REPORT

ON

THE NAVOTAS FISHING PORT CONSTRUCTION PROJECT

IN

THE REPUBLIC OF THE PHILIPPINES

1963

JAPANESE SURVEY TEAM

DISPATCHED BY

OVERSEAS TECHNICAL COOPERATION AGENCY OF JAPAN

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Report on the Navotas Fishing Port Construction Project

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Page	Line	Correct	for	to
1	2	"	Conditions and ---	1. Conditions and ---
4	4	"	population increase	population will increase
5	17	"	productive method	productive methods
7	22	"	of Berth	of berth
8	15	"	$\frac{60 \times 6}{14} = 2.6$ vessels	$\frac{60 \times 6}{14} = 26$ vessels
8	16	Insert	Required number of berth is : $\frac{140}{26} = 5$ berth	
8	26	Correct	for	to
		"	40 x 20 = 80 vessels	40 x 2 = 80 vessels
9	16	"	Required quaywall length	Required length
9	last	"	$\frac{24}{5.3} = 9$ berth	$\frac{48}{5.3} = 9$ berth
11	19	"	$430 \times \frac{3}{2} = 2,000^{m}$	$430 \times \frac{2}{3} = 2,000^{m}$
11	22	"	$750 \times \frac{2}{3} - 3,600^{m}$	$750 \times \frac{2}{3} = 3,600^{m}$
12	13	Erase	for outgoing fishing vessels	
12	31	Correct	for	to
		"	53,200 = 180,000 tons	53,200 = 180,150 tons
13	24	"	Required for	Required space for
14	4	"	Ship yard	Shipyard
15	5	"	100 x 8 = 800M	100 x 8 = 800^{m}
17	9	"	Fishlanding quaywall	Fish landing quaywall
21	9-11	"	860,000 742,000	860,000 742,000
				1,602,000

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Foreword

The report is hereby presented on the results of the basic survey on the Navotas Fishing Port Construction Project by the Japanese Survey Team, dispatched by Overseas Technical Cooperation Agency of Japan in compliance with the request of the Government of the Republic of the Philippines. Prior to the presentation of the report discussion has been held on the results of the survey between the officials concerned in the Government of the Philippines and the Team.

The Survey Team has been comprised of five fisheries specialists and engineers in the Fisheries Agency of the Ministry of Agriculture and Forestry headed by H. Kaiho with T. Fukuchi, H. Tanabe, T. Yamamoto and M. Sekiguchi. The Team left Japan for the Philippines on March 16, 1963. The survey has been carried out for three weeks on the basic matters for the port construction as well as on the various related data and information. The Team left Manila for Tokyo on 5 April.

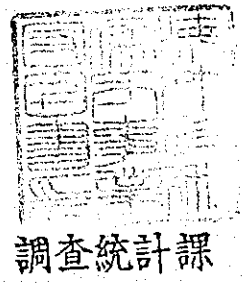
Each and every member of the Team feels that it an honor if this report serves in some measure to the construction of the Navotas Fishing Port, ultimately contributing to the long term fishing-industry-development program of the Philippines. The Team believes that the modern Navotas Fishing Port is a great possibility.

On behalf of the Team I wish to express our deepest gratitude to Dr. Arsenio N. Roldan Jr., Commissioner, Fisheries Commission, Mr. Gonzalo G. Ferrer, Technical Official, Fisheries Commission, and Mr. Leonardo Malabanan, Regional Director, Regional Office III, Fisheries Commission for their cooperation and guidance as well as for their warm hospitality, sometimes far beyond their call of duty. And without their assistance this survey has not been possible.

H. Kaiho
Chief of the Survey Team

Hisao Kaiho

Dated: July 4, 1963
Tokyo, Japan



C O N T E N T S

Chapter I. General description

Conditions and desires from the Government of the Philippines for the planning of the fishing port were:

(1) Principal hinterland of the proposed fishing port shall be Manila and Quezon and the surrounding districts thereof;

(2) Fishing vessels which will operate from the proposed fishing port shall be both large and small types, large type, operating all over the Philippines territories and small type, operating in the coastal water;

(3) Coast line for the distance of 6 km from the mouth of the Vitas River to the mouth of the Navotas River, 1900 m off shore should be reclaimed for the port construction;

(4) By the above reclamation 950 ha is created;

(5) The reclamation should be so carried out leaving the existing channel as it is so that fishing vessels now operating from the said channel can continue to operate;

(6) The port shall be so constructed as to be the base of operation for all fishing vessels;

(7) Oil, water and ice supplying facilities for all types of fishing vessel shall be planned;

(8) Public Cold Storages shall be constructed near fish landing place;

(9) 7,400 one-storied fishermen's houses shall be constructed. Lot size for each house shall be 180 m^2;

(10) Fisheries commission office building shall be constructed, facilitating the checking and control of fish unloading;

(11) Besides above the following attached facilities are to be constructed:

Fishing vessel repair shop;
Hospital;
School;
Training centers for both of fisheries on tidal and on non-tidal waters;
Fish market;
Aquarium;
Recreation center;
Theater;
Church;
Grocery store;
Drug store;
Hotel;
Fish processing plant;
Fishing gear drying ground.

2. Opinion and Plans by the Team.

The Survey Team has fully adapted the conditions of the Philippines Government and incorporated the desires of the said Government as much as possible in their fishing port construction design.

(1) The design makes it possible for all the fishing vessels to land their fish catch directly on dock;

(2) Shed provided with sufficient space for sorting, weighing, buying and selling of fish catch. Shed shall be of concrete flooring to be kept clean by washing with water;

(3) Facilities fully capable of supplying needed ice for fresh fish transportation;

(4) Cold storages fully capable to insure the adjustment of price, demand and supply of fish and to preserve the freshness of fish;

(5) Facilities to quick supply ice, fuel oil and water to fishing vessels;

(6) Individual and separate facility for fish landing, fuel feed, water supply and mooring;

(7) 4 m and 1 m water depths shall be planned for the large and small types of fishing vessel respectively;

(8) Wide area shall be secured at first to meet the possible need in future. At first least necessary facilities shall be constructed and enlargement can be made in accordance with requirement in future;

(9) Plan shall consist of facilities enabling the repair of fishing vessels, the purchase and repair of ship's fittings and fishing gears;

(10) Plan shall make it possible for the fishing vessels to utilize the present sea coast and the Navotas River as the base of operations;

(11) Plan shall take into account the possibility of cooperative works and undertaking by the organizations such as fisheries cooperative;

(12) Considerations shall be given to be in harmony with the expansion project of the commercial port of Manila.

Chapter II. Object of Plan

1. General description.

The proposed fishing port construction shall be completed in two 5-years plans. First 5-years plan to be launched in 1964 and second in 1969.

2. Hinterland.

Following districts are considered as the prospective hinterlands of the Port.

	(Population in 1960)
Manila	1, 145, 723
Malabon	76, 689
Navotas	49, 828
Caloocan City	142, 771
Las Piñas	16, 097
Mandalyong	79, 654
Paranaque	62, 030
Munting lupa	not clear
Angano	7, 112
Antipolo	22, 052
Makati	114, 418
Montalban	9, 655
Morong	13, 743
Cainta	6, 814
Baras	4, 434
Binangonan	31, 449
Cardona	12, 503
Jala jala	5, 267
Pasig	61, 899
Peteros	13, 211
Pililla	9, 068
San Juan Del Monte	57, 071
San Mateo	12, 029
Taguig	22, 002
Tanay	13, 641
Tay tay	21, 744
Teraza	4, 900
Pasay City	132, 173
Quezon	397, 374
Total	2, 609, 253

3. Consumers population

Population in the hinterland in 1960 was as follows;

Manila	1, 145, 723
Rizal province	1, 463, 530
Total	2, 609, 253

Assuming the annual population increase as 3 %, the above population will increase in 1968 after five years,

to 3, 305, 300

And the same population increase in 1973 after ten years,

to 3, 831, 800.

4. Estimated consumption.

Estimated consumption of marine products after five years in 1968 is:

26. 97 kg x 3, 305, 300 = 89, 100 tons

26. 97 kg is per capita fish consumption established by the National Research Food Council of the Philippines.

Estimated consumption after ten years in 1973 is:

155, 000 tons = 26. 97 kg x 3, 831, 800 x 1. 5

Assumption of 1. 5 times increase has been made due to the population concentration in urban district, expansion of the hinterland and per capita fish consumption increase.

Breakdown of the estimated fish consumption after five years in 1968

Fresh	(60 %)	89, 100	x	.6	=	53, 460 tons
Salted	(5 %)	89, 100	x	.05	=	4, 460 "
Dried	(5 %)	89, 100	x	.05	=	4, 460 "
Smoked	(5 %)	89, 100	x	.05	=	4, 460 "
Canned	(25 %)	89, 100	x	.05	=	22, 260 "

The same breakdown after 10 years in 1973

Fresh	(60 %)	155, 000	x	.6	=	93, 000 tons
Dried	(5 %)	155, 000	x	.05	=	7, 750 "
Salted	(5 %)	155, 000	x	.05	=	7, 750 "
Smoked	(5 %)	155, 000	x	.05	=	7, 750 "
Canned	(25 %)	155, 000	x	.25	=	38, 750 "

Percentages in ( ) are from the policy by the Government of the Philippines.

5. Production goal.

Production goal after five years in 1968 are:

Fresh	(100 %)	53, 460	x	1. 00	=	53, 460 tons
Dried	(100 %)	4, 460	x	1. 00	=	4, 460 "
Salted	(100 %)	4, 460	x	1. 00	=	4, 460 "
Smoked	(100 %)	4, 460	x	1. 00	=	4, 560 "
Canned	(10 %)	22, 260	x	0. 10	=	2, 226 "
Total						69, 066

Productive methods at the same year

Sea water	Otter trawl	(35 %)	69,066	x 0.35	=	24,200 tons
	Bag net	(32 %)	69,066	x 0.32	=	22,100 "
	Others	(20 %)	69,066	x 0.20	=	13,800 "
	Total					60,100 tons
Fish ponds		(13 %)	69,066	x 0.13	=	9,000 tons

Estimated from the Philippines' fisheries census.

Production goal after 10 years in 1973 are:

Fresh	(100 %)	93,000	x 1.00	=	93,000 tons
Dried	(100 %)	7,750	x 1.00	=	7,750 "
Salted	(100 %)	7,750	x 1.00	=	7,750 "
Smoked	(100 %)	7,750	x 1.00	=	7,750 "
Canned	(10 %)	38,750	x 0.10	=	3,875 "
Total					120,125 tons

Productive method at the same year

Sea water	Otter trawl	(35 %)	120,125	x 0.35	=	42,000 tons
	Bag net	(32 %)	120,125	x 0.32	=	38,400 "
	Others	(20 %)	120,125	x 0.20	=	24,000 "
	Total					104,400 tons
Fish ponds		(13 %)	120,125	x 0.13	=	15,600 tons

6. Fishing vessels

In order to compute the number of fishing vessels required to achieve the said production goal fish catch productivity of fishing vessel have been assumed as follows:

Large type of vessels (50 G/T on an average)

Bag net	100 tons/vessel/year
Otter trawl	150 tons/vessel/year
Others	200 tons/vessel/year

Small type of vessels

Banca	20 tons/vessel/year

* By studying the Philippines fisheries census productivity increase in fish catch by large type fishing vessels has been assumed.

Number of fishing vessels required to achieve the production goal after five years in 1968 is:

Bag net	$22,100 \div 100 = 220$	
Otter trawl	$24,200 \div 150 = 160$	
Others	$\frac{1}{200}\{13,800 - (20 \times 200)\} = 50$	
Total		430 vessels
Banca		200 vessels

Number of fishing vessels required to achieve the production goal after ten years in 1973:

Bag net	$38,400 \div 100 = 380$	
Otter trawl	$42,000 \div 150 = 280$	
Others	$\frac{1}{200}\{24,000 - (20 \times 300)\} = 90$	
Total		750 vessels
Banca		300 vessels

Chapter III. Facilities Planning

1. Fish landing quaywall.

* Berth required after five years in 1968.

(Berth for large type of vessels.)

If an average sailing frequency of a vessel per year is assumed as 20, the number of incoming vessels totals to:

$$430 \text{ vessels} \times 20 = 8,600 \text{ vessels}$$

The number of incoming vessels on an average per day is:

$$\frac{8,600}{365} = 24 \text{ vessels/day}$$

Upon the assumption that maximum number of incoming vessels a day is twice as many as the average number then,

$$24 \times 2 = 48 \text{ vessels/day}$$

Assuming an average cargo capacity of vessels as 10 tons and unloading of one ton of cargo as 10 minutes then time required for a vessel to unload is:

$$10 \text{ min.} \times 10 = 100 \text{ min.}$$

If fish catch unloading is to be carried out during the six hours period from 2 AM to 8 AM the number of vessels capable to unload fish catch at a dock a day is:

$$\frac{60 \times 6}{100} = 3.6 \text{ vessels}$$

Accordingly needed number of Berth:

for average number of incoming vessels: $\frac{24}{3.6} = 7$ berth

for the maximum number of incoming vessels: $\frac{48}{3.6} = 13$ berth

If berth number for maximum incoming vessels is adapted then some berth may become idle and if average incoming vessel is adapted then vessels have to wait. So mean value of the two is proposed:

$$\frac{7 + 13}{2} = 10 \text{ berth}$$

If a length of 30 m is assuemed for one berth then total length is:

Lighter's wharf $30^{m} \times 10 = 300^{m}$

(Berth for small type of fishing vessels.)

If an average sailing frequency of a vessel per year is assumed as 250 days, the number of incoming vessels totals to :

$$300 \text{ vessels} \times 250 = 50,000 \text{ vessels}$$

The number of incoming vessels on an average a day is:

$$\frac{50,000}{365} = 140 \text{ vessels/day}$$

Assuming an average cargo capacity of vessels as 0.2 ton and unloading of one ton of cargo as 70 minutes then time required for a vessel to unload is:

$$70^{\text{min.}} \times 0.2 = 14^{\text{min.}}$$

If fish catch unloading is to be carried out during six hours period from 2 AM to 8 AM., the number of vessels capable to unload fish catch at one berth a day is:

$$\frac{60 \times 6}{14} = 2.6 \text{ vessels}$$

If a length of a berth is assumed as 9 m, total length is:

$$9^{m} \times 5 = 45^{m}$$

No great fluctuation is expected in the number of small fishing vessels, so the above 45 m will be extended to 50 m.

* Required berth after ten years in 1973.

(Berth for large type of vessels.)

Using the same formula above:

Maximum number of incoming vessels is $750 \times 20 = 15,000$ vessels

An average number of incoming vessels a day is $\frac{15,000}{365} = 40$ vessels

Maximum number of incoming vessels a day is $40 \times 20 = 80$ vessels

Required berth for the average number of incoming vessels is:

$$\frac{40}{3.6} = 11 \text{ berth}$$

Required berth for the maximum number of incoming vessels is:

$$\frac{80}{3.6} = 22 \text{ berth}$$

Accordingly, the number of quaywall planned is:

$$\frac{11 + 22}{2} = 17 \text{ berth}$$

Therefore, a total length of quaywall to be planned is:

$$30^m \times 17 = 510^m$$

(Lighter's wharf for small type of vessels.)

Using the same formula used above:

Total number of incoming vessels is 300 x 250 = 75,000 vessels

An average number of incoming vessels a day is $\frac{75,000}{365} = 210$ vessels

Required number of berth is:

$$\frac{210}{26} = 8 \text{ berth}$$

Required quaywall length of wharf is: $9^m \times 8 = 72^m$

Total length taken is: 100^m

2. Ice supplying quaywall.

Increased scale after five years in 1968.

Assuming the number of vessels to operate from the Port as in the case of fish landing quaywall.

An average number a day is 24.

The maximum number a day is 48.

Assuming required hour of loading ice on board a vessel as 1.5 hours.

Working hour a day as 8 hours:

the number of vessels which can be loaded with ice at one dock a day is $\frac{8}{1.5} = 5.3$ vessels

Accordingly, the required berth is:

$\frac{24}{5.3}$ = 5 berth for average number of incoming vessels

$\frac{24}{5.3}$ = 9 berth for maximum number of incoming vessels

Mean value of the above two, which is 7 docks was adapted in the plan berth required.

$$\frac{5+9}{2} = 7 \text{ berth}$$

Assuming 30 m as a length of one berth a total length is:

$$30^m \times 7 = 210^m$$

Expanded scale after ten years in 1973.

Using the same formula above:

The number of vessels operating from the port:

40 vessels on the average a day

80 " maximum a day

Required number of berth,

for an average number of incoming vessels, $\frac{40}{5.3} = 8$ berth

for the maximum number of incoming vessels, $\frac{80}{5.3} = 15$ berth

Proposed number of berth:

$$\frac{8+15}{2} = 11 \text{ berth}$$

Length of the proposed quaywall:

$$30^m \times 11 = 330^m$$

3. Oil supplying quaywall.

Required length after five years in 1968.

Applying the same formula used heretofore the number of vessels to supply at oil supplying quaywall as:

24 ships a day on an average,
48 ships a day at the maximum

Assuming the hours required to supply an oil to a vessel as 1.5 hours. And working hours a day as 8 hours.

Required length of quaywall is 210^m same as ice supplying quaywall.

If half of the vessels are to be supplied from oil tanker while moored at mooring quaywall, then the required length will be only:

$$210^m \times 1/2 = 105^m$$

Required quaywall after ten years in 1973.

Applying the same formula used heretofore the number of fishing vessels which will use a quaywall is assumed as:

on average a day	40 ships
at the maximum a day	80 ships

Required quaywall length for the above is:

$$330 \ m$$

And if half of the vessels are to be supplied from oil tanker, quaywall length is:

$$330 \ m \times \frac{1}{2} = 165 \ m$$

4. Mooring quaywall.

In general, mooring quaywall should accommodate all vessels. However, some vessels are always away from the port for large vessels 2/3 of the total number are to be tied up at mooring quaywall and for small vessels mooring quaywall is provided for all vessels. Vessels are to be moored perpendicular to quaywall and quaywall length is:

7.15 m for large vessel and
3 m for small vessel

Required quaywall after five years in 1968 is:

for large vessel, $7.15 \ m \times 430 \times \frac{3}{2} - 2,000 \ m$ and

for small vessel, $3 \ m \times 200 = 600 \ m$

Required quaywall after ten years in 1973 is:

for large vessel, $7.15 \ m \times 750 \times \frac{2}{3} - 3,600 \ m$ and

for small vessel, $3 \ m \times 300 = 900 \ m$

5. Moorage

If a moorage for a vessel is assumed as:

for large type of vessel	280 m^2
for small type of vessel	40 m^2

Need mooring area after five years in 1968 is:

for large vessel	280 m^2	x 430	=	120,400 m^2
for small vessel	40	x 200	=	8,000
Total				128,400 m^2

Needed mooring area after ten years in 1973 is:

for large vessel	280 m^2	x	750	=	210,000 m^2
for small vessel	40	x	300	=	12,000
Total					222,000 m^2

Whereas mooring quaywall was planned for only 2/3 of the large vessels moorage has been planned for all vessels because in case of quaywall shortage vessels can be moored in double rows but moorage should accommodate all vessels.

6. Ice plant.

Ice requirement is assumed as:

for transportation of one ton of fresh fish 1 ton
for cold storage of one ton of fresh fish 2 tons
for outgoing fishing vessel

for outgoing fishing vessel	Otter trawl	1 ton/one ton fish
	Bag net	1 ton/one ton fish
	Others	0.5 ton/one ton fish

Ice requirement after five years in 1968 is:

for transportation of fresh fish

$$1 \text{ ton} \times 60,100 = 60,100 \text{ tons}$$

for cold storage of fresh fish

$\frac{1}{3}$ of fresh fish and assuming all materials for processing are to be stored.

$$2 \text{ tons} \times \left(\frac{53,460}{3} + 4,460 + 4,460 + 4,460 + 2,226\right)$$

$$= 66,850 \text{ tons}$$

for outgoing fishing vessels,

Otter trawl	1 ton	x	24,200	=	24,200 tons
Bag net	1	x	22,100	=	22,100
Others	0.5	x	13,800	=	6,900
Total					53,200 tons

Grand total is; 60,100 + 66,850 + 53,200 = 180,000 tons

Average requirement per day is $\frac{180,150}{365}$ = 500 tons

Required space for the ice plant is 9,500 m^2

Ice requirement after ten years in 1973.

for transportation of fresh fish,

$$1 \text{ ton} \times 104,400 = 104,400 \text{ tons}$$

for cold storage of fresh fish,

$$2 \text{ tons} \times \left(\frac{93,000}{3} + 7,750 + 7,750 + 7,750 + 3,875\right)$$

$$= 116,250 \text{ tons}$$

for outgoing fishing vessels

Otter trawl	1 ton	x 42,000	= 42,000	tons
Bag net	1	x 38,400	= 38,400	
Others	0.5	x 24,000	= 12,000	
Total			92,400	tons

Grand total in 104,400 + 116,250 + 92,400 = 313,050 tons

Average requirement per day is $\frac{313,050}{365}$ = 860 tons

Required space for the facilities is 16,000 m^2

7. Cold storage and icehouse.

Cold storage capacity shall be seven times that of a daily average amount of fish handled and storing capacity of ice ten times of a daily production capacity.

Required capacity after five years in 1968.

Fresh fish	$\frac{60,100}{365}$ x 7	= 1,200	tons
Ice	500 tons x 10	= 5,000	
Total		6,200	tons

Required for facilities, 10,000 m^2

Required capacity after ten years in 1973.

Fresh fish	$\frac{104,400}{365}$ x 7	= 2,000	tons
Ice	860 tons x 10	= 8,600	
Total		10,600	tons

Required space for facilities 17,000 m^2

8. Shipyard and fishing vessel repair facilities.

Each shipyard shall be equiped with the following installation and lot requirement per ship yard shall be 100 m by 150 m.

Slip way ---------- five lanes, $70^m \times 10^m$
Fitting-out quaywall ---------- 50^m
Winch
Machine shop
Wood-working shop
Sawmill
Raw material storehouse
Office and design room
Mold loft
Storehouse
Lodgings
Power room
} ---------- $11,500^{m^2}$

Required facilities after five years in 1968.

Assuming that each vessel is to be regularly checked every two years, the number of vessels for checking per year is:

$$430 \times \frac{1}{2} = 215 \text{ vessels}$$

Assuming required period for regular check per vessel as one month and shipyard working period per year as 10 months then 10 vessels can be checked in one slip way and as there are 5 slip ways, number of vessels which can be checked per shipyard per year is:

$$10 \times 5 = 50 \text{ vessels}$$

Required number of shipyard for periodical check is:

$$\frac{215}{50} = 4 \text{ places}$$

Assuming would-be-newly-constructed fishing vessels as 10 % of the existing vessels.

$$430 \times 0.1 = 43 \text{ vessels}$$

Required time for construction is assumed as:

up to launching	4 months
for fitting-out	2 months
Total	6 months (approximate)

Therefore 10 vessels can be constructed at one shipyard required number of shipyards for the construction of new vessels is:

$$\frac{43}{10} = 4 \text{ places.}$$

Total is; 4 + 4 = 8 places

Total required length 100 x 8 = 800 M

Required scale after ten years in 1973 using the same formula as above:

number of fishing vessels need to be checked is:

$$750 \times \frac{1}{2} = 375 \text{ vessels}$$

number of shipyards necessary for periodical check is:

$$\frac{375}{50} = 8 \text{ places}$$

number of shipyard for new vessel construction is:

$$750 \times 0.1 = 75 \text{ vessels}$$

Total is; 8 + 8 = 16 places

Total required length is $100^{m} \times 16 = 1,600^{m}$

9. Fishermen's house

Total number of houses to be built is: 7,400

Required lot size per house is: 180^{m^2}

Figures were supplied by the Government of the Philippines.

Total housing area:

$$180^{m^2} \times 7,400 = 1,332,000^{m^2}$$

Required lot for attached facilities is assumed as:

Road	20 %
Shops	5 %
School and church	15 %
Park and green belt	20 %
Total	60 %

Necessary Area for the lot:

$$1,332,000^{m^2} \times \frac{100}{100 - 60} = 3,330,000^{m^2}$$

10. Fisheries Commission building and training center.

Fisheries Commission building Training Center Fisheries Laboratory Aquarium	60,000 m^2

Figures supplied by the Government of the Philippines.

11. Ship's fittings and fishing gear stores and factories

Ship's fittings store:	4		
	Space for each	$20^m \times 30^m =$	$600\ m^2$
	Required area	$600^m \times 4^m =$	$2,400\ m^2$
Fishing gear store:	15		
	Space for each	$10^m \times 15^m =$	$150\ m^2$
	Required area	$150^m \times 15^m =$	$2,250\ m^2$
Electric appliance store:	2		
	Space for each	$10^m \times 15^m =$	$150\ m^2$
	Required area	$150^m \times 2^m =$	$300\ m^2$
Casting and forging shop:	1		
	Required area	$200^m \times 400^m =$	$80,000\ m^2$
Machine shop:	1		
	Required area	$100^m \times 100^m =$	$10,000\ m^2$
	Total		$94,950\ m^2$

12. Others.

Besides above following facilities are to be constructed:

Site for marine product processing shop
Hospital
Theater
Recreation center
Lodgings
Hall
Restaurant and store
Wireless station
Meteorological and signal stations
Office space for whole seller
Forwarding agent, garage and Van yard
Port inspection station

Chapter IV. Layout of Facilities

Each facility proposed under Chapter III has been arranged as per attached drawing.

Comparison of necessary facilities with those shown in the drawing is as follows;

Kind of Facility	Requirements in 1973	Plans arranged in the drawing
1. Mooring facilities		
Fishlanding quaywall (for large vessels)	510 m	550 m
" (for small vessels)	100 m	100 m
Ice supplying	330 m	350 m
Oil supplying	160 m	200 m
Resting (for large vessels)	3,600 m	3,600 m
" (for small vessels)	900 m	1,050 m
2. Anchorage	222,000 m²	288,000 m²
3. Ice plants and cold storages		
Ice plants	16,000 m²	15,600 m²
Cold storage	17,000 m²	17,250 m²
4. Shipyard	1,600 m²	1,600 m²
5. Fisheries Commission bldg. and training center	60,000 m²	97,500 m²
6. Living houses	3,330,000 m²	3,586,000 m²
7. Ship's fitting, fishing gear store and casting factory	94,950 m²	98,950 m²
8. Site for a processing plant	-	75,000 m²
9. Cooperative workship	-	64,800 m²
10. Net treating place	-	17,540 m²
11. Sewerage treatment plant and refuse furnace	-	102,000 m²

In arranging facilities, the following points were taken into account.

1. Fish catch landing place should be placed at the center of the fishing port with ice, water supplying and mooring facilities, fishermen's houses and shipyards around.

2. Fish landing place was planned for the use of both large and small vessels capable to land their catch concentrically at one place.

3. Ice supply facility was arranged as close as possible to the fish landing place with due consideration given to the distance from the facility to ice plant, icehouse and cold storage.

4. Mooring facility was arranged so as to take suitable distance from each of fish catch landing place, ice and oil supplying facilities.

5. Oil supplying facility was put at the distance from other facilities in order to prevent fire explesion, etc.

6. Fishermen's houses were arranged close to the mooring facilities for their convenience to and from their own vessels, and to protect the crafts and equipments from theft.

7. Fisheries Commission building was arranged near to the fish landing place for easy control of the fishing port.

8. At the back of the fish landing place, shopping center was planned with stores, stands, forwarding agents, etc.

9. Industrial district with the concentration therein of shipyards, casting and forging shops, sewage treatment plants segregated from residential and commercial districts.

10. To minimize the tide and wind effects, pectination was adapted in forming a shipyard site. Shipyard was located off the shore as far as possible to insure a sufficient waterdepth to avoid sand drift.

11. Water way is to be constructed for the small vessels which are using the present sea shore.

12. At the corner of mooring dock cooperative workship was arranged to carry-out, simple processing such as salting and drying of fish by fisheries cooer-ative, etc.

13. Space with 40 m breadth was placed along mooring for drying and repairing nets, the preparation of departure and others. Fishing gear stores and werehouses were also placed along mooring dock.

14. Parks and roads were to be constructed along the shore line because of the invasion of sea water splash.

15. Apron with 10 m breadth was arranged on a revetment for the convinience of maintenance, repair and public use.

(Note)

1. Proposed reclamation acreage differs somewhat from that of the Philippines Government.

2. As the proposed design is not based on the surveyed map and as no survey map was available, the same is subject to some change when acurate survey is made.

Chapter V. Roughly Estimated Construction Cost

A roughly estimated construction cost for the proposed plan is as follows. However, the estimate was made only for the basic facilities of the Port.

Unit: thousand yen

Facilities	Q'ty	Unit price	Total
1. Exterior facilities			
Breakwater	350 m	300	105,000
Revetment	4,550	300	1,365,000
Side revetment			
NE side	1,900	200	380,000
SW side	1,600	200	320,000
Revetment of shipyard channel	300	150	45,000
Shore side revetment	4,950	100	495,000
Revetment in harbour			
Brekwater approach	100	200	20,000
Mooring channel	400	150	60,000
Connection channel revetment	1,300	100	130,000
Sub total			2,920,000
2. Mooring facilities			
Fish landing quaywall			
for large vessels	550 m	250	137,500
for small vessels	100	150	15,000
Ice supplying dock	350	250	87,500
Oil supplying dock	200	200	40,000
Mooring dock			
for large vessels	3,600	200	720,000
for small vessels	250	150	37,500
for official use	150	200	30,000
Towing place	400	200	80,000
Sub total			1,147,500
3. Dredging			
- 4 m	568,000 m³	0,12	68,160
- 2 m	334,000	0,12	40,000
- 1 m	391,000	0,12	46,920
Sub total	1,293,000		155,160

Unit : thousand yen

Facilities	Q'ty	Unit price	Total
4. Reclamation			
Dredged sand	905,100 m^3	0.03	27,000
Others	65,785,900	0.15	9,867,900
Sub total	66,691,000		9,894,900
5. Fish landing shed			
for large vessels	17,600 m^2	15	264,000
for small vessels	2,400	15	36,000
Sub total	20,000		300,000
6. Ice plant and cold storage			
Ice plant	860 ton/day	1,000	860,000
Cold storage	10,600	70	742,000
Sub total			
7. Road & Bridge			
Central road	495,000 m^2	5	475,000
Cross road No. 1	85,750	5	428,750
No. 2	85,750	5	428,750
No. 3	25,750	5	128,750
No. 4	85,750	5	428,750
Coastal road			
NE side	111,750	5	558,750
SW side	22,500	5	112,500
Other road			
Shipyard district	22,500	5	112,500
Fish landing place	24,000	5	120,000
Bridge			
Central road	1	@100,000	100,000
Cross road	4	@100,000	400,000
Sub total			5,293,750
8. Shipyard			
Slip way	80 lane	1,000¥ 1000/lane	80,000
Fitting-out dock	800 m	20¥ 100/m	160,000
Revetment	2,240	15 "	336,000
Sub total			576,000
9. Light house	2 house	@2,500	5,000

Unit : thousand yen

Facilities	Q'ty	Unit price	Total
10. Fisheries Commission building	5,600 m^2	60	336,000
11. Residential house			
House	592,000 m^2	20	11,840,000
Road	678,300	3	2,034,900
Sub total			13,874,900
12. Park			
Sea side park	305,500 m^2	2	611,000
Fish landing district	28,400	2	54,000
Residential district	523,400	2	1,046,800
Sub total	857,300		1,712,600
Grand total			37,817,810

1.	Exterior facilities	2,920,000	thousand yen
2.	Mooring facilities	1,147,500	
3.	Dredging	155,160	
4.	Reclamation	9,894,900	
5.	Fish landing sheds	300,000	
6.	Ice plant and cold storage	1,602,000	
7.	Road & Bridge	5,293,750	
8.	Shipyard	576,000	
9.	Light house	5,000	
10.	Fisheries Commission bldg.	336,000	
11.	Living house	13,874,900	
12.	Park	1,712,600	
	Total	37,817,810	

(Note) The above estimate will be subject to change according to the soil survey and detailed design.
Following public facilities are deemed as necessary.

1. Railroad
   - Harbour line 4,850 m
   - Railway bridge one place

2. Laboratory, training Center and Aquarium.

3. Communication facilities.
   - Radio station
   - Meteorological signal station

4. School and Church
   - Primary school 4
   - Junior high school 2
   - Church 1

5. Electric facility

6. Water works

7. Sewerage system
    - Sewerage system
    - Waste water treatment plant
    - Refuse furnace

8. Others
    - Hospital
    - Lodgings for crew

Chapter VI. Construction Plan

As stated in Chapter II and III the Port construction is to be carried out in two 5-years plans; first 5 years plan to be launched in 1968. Detailed construction program is as follows:

Facilities	Whole plan	First 5 years plan	Second 5 years plan
1. Exterior facilities			
Breakwater	350 m	350 m	0 m
Sea Wall	4,550	4,550	0
Side revetment	3,500	3,500	0
Revetment of shipyard channel	300	300	0
Shore side revetment	4,950	4,950	0
Revetment of connection channel in harbor	1,300	1,300	0
Revetment in harbor	500	500	0
Tentative revetment	-	2,820	0
2. Mooring facilities			
Fish landing dock			
for large vessels	550 m	350 m	200 m
for small vessels	100	100	0
Ice supplying quaywall	350	250	100
Oil supplying quaywall	200	100	100
Resting quaywall			
for large vessels	3,600 m	2,000 m	1,600 m
for small vessels	250	250	0
for official use	150	150	0
Towing place	400	400	
3. Dredging	1,293,000 m³	1,293,000 m	0 m
4. Reclamation	66,691,000	66,691,000	0
5. Fish landing shed	20,000 m²	14,000 m²	6,000 m²
6. Ice plant and cold storage			
Ice plant	860 t/day	500 t/day	360 t/day
Cold storage	10,600	6,500	4,100
7. Road and bridge			
Road	958,750 m²	—	—
Bridge	5	2	3
8. Rail road	4,850 m	0 m	4,850 m
9. Shipyard	16	8	8
10. Light house	2	2	2
11. Fisheries Commission bldg.	5,600 m²	5,600 m²	0 m²

Chapter VII. Conclusion

1. Expected benefit of the plan.

The benefits which are expected from the completion of the plan can be enumerated as follows:

(1) Saving in time, labor and cost in landing fish catch due to direct handing from Boat to Land.

(2) Saving in time in supplying fuel oil and ice to fishing vessels, ultimately resulting in the rotation of fishing vessels, insuring vessels working efficiency.

(3) Increase in the fish catch productivity because sufficient ice can be stored aboard vessel thus, more fish can be stored aboard, insuring fish freshness.

(4) Because safe anchorage is provided for fishing vessel and outbound vessel is notified of weather forecast from meteorological station by signal, vessels are protected from sea disaster.

(5) Because fish unloading is made at one time openly, fair trade and proper and stabilized price are insured.

(6) With the adequate cold storage freshness of fish is maintained, fishermen's income is stabilized because demand and supply adjustment becomes possible, and consumers can buy fresh fish at stabilized price at all time.

(7) Investigations on fish catch and on number of fishing vessels can be carried out easily, and it is much more convenient to collect necessary data for establishing fisheries policy.

(8) Development of fisheries is expedited because it becomes possible to carry out guidance and extension of new fishing method effectively.

(9) Improvement of fishermen's living standard is insured.

(10) Fishermen will receive such intangible benefits as repair of their vessels, purchase of fishing gears and other services.

2. The accuracy of the plan and the matters to be investigated in future.

The proposed plan is only very brief based on-the-spot survey of the Philippines fishing industry in very short time of few days.

Accordingly, if the fishing port construction plan is to be carried out then more concrete and detail investigations are necessary to compile a definite plan.

In case the plan and estimated construction cost are to be refered it is deired that careful consideration be given to the following matters.

(1) Soil survey.

In this survey because soil survey of sea bottom could not be investigated, for time being soil nature of sea bottom has been assumed as an ordinary one for the plan. In case sea bottom foundation is softer than the assumed values then the following matters will become problems.

(a) Is there any borrow pit of good quality soil nearly for the reclamation? If not the construction cost will become much higher.

(b) Do the proposed structures on dock and revetment need special foundation? The construction costs will be subject thereto.

(c) Will there be no occurance of foundation settlement? If a large settlement occurs then foundation treatment is necessary.

(2) Depth survey.

Dredging and reclamation costs occupy a large portion of the total cost. So the same should be computed by an accurate sounding map. As stated above, sounding map could not be obtained by the survey team the same costs have estimated on the basis of a rough drawing. Accordingly, the costs in accordance with the actual survey in future might be different from the estimated costs.

(3) Sea conditions.

As practically no survey has been made on wave and sand-drift at this time following matters should be studied.

(a) Sand-drift and sand running-down from a river should be investigated to make certain that to Port will not be buried thereby.

(b) Careful study should be made in the construction of the shape of port entrance and breakwaters by investigating size and direction of wave.

(4) Other necessary matters.

Before the execution of this plan, the followings matters should be investigated following this survey.

(a) Soil survey.

(b) Sounding.

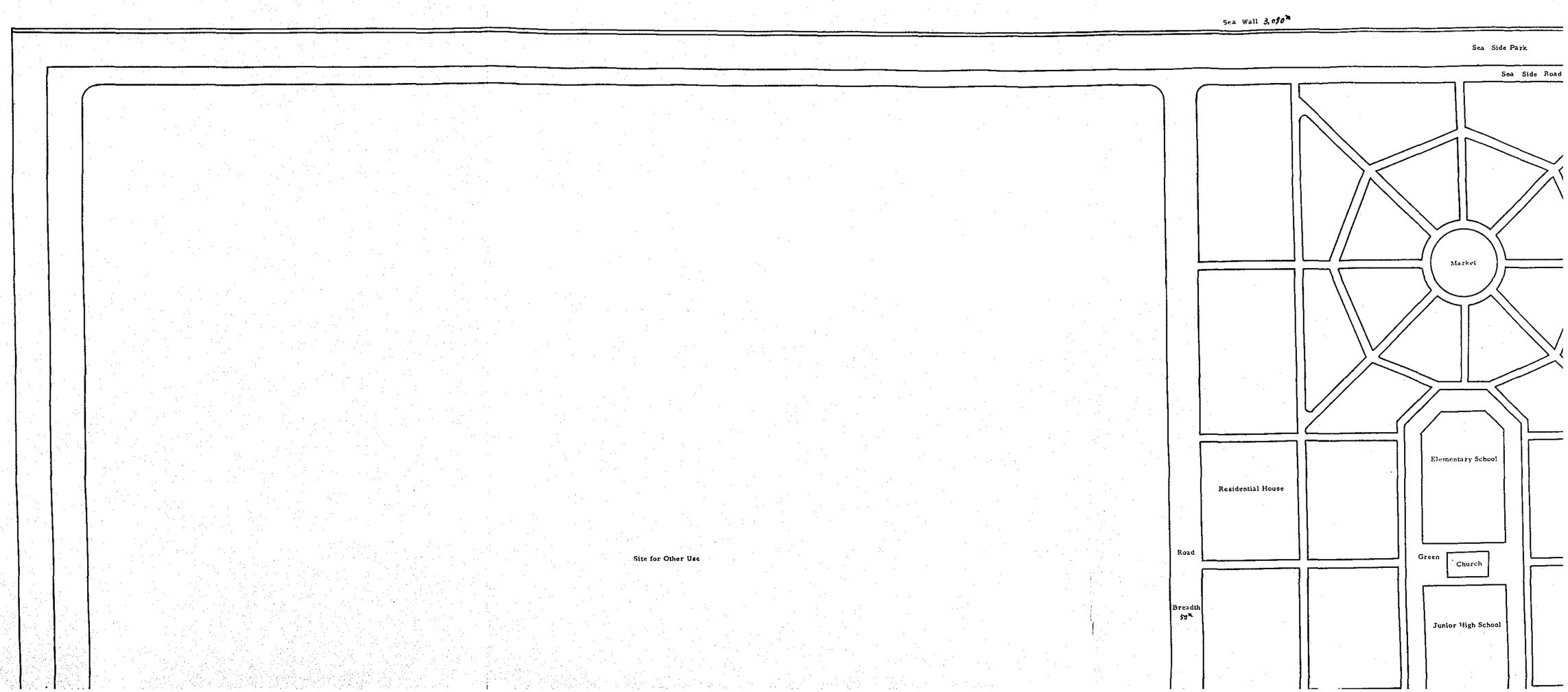
(c) Survey on waves and sand-drift at coast.

(d) Structures' designs.

(e) Construction cost estimates based on actual design.

(f) Analysis of various data concerned with fisheries and review of this plan based thereon.

THE DESIGNED PLAN OF THI



THE DESIGNED PLAN OF THE NAVOTAS FISHING PORT

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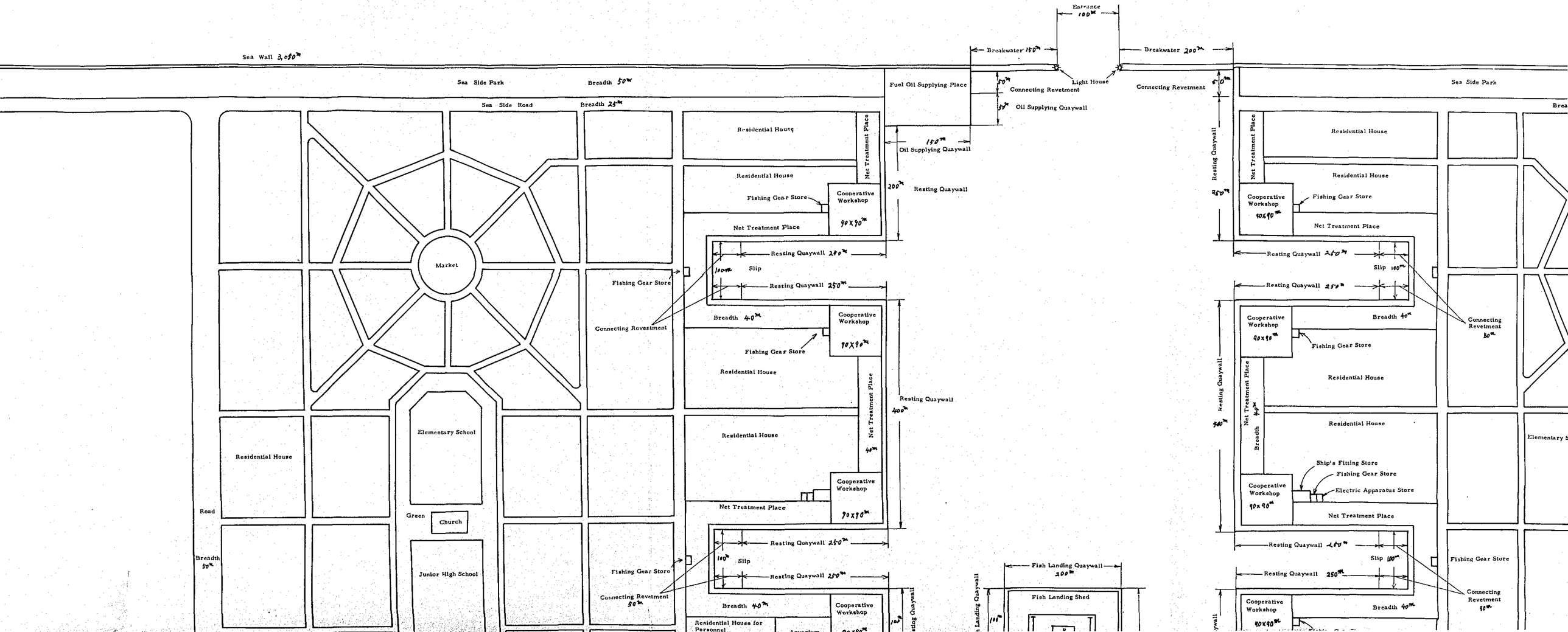


Scale : 1 - 5,000

THE MANILA BAY

Entrance 100m
Breakwater 150m
Breakwater 200m
Light House
Connecting Revetment
Connecting Revetment
Fuel Oil Supplying Place
Oil Supplying Quaywall
Oil Supplying Quaywall
Net Treatment Place
Resting Quaywall
Cooperative Workshop 90x90m
Resting Quaywall 200m
Resting Quaywall 360m
Sea Wall 1500m
Sea Side Park
Breadth 50m
Breadth 25m
Residential House
Residential House
Net Treatment Place
Cooperative Workshop 90x90m
Fishing Gear Store
Net Treatment Place
Resting Quaywall 250m
Slip 180m
Resting Quaywall 250m
Breadth 40m
Cooperative Workshop 90x90m
Fishing Gear Store
Residential House
Residential House
Net Treatment Place
Breadth 40m
Cooperative Workshop 90x90m
Ship's Fitting Store
Fishing Gear Store
Electric Apparatus Store
Net Treatment Place
Resting Quaywall 250m
Slip 180m
Resting Quaywall 250m
Cooperative Workshop 90x90m
Breadth 40m
Connecting Revetment 80m
Connecting Revetment 40m
Market
Residential House
Residential House
Elementary School
Elementary School
Green
Church
Fishing Gear Store
Junior High School
Elementary School
Ship Yard
Revetment 225m
410m
Revetment 150m
410m
Ship Yard
Revetment 320m
80m
Ship Yard
Road Breadth 30m
410m
Revetment 150m
Ship Yard
250m
Cooperative Workshop 90x90m
Net Treatment Place
Resting Quaywall 400m
40m
Cooperative Workshop 90x90m
250m
250m
Cooperative Workshop
Resting Quaywall
Fish Landing Quaywall 200m
Fish Landing Shed
Landing Quaywall

Reventment
1,900m

Breadth
30m

Railway Bridge

Harbour Line

Market

Bridge

Site for Other Use

Market

Reside

Bridge

Revetment 2,450m

Bridge

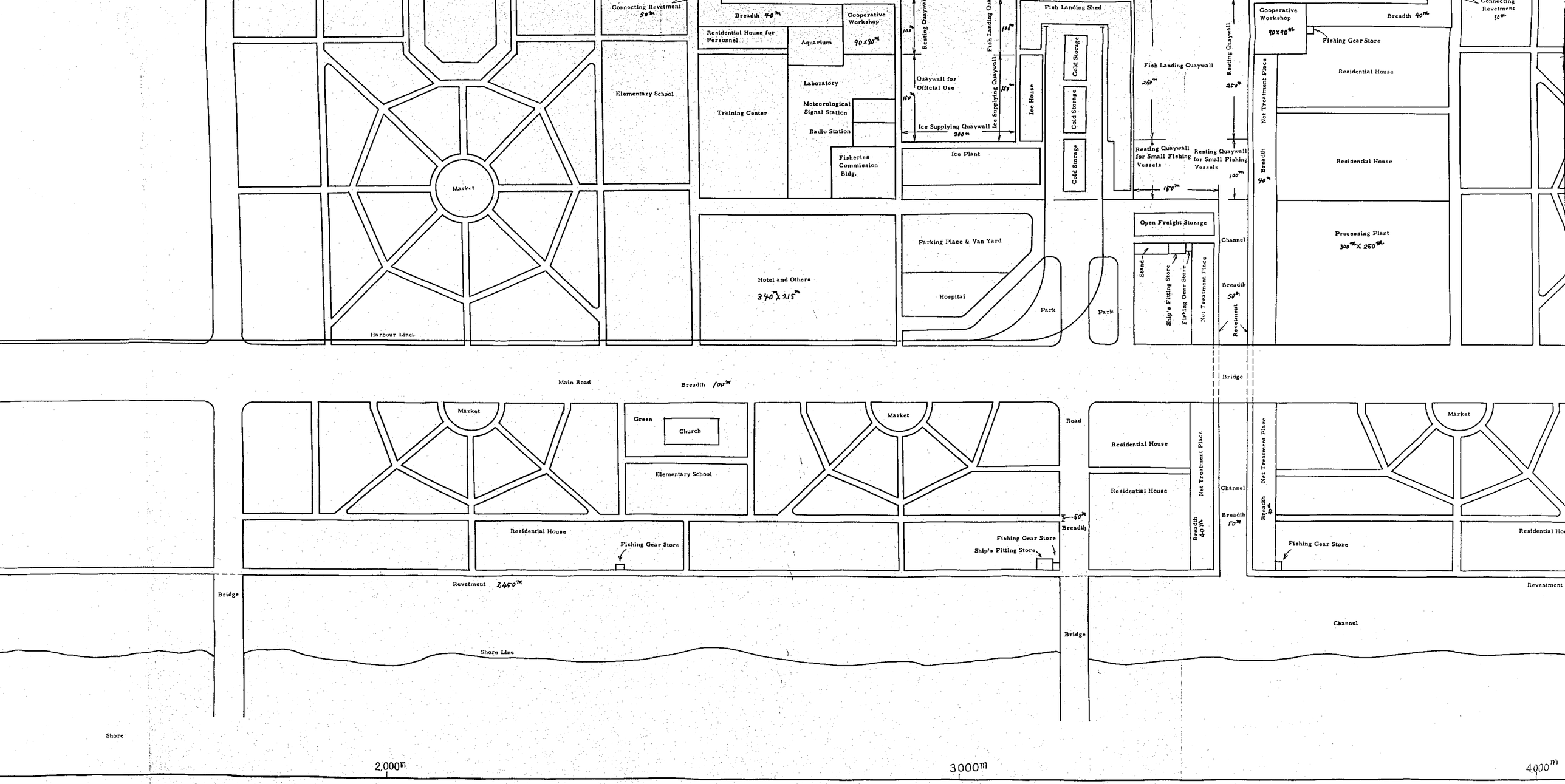
Channel

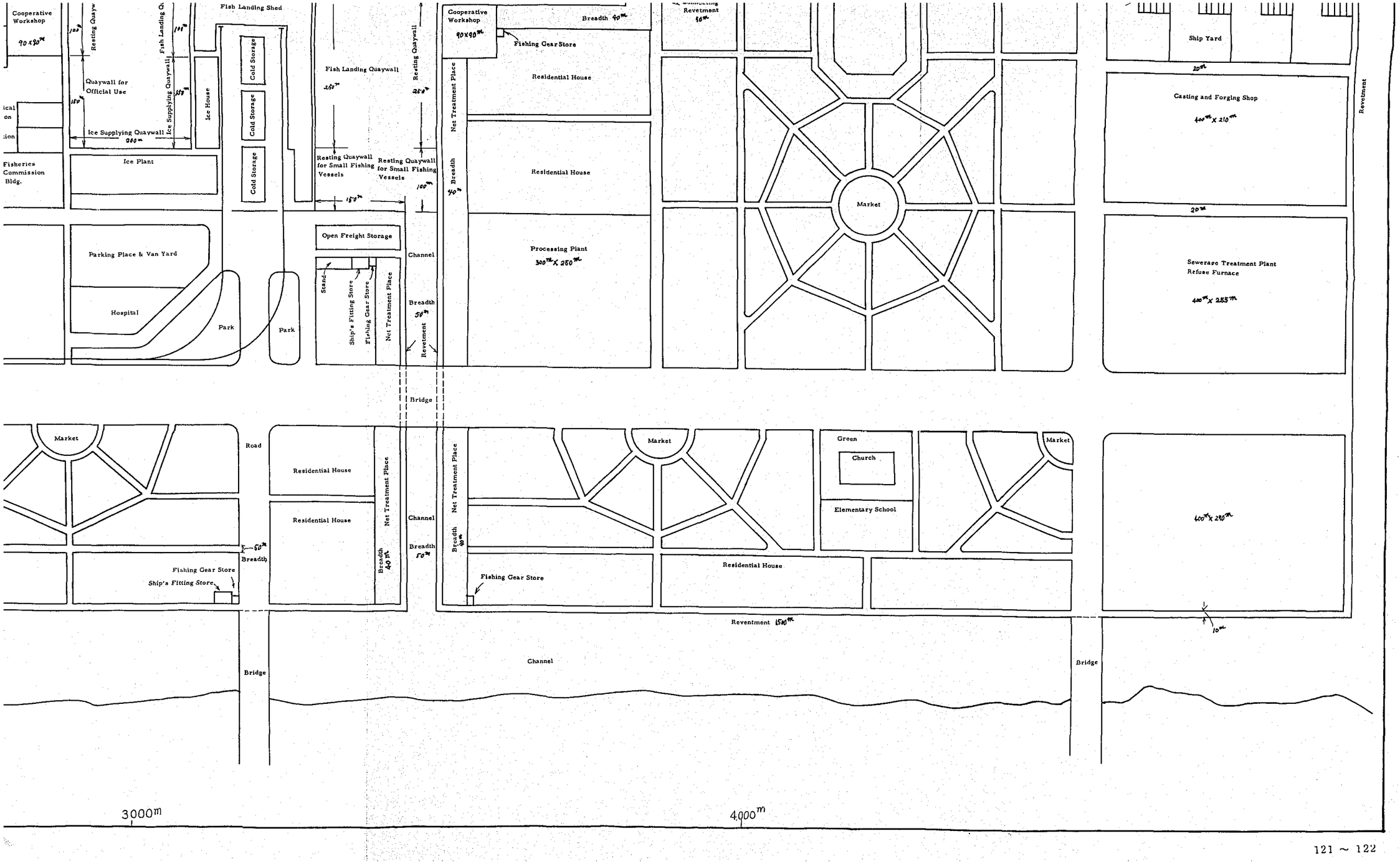
Shore Line

Shore

1,000m

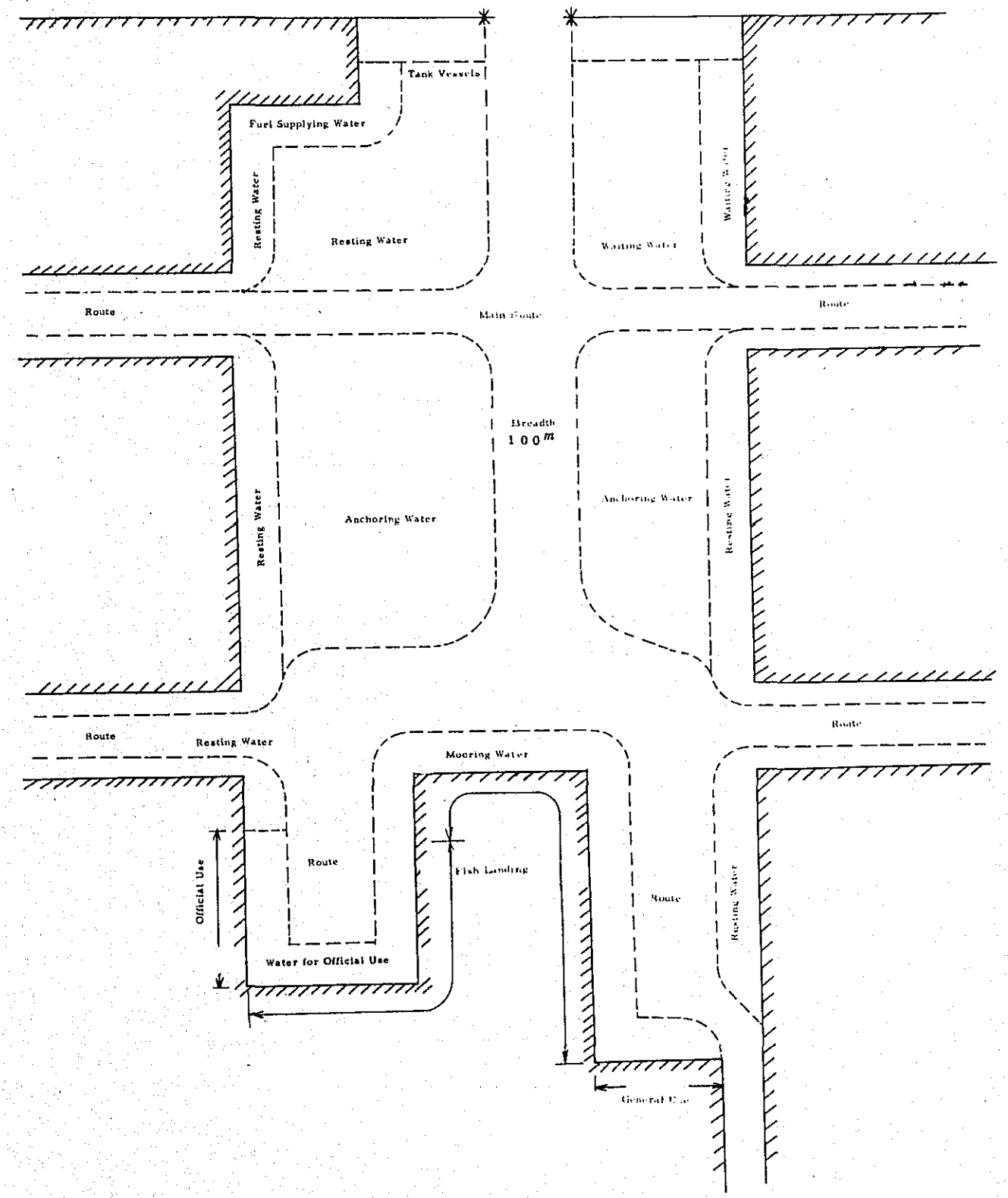
2,000m


Connecting Revetment 50m
Breadth 40m
Cooperative Workshop 90×90m
Residential House for Personnel
Aquarium
Laboratory
Meteorological Signal Station
Radio Station
Fisheries Commission Bldg.
Training Center
Elementary School
Market
Harbour Line
Quaywall for Official Use
Ice Supplying Quaywall 260m
Resting Quaywall 100m
Fish Landing Quaywall 185m
Ice House
Cold Storage
Cold Storage
Cold Storage
Fish Landing Shed
Ice Plant
Fish Landing Quaywall 248m
Resting Quaywall 428m
Resting Quaywall for Small Fishing Vessels
Resting Quaywall for Small Fishing Vessels 100m
180m
Cooperative Workshop 90×90m
Fishing Gear Store
Residential House
Net Treatment Place
Breadth 50m
Residential House
Processing Plant 300m×250m
Connecting Revetment 50m
Open Freight Storage
Channel
Breadth 50m
Revetment
Stand
Ship's Fitting Store
Fishing Gear Store
Net Treatment Place
Hotel and Others 340m×215m
Parking Place & Van Yard
Hospital
Park
Park
Bridge
Main Road
Breadth 100m
Market
Green
Church
Elementary School
Residential House
Fishing Gear Store
Market
Fishing Gear Store
Ship's Fitting Store
Road
Residential House
Residential House
Net Treatment Place
Breadth 40m
Channel
Breadth 50m
Net Treatment Place
Breadth 50m
Market
Fishing Gear Store
Residential House
Revetment 3,450m
Bridge
Shore Line
Bridge
Channel
Reventment
Shore
2,000m
3000m
4,000m


Cooperative Workshop
90 x 90m
Resting Quaywall
Quaywall for Official Use
Ice Supplying Quaywall
Fish Landing Quaywall
Ice House
Cold Storage
Cold Storage
Cold Storage
Fish Landing Shed
Fisheries Commission Bldg.
Ice Plant
Parking Place & Van Yard
Hospital
Park
Park
Fish Landing Quaywall
Resting Quaywall for Small Fishing Vessels
Resting Quaywall for Small Fishing Vessels
Resting Quaywall
Open Freight Storage
Stand
Ship's Fitting Store
Fishing Gear Store
Net Treatment Place
Channel
Breadth 50m
Revetment
Bridge
Cooperative Workshop
90x90m
Breadth 90m
Fishing Gear Store
Residential House
Net Treatment Place
Breadth 50m
Residential House
Processing Plant
300m x 250m
Revetment 50m
Market
Ship Yard
20m
Casting and Forging Shop
400m x 210m
20m
Sewerage Treatment Plant
Refuse Furnace
400m x 255m
Revetment
Market
Road
Residential House
Residential House
Net Treatment Place
Channel
Breadth 50m
Breadth 40m
50m
Breadth
Fishing Gear Store
Ship's Fitting Store
Bridge
Market
Net Treatment Place
Breadth 40m
Fishing Gear Store
Residential House
Green
Church
Elementary School
Market
400m x 280m
Revetment 150m
10m
Channel
Bridge
3000m
4,000m

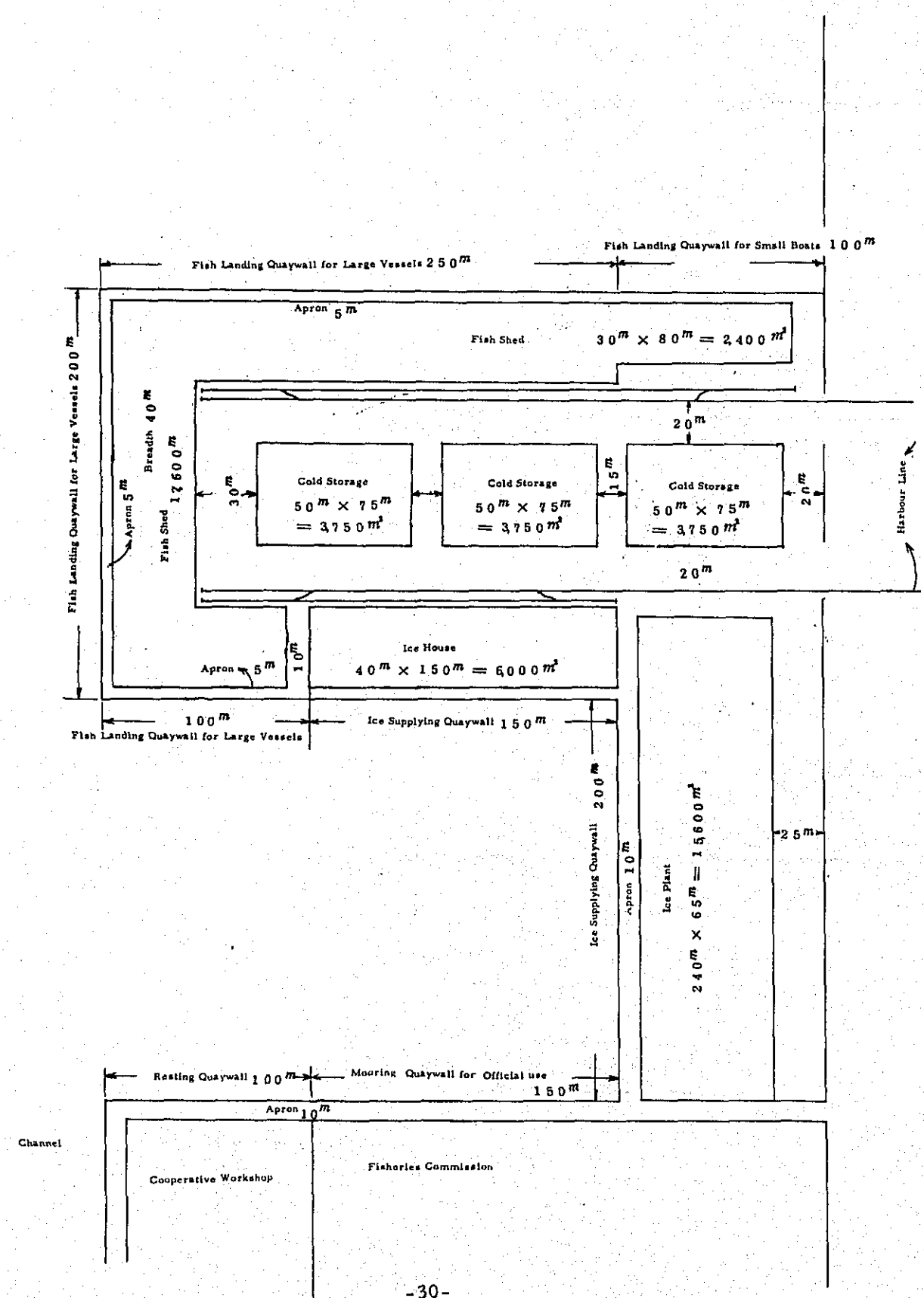
Using Plan of Water

Scale : 1 - 6.000



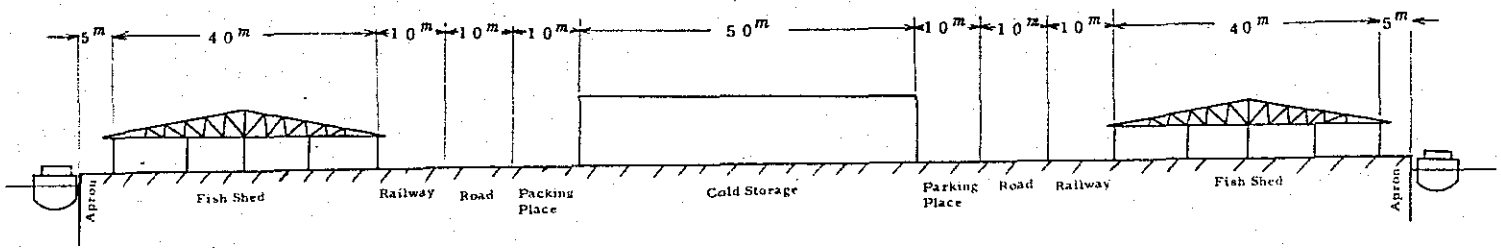
Detail Drawing of Fish Landing District

Scale : 1-2, 500



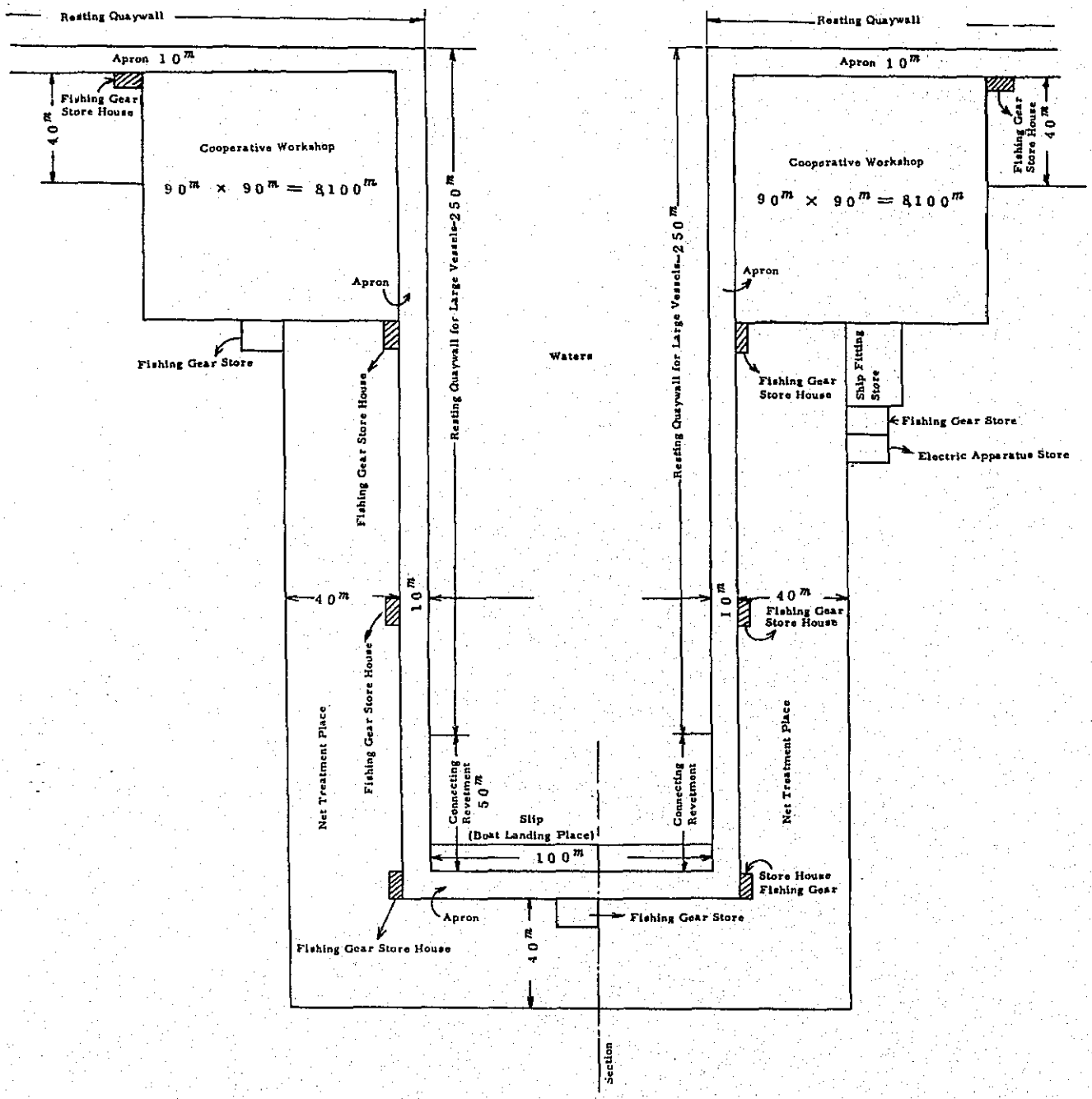
Cross Section of Fish Landing Quaywall

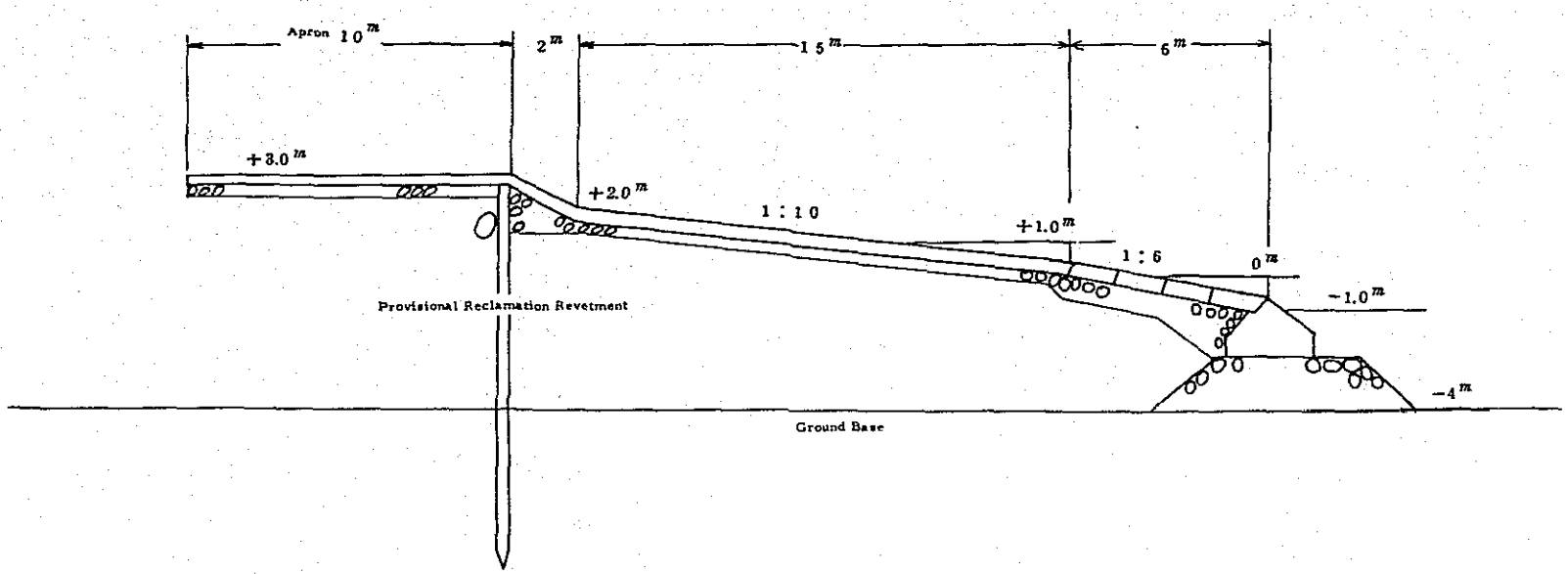
Scale : 1-1,000



Detail Drawing of Diversion Channel

Scale : 1-2,000

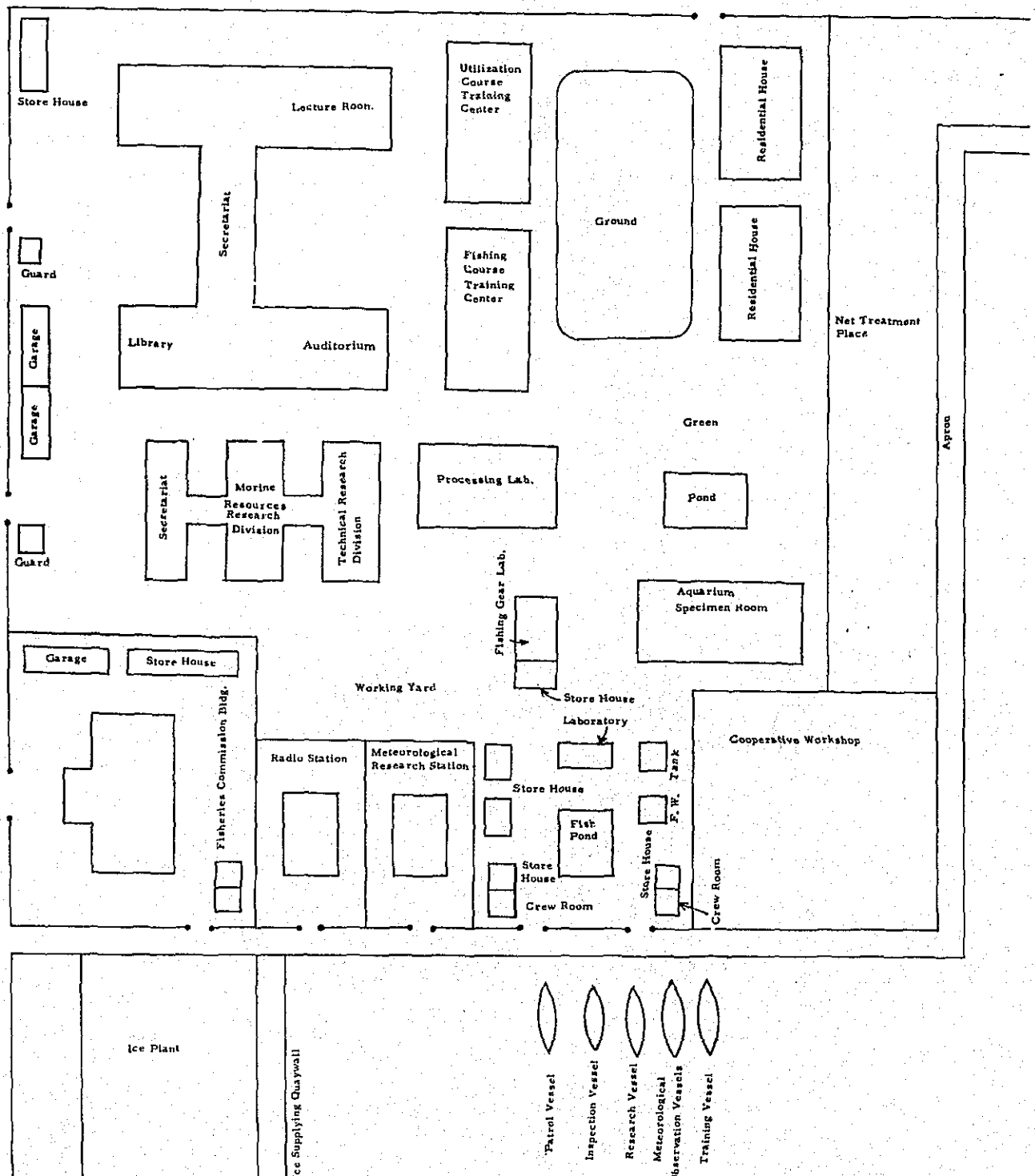




Cross Section Drawing of Slip (Boat landing place)

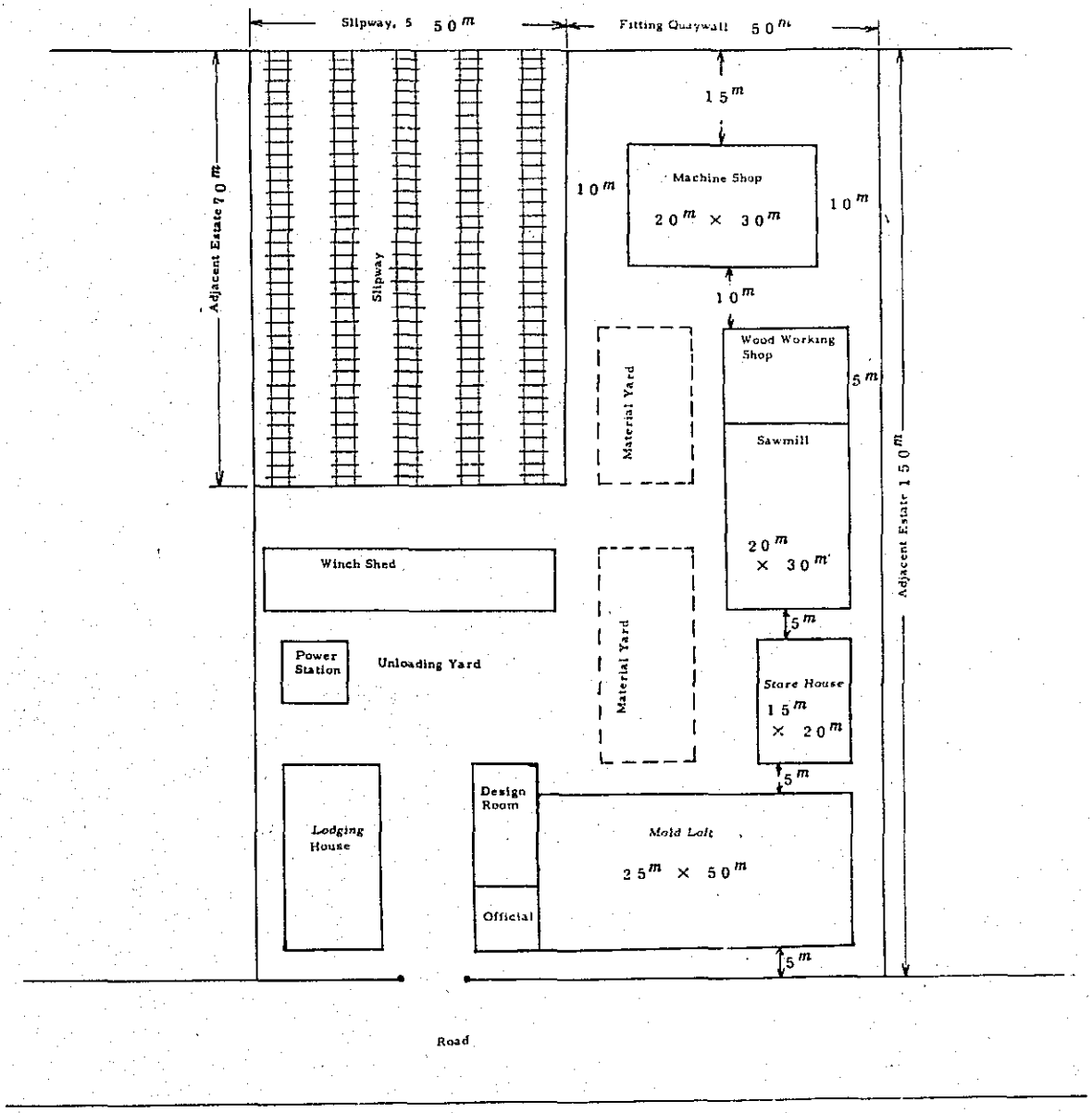
Scale : 1-200

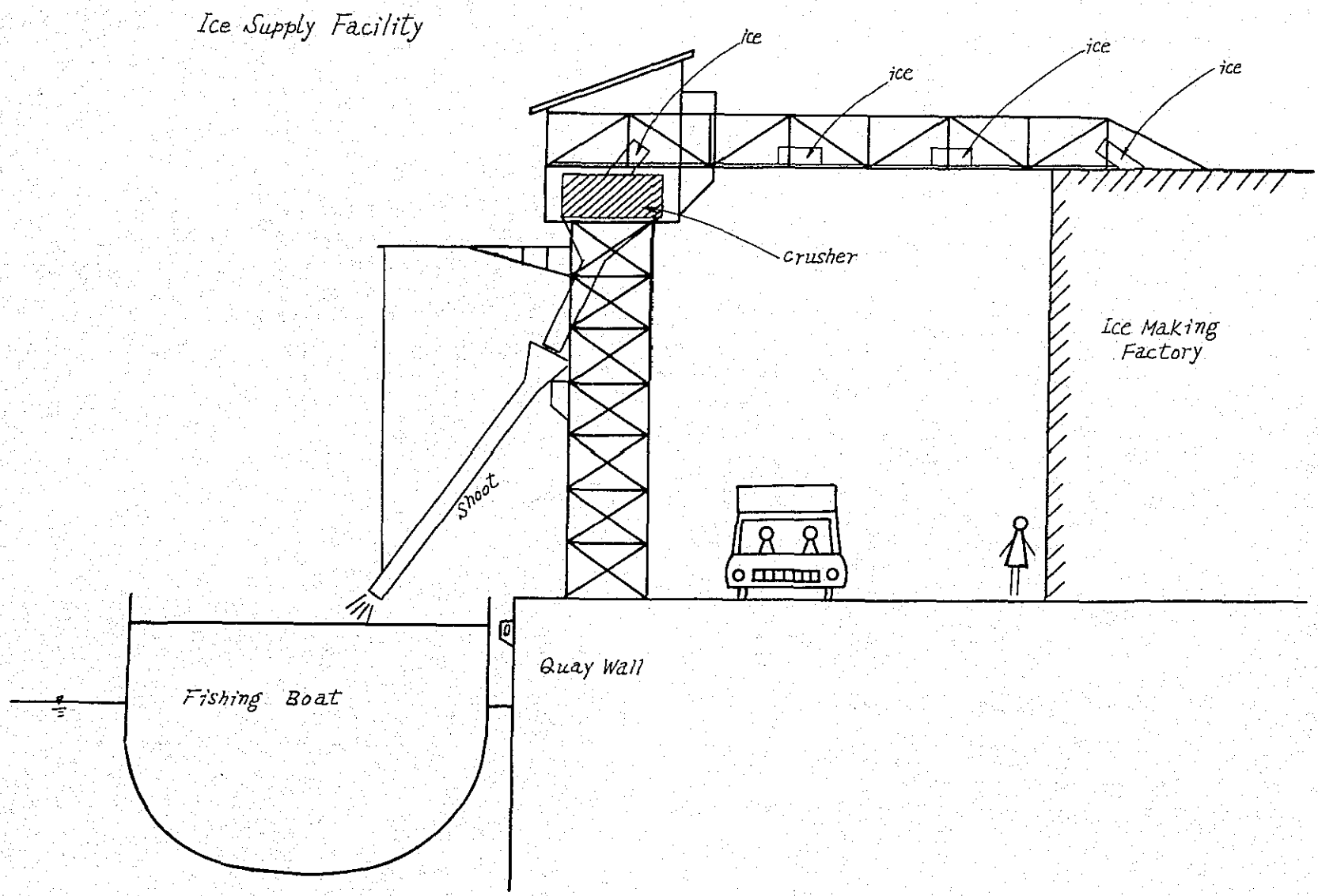
Detail Drawing of Fisheries Commission,
Loboratory,Training Center



Detail of Shipyard

Scale 1-1,000




Ice Supply Facility
ice
ice
ice
ice
crusher
Ice Making Factory
Shoot
Quay Wall
Fishing Boat