba Ria-Vung Tau Province.

Table 2.1.2 Fishing Vessel Population in the Ba Ria-Vung Tau Province by Length
(As of the end of May, 1994)

Registered Place	Number of boats	Number of Fishermen	Boat length			
			under 8m	8-15m	15-20m	over 20m
Vung Tau City	1,184	5,284	230	576	377	1
Xuyen Moc	357	1,743	42	301	14	0
Long Dat	1,165	9,039	74	433	476	182
Chau Thanh	84	307	29	55	0	0
Con Dao Is.	11	92	7	4	0	0
State Companies	13	88	0	0	12	1
Total	2,814	16,553	382	1,369	879	184

(Source: Fisheries Department of Ba Ria-Vung Tau Province)

The following table classifies these same vessels by engine horsepower.

Table 2.1.3 Fishing Vessel Population in the Ba Ria-Vung Tau Province by Engine Horsepower
(As of the end of May, 1994)

Registered Place	Engine Horsepower					
	No Motor	under 20 PS	20-33 PS	33-45 PS	45-75PS	over 75PS
Vung Tau City	296	420	188	226	260	90
Xuyen Moc	0	256	71	17	12	1
Long Dat	0	331	106	106	451	172
Chau Thanh	124	79	5	5	0	7
Con Dao Is.	0	9	1	5	0	7
State Companies	0	0	0	1	1	0
Total	420	1,095	371	349	724	275

(Source: Fisheries Department of Ba Ria-Vung Tau Province)

3) Use of the Fishing Port at Ben Da/Ben Dinh by Fishing Vessels from outside the Ba Ria-Vung Tau Province.

The following table tabulates 1993 port call registrations at the Ben Da/Ben Dinh fishing port by vessels from outside the Ba Ria-Vung Tau Province, classified by the Province of register.

Table 2.1.4 Port Call Registrations at the Ben Da/Ben Dinh Fishing Port by Vessels from Outside the Ba Ria-Vung Tau Province in 1993

Province	Engine Horsepower			
	under 45PS	45-200PS	over 200PS	Total
Binh Dinh	651	159	0	810
Khan Hoa	36	59	0	95
Binh Thuan	8	3	0	1
Soc Tang	0	2	12	14
TraVinh	10	4	3	17
Quang Ngai	38	141	0	179
Ben Tre	0	2	0	2
Tien Giang	0	12	12	24
Kien Giang	1	0	0	1
Ho Chi Minh City	8	25	0	33
Phu Yen	14	3	0	17
Total	766	410	27	1,203

(Source: Fisheries Department of Ba Ria-Vung Tau Province)

Engine horsepower of fishing vessels from outside the Province using the Ben Da/Ben Dinh port facilities averaged 45.02 PS, with a maximum of 500 PS. These vessels remained in port for an average of 74 days, with a maximum stay of 404 days. (These figures show the number of operating days based on this port and so do not necessarily indicate the actual number days spent

in port.) Analyzing the data by month, as shown in Figure 2.1.4, we see that peak usage by outside vessels occurs twice a year, from March to May and again from October to December. More than 350 outside boats used the port in the former period, and over 400 during the latter.

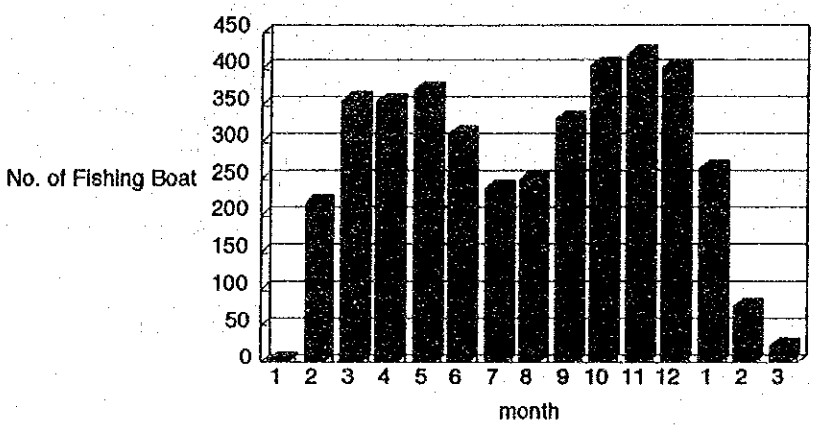


Figure 2.1.4 Number of Fishing Boat Operating Days at the Ben Da/Ben Dinh (Registered in 1993)
(Source: Fisheries Department of Ba Ria-Vung Tau Province)

The data cover only registrations from January-December, 1993. Thus, overlapping develops from stays during January, February, and March carried over from the previous year and registrations deferred to the new year (1994). The actual figures, therefore, run higher than those shown in the chart.

(3) Fishing Methods :

The principal fishing methods employed in Vietnam include: pair-trawling, single-trawling, purse seining, set and drift gill net, lift net, line fishing, and trapping. However, relatively large vessels use the trawling, purse seining, and drift gill net methods. Generally speaking, the same fishing boat will confine itself to just one fishing method and one type of gear; multiple gear are not used. In the case of the purse seine fishery, in order to aggregate fish with fish lamps at night, fishing activity is prescribed according to the lunar cycle. Thus, operations are not normally undertaken between the 12th and 19th day of the lunar cycle.

In the following table, figures are given on the total number of fishing vessels registered in Ba Ria-Vung Tau, classified by fishing method used.

Table 2.1.5 Number of Fishing Vessels Registered in Ba Ria-Vun Tau by Fishing Method

District	Number of Boats	Fishing Method				
		Trawl Net	Purse Seine	Gill Net	Lift Net	Others
Vung Tau City	1,184	536	143	284	127	94
Xuyen Moc	357	2	56	297	0	2
Long Dat	1,165	490	261	403	0	11
Chau Thanh	84	7	0	10	7	60
Con Dao Is.	11	0	0	11	0	0
State Company	13	13	0	0	0	0
Total	2,814	1,048	490	1,005	134	167

(Source: Fisheries Department of Ba Ria-Vung Tau Province)

(4) Fishing Population :

The following table shows data on the number of fishermen, family members, and fishery workers in Ba Ria-Vung Tau Province.

Table 2.1.6 Number of Fishermen, Family Members, and Fishery Workers in Ba Ria-Vung Tau Province

	1985	1990	1991	1992
A. Fishermen				
Fishermen's Families	2,687	6,018	6,050	8,376
Fisheries Workers	13,434	30,090	30,141	43,880
Fishermen	6,478	12,030	12,030	15,960
B. State Companies				
Fishermen	1,123	344	290	270
Workers	115	35	30	30
Total				
Fishermen	7,601	12,374	12,337	16,230
Fisheries Workers	13,549	30,125	30,171	43,910

(Source: Fisheries Department of Ba Ria-Vung Tau Province)

(5) Fishing Ports in the Vicinity of Vung Tau :

There are 4 principal fishing ports in Ba Ria-Vung Tau Province:

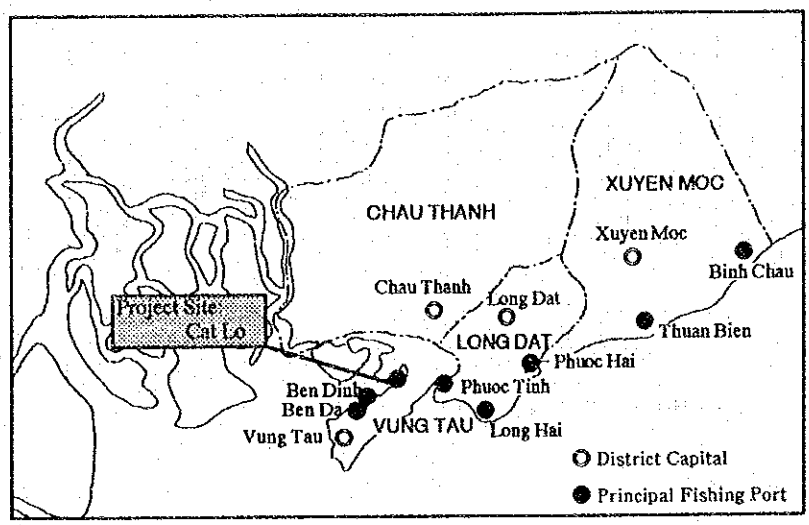


Figure 2.1.5 Fishing Ports in Ba Ria-Vung Tau Province

1) Binh Chau

This port is located in Xuyen Moc District, rather distant from Vung Tau City, and has no jetty. It is used by about 400 boats, up to a maximum of 90 PS.

2) Phuoc Tinh

This port is located in Long Dat District and has a 60m jetty, with a 200m jetty under construction nearby. The port can accommodate about 600 vessels, up to a maximum of 300 -350 PS.

3) Ben Da/Ben Dinh

This port is located within Vung Tau City. It has one 50 m concrete jetty along with a number of wooden jetties. It can handle some 2,000 vessels up to a maximum of 450 PS.

4) Cat Lo

This port is also situated within the Vung Tau City limits, but at a distance of about 10 km from the city center. This is the Project Site shown in the Request document, and SOWESFOOD is presently building a jetty there. A joint venture with a Thai company, is using a temporary jetty at the adjacent commercial port. The maximum size of vessel that can be accommodated at this port is 1,000 PS.

The jetties at the above ports are much too small to handle the number of fishing vessels utilizing these ports. As a result, many fishing vessels must be moored off the shore or anchored 5 or 6 abreast alongside the jetty, land directly on the beach, or land their catches and take on supplies via bamboo canoes or small wooden skiffs. This situation causes a considerable loss of time when landing catches and, even when time is not a factor, greatly increases the damage rate for high-value fish. Handling and sorting take place under a scorching sun, without benefit of pavement or water supply, creating undesirable sanitary conditions. And, owing to the time required to transport ice from the ice plant and load it on board the vessels, ice supply operations further aggravate jetty congestion, reducing vessel operating rates even more.

At Vung Tau (Ca Lo) fishing port, a concrete pile jetty for fishing boat use, planned by SOWESFOOD, is virtually complete, but the remaining 20 m portion, as well as installation of fenders, piping, and supply facilities for water, fuel, and power, are still incomplete. The Team were informed that SOWESFOOD plans to finish this jetty during 1994. As noted above, a joint venture between Vietnam and Thailand constructed a temporary steel-frame jetty within the commercial port located about 50m to the west of the SOWESFOOD jetty, and vessels of Thai registry are already docking there to land catches and take on ice and provisions hauled to the jetty by truck.

(6) Ice-making Plants in the Vung Tau Area :

There are 57 ice plants in Ba Ria-Vung Tau Province with a combined production capacity of 2,240.9 tons per day. The largest facility has a daily capacity of 250 tons.

In Vietnam, refrigeration facilities are lacking not only on fishing vessels but even on transport system for domestic distribution. Ice then becomes the only means of keeping fish fresh, with huge quantities required for fish storage, transport, and processing. Following is a brief profile of the ice plants in Ba Ria-Vung Tau Province.

Table 2.1.7 Ice-making Plants in the Vung Tau Area (As of June 30, 1994)

District	Number of Ice Plants	Total Production Capacity	Smallest Plant	Largest Plant
Vung Tau City	26	1,225.0 tons/day	10.0 tons/day	92.5 tons/day
Chau Thanh	16	655.0 tons/day	5.0 tons/day	250.0 tons/day
Long Dat	12	279.4 tons/day	9.0 tons/day	45.0 tons/day
Xuyen Moc	3	71.5 tons/day	3.5 tons/day	40.0 tons/day
Total	57	2,240.9 tons/day		

(Source: Fisheries Department of Ba Ria-Vung Tau Province)

(7) Fish Distribution :

Fish distribution in South Vietnam at present is chiefly in the hands of private brokers. However, only a short time has passed since the changeover in distribution structure from a planned to a market economy, and so the new distribution system has not been fully established.

Nevertheless, though still in a fluid state, the basic fish distribution structure has begun to resemble that which existed prior to the unification. Brokers and dealers vary considerably in size. The large brokers monopolize the jetties, buying and distributing the entire catch landed by fishing boats tying up at the jetty. Small brokers, on the other hand, purchase only a portion of a vessel's catch, with almost all of their purchases sold on the spot to retailers. In this sense, the brokers are multi-faceted operations: some of the fish moves from brokers directly to processors or consumers, while other catches reach processors and consumers through secondary and tertiary brokers and wholesalers.

Primary brokers supply departing fishermen with fuel, ice, water, and food, and, on occasion, even with engines, fishing equipment, and gear. These sales are made on credit, with the obligations repaid upon return to port out of the proceeds of sales to the financing brokers.

The brokers deduct interest at bank rates from the prices they pay to the producers at the jetty. However, there are no official standards or regulations governing these interest charges; the agreements between fishermen and primary brokers are strictly private arrangements, tending to vary subtly on the basis of past dealings and market conditions.

The fish purchased by brokers is sorted, ice-packed in 70-100 kg lots in bamboo baskets or wooden boxes, and shipped by truck or carrier vessel to processing plants or consuming markets.

Following shows a diagram of fish distribution channels in the Project area.

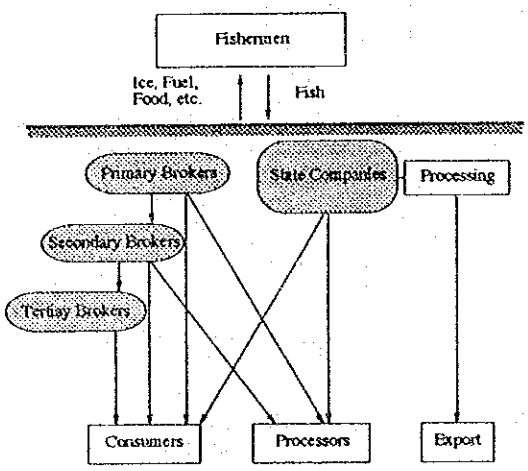


Figure 2.1.6 Diagram of Fish Distribution Channel

State companies have their own in-house brokerage operations. While their main business lies in the processing and export of fish and shrimp, they conduct direct brokerage as a means of securing raw material supplies. The best quality fish bought by these firms from the fishermen is use in export processing operations, while ordinary grade fish is sent to domestic markets. When state companies buy catches from fishermen, they are in direct competition with private brokers, providing the same sort of supply services and credit facilities as the private brokers offer.

2.2 Basic Project Concept :

2.2.1 Guidelines in Implementing Cooperative Programs

If this Project is carried out under the grant-aid cooperation scheme of Japan, the basic policy guidelines will be as follows:

1) The facilities are intended to prevent overfishing by the coastal fisheries and to promote the development of offshore fishery resources.

2) The target coastal vessels will be those already operating in the Vung Tau area. Thus, the Project facility will serve to ease congestion at existing fishing ports. In the case of offshore vessels, target users will include not only existing offshore vessels but also those that will be converted from coastal to offshore operations.

3) With respect to fish catch distribution, the Project facilities will basically continue the same distribution patterns as prevail at existing facilities in the area. The market at the Project port will be open to all private fish brokers who will be able to trade freely there.

2.2.2 Discussions on the Principal Components of the Request

1) Although Vietnam's coastal fishery production is close to sustainable annual yield, overfishing has not occurred in all fishing grounds. Catch effort is being concentrated in certain inshore grounds, with a depth of 20m or less, which are readily accessible to small boats. In deeper coastal waters close to offshore grounds, there is still room for development. If landing and supply operations can be rationalized and shortened through the Project facilities, it should be possible to take longer trips to fishing grounds and so extend operations to more distant waters. In deeper grounds, close to offshore waters, stocks cannot be said to have been fully

exploited. For this reason, the Project facilities are intended to facilitate operations by coastal vessels in more distant grounds by rationalizing and shortening the time presently consumed by landing and supply operations, which will in turn raise vessel operating rates and thereby allow the longer cruising time needed to reach these more distant grounds. In addition, according to the Ministry of Fisheries, under existing conditions, post-harvest loss ratios exceed 30%, most of which is believed to be attributable to the inadequacy of existing landing facilities. Based on a lowering of these damage ratios through the Project facilities, coastal fisheries resources can, in our opinion, be more effectively utilized, which will tend to discourage overfishing. There is thus a vital need for fishing port infrastructure to encourage the development of the offshore fishery as well as sustainable development of the coastal fisheries.

2) The direct beneficiaries of the Project would be the coastal fishermen of Ba Ria-Vung Tau Province, fishermen from outside the Province who come to fish from nearby waters, and offshore fishing enterprises. Fish brokers and processors in the Vung Tau area would also derive significant benefits from the opportunity to handle a much larger volume of high-quality fish. As already observed in Section 2.1.1 ("State of the Fishing Industry and Fishing Fleet in the Vung Tau Area"), over 3,000 fishing vessels are presently operating in the waters around Vung Tau, competing for the limited number of landing facilities. The Project cannot, of course, satisfy the entire demand for landing facilities; it will accommodate only a portion of these coastal vessels within the confines of the site area that has been prepared for the Project by the Vietnam side.

The typical particulars of fishing vessels in Vietnam may be divided into the following four categories by length class:

	Vessel length (approximate)
a) Offshore fishing vessels:	30-35 m
b) Large coastal vessels :	15-18 m
c) Small coastal vessels :	7-11 m
d) Artisanal coastal boats :	less than 7 m

The artisanal boats have, understandably, concentrated their catch effort in areas close to shore, which are reported to be overfished. However, in the future, vessel sizes will have to be increase in order to convert to operations farther offshore. In addition, it will not be convenient for these tiny vessels to use the same facilities as larger size boats; and if these small boats were to converge with large vessels, a safety hazard would be created. For these reasons, the small artisanal boats will not be considered potential users of the Project facilities

The following chart gives a current profile of the fishing fleet operating in the Vung Tau area and indicates the range of vessels that are likely to use the new fishing port.

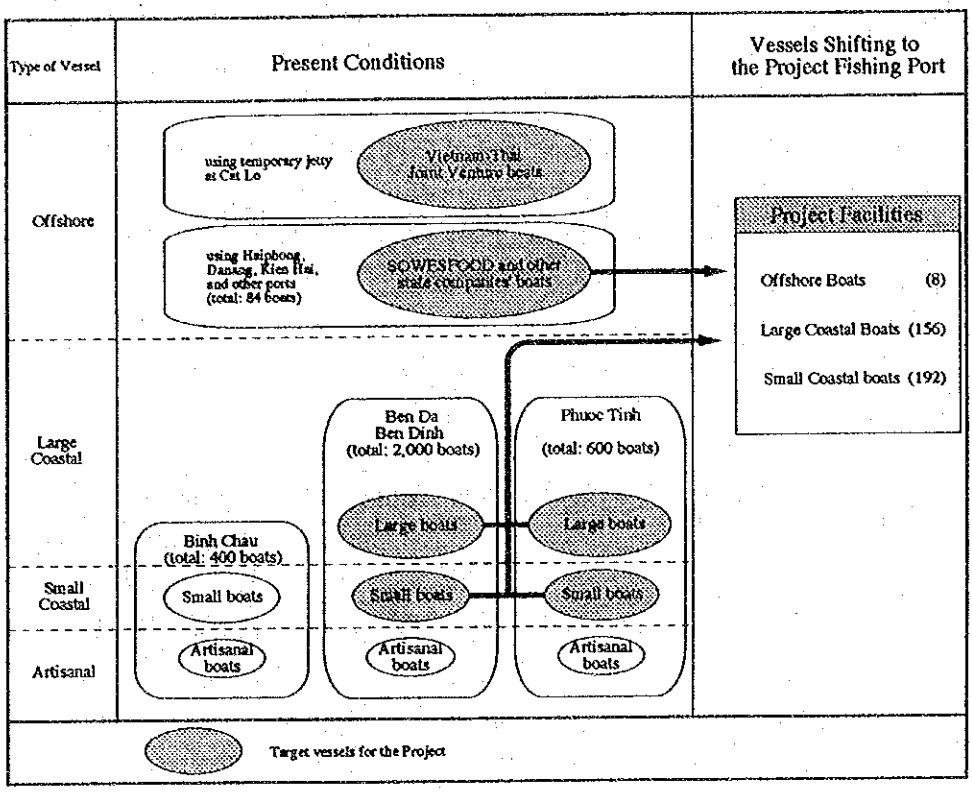


Figure 2.2.1 Vessels Expected to Utilize the Project Fishing Port.

When the Vung Tau port facilities are completed, this will be the first full-scale port for dual use by offshore and coastal fisheries in southeast Vietnam, which is endowed with abundant offshore and coastal resources along with an active fishing industry. On the basis of a growth in fish production and the qualitative and quantitative development of distribution channels, the new port can be expected to play a major role in accelerating the development of the country's fisheries.

At the present time, domestic fish supplies in Vietnam are generally tight, placing suppliers in an advantageous position. Particularly in the case of processing plants, operating rates fluctuate on the basis of their ability to secure adequate supplies of raw fish, forcing them to compete fiercely for this fish. Under a market economy, fish brokers help to stimulate fish distribution by acting as intermediaries between fishermen, processors, and retailers. However, under existing conditions, with the economy in a state of transition from planned to free markets, the position and power of these private brokers have not yet been established, and so distribution remains in a

state of flux. In export processing too, which is one of SOWESFOOF's business line, if this company were to use its position to monopolize the fish brokerage business, the private brokers in the process of development would weaken, creating a danger that the fish distribution structure incorporated in the Project facilities would decay. It is vital, therefore, that the Project facilities allow private brokers to trade freely.

The decrease of fishery resources as a result of overfishing by coastal fishermen is a grave environmental problem facing Vietnam, and its solution lies in two areas : First, to achieve sustainable development of the coastal fisheries through conservation and efficient utilization of coastal resources: and, secondly, to encourage utilization of unexploited resources by promoting development of the offshore fishery. Completion of a new fishing port geared to both offshore and coastal fishing vessels under the Project would, therefore, assure major progress in solving environmental problems.

From the above considerations, it can be concluded that Project implementation will benefit a large number of people, is very much in the public interest, and conforms to the objectives of Japan's grant-aid scheme. Based on the above, we have determined that, since the efficacy, practicality and implementation capability of the recipient country have been established and the Project has been deemed to conform to the guidelines and objectives of Japan's grant-aid cooperation scheme, it is appropriate that it be implemented under a grant-aid from Japan. Accordingly, we have prepared the following Basic Design, based on the Project outline, on the premise that the Project will be carried out under a grant-aid from Japan.

A fishing port is a unified complex whose function is to provide necessary support to fishing operations. These functions normally include all or part of the following :

1) Fish landing capability
   ----- to land and wash the catches.
2) Distribution capability
   ----- to handle, sort, sell, pack, and ship the fish that has been landed.
3) Supply capability
   ----- to supply fishing vessels with ice, fuel, water, food, fishing nets, and gear
4) Cold storage capability
   ----- temporary storage, refrigeration, and freezing for the landed fish
5) Processing capability
   ----- to wash and sort the landed fish, conduct primary and secondary processing, freezing, curing, and fish sauce manufacturing operations

6) Fishing vessel repair capability
   ----- to perform repairs on engines, hulls, navigation instruments, radio equipment, fishing gear, and other items.
7) Outfitting for fishing operation
   ----- gear repair and preparation, loading and other services directing concerned with fishing activity
8) Rest facilities
   ----- rest and recreation for fishing crews ; mooring fishing vessels for this purpose
9) Sheltering capability
   ----- shelter vessels during storm to protect hulls.
10) Management capability
   ----- to operate and maintain port facilities

The specific port functions required under this Project are as follows.

The most basic and indispensable functions of a fishing port are fish landing, fish distribution, supply and cold storage. However, with respect to the landing function, offshore fishing vessels will be served via a landing facility that is presently be constructed by the Vietnam side. Thus, a new landing capability is required only for coastal fishing vessels.

In terms of the fish distribution function, the Project facility will be expected to provide only a landing area; there is no need for the management organization to become directly involved in fish distribution. Nor would it be desirable, at a time when private fish brokers are still in the development stage, for the authority of the fishing port to adopt a posture that would impede fish distribution activities by the private sector.

With regard to processing, since, in most cases, individual firms process fish in their own ways, they develop their own facilities and equipment. However, in terms of primary processing for freezing and cold storage, space will have to be prepared for this function. At the present time, since private fishermen, brokers, and processors are still very small businesses and financially quite weak. They would thus be hard pressed to develop such facilities under their own power, and so a temporary processing area, chilling storage, quick-freeze installation, cold storage, and other basic facilities must be provided on a public basis.

With respect to fishing vessel repairs, the Vietnam Government had included a slipway in its original Request. Under existing conditions in Vietnam, there is indeed a shortage of repair facilities for offshore fishing vessels. But, as the number of such vessels is small, their requirements can be handled by repair yards servicing ordinary vessels. In addition, most coastal fishing vessels are also able, for the time being, to be serviced and repaired at private shipyards or

repair works. Accordingly, there is no pressing need to include a repair yard for fishing vessels in the Project facilities. Under present conditions in the Vietnam fisheries, no specialized facilities yet exist to prepare fishing boats for departure, such as providing net repair and preparation, and so it will be sufficient to provide an area for these operations. While crew rest facilities are indeed necessary, given the severe shortage of jetty facilities, it would be difficult to secure extra jetty space sufficient to moor fishing vessels just for this purpose. It will though be possible to meet the need for rest and recreation facilities through off the jetty mooring. Also, since the Project site at Cat Lo is in calm waters on an estuary, we see no need to provide facilities for protecting vessels during severe weather.

There is a requirement, however, for administrative offices and a storage area as well as a workshop for maintaining the ice-making unit, freezer, and other equipment.

Based on the above, the required functions at the Project facility will include fish landing, distribution, supply, cold storage, and administration.

Existing fish landing operations at fishing ports rely exclusively on manual labor involving huge amounts of time and effort. This has led to ever worsening congestion at the jetties and ever longer waiting times for landing catches, which in turn has resulted in increased fish deterioration. The Project not only requires new facilities but is intended also to rationalize and shorten landing and supply operations via the use of fish/ice handling equipment and to modernize distribution through the introduction of vehicles and equipment.

Based on the above evaluation, the main elements of the Project will incorporate jetties to provide fish landing capability for coastal vessels, access bridges, a dual-purpose fish handling and market building to furnish distribution capability, an ice-making plant, ice storage facility, oil tanks, and freshwater tank to provide supply capability; chilling storage, cold storage and quick-freezer to provide storage capability, an administration building and warehouse for overall facility management; and the supply of fish/ice handling equipment, vehicles and other equipment for workshop.

A profile of the fishing port functions required under the Project, along with its major component elements, is presented in the following chart.

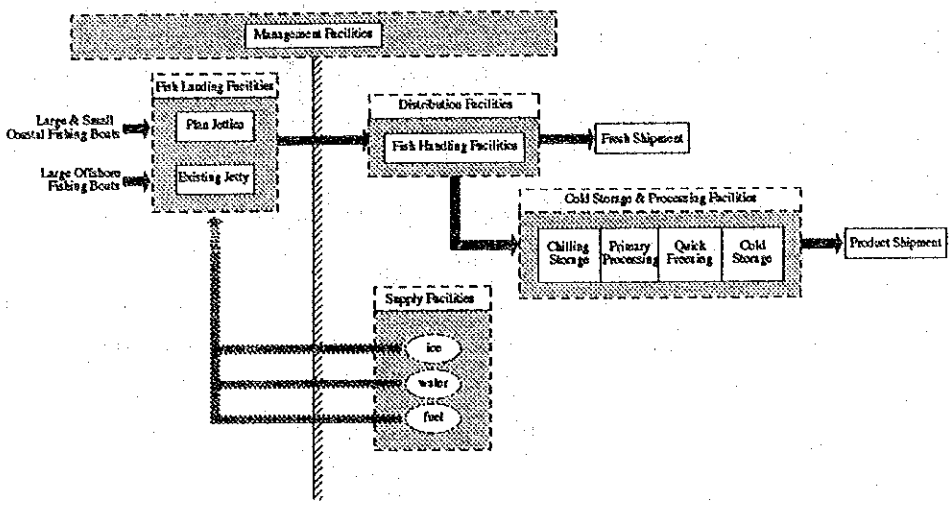


Figure 2.2.2 Major Component Elements of the Project

2.2.3 Environmental Problems:

Three aspects of the subject Project have environmental overtones. Firstly, the Project is programmed to play a positive role in protecting the environment. One of the most serious problems affecting the marine environment in Vietnam is the environmental damage caused by irresponsible fishing by the coastal fisheries -- namely, resource decrease. In the National Plan for Environment and Sustainable Development: 1991-2000; A Framework for Action (NPESD), as established by the Vietnam government in June, 1991, the following two policies were proposed to solve this problem:

1. Prohibiting fishing methods harmful to the environment and promoting methods that are environmental-friendly ; curbing reckless fishing by imposing restrictions on net mesh and catch sizes, protecting breeding and spawning areas, and instituting closures during breeding seasons.
2. In order to reduce excessive catch effort vis-a-vis the coastal fishery resource, promote development of offshore resources and the untapped resources on offshore reefs, based on rational resource evaluations.

The first policy seeks to protect coastal fishery resources through new or improved controls on fishing methods and operating periods, thereby achieving sustainable development and effective resource utilization. While this Project cannot directly control coastal fishery operations, it can improve post-harvest loss ratios, which are exceedingly high at present, through more efficient fish landing operations and achieve sustainable development of the coastal fisheries on

the basis of more effective resource utilization.

The second solution is to promote offshore fisheries. The principal aim of this Project is to create a fishing port for offshore fishing vessels, which is the most timely and constructive step that can be taken at present to develop the offshore fishery.

The second aspect of the Project with environmental implications is pollution associated with the construction work itself. The major negative impact that construction might have on the environment would be on water quality and mangroves, resulting from sand and silt flows generated in dredging operations, pile driving for the jetty, and site preparation. In 1943, Vietnam had 400,000 ha of mangrove forests, of which 250,000 ha were located in the southern delta region. However, the mangrove forests in the Vung Tau area were almost totally destroyed by the defoliants used during the 2nd Indochina War between 1965 and 1970, so that the only remaining ones are those that were planted after the war. Thus, the present area of mangrove forests in the delta region is only a fraction of previous levels.

The Project site is on the south bank of the Dinh River, where there has been considerable development, owing to its proximity to National Highway 51. There is a navy port upriver and a commercial port and towns adjacent to the site. Downstream, there is a service port for oil drilling and a continued string of urban areas, so that no mangrove forests remain.

On the opposite northern bank, however, development has been at a much slower pace, and formations of sparse mangrove shrubbery are seen in the swamps. The condition of the mangroves on the opposite bank of the river is shown in photographs in the Appendix. The discharge of sand and silt during the dredging, pile driving, and site preparation operations can be reduced to environmentally neutral levels by erecting a silt screen in the waters at the construction sites, which will prevent any such effluence or mud accumulation. In our judgment, therefore, there is virtually no chance of this construction activity inflicting direct damage on the local environment.

The third way in which the Project might have an environmental impact is through pollution generated by operation of the facilities. The only factors that could conceivably cause pollution during operations would be drainage and foul odors from fish processing activity. But waste water from processing operations can be separated from general drainage and then biologically treated to lower B.O.D. during drainage to a non-polluting level.

As to the odor problem, only primary processing will be done at the Project facility, involving the removal of heads, gills, and guts from the catches; there will be no curing, fish sauce, or fish meal production, and so virtually no odors will be generated.

There is always the possibility of major water contamination from bilge or accidental oil

spills from fishing vessels using the port, but this problem can be solved by collecting bilge from the boats for disposal through the waste water treatment facility.

In the event of an accidental oil spill, damage can be readily contained within port waters by using oil fences or oil adsorbent, thereby preventing any environmental damage outside. Accordingly, there is scant likelihood, in our opinion, of facility operations causing environmental damage.

2.3 Project Objectives and Targets :

2.3.1 Objectives :

The Project, which is based on the Vietnam Government's 5th 5-year Plan(1991-1995) and its "Directions and Objectives for Vietnam Fisheries Development During 1991-2000 Period", is intended to provide a fishing base for coastal and offshore fishing vessels. Through improvements in the conditions for fish landings, vessel supply, and fish distribution, the Project has the dual goal of developing the offshore fishery resources while maintaining the coastal fishery resources in southeast Vietnam in order to achieve sustainable growth in both sectors.

The most immediate problem facing Vietnam's marine fisheries is that of expanding fishery production. To accomplish this objective, there is a compelling need to build new fishing port facilities to eliminate the infrastructure deficiencies that represent the major bottleneck to offshore fishery development in southeast Vietnam water, which are known to hold an abundant supply of unexploited resources. Secondly, in order to achieve sustainable development for coastal fisheries, which are approaching potential annual yield, the intent is to reduce post-harvest losses and add value to the catches. For this purpose too, there is an urgent need to build landing and supply facilities for coastal fishing vessels, which are badly lacking under present conditions.

The objective of this Project, then, is to develop the fishing port facilities required to increase fish production and raise the market value of coastal fishery catches, and to provide vehicles and equipment to modernize physical distribution of fish catches within the port complex.

2.3.2 Target Fishing Vessels for the Project :

The typical sizes of fishing vessels may be summarized as follows.

	Vessel length (approximate)
a) Offshore fishing vessels:	30-35 m
b) Large coastal vessels :	15-18 m
c) Small coastal vessels :	7-11 m
d) Artisanal coastal boats :	less than 7 m

The tiny artisanal boats operate very close to shore, where catch effort is concentrated and there are indications of reckless fishing. These boats are logical candidates for conversion to larger vessels so as to be able to shift operations farther offshore. It would be inconvenient to attempt to equip these boats with the same facilities as found on larger boats, while a serious safety problem would present itself if the small boats are allowed to converge with large vessels. For the above reasons, the artisanal boats will not be considered as target vessels under this Project.

Table 2.1.2 tabulates the fishing vessels belonging to Ba Ria-Vung Tau Province by vessel length. Based on this table, the number of potential target vessels from Ba Ria-Vung Tau Province for the facilities at the Project fishing port will include 1,063 large coastal and 1,369 small coastal vessels.

The Project port will also be used by vessels from other Provinces. The main fishing ports in the Ba Ria-Vung Tau Province are Ben Da/Ben Dinh, Phuoc Tinh, Bin Chau, and Cat Lo. At Bin Chau, however, the largest fishing boat has a horsepower of only 90 PS. Therefore, since this port is far from Vung Tau, only a few boats from this port are likely to move to the new port, even after completion of the Project facilities. Bin Chau boats, therefore, will not be considered relevant for our purposes.

Table 2.1.4 tabulates fishing vessels from outside the Province using the fishing port at Ben Da/Ben Dinh by engine horsepower. In Vietnam, vessel size is normally shown by horsepower, so the fishing boats from other Provinces are not classified by vessel length. However, since there is generally a close correlation between horsepower and length and, on the assumption that the relationship in Ba Ria-Vung Tau Province between horsepower and boat length can also be applied to non-Province boats, we are in a position to project the number of target fishing vessels for the Project facilities.

The distribution of fishing vessels registered in Ba Ria-Vung Tau Province by engine horsepower is given in Table 2.1.3. Comparing this table with Table 2.1.2, the number of boats with engine horsepower of 45 ps or over are almost identical to those with a boat length of 15m or more. On this basis, we may assume that fishing boats of 45 ps or more will represent the target vessels in the large coastal vessel class for the Project port facilities.

Furthermore, if a vessel carries an engine of 200 ps or more, it is capable of fishing in offshore grounds with depths of 50 m or more and so is a logical candidate for conversion to offshore operations. The remaining fishing boats can be presumed to have traveled a considerable distance from other Provinces and so cannot possibly include small artisanal boats.

They may, therefore, be classified as small coastal vessels. Accordingly the non-Province vessels now using the Ben Da/Ben Dinh fishing port that can be considered target vessels for the Project port facilities include 27 offshore, 410 large coastal, and 766 small coastal vessels.

Data were not available on fishing boat usage patterns for the Phuoc Tinh fishing port. But, assuming that the number of non-Province boats using this port and overall boat size distribution are the same as at Ben Da/Ben Dinh, the potential target vessels for the Project facilities would include 8 offshore, 122 large coastal, and 229 small coastal vessels.

At Cat Lo, since the fishing vessels belonging to the Viet-Thai joint venture are temporarily using part of the commercial port adjacent to the Project facility and so are considered unlikely to shift to the new port after completion, they have not been taken into consideration for Project purposes.

In addition to the above, there is also a fleet of offshore fishing vessels belonging to state companies. Recent figures on the total fleet were not available, apart from a general profile of the boats belonging to SOWESFOOD and Halong Fiscom, based in Haiphong. In 1989, state companies operated a total of 65 vessels but, since most of these were quite old, with low catch efficiency, their operating rates were poor. We estimate that, at present, the only vessels in the state company fleets that are likely to sail into offshore waters off Vung Tau are 10 SOWESFOOD vessels and perhaps 39 (roughly 60%) of the other state companies' vessels. The SOWESFOOD fleet presently includes 2 tuna longline vessels plus 8 trawlers and line fishing boats that fish mainly in the Kien Giang area. These vessels range from 60 to 150 tons, with an average length of 32 m, width of 7 m, and draft of 3.2 m.

Based on the above analysis, among the fishing vessels fishing in the vicinity of Vung Tau, the total that could conceivably make use of the new port include 84 offshore, 1,595 large coastal, and 2,364 small coastal vessels.

In the Minutes of Discussions between the Government of Vietnam and the Team, the number of target fishing vessels for the Project facilities totaled 8 offshore, 156 large coastal and 192 small coastal vessels. On this basis, the fulfillment ratios under this Project would come to 9.52% for the offshore, 9.78% for the large coastal, and 8.12% for the small coastal categories. These ratios have been deemed appropriate.

The types, operating patterns, and planned landing volumes for the target fishing vessels

under this Project are summarized in the following table.

Table 2.3.1 Principal Particulars, Operating Patterns, and Anticipated Landing Volumes for Target Plan Fishing Vessels

	Offshore Vessels	Coastal Large Boats	Coastal Small Boats
Principal Particulars			
Length Over All	30 - 35 m	15 - 18 m	7 - 11 m
Breadth	7.0 - 8.0 m	3.5 - 4.0 m	2.5 - 3.5 m
Draft	3.2 m	1.5 - 1.7 m	0.8 - 1.2 m
Fish Hold Capacity	130 cu.m	25 cu.m	2 cu.m
Fuel Tank Capacity	23 cu.m	4 cu.m	0.1 cu.m
Fresh Water Tank Capacity	21 cu.m	3 cu.m	0.5 cu.m
Operating Patterns			
Average Number of Operating Days	10 days	10 days	7 days
Average Number of Supplies/Rest Days	4 days	3 days	1 days
Number of Boats per Day	1	12	24
Total Number of Boats	8	156	192
Max. Landing Volume per Boat	65 ton	12.5 ton	1.0 ton
Max. Landing Volume per Day	65 ton	150 ton	24ton
Total Landing Volume per Year	13,520 ton	54,600 ton	8,640ton

2.4 Project Description:

2.4.1 Execution Agency and Operational Structures:

The executing agency for the Project is the Ministry of Fisheries. As the management body for the fishing port facilities, a Vung Tau Fishing Port Authority will be established as an independent organization to administer the facilities. This Authority will report to SOWESFOOD, a state company belonging to the Ministry of Fisheries, which is the implementing organ for fishery development in South Vietnam.

In addition, an Advisory Committee for the Vung Tau Fishing Port Authority will be formed to give the Ministry of Fisheries, SOWESFOOD, fishermen, and fish brokers a voice in facility operations. This Advisory Committee will be composed of representatives of the Fisheries Department of Ba Ria-Vung Tau Province as well as fishermen's associations or fisheries departments of other provinces whose fishing vessels use the Vung Tau fishing port.

(1) Vung Tau Fishing Port Authority:

The authority and responsibilities of the Fishing Port Authority will extend to the following areas:

a) Permits for and control of docking and sailing operations for vessels entering or leaving the port.
b) Permits for and control of facility use by fish brokers and vendors, if any.
c) Operation and maintenance of port and shore facilities and equipment (including dredging out to the main channel)
d) Collection of dock charge, facility usage fees, other charges, and commissions.
e) Production and sale of ice.
f) Storage and sale of fuel and fresh water.
g) Collection and organization of data on fish catch and landings.
h) Overall administration of facilities and personnel.
i) Assuming responsibility for financial obligations in connection with port management and maintenance and making payments on these obligations.

The accounts of the Fishing Port Authority will be maintained on an independent basis with a view to making the organization self-supporting.

(2) Advisory Committee for the Vung Tau Fishing Port Authority:

This Committee will be made up of representatives from the Ministry of Fisheries, SOWESFOOD, the Fisheries Department of the Ba Ria-Vung Tau Province, and the fishermen's associations or fisheries departments of the other main provinces utilizing the Vung Tau fishing port. It will review proposals from, and provide guidance to, the Fishing Port Authority in connection with the formulation of general policies for fishing port operations, regulations for port administration, and facility maintenance. A Secretariat will be established within the Advisory Committee to handle Committee business and external liaison.

(3) Executive Board:

The Managing Director of the Fishing Port Authority will have responsibility and authority, pursuant to the advice of the Advisory Committee, over all phases of fishing port management, facility maintenance, and personnel administration. The Managing Director will be supported by an Deputy Managing Director and the respective Directors of the Operations Department, Administration Department, and Maintenance Department of the Authority.

(4) Management:

The duties and responsibilities of the Fishing Port Authority will be as follows:

(A) Operations Department:

a) Transport:

---- liaison with vessels entering port; assignment of Jetty space to arriving vessels

---- transport of landed catches to the fish handling cum market, processing room, and chilling storage

---- transport and loading of ice; receiving and loading of fuel and fresh water

b) Ice production:

---- ice making, thawing, can dumping, storage and delivery

c) Refrigeration:

---- operation of quick-freezer; movements into and out of the chilling and cold storage ; temperature control therein

(B) Administration Department:

a) Accounting:

---- preparation of budgets, cashier operations, payrolls

b) Personnel:

---- administration, employment, training , social insurance

c) Materials:

---- procurement, storage, and control of materials used in the Authority,

d) Security:

---- security protection within the port area, fire protection, emergency medical care

e) Management:

---- administration of port facilities and property;

---- facility leasing

f) Publicity:

---- public relations and diffusion programs

g) Statistics:

---- collection and organization of catch and landing data

(C) Maintenance Department:

a) Marine operations:

---- dredging and maintenance of channel and port waters

---- maintenance and control of navigation lights, buoys, and other navigation aids

---- operation and control of in-port vessel traffic

---- measures to prevent oil spills

b) Construction:

---- maintenance and administration of port structures

---- small-scale construction work

---- design and surveying

c) Machinery:

---- maintenance of ice making machines, refrigeration machines and other machineries

---- servicing work on vessels in port

---- workshop

d) Electrical work:

---- maintenance and control of electrical facilities.

(5) Personnel :

Staff and site-labor requirements to carry out the above operations are as shown below:

Table 2.4.1 Staff and Labor Requirements

	Staff	Workers
(A) Operations Dept.		
a) Transport · vessel liaison/jetty allocation	2	
· transportation, handling	2	18 (5 x 3 Shifts+3)
b) Ice Production	1	20 (5 x 4 Shifts)
c) Freezing Operation	1	10
Sub-total	6	48
(B) Administration Dept.		
a) Accounting · preparation of budgets	1	
· accounting, payrolls	2	
· cashiers	3	
b) Personnel	2	
c) Store	2	
d) Security	1	6 (2 x 3 Shifts)
e) Facility Management	2	
f) Public Relations	1	
g) Statistics	3	
Sub-total	17	6
(C) Maintenance Dept.		
a) Marine Operations	1	
b) Construction	1	
c) Machinery	2	5
d) Electrical	2	
Sub-total	6	5
(D) Advisory Committee		
a) Managing Secretary	1	
b) Secretary Staff	2	
Sub-total	3	
Grand Total	32	59

2.4.2 Operating and Maintenance Plan:

After completion of the Project facilities, operations and maintenance will be conducted by the Vung Tau Fishing Port Authority. Maintenance and operating costs will comprise running costs for the facilities and equipment, staff salaries incurred for maintenance and operations, and wages of site workers. The following assumptions have been used in making these calculations :

Number of operating days for landing jetty and handling area : 365 days / year
Number of non-working days for the Authority : 8 days / year
Electricity rate : $0.05 / KWH
Water rate : $0.45 / cu. m

(1) Maintenance and operating costs

1) Electricity :

Power consumption at the Project facilities will be as shown below :

Table 2.4.2 Power Consumption

Facility	Capacity	Load	Hours of Operation	Operating days	Annual Consumption
Ice, cold storage, freezer	870 KW	0.7	24 hrs	357	5,217,912 KWH
Machine tools	60 KW	0.4	3 hrs	357	25,704 KWH
Power for moored vessels	90 KW	0.4	12 hrs	365	157,680 KWH
Lights, general outlets	70 KW	0.4	12 hrs	365	122,640 KWH
Air conditioning, ventilation	20 KW	0.5	8 hrs	357	28,560 KWH
Water Lifting pumps, others	11 KW	1.0	4 hrs	357	15,708 KWH
TOTAL					5,568,204 KWH

5,568.,204 KWH x $0.05/KWH = $278,.410.2 / year

2) Water:

Water consumption at the Project facilities will be as shown below :

Table 2.4.3 Water Consumption

Target Uses	Daily Water Supply	Number of Supply days	Annual Water Supply
Offshore Vessels	21 cu.m	208	4,368 cu.m
Coastal Boats	48 cu.m	365	17,520 cu.m
Ice Making	240 cu.m	357	85,680 cu.m
Coolant	130 cu.m	357	46,410 cu.m
Processing	70 cu.m	357	24,990 cu.m
Waste Water Treatment	188 cu.m	357	67,116 cu.m
Drinking, miscellaneous	10 cu.m	357	3,570 cu.m
TOTAL			249,654 cu.m

249,654 cu.m x $0.45 / cu.m = $112,344.3 / year

3) Fuel oil :

The vehicles and machinery consuming fuel and oil will include the emergency

generator, trucks, vans, truck crane, and forklift.

The generator will be activated during periods of power blackouts. Since generator will be operated during blackouts and we set the power consumption rate on the basis of normal operating rates, therefore generator operating costs will not be separately costed. With regard to diesel oil, although current retail prices in Vung Tau City are $0.25/lit, since oil tanks will be provided to allow the Authority to buy from tankers in bulk, the cost of diesel fuel has been set at $200/k. lit.

a) Vehicle fuel and lubricant costs:

Based on the number of vehicles, horsepowers, operating hours, operating rates, fuel consumption, operating days, and annual fuel consumption, annual vehicle fuel costs have calculated at : 158, 355.86 kg per year x 1/0.84 (specific gravity) x $200/k.lit. = $37,704/year.

Table 2.4.4 Fuel Consumption by Vehicles

	No.	Horse Power	Hours	Operation. rates	Consumption	Days	Annual Consumption
Truck	1 x	80 PS x	8 hrs	x 0.2 x	180g/PS-Hr	x 180 =	4,147.2 Kg
Truck Crane	1 x	165 PS x	12 hrs	x 0.1 x	180g/PS-Hr	x 208 =	7,413.12 Kg
Forklift(1 ton)	2 x	30 PS x	12 hrs	x 0.7 x	180g/PS-Hr	x 357 =	32,387.04 Kg
Forklift (2 tons)	3 x	57 PS x	12 hrs	x 0.7 x	180g/PS-Hr	x 357 =	92,303.06 Kg
Van	1 x	215 PS x	8 hrs	x 0.2 x	180g/PS-Hr	x 357 =	22,105.44 Kg
TOTAL							158,355.86 Kg

The cost of lubricating oil has been set at 10% of fuel costs, or $3,770/year. Thus, the total fuel and oil budget for vehicle use comes to $41,474/year.

b) Fuel purchases sale for fishing vessels :

Since the monthly fuel volume to be supplied to fishing vessels will run 1,592.8 cu.m, the annual total becomes :

1,592.8 cu.m x 12 = 19, 113.6 cu.m

However, since this fuel will be purchased for resale to fishing vessels, purchase costs are not shown here. Instead, the net profit from these sales will appear under the revenue calculations in Section (2). On this basis, annual fuel and oil costs remain at $41,474/year, as calculated in (a) above.

4) Expendable :

The main expendable items will include brine and steel cans for ice production.

Brine requirements will be 6 tons/ month. Ice cans are assumed to have a useful life of 3 years. Accordingly, 1/3 of the ice cans stock will have to be replaced each year.

Thus, 4,000/3 cans x $15/can = $20,000/year

The total budget for expendable has been set at $28,640 per annum.

5) Replacement parts :

Replacement parts for equipment and machinery have been set at an amount calculated at 1/2 of the repair cost rates, as shown below, based on original equipment cost and the number of years it has been in use (i.e., since installation). In Japan, ice-making and freezing equipment are assumed to have a useful life of 13 years.

Table 2.4.5 Replacement Parts Cost

Number of Year in use	Repair Cost Rates	Replacement Parts Rate	Replacement Parts Cost
0	0.00%	0.00%	$0
1	2.00%	1.00%	$40,00
2	3.30%	1.65%	$66,000
3	3.96%	1.98%	$79,200
4	4.60%	2.30%	$92,000
5	5.25%	2.63%	$105,000
6	5.90%	2.95%	$118,000
7	6.56%	3.28%	$131,200
8	7.20%	3.60%	$144,000
9	7.85%	3.93%	$157,000
10	8.50%	4.25%	$170,000
11	9.16%	4.58%	$183,200
12	9.82%	4.91%	$196,400

6) Maintenance costs :

The maintenance budget has been calculated at $40,000/year, broken down into: $10,000/year for the port facilities, $20,000/year for the buildings, and $10,000/year for the equipment. In addition to the above, a maintenance dredging in the port waters for every 5 years may be required. It will cost as follows;

10,000 cu.m x @$3.5/cu.m = $35,000/per every 5 years

7) Labor :

Table 2.4.6 Labor Cost

Personnel	Number		Monthly rate		Months		Annual cost
Managing Director	1	x	$350	x	12	=	$4,200
Deputy Managing Director	1	x	$330	x	12	=	$3,960
Director	3	x	$300	x	12	=	$10,800
Managing Secretary	1	x	$300	x	12	=	$3,600
Staff (Class 1)	11	x	$230	x	12	=	$30,360
Staff (Class 2)	21	x	$210	x	12	=	$52,920
Worker	59	x	$150	x	12	=	$106,200
TOTAL							$212,040

8) Miscellaneous office costs :

These have been set at 40% of labor costs, or $84,816/ year.

9) Depreciation :

No provision need be made for depreciation when a project is predicated on a grant-aid. However, in the normal course of facility operations, replacement will be required at some point, and so depreciation has been calculated for reference purposes. We have set the useful life of the various facilities and equipment items at the standard levels used in Japan, with depreciation figured on a fixed sum basis. The useful lives of the facilities are assumed as follows.

Jetty	50 Years
Shore Protection	50 Years
Pontoon	50 Years
Office Building	65 Years
Fish market	35 Years
Ice Plant	35 Years
Fuel Tank	15 Years
Drainage, Sewage & Piping	15 Years
Electrical Installations	15 Years
Refrigeration Facility	13 Years
Forklift	4 Years
Vehicle	5 Years
Other Equipment	5 Years

Summarizing the above requirements, the annual operating budget has been set as follows:

Table 2.4.7 Annual Operating Budget

Item	Cost per Annum	
1) Electricity	$278,410.2	
2) Water	$112,344.3	
3) Fuel oil	$41,474.0	
4) Expendable	$28,640.0	
5) Replacement parts	---------	To vary with the number of years of equipment use
6) Facility Maintenance	$40,000.0	+Maintenance Dredging for every 5 years
7) Labor	$212,040.0	
8) General office expenses	$84,816.0	
9) Depreciation	---------	not computed
GRAND TOTAL	$797,724.5 /yr.	+replacement parts + dredging

(2) Revenues :

1) Ice sales :

Annual ice sales revenue has been set at 76,760 tons. The current retail price for ice in the Vung Tau area runs $0.5 - 0.7/50 kg. A selling price of $0.5/50 kg has been assumed for the Project facility.

76,760 Tons x @$0.5/50 kg = $767,600/Year

2) Water sales :

The annual supply of freshwater to the fishing vessels has been set as follows.

Table 2.4.8 Annual Supply of Freshwater

	Supply per Boat		Number of Annual Trip			Annual Supply
Offshore Vessel	21.0 cu.m	x	28		=	4,368 cu.m
Coastal Large Boat	3.0 cu.m	x	156 boats	x 28	=	13,104 cu.m
Coastal Small Boat	0.5 cu.m	x	192 boats	x 45	=	4,320 cu.m
TOTAL						21,792 cu.m

The water rate at the Jetty, as charged by the Water Supply Company of Ba Ria-Vung Tau Province (WASUCO) is $1.00/ ton, but this includes the cost of tank lorries. Thus, adding $0.15 to the cost price, the selling price for water has been set at $0.6/ton.

21,729 cu.m x @$0.6/cu.m = $13,075.20

3) Fuel Sales :

The annual volume fuel deliveries to fishing vessels has been set at 19,113.6 k.lit. Assuming a selling price of $240/ k.lit, the net profit from fuel sales will be $40/ k.lit, producing an annual revenue of :

19,113.6 k.lit x $40/k.lit = $764,544/year

4) Revenue from jetty fees :

The current schedule of jetty fees at the Ben Da fishing port is as follows :

Vessel length 25 m or less: 15,000 VND/day

Vessel length over 25 m: 20,000 VND/day

Approximately the same fee levels are postulated for the Plan facility. However, since the jetty for offshore fishing vessels is owned by SOWESFOOD, jetty use rates have been calculated only for coastal fishing boats.

Assuming a jetty use charge of $1.50/day for coastal vessels ; based on a usage period of one day per vessel, revenue from this source has been projected at:

Coastal Large Boat: 156 x 28 days x @$1.5 = $ 6,552/Year

Coastal Small Boat: 192 x 45 days x @$1.5 = $12,960/Year

5) Usage fees for chilling/cold storage :

Usage fees will be charged for the freezer and cold storage facilities at levels commensurate with operation costs. These costs are as shown below.

a) Electricity:

190 KW x 0.70 (Load) x 24 hours x 357 days = 1,139,544 KWH

1,139,544 KWH x $ 0.05/KWH = $ 56,977.2/Year

b) Water:

-- for processing :

24,990 cu.m x $0.45/cu.m = $11,245.5 /year

-- for waste water treatment :

67,116 cu.m x $0.45/cu.m = $30,202.2 /year

Total: $41,447.7 /year

c) Labor :

-- Staff salaries: $230 x 12 months = $ 2,760.0 /year

-- Wages: $150 x 12 months x 10 persons= $18,000.0 /year

The total of the above items comes to $119,184.9/year. Annual processing volume has been set at 4.5 tons/day x 357 days = 1,606.5 tons, rounded to 1,6000 tons/year. Thus,

$119,184.9/1,600 tons = $74.49/ton, or $74.5/ton of freezing volume.

Accordingly, the annual revenue from cold storage and freezer use charges works out to:

1,606.5 tons x $ 74.5 = $119,684.25

6) Other revenue:

The main items under "other revenue" will comprise: registration fees for fish brokers and dealers utilizing the port facilities and lease charges for vendors setting up shop in the crew rest area. It is desirable that broker registration fees be set at only nominal levels so as to encourage private brokers to make active use of the Project facilities; thus, income from this source has not been included in the revenue projections. Lease charges for vendors are considered only secondary to the Project and so have also been excluded from these calculations.

Summarizing the above items, operating revenue for the Plan facilities can be projected as follows :

Table 2.4.9 Annual Operating Revenue

Item	Amount
1) Ice sales	$767,600.00
2) Water sales	$13,075.20
3) Fuel sales	$764,544.00
4) Jetty use fees	$19,512.00
5) Revenue from chilling / cold storage & Quick freezer	$119,684.25
6) Other income	$0.00
TOTAL	$1,684,415.45

The Funding Schedule, by fiscal year, for revenues and operating expenses is shown in Appendix Table7-1. It is apparent from these figures that, excluding only the year of maximum depreciation expense, when the cost of replacement parts will be at a maximum, a net operating surplus will normally be achieved. Thus, apart from the initial operating expenses, no special budgetary appropriation will be required for project operations.

It will, admittedly, be difficult to fully depreciate all of the initial Project investment. However, excluding the construction cost of the jetties and buildings, it should be

possible to cover depreciation for the other equipment: viz., ice-making and freezing equipment, vehicles, and machinery items.

In Appendix Table 7-2, a Funding Schedule has been prepared, based on fixed sum depreciation of the various equipment and machinery items. When depreciation for this equipment is included, and hypothecating a future 25% rise in electricity rates, a 30% increase in labor costs, a 15% decrease in ice sales prices, or a decline of $5/k.lit. in fuel selling prices, the operating deficit in the final fiscal year of the project under each of these assumptions, can be projected at $778,497, $845,946, $2,150,106, and $1,171,506, respectively. It is, therefore, vital that the Authority shall maintain proper cost management and setting of appropriate selling prices.

(3) Personnel Plan :

The essential functions of this project, such as ice sales, refrigeration, freezing, and management of vessel arrivals and departures, are already being handled by SOWESFOOD, SEAMECO (another state corporation), the Department of Fisheries of Ba Ria-Vung Tau Province and private firms. These organizations have developed a good pool of skilled technicians in these areas. Accordingly, by hiring these experienced people and also recruiting less experienced technicians, and through the cumulative effect of on-the-job seasoning, these employees should be sufficient to insure effective maintenance and operations at the Project facilities. However, with respect to overall fishing port administration, since the kind of experience required of the new Vung Tau Fishing Port Authority is still lacking in Vietnam, careful consideration should be given to experience and skills when selecting the management.

In addition, if possible, consideration should be given to nurturing the development of managerial skills through a program of technical cooperation, incorporating management training and expert guidance.

2.5 Technical Cooperation :

In September, 1993, JICA (Japan International Cooperation Agency) dispatched a Project Formation Survey Team to Vietnam to study the fishery sector. As a result, this Team recommended, as a possible adjunct of Japan's technical cooperation program for Vietnam, that a development survey be conducted in the near future on offshore fishery resources and that fishery advisors be dispatched to the Vietnamese Ministry of Fisheries. With respect to the

offshore resource survey, JICA has already conducted a preliminary study and is accelerating review and preparations for implementation.

In the course of discussions with the Vietnam authorities during the field survey, the Basic Design Study Team was asked about the possibility of Japan accepting trainees in connection with fishing port operations. The Project facility is to be run by a newly established Port Authority. Vietnam is now in a transitional stage from a planned to a market economy. Despite the fact that a self-supporting state company in a market economy is operated in virtually the same way as a private company, the management of numerous "public" facilities in Vietnam has been entrusted to just a single state corporation, based on the concept that a state company = a state body = a "public" organ. For this reason, almost all of these state company become national monopolies that are not necessarily able to give full play to the public nature of the facilities they administer. But the Vung Tau Fishing Port Authority is to operate in unison with its users (fishermen and brokers) and administrative agencies (competent authorities and local government bodies), reflecting the views of port users. The management approach for this public facility will be geared to improving operating efficiency and achieving equitable administration, which is characteristic of the majority of public corporations in Japan and other countries with a market economy. The strong interest expressed by the Vietnam authorities in management training opportunities and technical guidance through participation in training courses has been prompted by this compelling need to develop competence at all managerial levels by familiarizing port administrators with modern management methods.

SECTION THREE: BASIC DESIGN

3.1 Design Policies:

This Project, forming part of the fishery development program in Vietnam, involves the creation of a fishing port to both develop the offshore fishery and achieve sustainable development of the coastal fisheries.

The Project facilities and equipment comprise: jetties for fish and landings and supply operations, ice-making plant, fuel and freshwater tanks, chilling and cold storage facilities, fish handling cum market building, administration building, warehouse, waste water treatment facility, fish/ice handling equipment, ice-crushers, transport vehicles, and environmental protection equipment. The Vietnam side has already started construction on a portion of the jetty facilities, with completion close at hand. Consideration should be given to the organic linkage of the new and existing facilities under this Project.

3.1.1 Basic Guidelines in Facility Design:

1) The target fishing vessels for the existing jetty will be offshore vessels belonging to SOWESFOOD and other state corporations. Since SOWESFOOD expects to complete work on this jetty during 1994, structural work on this facility is not included in the Project. However, the fuel, water, and ice supply facilities have been incorporated in the Basic Design, since it is logical that their design be integrated with the facilities to be used by coastal fisheries. Also, in view of the fact that fenders of sufficient shock absorbency cannot be obtained locally, these facilities, along with the dredging work in front of the jetty, have been included in the Basic Design.
2) While the new jetty will serve both large and small coastal vessels, adequate water depth and construction must be provided to enable small tankers to dock there for fuel supply operations.
3) The shore protection must be of a structure and shape that will prevent flooding of the Project site at high tide and will allow small boats to moor easily in the area between the pontoon jetty inside the new main jetty and the shore protection.
4) Supply methods should be improved so as to rationalize both loading time and labor. The ice-making and ice-storage equipment will be given a capacity sufficient to meet supply requirements, based on an evaluation of the number of target fishing vessels and loading times.

5) The fish handling area, which is to double as a fish market, will be made large enough to ensure that fish distribution can be conducted primarily by private brokers and dealers.

6) With regard to the processing area, quick-freezer, chilling storage and cold storage, it is assumed that fish of high commercial value will be given primary processing and stored in the cold storage.

7) While adequate space will provided in the Design for crew rest facilities, these are to be furnished by the Port Authority after completion of the Project facilities.

8) With regard to the design of the fuel and freshwater tanks, consideration will be given to meeting supply requirements for target vessels and to providing fire fighting facilities, an oil fence, and other safety and pollution-prevent measures.

9) The facilities will be made appropriate to the natural environment at the Project site, particularly the high temperature and humidity, the scorching sunshine, and other climatic conditions, such as the fact that the Project facilities will be vulnerable to damage from sea winds owing to their proximity to the sea.

10) The Project site faces the Dinh River, with sparse mangrove forests on the opposite bank. Vung Tau has been renowned as a tourist area of scenic beauty, thanks to its exquisite seascapes and sandy beaches. The Project will give maximum consideration to protecting this superb environment during construction and ongoing operations by maintaining a responsible harmony with the natural conditions at the Project site and the surrounding environment.

11) The Project facility is to be managed on a self-supporting basis by a newly established Vung Tau Fishing Port Authority. The facilities, therefore, will be designed to function efficiently at minimum cost.

12) The Project will use structures, materials, and construction methods that take account of local building conditions. During implementation, local labor, materials, and construction equipment will be employed to the maximum possible extent so as to contribute to vitalization of the regional economy through construction activity for the Project.

3.1.2 Basic Guidelines for Equipment Design :

1) At existing fishing ports in Vietnam, fish landing operations are unmechanized and so very time-consuming. This situation has led to increased congestion and inadequacies at the jetties as well as a deterioration in catch quality. The Project will seek to modernize fish distribution in the Port by introducing time-saving fish/ice handling equipment, such as belt conveyors, roller conveyors and forklifts.

2) In principle, equipment items will be designed to be repairable locally wherever possible and from the standpoint of availability of replacement parts.

3.2 Consideration of Design Conditions :

3.2.1 Code and Standards:

Government standards in Vietnam governing engineering work and structural design and building standards are not strictly observed, so that applicants are apt to use their familiar code and standards. In the case of coastal engineering works, Russian standards are often applied.

In the Project, Japanese standards will, in principle, be applied to structural work, based on local conditions. However, formal permission is required, similar to the approval process in Japan. Following chart shows Design Approval Process in Vietnam, which may require a period of three months from application to approval.

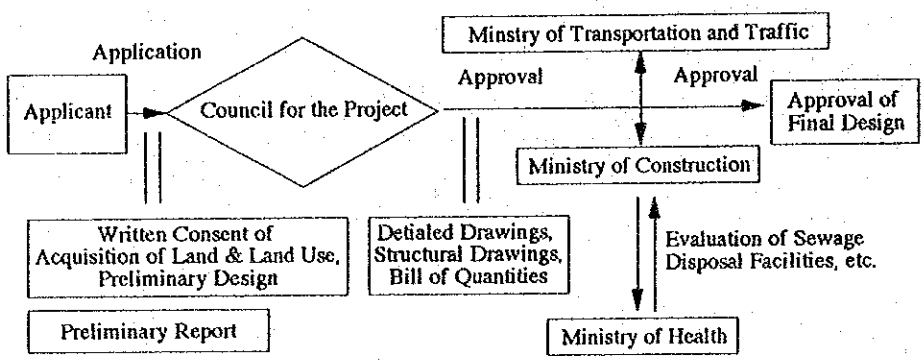


Figure 3.2.1 Design Approval Process in Vietnam

3.2.2 Oceanographic Conditions:

1) Tidal levels: (at C.D.L.= ±0.00 m)

H.H.W.L.	+4.39 m
H.W.L.	+3.65 m
M.S.L.	+ 2.42 m
L.W.L.	+ 0.39 m
L.L.W.L.	- 0.38 m

2) Flow velocity: 1.0 knot

3.2.3 Wind load:

This has been based on the following formula for design wind load (as shown in the applicable Construction Ordinance of the Japan Construction Standards Act)

$P = q \times c \times A$

where: $q = 60\sqrt{h}$ ($h < 16$ m)

h = height of structure

c = wind force coefficient

A = load-bearing area

P = design wind load

3.2.4 Load Conditions:

These conditions have been set as follows on the basis of facility use, type, and local conditions.

1) Port facilities

-- Surcharge:

Pile jetty:	1,000 kg/sq.m
Pontoon jetty	500 kg/sq.m

-- Live load:

Pile jetty:	T-20
Pontoon jetty:	forklift (1-ton class)

2) Buildings:

-- Live loads

Offices:	300 kg/sq.m
Storage area:	400 kg/sq.m
Corridors (balconies):	300 kg/sq.m
Ice storage	2,000 kg/sq.m

3.2.5 Soil Conditions:

(Results of the soil surveys are shown in the Appendix.7-6)

From D.L.- 2.0m to ±0 m

N value:	1~3
Unit weight of soil:	1.6 ton/cu.m

From D.L.-0m to -25 m

N value	15 ~50
Internal frictional angle	30 degree
Unit weight of soil:	1.8 ton/cu.m
Unit weight of submerged soil:	1.0 ton/cu.m

3.2.6 Design Standard of Materials :

1) Concrete:

Ordinary concrete (coastal facilities)

Design standard strength: Fc = 240 kg/sq.cm

Ordinary concrete (buildings)

Design standard strength: Fc = 210 kg/sq.cm

Plain concrete (coastal facilities)

Design standard strength: Fc = 180 kg/sq.cm

2) Steel materials:

Type of Steel	Code	Steel Grade	
Steel pipe for structural use	Steel pipe piles	SKK 400	
Steel plate for structural use	Rolled steel for general structural use (in compliance with JIS G3101)	SS 460	sheets/rolled
Steel bars	Reinforced concrete bar	SD 295A	deformed bar

3.2.7 Seismic Force:

Since there was no earthquake record stronger than M.4 in south Vietnam, seismic force is not taken into consideration in designing port facilities or buildings in south Vietnam and so will not be considered in this Project.

3.3 Basic Plan:

3.3.1 Site Arrangement Plan:

The Project site is on the north side of an access road 450m off National Highway 51, running along the bank of the Dinh River. The original site which had been prepared by the Vietnamese authorities was a 3 ha parcel ("A" Area), enclosed by a block fence on two sides -- the road and the southeast line. The area was relatively flat. The configuration of "A" site is shown

below.

However, the site configuration presented a problem. The riverside frontage was short, making it impossible to obtain the required jetty length. In addition, it became clear that the "B" Area in the chart (6 ha) had been secured by SOWESFOOD for future use. At this point, as a result of our field discussions, it was agreed that the Project site would comprise most of Area A plus a portion of Area B, a combination which resulted in an appropriate topography.

The revised Project site, as agreed with the Vietnamese side, incorporated both Areas A and B in the configuration shown below (a-b-c-d-e-f, totaling about 2.85 ha).

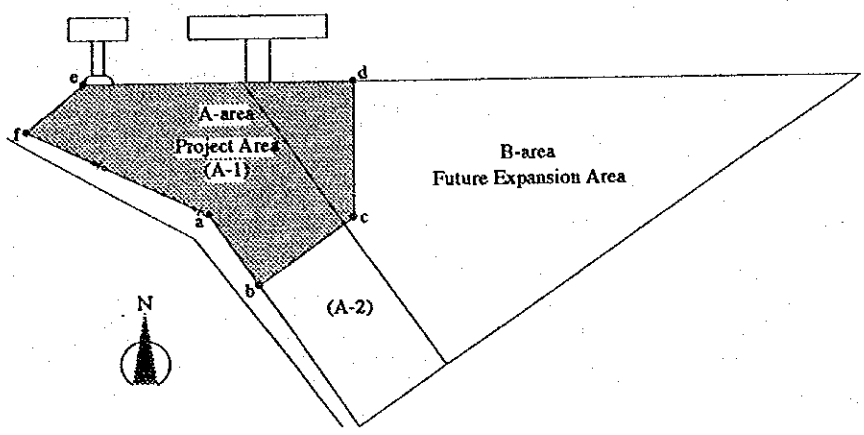


Figure 3.3.1 Project Site Arrangement Plan

Based on the above developments, we list below the main elements of the site Project :

1) The base line for the new jetty will lead into that for the existing jetty, running parallel to river flow.
2) There are two gates on the site fronting on the access road, both of which will be actively used. The front gate will serve as the main gate for the following reasons:
   a) The front gate is set back from the front access road, providing a maximum road width of 19m, which is appropriate for movements of large vehicles.
   b) From this gate, it is a straight line, through virtually the dead center of the property, to the jetty.
   c) It is already equipped with a guardhouse.
3) The sections of Areas A and B that were excluded when setting the Project site will be reserved for possible future expansion and development. The site layout plan reflects this possibility.

The following detailed layout plan has been based on the above considerations.

The apron area, extending in an east-west direction alongside the jetty, may be considered the main horizontal flow axis. At a point sandwiching this axis and facing the two jetties will be located the Fish Handling cum Market Building, ice-making plant, and chilling/cold storage facilities, which will play a central role in the facility complex.

The line running from the main gate to the jetty in a north-south direction may be considered the vertical flow axis. This axis extends to the general consuming areas outside the Project site and along this axis, on the eastern side, will be located the Fish Handling cum Market Building and Administration Building, while the ice-making plant will be placed on the western side.

Another flow line will run from the sub-gate to the jetty. The oil tanks will front on this line with a view to minimizing their effect on other facilities. On this basis, the frame for the main facility cluster has been determined. In this basic frame, the plan is to place auxiliary and complementary facilities for the main facility cluster (e.g., warehouse, workshop, and elevated water tank) on the southern side of the site.

Looking ahead to future expansion and development, ample space has been left between the Fish Handling cum Market Building and Administration Building to facilitate access. The site plan is as shown below.

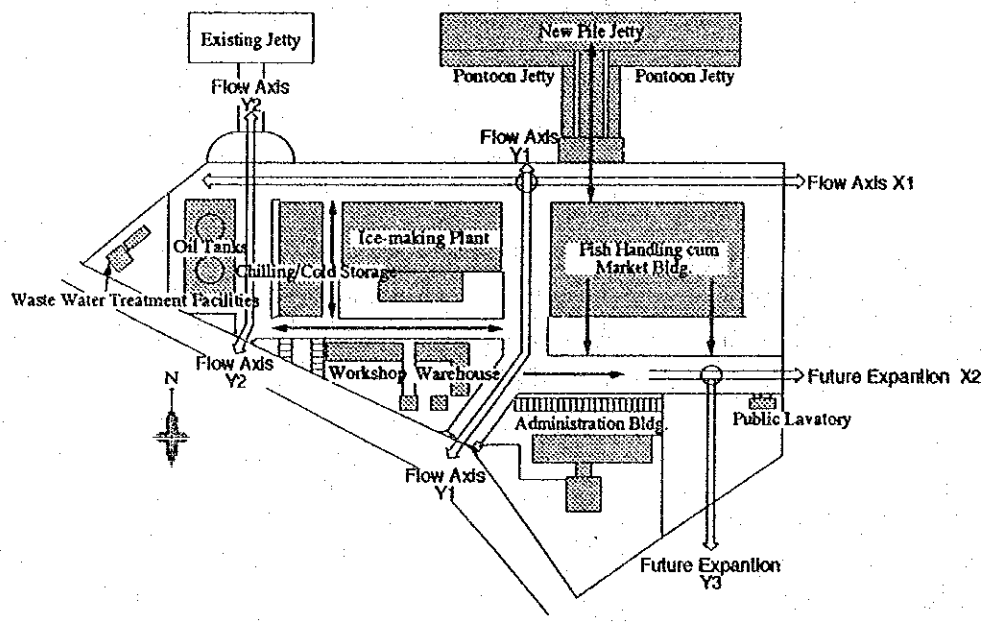


Figure 3.3.2 Layout Plan

3.3.2 Coastal Civil Engineering Facilities Plan :

1) Landing Facilities :

A) Principal particulars of target user vessels

The requisite size of the landing jetty has been calculated on the basis of the capacity of the user vessels under this Project. The principal particulars and operating patterns of the target vessels are shown in Table 2.3.1.

B) Estimate of Required Length :

A landing jetty of reinforced concrete, using pile construction, is almost being completed at the Project site, with a design width of 20m, a design length of 50m, and a design water depth of -6.5m at the jetty. The Project assumes that the number of user fishing vessels per day will include 1 large offshore, 12 large coastal, and 24 small coastal vessels, and the required length has been calculated on this basis. Inasmuch as the large offshore vessels will use the jetty now under construction, they will not be included in the new jetty plan.

The required jetty lengths have been calculated on the basis of the following formula :

Jetty length = N / r x L

where, N ; Standard number of fishing boats per day

r ; Number of rotation of the berth

= Hours allowed for fish landings / Fish landing hours hours per vessel

L ; Berth length = vessel length + surplus (at 10% of vessel length)

(1) In the case of large offshore vessels (using the existing jetty):

N ; Standard number of fishing boats per day = 1

r ; Number of rotation of the berth

= Hours allowed for fish landings / Fish landing hours hours per vessel

= 12 hours / 12 hours = 1.0 berthing operation

L ; Berth length = vessel length + surplus = (30 ~ 35) + (3 ~ 3.5)= 33.0 ~ 38.5 m

The jetty length required by the large offshore fishing vessel becomes:

Total jetty length = N / r x L = 1 / 1.0 x (33.0 ~ 38.5)m = 33 ~ 38.5 m

Based on the above, the required berthing length will be 33.0 ~ 38.5 m. Since the berthing length of the jetty under construction will be 50 m, this will be adequate.

(2) In the case of large coastal fishing vessels (using the new jetty):

N ; Standard number of fishing boats per day = 12

r ; Number of rotation of the berth

= Hours allowed for fish landings / Fish landing hours hours per vessel

= 12 hours / 7 hours = 1.7 berthing operations

L ; Berth length = vessel length + surplus = (15 ~ 18) + (1.5 ~ 1.8) = 16.5 ~ 19.8 m

The jetty length required by the large coastal vessels becomes:

Total jetty length= N / r x L= 12 / 1.7x (16.5 ~ 19.8) m=116.5~139.8 m

(3) In the case of small wooden coastal fishing vessels (using the new jetty):

N ; Standard number of fishing boats per day = 24

r ; Number of rotation of the berth

= Hours allowed for fish landings / Fish landing hours hours per vessel

= 12.0 hours / 4.0 hours = 3.0 berthing operations

L ; Berth length = vessel length + surplus = (7~11) + (0.7 ~ 1.1) = 7.7 ~ 12.1 m

The jetty length required by the small coastal vessels becomes:

Total jetty length = N / r x L = 24 /3.0 x (7.7 ~ 12.1)m = 61.6 ~ 96.8 m

The required jetty lengths, as derived above, are summarized in the following table.

Table 3.3.1 Required Jetty Lengths

	Range Smallest Largest	Applied Value	
Jetty for offshore fishing vessels	33.0 ~ 38.5 m	50.0 m	using existing jetty
Jetty for large coastal fishing boats	116.5 ~ 139.8 m	120.0 m	new construction
Jetty for small coastal fishing boats	61.6 ~ 96.8 m	100.0 m	new construction
Total	211.1 ~ 275.1 m	270.0 m	

Accordingly, the jetty usage pattern under this Project will be as follows :

1) Large offshore vessels : to use existing jetty
2) Large coastal vessels : to use the new main jetty
3) Small coastal vessels : to use the new pontoon jetties

Following chart shows usage pattern under this Project.

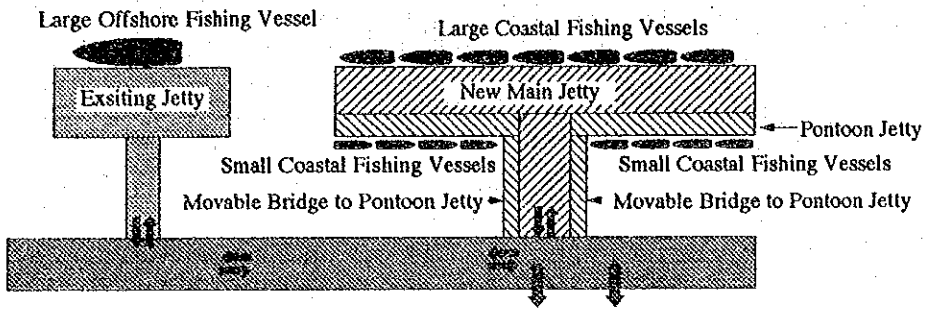


Figure 3.3.3 Usage Pattern of Landing Jetties

C) Structural Type for the Landing Jetties:

In this section, the various structural methods and facility types for the landing jetties will be evaluated with respect to the jetty size and functions, as outlined in the previous section.

(1) Jetty for large offshore vessels (existing jetty)

As already noted, a reinforced concrete landing jetty is presently under construction in the Project area with a 20m W x 50m L and a water depth of -6.5m. As of the time of our field survey (July, 1994), construction had not yet been completed on the final 20m portion of slabs on the downstream side. It has been confirmed that SOWESFOOD will complete the construction work by the end of 1994. Fenders, bollards, and incidental facilities, such as water, fuel, and power supply had not yet been installed, though, those incidental facilities are to be provided as part of this Project.

(2) Jetty for Large Coastal Vessels (new construction) :

The principal particulars for the large coastal vessels utilizing the new jetty are as shown in Table 2.3.1., " Principal Particulars and Operating Patterns of Project Target Vessels ". The largest vessel using the Plan jetty will presumably be the oil tankers, which will call about once a month to deliver marine fuel to the oil tanks.

In this project, therefore, assuming that the water depth in front of the new jetty will be the same as that in the channel (-6.5 m), the maximum size of vessel expected to tie up at this jetty will be oil tankers of the 3,000 DWT class, which are capable of negotiating this depth and mooring at the jetty. Following are the standard principal particulars for an oil tanker of this class :

Table 3.3.2 Principal Particulars for 3,000 DWT Oil Tanker

Length overall	88.0 m
Breadth(Mold)	13.8 m
Depth (Mold)	6.5 m
Full Load Draft	5.6 m

< Water Depth and Crown Height >

The design depth in front of the new jetty will be set at -6.5m, the depth required for the above 3,000 DWT oil tanker, which will have the largest full load draft among the prospective user vessels, including a reserve depth of 0.9 m.

According to the fishing port design standards used in Japan, crown height is set by adding the values shown in the following chart to the average M.H.W.L.

In the case of the subject Plan, based on H.W.L.=C.D.L.+3.65m, L.W.L.=C.D.L.+0.38m, crown height would become C.D.L.+4.05 m. However, since H.H.W.L. is C.D.L.+4.39m, considering the fact that the crown height cannot be less than this value along with the particulars of the target vessels in the area, the crown height for the Plan jetty has been set at C.D.L.+4.80m, the same as that of the neighboring jetty.

Table 3.3.3 Standard Crown Height Values for Mooring Bank

Size of Target Fishing Vessel:	Tidal Range = 3.2 ~ 3.4 m 3.26 m in the subject Plan {=H.W.L.(3.65) - L.W.L.(0.38)}
20 ~ 150 G.T.	0.4 m
150 ~ 500 G.T.	0.6 m

(Source: Standard Design Method for Fishing Port Facilities, Japan National Fishing Port Association)

< Apron Width >

The apron at this jetty will be used both to unload catches from large coastal vessels and as an outfitting area. The apron must, therefore, be wide enough to allow adequate space for loading and unloading, temporary storage, handling operations, and a transportation corridor. In Japan, the standard values shown in the following table are used to set apron width.

In the subject Plan, as noted above, the apron area is to accommodate both catch landings and outfitting. In addition, landing cranes will be provided to improve the

efficiency of loading and unloading operations, while hand carts will be used to move catches to the handing area and ice-making facilities.

Furthermore, landing operations at virtually all of the existing facilities in the area are heavily based on manual labor. Thus, given the mixture of mechanized and manual operations on the new jetty, it will be necessary, from a safety standpoint, to provide a reserve margin in the apron width. Accordingly, the overall apron width for the Plan jetty has been set at 15 m.

Table 3.3.4 Standard Apron Widths for Mooring Banks

Jetty Classifications		Apron Width
Fish landing jetty	when the entire fish catches are instantly carried in a building	3.0 m
	when the catches are carried away directly from the apron to outer area	10.0 m
Jetty for outfitting		10.0 m
Jetty for idle berthing		6.0 m

(Source: Standard Design Method for Fishing Port Facilities, Japan National Fishing Port Association)

< Substructure >

The principal structural types for jetty construction may classified into gravity, sheet pile, pile, and pontoon. Almost all jetties along the Saigon River and in the vicinity of the Project site use either the pile or pontoon method. The existing jetty also uses a pile structure, and it has been determined that, from the standpoint of preventing adverse environmental impact, such as altering river currents in the surrounding area, siltation, or drift sand, no particular problems would be encountered by selecting this pile type.

< Comparative Analysis of Pile Materials >

The substructure of the existing jetty is combination piles of reinforced concrete construction (40cm squares), hereafter called RC squared piles. Since the RC squares are fabricated locally, this is the popular construction method used in Vietnam.

In evaluating the possible substructure types, as discussed in the preceding section, when using RC squared piles, it will be necessary to use a diagonal pile structure, as in the existing jetty, so as to prevent the development of bending moments in the pile heads. When designing a substructure with RC squared piles, not only will a large number of piles have to be used, but the structural work also becomes complex in terms of joining the superstructure and pile heads, requiring quality control of the highest order. In our judgment, therefore, it would be preferable to adopt a simpler structure in fieldwork.

Comparing the anti-corrosion properties of the RC squared and steel pipe piles, a major

corrosion problem is encountered with steel piles in sea and brackish water. RC squared piles, on the other hand, require high quality control and accuracy management during construction, are prone to a grave safety hazard after completion as a result of a rapid deterioration in strength caused by corrosion in the reinforcements if it were damaged upon piling impact.

Comparing the two alternatives, when priority is placed on long-term safety, in the case of steel piles, almost complete durability can be imparted by anti-corrosion treatment and preventive insulation, but the benefits of RC squared piles may be offset by major danger, based on poor quality control in situ and rough usage, if any, after the jetty goes into service.

Based on the above considerations, we plan to employ the upright pile system, using steel pipe piles that will be applied heavy duty anti-corrosion treatment.

(3) Jetty for Small Coastal Vessels (new construction):

The principal particulars for the small coastal vessels utilizing the new jetty are as shown in Table 2.3.1: "Principal Particulars and Operating Patterns of Project Target Vessels".

The crown height for the pile jetty used in this plan will be C.D.L.+4.8m, but this will not be practical for landing catches from small boats at low tide, when the height difference between crown and freeboard will reach about 3 m. Thus, some way must be found to overcome this problem.

When tide conditions at the Project site handicap loading and unloading operations, a possible structural solution would be either a pontoon or concrete stairs on the jetty. Comparing the two alternatives, with a pontoon jetty, loading and unloading can be accomplished at a uniform level of efficiency without concern over tidal levels, making this type extremely efficient, whereas, with stairs on the jetty, unloading efficiency will not be as high under certain tidal conditions. In this Project, 192 small coastal vessels are expected to use the facility but, in point of fact, a much larger number of small fishing boats will be operating in the vicinity of the Project site. In order, therefore, to maximize vessel use of the Project facilities, efficient jetty utilization is a prime requisite. Accordingly, it is planned that the jetty for small vessels will use a pontoon jetty as the structural type, set behind the pile jetty used by the large coastal boats.

< Water Depth and Crown Height >

Full load draft of the small coastal boats using the jetty will not exceed 1.2m, while the standard draft for a pontoon jetty will range from 0.6 ~ 1.4m, depending on whether it is made of steel or concrete. Figuring on a 1.2m draft at full load for the small coastal fishing

boats, the required water depth, including reserve depth, has been set at 2 m.

Since the freeboard of the target vessels will vary from 0.4 ~ 0.8m, the crown height will, accordingly, be set at 0.6m.

< Required Width of the Pontoon Jetty >

The apron on the pontoon jetty will be used for both fish landing operations and outfitting for fishing by the small coastal boats. The width for this purpose must be established by taking into account the space required for loading and unloading operations, fish handling, and a transport corridor.

Among the activities to be performed on the jetty apron, those consuming the largest areas will be the fish landing and ice loading operations. It is planned to conduct these operations with a 1-ton forklift and small box pallets.

Based on the above factors, the width composition of the apron by type of activity may be planned as follows.

Table 3.3.5 Width Composition of Working Area on Apron

	Required Width	Remarks
Loading/unloading space	1.0 m	
Rotating radius for forklift operations (1 ton unit)	3.6 m	when using box pallets
Reserve width	0.4 m	
Passageway for workers	1.0 m	
Total	6.0 m	

Accordingly, the apron width for the pontoon jetty serving the small coastal boats has been set at 6.0m.

< Choice of Structural System >

The structural system for a pontoon jetties of this size may be broadly classified into two types, concrete or steel, depending on the material used. There is also a hybrid system blending the two types. In our view, the most vital considerations in determining the structural type for this Project are corrosion resistance and quality control during construction on site.

With regard to corrosion, as discussed in the previous section while comparing steel and RC squared piles, based on a thick application of an anti-corrosion agent and heavy duty anti-corrosion insulation, a maintenance plan can be prepared predicated on an almost definitive useful life. There is, accordingly, no reason for the steel materials to be considered inferior to concrete on this count.

The Project is to have the pontoon jetties built locally. In this case, from the standpoint of quality control, since a broad range of materials, including temporary facilities, must be used for a concrete structure, it will present problems in connection with materials, quality, and construction controls.

Furthermore, since quality control will have a direct, long-term impact on durability, we have decided that, from an overall standpoint, a steel structure will be both safe and highly reliable. Accordingly, a steel structure has been selected for this Project. The following table presents a comparative evaluation of the three structural types, based on the materials employed.

Table 3.3.6 Structural Options for the Pontoon Jetty

Conditions	Concrete Structure	Steel Structure	Hybrid Structure
Natural Conditions: (1) Wave resistance	○	△	○
Usage Conditions: (1) Vessel impact resistance (2) Ease of unloading (3) Maintenance (4) Anti-corrosion properties	 × ○ ○ ○	 ○ ○ △ △	 △ ○ ○ ○
Construction Conditions: (1) Availability of local materials (2) Availability of local labor force (3) Temporary construction (4) Quality / accuracy control	 ○ △ △ △	 ○ ○ ○ ○	 △ △ △ ×
STRUCTURE SELECTED		◎	

○ : Suitable, easy to use △ : Some consideration required × : Unsuitable, difficult to use

2) Shore Protection :

The Project site stretches along the Dinh River, which is 500m wide at this point. From the standpoint of silting and erosion, we understand that the Project area is subject to erosion, while the opposite bank has a tendency to silt.

However, so far as we could determine from our observation of structures along the river bank in the Project vicinity, the erosive tendency was not found to be so great; consequently, if a gentle traverse slope is maintained from the shore line to the center of the river, no major erosion is expected to develop on the shore line.

However, since, in this Project, the pontoon jetty for small coastal vessels is to be placed to the rear of the pile jetty, dredging will have to be done along the shore line. But in order to secure a depth area sufficiently large to avoid impairing the movement of small fishing vessels, it

is essential that an embankment be constructed along the apron at the bank line of the Project area so as to preserve the present natural gradient to the maximum possible degree. The protection method used in this Project will involve concrete pilings, as generally used in the area, with concrete slabs, making retaining wall at face of slope. The bank reinforcement in front of the concrete pile and slab structure embankment will be given stone reinforcement, as generally used locally. The gradient will be made as gentle as possible so as to alleviate any effect from a change in river currents.

3) Dredging Plan :

As already noted, the largest target vessels to use the new jetty will be 3,000 DWT oil tankers. To moor these tankers, a 6.5m depth will be required in front of the jetty facility.

Even when the pontoon jetty is installed behind the pile jetty for use by small coastal fishing boats, the minimum depth requirement will be 2 m. It will, therefore, be necessary to dredge to the required depth in front of the Project area.

There are several port facilities along the Dinh River upstream from the Project area. Based on interviews with the Vung Tau Port Authority and other port administrators, dredging of vessel channels to maintain prescribed channel depths is undertaken every 5-7 years by the Ministry of Transport and Ba Ria-Vung Tau Province. However, dredging of the entry channels from the main channel to the port facilities must be carried out by the individual port administrators. Actual measurements of siltation action at the Project site were not available but, based on our discussions, the annual siltation volume in the Project vicinity can be estimated at about 50mm/year.

Thanks to maintenance dredging every 5-7 years of both the main and entrance channels at existing ports in the Project area, no channel blockages have occurred to date from siltation. At all jetties and coastal facilities, dredging is undertaken, as required, in a strenuous effort to maintain vessel channels and in-port water depths.

Personnel at the various facilities are well versed in importance of carrying out maintenance dredging operations, and so no major problems have arisen in this respect in terms of facility management. In the case of both the commercial port adjacent to the Project site as well as the naval base 1.2 km upstream, dredging was conducted only once during jetty construction, and there has been no subsequent need for any maintenance dredging.

In this Project, we have designed a dredging plan to secure the proper water area and depth required for smooth operations by vessels using the Project facilities. After completion of the facilities, however, responsibility for maintenance dredging operations by the Vung Tau Fishing Port Authority should be carefully delineated and adhered to on the basis of discussions among related government agencies, including SOWESFOOD. It is quite essential for Vung Tau Fishing

Port authority to survey sounding in the port area every year for confirming the actual situation of siltation, and whenever necessary, to make maintenance dredging.

The dredging plan is outlined below:

Sea bed soil	: soft silty clay (with an N value not over 5)
Project dredging volume	: approximately 110,000 cu.m
Dredging method	: Grab dredging from a platform vessel
Disposal of dredged sand	: a disposal area about 12 km downstream from the Project site
Preventive measures for water pollution	: Dredging area is to be enclosed by a silt screen
Dredging area	: as shown in the following chart

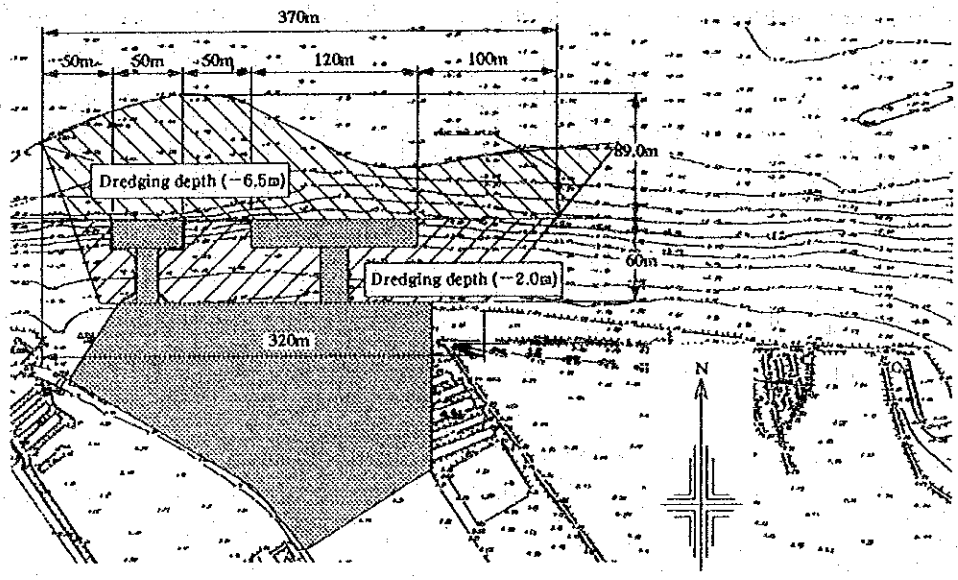


Figure 3.3.4 Dredging Plan

3.3.3 Construction Facility Plan:

1) Plan:

The construction facilities under the Project comprise the following:

A) Ice-making plant (ice-making room, ice storage,other)

B) Fish Handling cum Market Building (incl. rest space for fishermen and brokers)

C) Chilling and Cold Storage (incl. processing space, cold storage, chilling storage, quick freezer, and locker room)

D) Workshop

E) Administration building

F) Warehouse

G) Common facilities

H) Exterior facilities

As we see in Table 2.3.1, landing volume in this Project Facilities Use are shown below.

Table 3.3.7 Annual and Daily Landing Volume

	Offshore Vessels	Coastal Large Boats	Coastal Small Boats
Total Number of Boats	8	156	192
Max. Landing Volume per boat	65 ton	12.5 ton	1.0 ton
Max. Landing Volume pre day	65 ton	150 ton	24 ton
Total Landing Volume	13,520 ton	54,600 ton	8,640 ton

A) Ice-making plant

(1) Calculation of ice volume

a) Daily ice requirements

Ice demand at the fishing port may be broadly divided into two categories: ice for keeping fish fresh onboard fishing vessels and ice used by brokers in connection with fresh fish transportation. In the Vung Tau Project area, even excluding the Project facilities, as of the end of June, 1994, 57 ice-making plants were operating, with a combined daily production capacity of 2,240.9 tons. The construction of an ice-making plant in the Project Facility has considerable significance in terms of improving operating efficiency of the fishing fleet. However, since the fish brokers can, as in the past, purchase ice from local ice-making plants for their packing and shipping operations at the Project facility, no direct provision has been made in the design conditions for their shipping requirements. Should, however, any surplus develop in ice supplies after meeting vessel needs, this can be diverted to broker for fish transportation.

The rule of thumb is to set the ratio of vessel ice requirements to catch volume at 1:1. During the field survey, we did indeed find the target vessels carrying an ice load roughly equivalent to catch volume (Catch volume :Ice volume = 1:1); using this same relationship, maximum daily ice requirements may be calculated as shown in the following table.

Table 3.3.8 Maximum Daily Ice Requirements

Target Vessels	Per-vessel Ice Demand (tons/day)	No. of User Vessels per Day	Daily Ice Demand (tons/day)	Remarks
Offshore	65.0	1	65	
Large coastal	12.5	12	150	
Small coastal	1.0	24	24	
Total			239 *	* (maximum daily ice volume to be delivered)

b) Annual Ice Requirements:

Ice-making operations do not attempt to match production and delivery on a daily basis. Rather, the ice produced in a certain period of time is stored in an ice storage, with output and delivery then adjusted to an average of maximum and minimum daily usage. For the Project facility, ice requirements have been estimated on an annual basis, keyed to the operating cycles of the user vessels, expressed in terms of the number of trips per year.

Table 3.3.9 Vessel Operating Cycles and Annual Trips, by Class of Fishing Vessel

Target Vessels	Daily Ice Demand (tons/day)	No. of Trips per Year	Annual Ice Demand (tons/year)
Offshore	65.0	8 vessels x 26 trips/year = 208 trips	13,520
Large coastal	12.5	156 vessels x 28 trips/year = 4,368 trips	54,600
Small coastal	1.0	192 vessels x 45 trips/year = 8,640 trips	8,640
Total			76,760

c) Capacity of the Ice-making Plant:

Annual ice requirements for the Project facility will be as shown above. The capacity of the ice-making plant, based on average production over 357 operating days per year (365 days less 8 national holidays or maintenance) may be calculated on the following basis:

76,760 tons/day ÷ 357 days = 215 tons/day

Since an ice storage facility will also be built, the shortfall of 15 tons per day (= 215 - 200 tons/day) can presumably be covered out of ice storage. Accordingly, in this Project

50 tons/day/unit x 4 units = 200 tons/day.

The above daily production volume would comprise less than 10% of total ice production capacity in the Project vicinity and so will not, in our judgment, have a major impact on the

supply / demand balance in the Vung Tau area.

The capacity of the ice storage unit has been set at 5 days' production, allowing for equipment breakdowns and maintenance and the possibility of several large vessels entering port simultaneously. Thus,

200 tons/day x 5 days = 1,000 tons

(2) Room Composition and Size

The ice-making plant at the Project facilities will comprise an ice-making facility (200 tons/day) and ice storage (1,000 tons), as calculated in the previous section plus a machine room, storage, and locker room.

a) Size of Production Facility

The 3 main forms of ice production at a typical fishing port are block ice, plate ice, and flake ice. At this facility, however, daily production will be large (200 tons) and , considering the number of trips and operating and distribution patterns among local fishing vessels, we have decided to use block ice, which will be convenient to store.

The equipment used to make block ice in ice cans and a low-temperature brine tank. Sizes cover a wide range, from 11 - 135 kg block, while production time varies from 12 to 48 hours. At the Project facility, production is to be exclusively in 50 kg blocks, with a production cycle of 20 - 24 hours.

The width of an ice-making tank is determined on the basis of the ice can arrangement (4 - 15 cans). Length is set at 2 - 3 times width, which is considered the most economical range in terms of brine convection and equipment performance. The dimensions of an ice-making tank with a capacity of 50 tons/day/unit will vary considerably, depending on the specific ice can arrangement, and so must be determined with respect to site configuration, relationship to other facilities, and building structure. For purposes of this Project, we have decided to specify 4 ice-making tanks, each with a production capacity of 50 tons/day and an ice arrangement of 12 x 42 rows x 2 units.

The tank dimensions, based on the above considerations, will be as shown in the following chart.