BASIC DESIGN STUDY REPORT FOR FISHERIES PROMOTION PROJECT IN THE REPUBLIC OF KIRIBATI

MAY, 1982

JAPAN INTERNATIONAL COOPERATION AGENCY

BASIC DESIGN STUDY REPORT
FOR
FISHERIES PROMOTION PROJECT
IN THE REPUBLIC OF KIRIBATI

MAY, 1982

JAPAN INTERNATIONAL COOPERATION AGENCY

PREFACE

In response to the request of the Government of the Republic of Kiribati, the Government of Japan decided to conduct a study on Fishery Promotion Project and entrusted the study to the Japan International Cooperation Agency (JICA). The JICA sent to Kiribati a survey team headed by Mr. Tatsuhiko Iwasawa, International Affairs Division, Oceanic Fishery Department, Fisheries Agency from February 8 to 26, 1982.

The team had discussions with the officials concerned of the Government of Kiribati and conducted a field survey on Tarawa Island. After the team returned to Japan, further studies were made and the present report has been prepared.

I hope that this report will serve for the development of the Project and contribute to the promotion of friendly relations between our two countries.

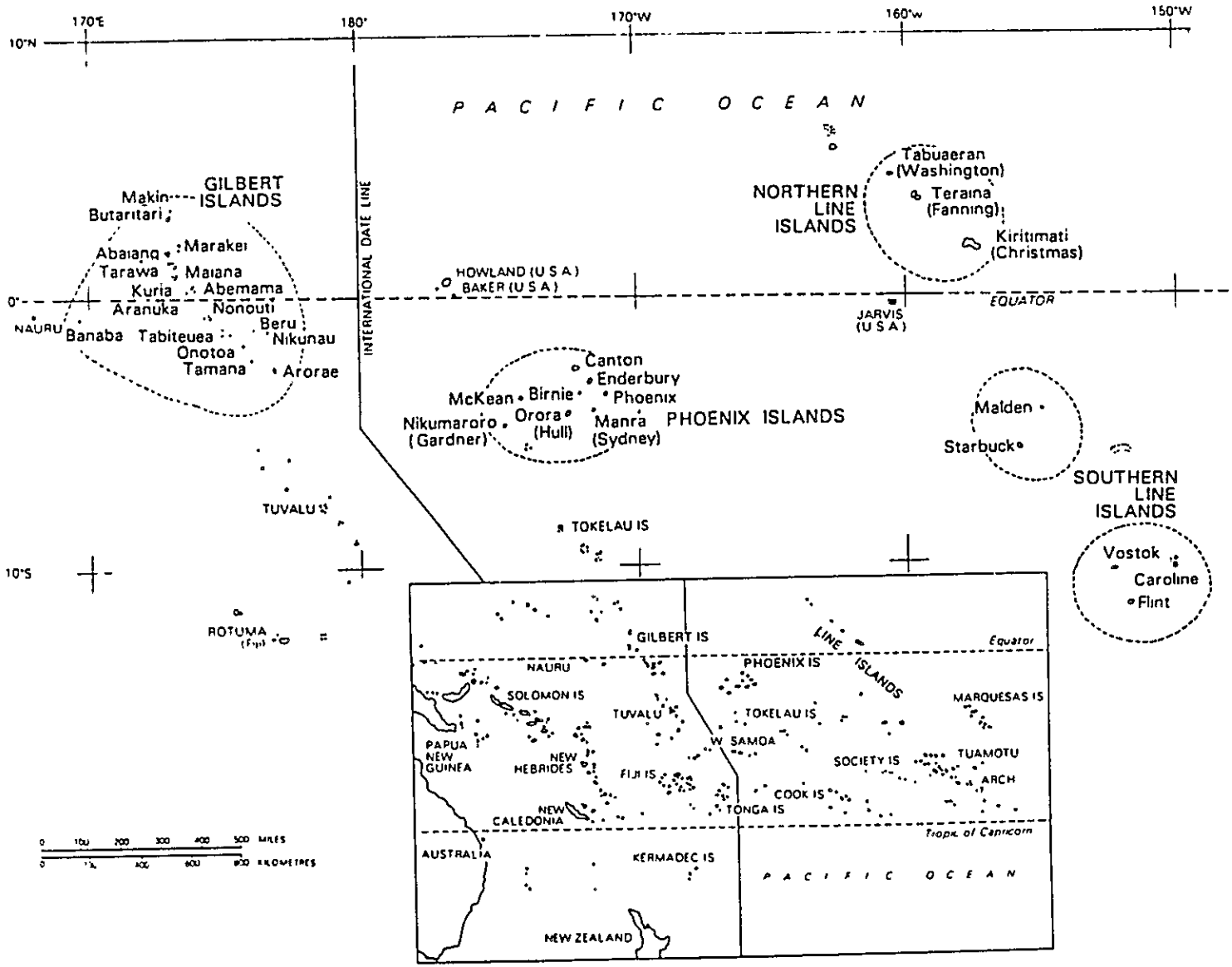
I wish to express my deep appreciation to the officials concerned of the Government of the Republic of Kiribati for their close cooperation extended to the team.

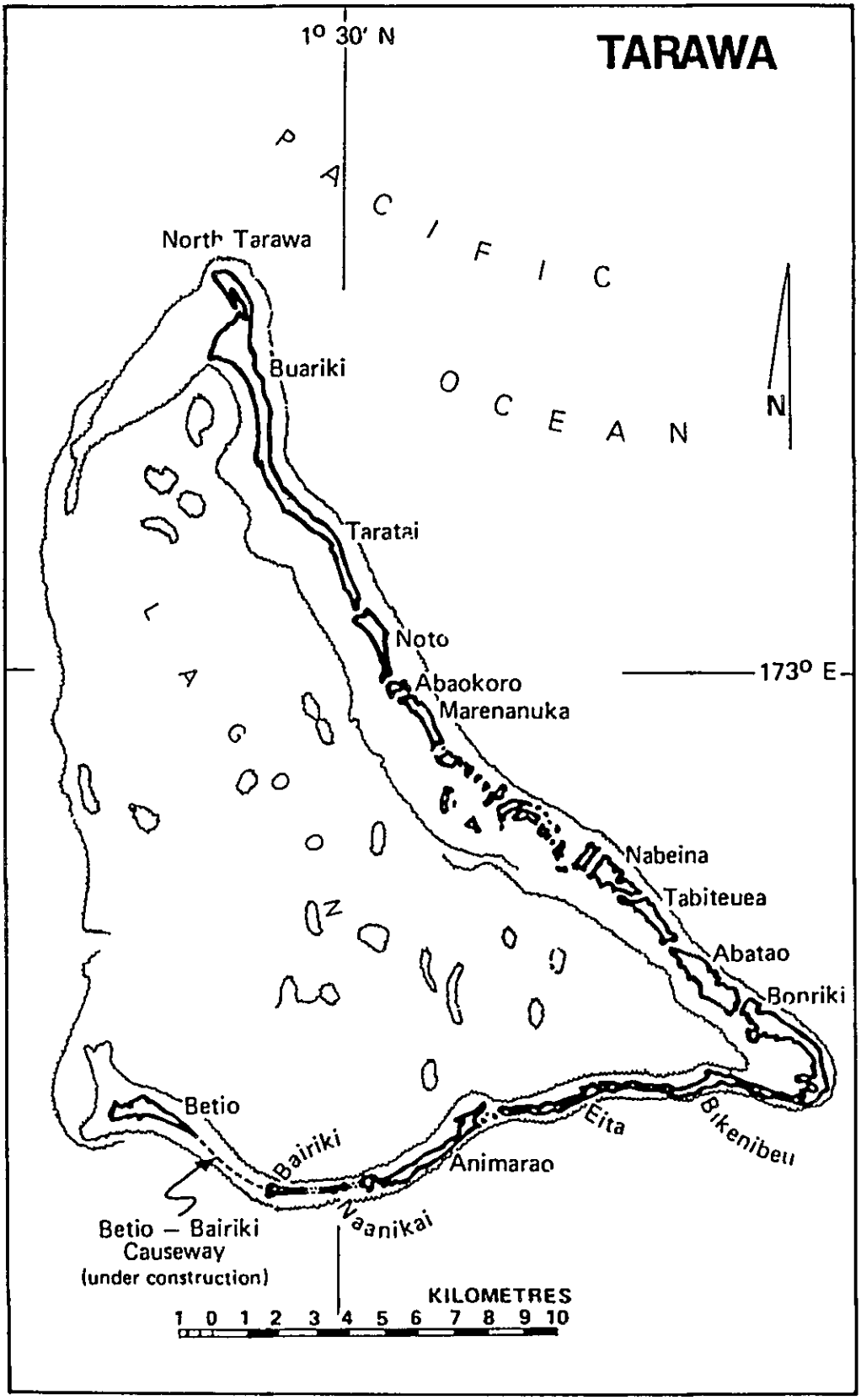
May, 1982

Keisuke Arita

President

Japan International Cooperation Agency


170°E
180°
170°W
160°W
150°W
10°N
0°
10°S
PACIFIC OCEAN
GILBERT ISLANDS
Makin
Butaritari
Marakei
Abaiang
Tarawa
Maiana
Kuria
Abemama
Aranuka
Nonouti
Beru
Nikunau
Banaba
Tabiteuea
Onotoa
Tamana
Arorae
NAURU
INTERNATIONAL DATE LINE
HOWLAND (U S A)
BAKER (U S A)
JARVIS (U S A)
EQUATOR
NORTHERN LINE ISLANDS
Tabuaeran (Washington)
Teraina (Fanning)
Kiritimati (Christmas)
PHOENIX ISLANDS
Canton
Enderbury
McKean
Birnie
Phoenix
Nikumaroro (Gardner)
Orora (Hull)
Manra (Sydney)
Malden
Starbuck
SOUTHERN LINE ISLANDS
Vostok
Caroline
Flint
TUVALU
TOKELAU IS
ROTUMA
GILBERT IS
LINE ISLANDS
Equator
NAURU
PHOENIX IS
SOLOMON IS
TUVALU
TOKELAU IS
MARQUESAS IS
PAPUA NEW GUINEA
NEW HEBRIDES
FIJI IS
W SAMOA
SOCIETY IS
TUAMOTU ARCH
COOK IS
TONGA IS
NEW CALEDONIA
Tropic of Capricorn
AUSTRALIA
KERMADEC IS
PACIFIC OCEAN
NEW ZEALAND
0 100 200 300 400 500 MILES
0 200 400 600 800 KILOMETRES


TARAWA
1° 30' N
PACIFIC OCEAN
N
North Tarawa
Buariki
Taratai
Noto
Abaokoro
Marenanuka
173° E
Nabeina
Tabiteuea
Abatao
Bonriki
Betio
Bairiki
Eita
Bikenibeu
Animarao
Vaanikai
Betio – Bairiki
Causeway
(under construction)
KILOMETRES
1 0 1 2 3 4 5 6 7 8 9 10

SUMMARY

The Republic of Kiribati, after the depletion of phosphate ores as a national economic support, set forth a national direction towards self-supporting economy. In its direction, the first priority was given to the promotion of fishery, especially to the skipjack/tuna export industry.

According to its Fisheries Development Program (1979-1982), the development project of skipjack/tuna resources has been carried out since early 1970, while England and Japan had provided a skipjack fishing training vessel and also helped the establishment of marine products distribution center. In addition to the above, the National Fishing Corporation (Te Mautari Ltd.) was set up and started its operation in February, 1981. This Corporation was meant to make a consistent operation from the skipjack pole-and-line fishing operations, refrigeration, storage to domestic marketing and exportation.

This time, as an extension of this program, Kiribati asked Japan for grant aid in the forms of fishing training vessel, fishing boat, ice making/brine freezing facilities and fishing equipment and gears. In response to this request, the Government of Japan, through the Japan International Cooperation Agency, dispatched a basic design survey team to Kiribati.

The survey team conducted field surveys and studied the necessities of the requested 59 GRT training vessel, 20 GRT fishing boat, ice making/brine freezing facilities and fishing equipment and gears. Also they discussed about the proprieties of the concrete scales and contents, then about the priorities together with the Kiribati Government officials concerned.

The Fisheries Development Program can be classified into three portions: (1) the skipjack/tuna export fishery, (2) the coastal fishery, and (3) the milk fish culture fishery. These are inter-related with each other, and being performed under the integral management of the National Fishing Corporation. According to its one-year performance, it is observed that more efficient operation will be made possible through the supply of training vessel, fishing boat and ice making/brine freezing

facilities in order to increase the catch of skipjack/tuna, to promote the coastal fishing and, in its turn, to stimulate the development of distribution sector.

On the basis of the result of the survey, the supply of the following items is considered appropriate.

1. 59 GRT skipjack fishing training vessel
   (built of steel) ..... One (1)
2. 20 GRT skipjack fishing boat
   (built of FRP) ..... One (1)
3. Ice making/brine freezing facilities
   Capacity: Ice making of 10 ton/day, or
   Freezing of 10 ton/day and
   ice storage of 20 ton .... One (1)
4. Fishing gear and equipment ..... One lot

In addition, the rough estimate for supply of the above-mentioned items as well as for consulting services amounts to approximately 500 million yens, with the project to be completed in approximately 10.5 months.

In the financial analysis of the project, it saws the fact that the operating cost for each above item can be met profits it makes, excluding the depreciation. However, it is possible to materialized measures to increase fish catch and further, by exchange of information among fishing boats and other means. At the same time, it is expected that the profitability of the project will be increased by means of the curtailment of expenses for fuel and supplies, and by the effective operation of skipjack fishing boats.

The proposed items will be owned and operated by the National Fishing Corporation. But in the light of the performance of two existing skipjack fishing vessels, it is observed that the operation of all vessels with the proposed ones by I-Kiribati alone appears still premature in terms of skillfulness and years of experience. Especially, since technology transfer to engine crew needs a long period of training time, the Government of Kiribati has been requesting the

Government of Japan for the dispatch of the experts in this respect as well.

Besides, hereafter when Kiribati will promote and operate solely on its own skipjack/tuna fishery as fishing boat fishery, an organic management of both land and sea will be particularly essential and also it will be an urgent task to do to train and secure excellent fleet managers for the industry's efficient operation.

Although problems yet remain to be solved, this project will be a support and a strong driving-force for the Fisheries Development Program of the Republic of Kiribati, and at the same time the grant aid of the Japanese Government on this occasion is considered to be extremely effective and timely as a step toward the nation's economical independence in a long range view.

CONTENTS

PREFACE

SUMMARY

Chapter 1 OUTLINE OF THE SURVEY 1
1-1 Objectives of the Survey 1
1-2 Background of the Request 1
1-3 Members of the Survey Team 2
1-4 Itinerary for Survey 2
1-5 Participants to the Discussion Meetings 2
1-6 Field Survey 3
1-6-1 Discussions with the Officials Concerned of the Government of the Republic of Kiribati 3
1-6-2 Field Surveys on Actual Conditions 3
1-7 Minutes of Discussions 3

Chapter 2 BACKGROUND OF THE PROJECT 7
2-1 National Development Program 7
2-2 Fisheries Development Program 7
2-2-1 National Fishing Corporation (Te Mautari Ltd.) ... 9
2-2-2 Skipjack and Tuna Fisheries 12
2-2-3 Coastal Fisheries 18
2-2-4 Pond Culture of Milkfish 21
2-3 Facilities Related to Fisheries 23

Chapter 3 CONTENTS OF PROJECT 29
3-1 Contents of Project 29
3-2 Details on Decision of Contents of Project 29
3-2-1 59-ton Skipjack Fishing Training Vessel 29
3-2-2 20-ton Skipjack Fishing Vessel 30
3-2-3 Ice Making and Refrigeration Facilities 30
3-2-4 Fishing Gear and Equipment 31

Chapter 4 BASIC DESIGN 35
4-1 Basic Policy 35
4-2 Basic Design 35

4-2-1 59-ton Training Vessel 35
4-2-2 20-ton Skipjack Fishing Vessel 38
4-2-3 Ice Making and Refrigeration Facilities 40
4-2-4 Fishing Gears and Equipment 45
4-3 Rough Estimation 47
4-4 Basic Design Plan 47
4-4-1 59 GRT Training Vessel 48
4-4-2 20 GRT Training Vessel 52
4-4-3 Ice Making/Brine Freezing Facilities 54

Chapter 5 EXECUTION PLAN 71
5-1 Execution Organization 71
5-2 Construction Plan 71
5-3 Process Plan 71
5-4 Management and Control Plan 73
5-4-1 59-ton Type Training Vessel and 20-ton Skipjack Vessel 73
5-4-2 Ice Making, Freezing Facilities 80

Chapter 6 OVERALL EVALUATION OF THE PROJECT 87
6-1 Priorities of the Programs 87
6-2 Scale Selection of the Investment Items 88
6-3 Estimation of the Effects 89

Chapter 7 CONCLUSION AND RECOMMENDATIONS 93

ANNEX
Annex I Members of the Survey Team 97
Annex II Itinerary for Survey 98
Annex III Participants to the Discussion Meetings 101
Annex IV Minutes of Discussions 102

CHAPTER 1

OUTLINE OF THE SURVEY

Chapter 1 OUTLINE OF THE SURVEY

1-1 Objectives of the Survey

The Government of the Republic of Kiribati made a request for grant aid to the Government of Japan in the forms of training vessels, ice making/brine freezing facilities, etc. as an extension program of the Fisheries Development Program.

In response to this request, Japan International Cooperation Agency carried out a basic design survey under the following objectives:

1. Thorough examination of the background and the contents of the request made by the Government of Kiribati, study of its role, and outlook for the purpose of fishery promotion.
2. Execution of field surveys in order to collect necessary information and to grasp the actual conditions which enables to study and evaluate the request contents from technical and economical points of view.
3. Confirmation of the contents of the project by thorough discussion between both Governments based on the results of the above mentioned survey.
4. Completion of proper basic design in Japan and preparation of the report essential for the examination of the project as a candidate for grant aid program.

1-2 Background of the Request

Since phosphate mining could not hold the national economy of the Republic of Kiribati any more, the Government of Kiribati has decided to develop the replacement industry. In order to realize a self-supporting economy, the first priority was given to the fishery promotion program, especially to the skipjack/tuna export industry. Kiribati has repeatedly conducted surveys and test operations to find out the skipjack/tuna resource potentialities since the biginning of 1970 and has seen a certain extent of good results.

At the early stage of this program, Kiribati received skipjack training vessels from England and Japan and, in consequence, established the National Fishery Corporation to systematize the whole functions, and the Corporation has been planning the ways to the development.

However, in order to supplement the lack of this project and to make it effective, Kiribati feels the need to increase the number of training vessels and fishing boats for more fish catch and training opportunities and, as a result, to expand land facilities for ice making and refrigeration.

1-3 Members of the Survey Team

The Survey Team was organized into six members headed by Mr. Tatsuhiko Iwasawa of the International Division, Oceanic Fisheries Department, Fisheries Agency, Ministry of Agriculture, Forestry and Fisheries as shown in Annex 1.

1-4 Itinerary for Survey

The survey was conducted for 19 days from February 8 and February 26 as shown in Annex II.

1-5 Participants to the Discussion Meetings

Throughout the survey period, the survey team made discussions with many parties concerned; Government officials of the Republic of Kiribati, people from private sectors as well as with the Japanese Embassy members, and tried to grasp the actual local conditions.

The officials from the Government of the Republic of Kiribati are as shown in Annex III.

1-6 Field Survey

1-6-1 Discussions with the Officials Concerned of the Government of the Republic of Kiribati

The survey team had discussed and learned about actual local conditions. Then the confirmation of the following items were made between the officials concerned of the Government of Kiribati and the survey team.

(1) National Development Plan and Fisheries Development Program
(2) Fisheries Development Program and its relevance to the request made this time.
(3) The contents
(4) Project Implementation system
(5) Maintenance and management plan
(6) Selection of the facility sites

1-6-2 Field Surveys on Actual Conditions

The survey team collected information and data and, at the same time, conducted field surveys on the following matters which are necessary for the basic design.

(1) General conditions of fisheries
(2) Skipjack, tuna fisheries
(3) Freezing, refrigerating facilities
(4) Port and fisheries related facilities
(5) Planned shore facilities
   a. condition of construction site
   b. locally procurable materials and equipments, and construction labors
   c. utilities and their fees
   d. related plans
   e. legislation

1-7 Minutes of Discussions

After the discussions with the officials concerned of the Government of Kiribati, keeping the survey results in mind, Minutes of Discussions was prepared and signed by both parties as shown in Annex IX. The Minutes mentions the outline of the project, priorities and the facilities/equipments to be prepared by the Kiribati Government.

CHAPTER 2

BACKGROUND OF THE PROJECT

Chapter 2 BACKGROUND OF THE PROJECT

2-1 National Development Program

In April 1979, or just before its independence, Kiribati formulated its 1979-82 National Development Program. In this program, various problems with which Kiribati was confronted were ascertained and the future direction was laid and realistic proposals were made.

The fundamental propositions of the Program are as follows.

(1) Establishment of its own constitution and political system preserving Kiribati's inherent culture,
(2) Development of remaining resources for the maintenance and improvement of local inhabitants' living standard without the revenues from phosphate ore whose production was once the nation's main economic support,
(3) Adoption of measures to cope with population increase and its concentration in urban area (Tarawa), and
(4) Maintenance of friendly ties with foreign nations with special emphasis on the reinforcement of cooperative relations with South Pacific nations.

In February 1981, the Ministry of Finance of the Republic of Kiribati issued an economic white paper (KIRIBATI. A review of the Economy and its future prospects). In it, it is pointed out that Kiribati's geographical environment of being a solitary island and limited natural and human resources are hindering its economic development, and that the nation only has marine resources, coconuts and handicrafts. In spite of all this, development of marine resources is a particularly important subject and the Government has been encouragingly promoting its fishery program.

2-2 Fisheries Development Program

The previously introduced Kiribati's economic white paper also states:

Although various programs, related to the Fisheries Development Program, have been positively examined with particular efforts on the skipjack/tuna export industry and milk fish culture, none of them has yet replaced phosphate ore as a conspicuous main revenue of the nation. At any rate, no matter what problems Kiribati confronts, they should be solved with multiple strategy.

Actually, the last survey of the Team found various obstacles to skipjack/tuna export. Moreover, the completion of the culture pond had taken more days than expected, since milk fish culture development requires engineering works.

The Ministry of Natural Resources Development takes charge of the Fisheries Development Program and its present objectives were revised into the following three items from the original National Development Program.

(1) Promotion of the skipjack and tuna export industry,
(2) Promotion of coastal fisheries, and
(3) Promotion of culture fisheries (milk fish).

(1): As for the skipjack/tuna export industry, the survey of its resources was conducted by Daini (2nd) Kyoryomaru in 1977 to '78. And in 1978, the first phase of training was initiated with the entry into service of Nei Manganibuka, a 100-ton skipjack fishery survey and training vessel provided by the British Government. Then in February 1981, Nei Arintetongo, a 100-ton skipjack fishery training vessels and Fish Marketing Center were provided by the Japanese Government, which contributed to the increase of training opportunities and fish catch. Although ahead of this achievement, efforts had been made to establish a joint firm with foreign enterprises so as to industrialize facilities and vessels, none of the foreign companies had embarked on the scheme due to the lack of basic complete equipment of harbor and land facilities essential for industrialization. However, it was clear that two 100-ton skipjack fishery vessels, an existing 50-ton refrigerator and the Fish Marketing Center (ice-making capacity: 1 ton/8 hours) were best used by none other than efficient operation brought about by industrialization. Therefore, in February 1981, the Kiribati Government

established Te Mautari Ltd., 100 percent government-financed National Fishing Corporation, which started the operation of two training vessels, exportation of skipjack/tuna, purchase of fish from coastal fishermen, its refrigeration, storage and sales. The result of one year operation of the National Fishing Corporation is mentioned later in this report.

(2): Promotion of coastal fisheries and milk fish culture fisheries is mentioned later in this report. The Kiribati Government had recognized early that already at the time of the survey the Fisheries Development Program contained several problems to be solved, and so the request was made to the Japanese Government on this occasion as part of a concrete measure of their solution.

2-2-1 National Fishing Corporation (Te Mautari Ltd.)

Since the formulation of the National Development Program, the Government of Kiribati had in mind the establishment of a joint skipjack and tuna fishing firm with capital invested jointly with foreign companies (Japanese and American) and made a variety of approaches, but the project has not been realized.

With the grant of skipjack fishing vessels, refrigerators, etc., the time approached for the establishment of a national fishing corporation of its own. With the Government's investment in kind, Te Mautari Ltd. was established in February 1981.

Each of definite items in this project belongs to the National Fishing Corporation and is to be managed thereby. Given below is the Corporation's organization, lines of business, personnel and the statement of accounts for fiscal 1981, which are the basis of "Control and Management Plan" of this project mentioned later in this report.

The outline of this firm and its financial statement for fiscal 1981 are shown below.

(1) Location of head office and facilities: Betio, South Tarawa (with branches at Bairiki and Bikenibeu for the sale of reef fish)

(2) Lines of Business, Organ :ation and Personnel

Section	Lines of Business	Main facilities	Personnel
Headquarters	Overall supervision and administration		Six besides General Manager
Operation Division	Fishing of skipjacks and tuna	Nei Manganibuca Nei Arintetongo (both are skip-jack vessels)	60 besides captains
Marketing Division	Export and domestic sales of skipjack and tuna	S. Tarawa Fish Marketing Ctr.	2 supervisors
	Purchase and sales of reef fish	50-ton refrige-rator	5 maintenance men
	Production and sales of reef fish	Bairiki and Bikenibeu marketing centers	10 market hands

(3) Balance Sheet for FY 1982 (Feb. - Dec.)

Balance Sheet (as of Dec. 31, '81)

	Cost or valuation	Depreciation	Net Book value
Fixes assets	1,921,475.59	212,791.00	1,708,684.59
Current assets			
Stock		60,485.00	
Goods in transit		8,569.87	
Debtors		90,162.35	
Cash on deposit		74,099.90	
Cash in hand		2,323.14	
Less current liabilities			
Creditors	189,510.32		
Bank overdraft	4,042.41		
		193,552.73	
Net current assets			42,087.53
			$1,750,772.12
Financed by:			
1,940,005 shares of A$1 each			1,940,005.00
Less profit and loss account			
Debit balance			(439,232.88)
Long-term loan			250,000.00
			$1,750,772.12

Balance sheet

Fixed assets	Cost or valuation	Depreciation	Net Book value
Vessels, boats, Machinery			
Nei Manganibuka	600,000.00	68,750.00	531,250.00
Nei Arintetongo	900,000.00	82,500.00	817,500.00
Angirerei	10,000.00	4,585.00	5,415.00
Skipjack	6,000.00	1,835.00	4,165.00
Skiffs	8,100.00	2,719.00	5,381.00
Outboard motors	4,444.00	2,175.00	2,269.00
Buildings			
Fish Reception Center	300,000.00	22,917.00	227,083.00
Office Building Betio	37,500.00	3,438.00	34,062.00
Vehicles			
Petrol pick-up	500.00	500.00	
Refrigerated truck	13,400.00	6,142.00	7,258.00
Diesel pick-up	6,487.00	2,973.00	3,514.00
Equipment, Furniture			
Reception center	12,644.59	4,879.00	7,765.59
Office	2,000.00	367.00	1,633.00
Fishing nets	20,400.00	9,011.00	11,389.00
	1,921,475.59	212,791.00	1,708,684.59

Loss of operations - vessels		235,449.93
	Market	157,982.13
	Head office	36,307.20
	Angirerei	9,493.62
		439,232.88

2-2-2 Skipjack and Tuna Fisheries

Near Betio, the base for the pole-and-line fishing of skipjack and tuna, are a lagoon where live bait may be caught and a milk fish hatchery. It also serves as a supply center of fuel, water and other necessary commodities. Given these factors, Betio is best fitted as

the basis for skipjack fishing vessels.

The fishing waters for which Betio is used as the base comprise the coastal waters of Tarawa, Nonouti and Abemama. In these waters, comprehensive and organic ship fishing operations must be planned and conducted.

(1) Pole-and-Line Skipjack Fishing from Large Vessels

The two 100-ton training vessels, the Nei Managanibuka and Nei Arintetongo, which belong to the Operation Division of the Kiribati Fishing Corporation in Betio carried out sipjack fishing operations from February through December 1981, with catches of 358 and 364 tons respectively, but the results were not satisfactory in terms of profitability, as indicated below.

Balance Sheet for 100-ton Training Vessels (Feb. 1 to Dec. 31, 1981)

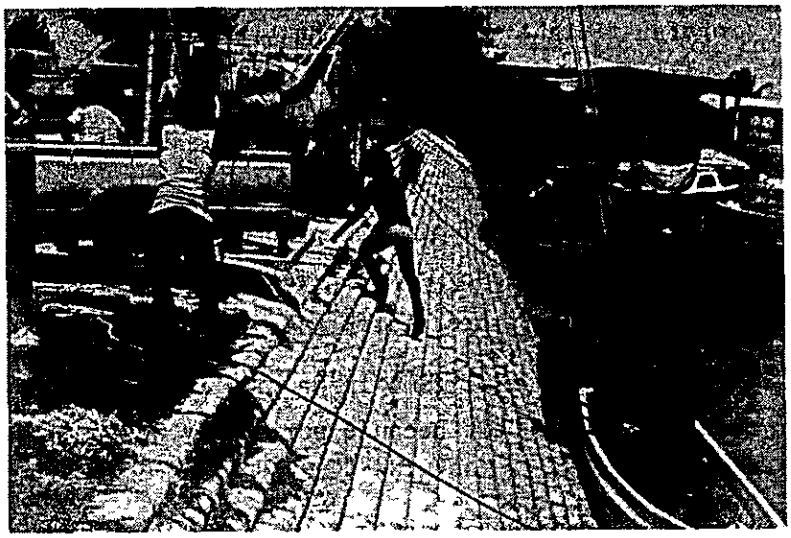
			Te Mauritai Ltd.
Income			
Proceeds of skipjack and tuna sold to Hawaii (FOB, Majuro)	682.6 S/T		482,605.64
Agent commission and other fees in Majuro			
Freight (Tarawa-Majuro)		8,763.67	
Agent commission	Ship control fees	4,280.27	
	Labor costs	4,541.19	
	Transportation, shipping costs	7,438.53	
	Miscellaneous	411.23	
			25,404.89
			451,170.75
Income of miscellaneous commission fees			1,404.87
Income from rescue work			27,000.00
Balance on hand			485,575.34

Expenditures

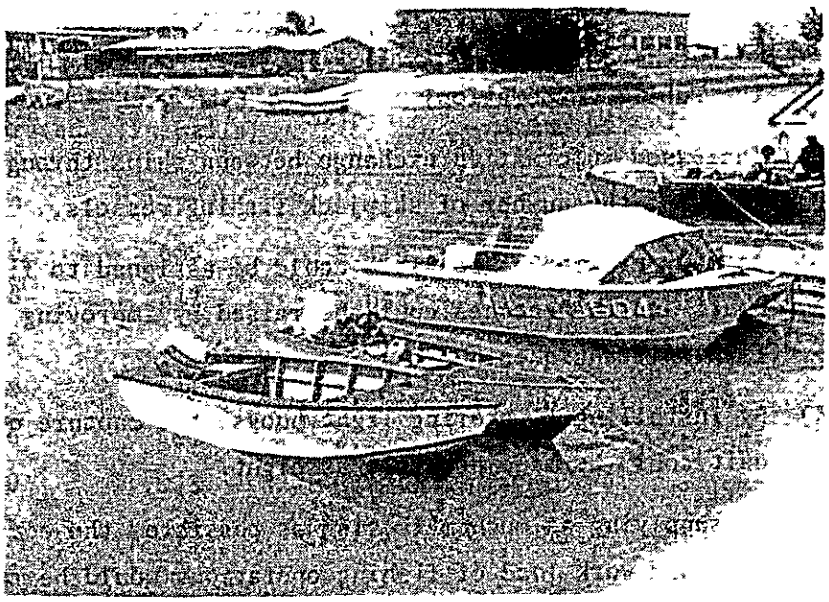
	Ne Manganibuka	Ne Arintetongo	Total	
Fuel	163,192.77	158,415.06	321,607.83	
Food	18,337.15	19,699.23	38,036.38	
Wages	46,674.78	45,060.96	91,735.74	
Commission	7,641.18	6,325.84	13,967.02	
Brine salt	3,447.84	3,618.73	7,066.57	
Fresh water	935.84	958.46	1,894.30	
Deck expendables	2,081.09	1,235.16	3,316.25	
Labor costs for fresh water	1,474.20	1,626.20	3,100.40	
Bait	19,995.67	18,779.88	38,775.55	
Fishing gear	2,542.10	735.04	3,277.14	
Clothing	2,305.31	497.07	2,802.38	
Total direct expenses			525,579.56	
Goods on hand at term end			15,808.00	
				509,771.56
Miscellaneous	957.71	819.71	1,747.42	
Allotments from Operation Div.			2,268.05	
Paid holidays	1,154.80	994.10	2,148.90	
Transportation	2,251.95	2,952.47	5,204.42	
Insurance	18,711.31	15,988.61	34,699.92	
				46,098.71
Depreciation				
Ships	68,750.00	82,500.00	151,250.00	
Skiffs	733.00	1,986.00	2,719.00	
Outboard motors	275.00	1,900.00	2,175.00	
Fishing nets, gear	4,000.00	5,011.00	9,011.00	
				165,155.00
Net loss after depreciation				- 235,449.93

An analysis of the above deficit operations indicates:

a. The number of operation days was extremely small, standing at 14-15 days a month, because:



Landing of Skipjack/Tuna at Betio Port



Speedboats for Skipjack/Tuna Hand Line Fishing
(Betio Port as Fishing Base)

(1) Due to a suspension of the services of the Daiwa Line (regular freight services), the training vessels were compelled to transport fish to Majuro in the Marshall Islands by themselves, losing chances for fishing operations;

(2) There were losses of time for the pumping of water, etc., due to the deficiency of port facilities and the inexperience of the shore staff; and

(3) There were losses of time in waiting for port entry after capture of live bait because port entry was not possible at night.

b. There were sharp rises in fuel costs and increases in cost due to the conditions of location of Tarawa.

The following are step which could be taken concerning the above.

a. Increases in Fish Catches

(1) The operating efficiency of the skipjack fishing boats could be raised with the employment of transports to Majuro or the U.S. possession of Samoa (under study at the Public Corporation).

(2) Increased information exchange between ships through increasing the number of skipjack fishing vessels.

(3) As many crewmen as possible could be assigned to fishing boats and the catches could be raised by improving the fishing techniques.

(4) By installing flickering light buoys, the capture of live bait could be made possible at night.

(5) By supplying as much milk fish as possible, the coeficiency and work load of fishing operations would be raised.

b. Cost Reduction

(1) To cope with high rises in the costs of fuel and other

supplies, consideration could be given to purchasing low-cost fuel, brine salt and other supplies from the U.S. possession of Samoa by transport.

(2) By increasing the number of medium-sized skipjack fishing vessels, savings could be effected in the fuel costs of skipjack fishing boats and further fuel saving efforts could be made by operating skipjack fishing boats in a more efficient manner while giving life to the merit of concerted fishing operations between ships.

(3) Pole-and-Line Fishing of Skipjack with Small Fishing Boats

At present, about 16 14-foot wooden speedboats are engaged in the hand line fishing of skipjack and tuna at Maiana Bank, about 20 miles south of Betio. These boats are able to catch about 100 kilos a day but are not equipped as fishing vessels and certains aspects of their safety are dubious. Consequently, it is desirable that they be replaced by larger FRP vessels and that the hauls be increased with the introduction of smaller fishing boats.

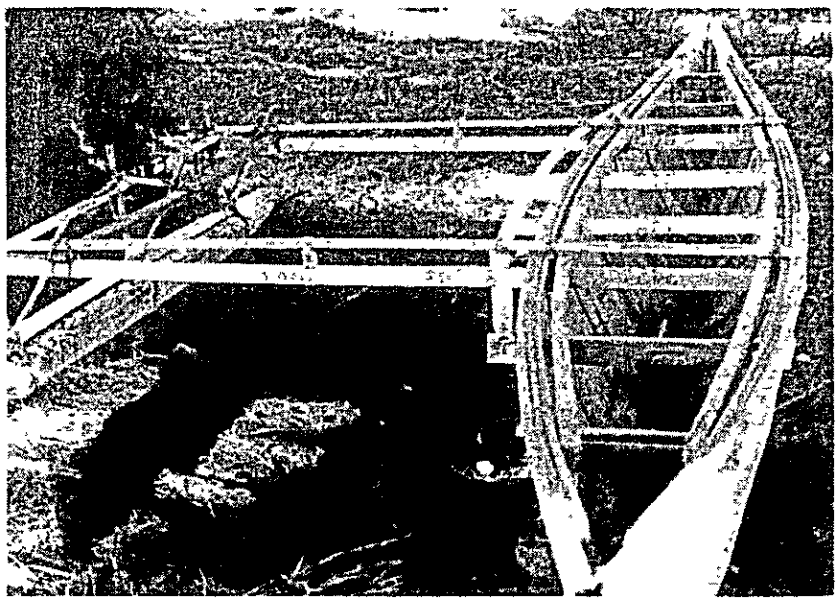
Operations of Nei Arintentongo in 1981

Month	Days Operated	Bait used (in pails)	Skipjack	Yellofin tunas	Total	Total Tonnage (S/T)
2	14	571	5,816	1,145	6,961	25,518
3	16	665	5,419	7,369	12,788	44,063
4	8	517	2,054	2,118	4,172	12,419
5	18	836	9,420	2,009	11,429	36,622
6	9	545	8,203	984	9,187	24,519
7	16	869	2,336	2,002	4,358	11,828
8	20	1,023	9,455	-	9,455	31,390
9	13	1,198	22,589	886	23,475	82,412
10	15	1,050	4,714	5,998	10,712	37,667
11	14	983	2,995	4,626	7,621	31,658
12	8	458	2,781	3,059	5,840	26,472
Total	151	8,615	75,782	30,216	105,998	374,568

2-2-3 Coastal Fisheries

(1) Reef Fishing Aboard Canoes

Before the Betio Fish Marketing Center was put into operation with Japan's grant aid in 1981, reef fish in the lagoons had been captured in a primitive manner from canoes, and the fish thus caught had been consumed by the fishermen's families, with surpluses being sold by them. Since the Fish Marketing Center was equipped with ice making, freezer and cold storage facilities and opened stocker-furnished fish marketing stations at Bairiki and Bikenibeu, fishermen have been able to buy ice from, and sell their fish to, the Fish Marketing Center. The fish thus bought are frozen and stored for sale to consumers at a rate of about one ton a day with a margin of about 40%. As a result, the distribution process from production to consumption has been greatly improved, while fishermen have become eager to produce more and their cash earnings have increased. On the other hand, as it has become a practice to assure the stable supply of fresh fish to consumers, there has been much progress in the distribution economy. Canoes, which had not been motorized, are now equipped with outboard engines. At present, about 20 canoes with outboard engines catch reef fish for unloading at the Fish Marketing Center. Fishing methods are the hand line method and the scoop-net fishing method with gill and landing nets.



Canoes with Outrigger

Payment Voucher Slip of Te Mauritari Ltd.

Given below is the form of a payment slip used by Te Mauritari for the purchase of fish from fishermen.

TE MAURITAI LTD.

PAYMENT VOUCHER SLIP

No. _____

Date _____

Name _____

Grade I	Weight LBS			Value
Ikanibong	_____	a	.454	$_____
Morikoi	_____	a	.454	$_____
Ikari	_____	a	.454	$_____
Onauti	_____	a	.454	$_____
Grade II				
Skipjack & YF/tuna	_____	a	.254	$_____
Other reef fish	_____	a	.354	$_____
Grade III				
Reef fish under 8"	_____	a	.304	$_____
Reef fish over 5 lbs	_____	a	.304	$_____
Total weight/value	_____			_____

Signature _____ Rcd by _____

Selling Price to Consumers

	Betio	Baikari	Bikenibeu
Grade I	0.60 ¢/lb	0.60 ¢/lb	0.65 ¢/lb
Grade II	0.50	0.50	0.55
Grade III	0.45	0.45	0.50

(2) Small-Scale Shore Fishing

Using an extremely primitive fishing method, fishermen step into the sea from the sand beach and catch very small quantities of fish with cast and gill nets for their own consumption. At low tide, bivalves

Betio Fish Marketing Center

Reef Fish Selling at Betio Fish Marketing Center

Reef Fish Selling on Street

are collected and blinds let down. For the development of marine resources off external islands, a 15-m fisheries guidance ship offered under an Australian grant aid program has been making a round of the islands since 1980 to provide guidance on fishing gear and methods.

(3) South Tarawa Fish Marketing Center and 50-Ton Refrigerator

A 50-ton refrigerator is used to store the fish caught by the two training vessels before they are transported to Majuro. The capacity of the refrigerator has now reached its limit and plans are being considered for using it exclusively for reef and lagoon fish.

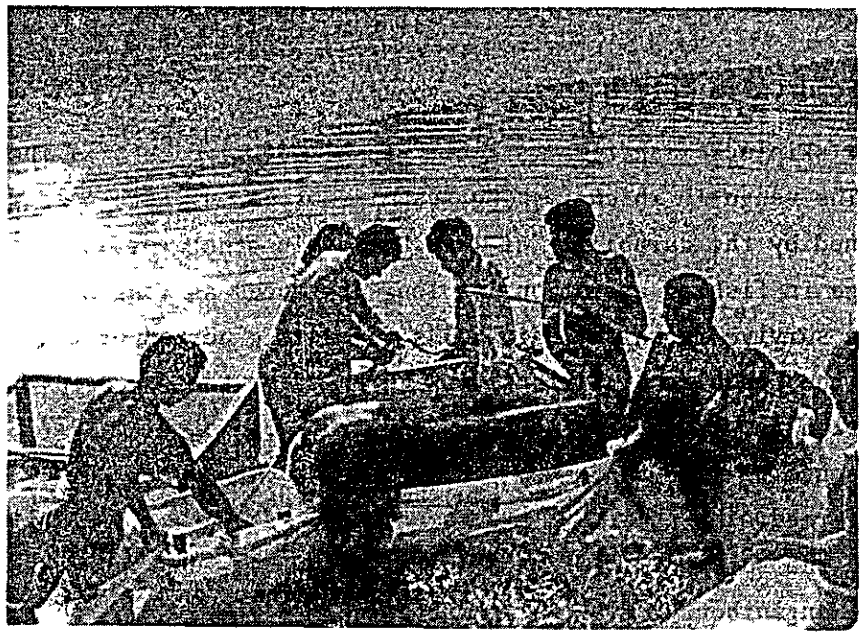
Skipjack and tuna	720 tons
Reef fish	70 tons (May - Dec.)

Of these, 660 tons of skipjack and tuna were exported and 60 tons sold for domestic consumption. Ten tons of reef fish were exported and 60 tons used for domestic consumption.

2-2-4 Pond Culture of Milkfish

For skipjack fisheries, a smooth supply of live bait is indispensable. The range in which fishing vessels may be put into operation is determined by the durability of live bait. In other words, it is possible to engage in fishing operations at long distances as long as the bait fish can survive in ships' bait holds for a long period of time. Live bait in the Republic of Kiribati was surveyed by the Japan International Cooperation Agency aboard the 59-ton Kyoryo Maru No. 2 in 1977-78 and the presence of gold sprat heering and blue backed sprat in the lagoons was confirmed. Durability tests were conducted in the ship's live-bait hold and the suitability of the fish as bait was also tested. Later, the Nei Manganibuca and Nei Arintetongo engaged in fishing operations using these fish as bait, but it turned out that they were not durable and availability limited their use to 4-6 skipjacking fishing vessels of the 50-100 ton class. With the technical cooperation of the United Nations, the Government of Kiribati in 1975 opened a sluice into a hatchery (Ambo) for the milkfish fingerlings (4 mm or so) which swam in schools near the sand beach of the lagoon for their pilot culture.

Culture Pond of Milk Fish (TEMAIKU)



Small-size Milk Fish as Live Bait for Skipjack Fishing
(Scooped with nets)

This experiment proved more or less successful. A new hatchery has been constructed for milk fish which are useful both as live bait for skipjack and as food in Temaiku (40 hectares). This hatchery is being expanded by 40 hectares. The output of milk fish in 1981 stood at about 32 tons, with 10 tons (some exported to Nauru) being used for bait for large fish and 16 tons for bait for small skipjack. The cultivation of milk fish may possibly increase job opportunities for local fishermen and their cash earnings, as fingerlings are purchased from fishermen in North Tarawa at a price of A$5.00 per 1,000. It may also contribute to the supply of live bait to skipjack fishing vessels and also to the development of live bait. Large milkfish are sold for A$1.32/kg for food and small milkfish for A$2.50/kg for live bait.

2-3 Facilities Related to Fisheries

(1) Ports

The major port of Kiribati is Betio on Tarawa Island, other ports include ones on Banaba and the Christmas Island. Betio Port is managed by the Port Department of the Shipping Corporation of Kiribati and ships are controlled by its Ship Department. Immigration, customs clearance, quarantine, etc., at port entry are also carried out. Betio Port has a depth of 2.5 m or so. Small vessels, less than 20 meters in length, may enter port at high tide but large ones drift outside the port.

a.	Wharf	None
b.	Stevedoring Facilities	
	Cranes	20 t x 1, 5 t x 1
	Forlifts	2 t x 2
	5-ton truck	1
	Tractors	3
	5-ton trailors	6
	80-ton-cargo barge	5
	Tugboats	3
	100-ton-cargo barge	1

	Passenger launch (66 men)	1
	" (32 men)	4
c.	Longshoremen	Available on a 24 hour a day basis. Labor efficiency: 29 tons/hour
d.	Shore Warehouses	
	for General cargoes	1,167 m^2
	for Copra	1,000 m^2
	for Cereals	315 m^2
e.	Containers	There is room for about 120 containers. Power supply is available for refrigerated containers.
f.	Oil and Water Supply	Two BP oil tanks and four Mobil tanks are available near the port. They are capable of storing 33,000 gallons (about 150 kiloliters) of marine diesel. Ships other than those of the Shipping Corporation of Kiribati cannot be supplied with oil and water except in the event of an emergency.
	Oil supply	Ordinary ships are supplied only with marine diesel oil by barge. Training vessels of the Shipping Corporation of Kiribati are refueled while they are drifting with a hose from the pipeline which is stretched to the tip of the causeway. Price: A$480/kiloliter
	Water supply	Barges are used for water supply. Price: A$6.50/t (including the cost for the use of a barge)

(2) Repair Facilities

The Kiribati Shipyard Division of the Ministry of Communication and Works has a slipway in Betio Port.

a. Establishment of the Shipyard: 1950

b. Emplyees: 56

c. Repair division: Machinery, Department, Electricity Department, Whiff Department and Boiler Department

d. Recently Built Ships

74'6" landing barge	1	A$280,000
40'0" tugboat	1	90,000
Small barge (for use in the port)	3	90,000
" (for Christmas Island)	1	30,000

e. Ship Repairs in 1981

40-ton ferryboats	4
Small ships	5
FRP boats	A few

As regards repair capacity, very difficult repair work cannot be conducted due to the unavailability of sophsticated technology and facilities.

(3) Tarawa Seamen Training Center

With the assistance of the UNDP and Britain and investments from shipping firms in Britain and West Germany, the Tarawa Seamen Training Center was established in Betio in 1967 to train seamen for assignment to the two sponsoring firms' ocean-going ships as deckhands, firemen and stewards. Primary training for seamen is provided at the center. The object is for them to be assigned to foreign ships and remit hard currency to Kiribati. The center has 45 instructors, of whom three Germans, including one as the center director, are from the South Pacific Marine Service Association (SPMS), which is established by nine West German shipping firms and which has 75 vessels.

Males aged 17-23 are gathered from all over Kiribati for enrollment.

After admission, all trainees are housed in a dormitory to undergo four months' training. They finish the course at a rate of 40 graduates a time, including 25 trainees in the Navigation Department, 13 in the Engine Department and two in the Galley Department. Thus 120 junior seamen are trained a year. The curriculum at the center covers basic knowlidge for seamen, such as the lifting of dinghies, splicing of ropes and wires, disassembly of diesel engines and dynamic theories of derricks. It is to be strongly hoped that as many seamen as possible be allowed to go aboard the 59-ton training vessel which is to be provided by Japan and that graduates from the Engine Department acquire a license as early as possible after on-the-job training to contribute to the development of Kiribati's fisheries as skillful seamen both in name and reality.

CHAPTER 3

CONTENTS OF PROJECT

Chapter 3 CONTENTS OF PROJECT

3-1 Contents of Project

Upon the request of the Government of Kiribati, equipment to be provided by the Japanese Government and their priorities have been confirmed as follows.

1)	59-ton skipjack fishing training and research vessel	1
2)	20-ton skipjack fishing boat	1
3)	Ice making plant and brine freezing facilities	1
4)	59-ton skipjack fishing training and research ship	1
5)	Refrigerator for frozen skipjack and tuna	1
6)	Office	1
7)	Fishing gear and equipment	1 set

On the basis of the field survey and analysis of the above mentioned items after return to Japan, it was concluded that the followings were the proper items to be provided in this project.

1)	59-ton skipjack fishing training and research ship	1
2)	20-ton skipjack fishing boat	1
3)	Ice making plant and brine freezing facilities	1
4)	Fishing gear and equipment	1

3-2 Details on Decision of Contents of Project

3-2-1 59-ton Skipjack Fishing Training Vessel

Taking into account the distribution of skipjack/tuna fishing ground with Betio as the base, the density of the fish resources, the life span of live bait captured in the Gilbert atolls, the fish hauling coefficiency of fishing vessels (There is no great difference in the number of crewmen between this type of vessel and a 100-ton fishing vessel.), cost-effectiveness (fuel saving with the installation of smaller engines) and

so on, 59-ton skipjack/tuna fishing vessels are considered to be suitable for the fishing operation, since its sphere of operation is at most about 50 to 60 miles from each of the bait grounds (Abemama, Maiana, Butaritari Abaian, Nonoushi, Tarawa and others). Besides, live bait captured in the atolls (gold spot herring and blue backed sprat) is not so abundant in quantity. Therefore, taking account of this factor and the scale and actual results of the supply of small size milk fish produced in the Temaiku culture pond designed for bait (See page 24), the number of 50- to 100-ton skipjack fishing vessels which can be operated hereafter in the Gilbert sea area is probably limited to at most 4 to 6 vessels.

3-2-2 20-ton Skipjack Fishing Vessel

At the Maiana Bank, south of Betio, speedboats are engaged in the hand line fishing of skipjack and tuna, going out and returning in one day. Since they are just simple boats, their safety is dubious and there are no facilities for storing hauled fish. Simple nautical instruments, fishfinders and transmitter-receives are installed on then. If 20-ton skipjack fishing vessels made of reinforced fiber plastics (RFP) are operated for fishing at close distances, they can easily manage to go in and out of the shallow Betio Port and engage in efficient and highly profitable operations.

3-2-3 Ice Making and Refrigeration Facilities

At present, Fish Marketing Center at Betio Port is maintained and controlled in good condition by a British supervisor. The existing facilities which are capable of freezing fish at a rate of 1 ton/8 hours and making ice at a rate of 3 tons/day are forced to produce more than their capacity in view of the fish hauls. In addition to the shortage of facilities capacity, this invites deterioration of the facilities. Secondary, facilities are meant for use with reef fish and are in efficient for freezing skipjack and tuna. In light of these factors, it has now become necessary to refurbish the ice making and freezing facilities of the Fish Marketing Center to cope with increases in the number of fishing vessels and in demand and consumption.

Under this project, the freezing facilities will adopt a brine system, which is the most efficient for exclusive use in fishing for skipjack and tuna with fishing boats making one day trips. The capacity will be set at more than 1,000 tons a year to cope with future increases in demand. The existing ice making plant produces flake ice but the new facilities will produce block ice to supplement each other. As for its scale, the demand is expected to exceed 1,000 tons a year for fishing and distribution.

3-2-4 Fishing Gear and Equipment

The National Fishing Corporation will operate a total of four skipjack fishing training vessels, including two proposed vessels 59 GRT training vessel and 20 GRT. The existing vessels have been increasingly instrumental in producing training results. After the supply of new vessels, it is expected that the achievement of the Corporation will be sharply stepped up. In addition to these circumstances, the fishing gears (expendables such as skipjack lures, fishing but, glass lots and bait net etc.) are indispensable for skipjack fishing. As the shortage of such fishing gear will seriously affect the implementation of the Program, along with the possible suspension of the Program, the strong request of the Government of Kiribati has been made for fishing gear irrespective of the order of priorities.

CHAPTER 4

BASIC DESIGN

Chapter 4 BASIC DESIGN

4-1 Basic Policy

For the implementation of the basic design of this program, the following policy has been determined on the basis of the actual state of skipjack fishing.

1) The basic design will be formulated with a capacity so that it may be put to effective use in the future.

2) The basic design will be so worked out that it will be organically tied in with the existing facilities.

3) Care will be given to the local landscape, the technical level and the phase of development of the project, and especially maintenance and control.

4) In working out a construction program, efforts will be made to simplify the construction as much as possible in respect to the land facilities which are mostly to be constructed locally.

4-2 Basic Design

4-2-1 59-ton Training Vessel

(1) Design Plan

1) Operation Sea Area: The operation sea area will be Kiribati's exclusive fishing zone which is calm and little affected by typhoons, etc., as it is located along the equator.

2) Type of Vessel: Japanese style skipjack fishing vessels will be basically adopted, as Japan has many years of experience in pole-and-line fishing for skipjack.

3) Specifications: The ships must pass a JG test.

4) Tonnage and Horsepower: In view of the formation of the fishing grounds, the lifespan of live bait and the cost-effectiveness of operations, the ships are to have a tonnage of 59. As there will be no competition with other fishing vessels, the main engine should be a fuel saving 400 HP engine.

5) Construction: As the live bait is to be caught in a lagoon of which the water depth, sunken rocks, etc., have not been precisely surveyed, the ships will be made of steel taking into account its safety and maintenance.

6) Complement: As the ship is to be used for training in the fisheries industry, as many Kiribati seamen as possible will be aboard the ship to undergo training and efforts will be made to increase fish hauls.

7) Fish Hold: To raise the operation efficiency and exports, the ships will be equipped with a brine freezing tank. The live bait hold will be of the forced circulation type, which is effective for the inboard storage and culture of live bait.

8) Living Quarters: In the light of the physical constitution of I-Kiribati, the deck height will be made higher to make life onboard easier and safer.

9) Navigational Instruments: The instruments to determine the ship's position will be highly precise ones according to NNSS. For radio equipment, an SSB radio telephone system, which is of much use in port entry and departure and for exchanges of information, will be installed.

10) Fishing Gear for Live Bait: The gear for the capture of live bait will include, bouke-ami, beach seine nets and fish-luring lights.

11) Others: The basic design will be worked out so the various data of the two boats Nei Manganibuka and Nei Arintetongo which are in operation at present may be fully consolidated for use by skipjack fishing vessels.

(2) Basic Specifications

Type of Vessel:	Japanese style skipjack pole-and-line fishing ship
Gross tonnage:	Approx. 59 tons
Construction:	Steel
Dimensions:	Approx. 24.5 x 5.4 x 2.3 m
Brine tank:	" 25.0 m^3
Bait hold:	" 20.0 m^3
Fuel tank:	" 25.0 m^3
Fresh water tank:	" 8.0 m^3
Main engine:	400 HP x 1
Auxiliary engine:	120 HP x 2
Freezing capacity:	Approx. 3.5 tons/day
Water purification system:	
Generator:	100 KVA
Propeller:	Four-blade-in-one type manganese bronze
Service speed:	Approx. 9.5 knots/hour
Complement:	25 men
NNSS:	1 unit
Gyrocompass:	1 unit
Steering gear:	1 unit
Radar:	1 unit
Direction finder:	1 unit
Fish finder:	1 unit
SSB transmitter-receiver:	1 unit
Fishing gears for live bait	
5.5 m FRP boats:	2
25-HP outboard motors:	3
Bouke-ami (25 x 35 m):	1 set
Beach seine (100 x 4 m):	1 set
Fish-luring lights:	1 set

(3) Rough Estimate of Total Expenditures

59-ton Training of Vessel	¥ 183,305,000
Fishing Gears for Live Bait and Accessory Fishing Gears	¥ 18,304,000
Total	¥ 201,609,000

(Note) This excludes transportation fee and reserve fund.

4-2-2 20-ton Skipjack Fishing Vessel

(1) Design Plan

1) Operation Sea Area: The sea area at a distance from Betio Port which can be reached and returned from in a one-day trip.

2) Type of Vessel: The ship will be of the Japanese type, as Japan has many years of experience in pole-and-line fishing of skipjack.

3) Specifications: The ships must pass a JG test.

4) Tonnage and Horsepower: The tonnage will be 20 tons and the horsepower around 150 with due consideration given to the safety of the ship's navigation and the cost-effectiveness since the ship will be engaged in fishing operations on a one-day-trip basis.

5) Construction: The ship will be constructed of fiber reinforced plastic (FRP) with due consideration given to the operating range, cost-effectiveness of fuel with a lightweight hull, etc.

6) Complement: The design plan is the same as that of the 59-ton skipjack fishing training vessel.

7) Fish Hold: As the ship is to be engaged in one-day trips, block ice will be used in addition. A small refrigerator will be used for refrigeration with seawater. A forced circulation system will be used for the live bait hold.

8) Navigational Instruments: The navigational instruments will include, among others, a magnetic compass, an SSB transmitter-receiver, a direction finder and a fish finder.

9) Fishing Gear for Live Bait: In accordance with the design plan for the 59-ton skipjack fishing training vessel.

10) Others: The design plan will be formulated so that the various data of skipjack fishing FRP ships may be fully integrated.

(2) Basic Specifications

Type of Vessel: Japanese style pole-and-line fishing boat
Gross tonnage: Approx. 20 tons
Construction: FRP
Dimensions: Approx. 15.5 x 3.6 x 1.45 m
Cold seawater and ice hold: 9.0 m^3
Live bait hold: Approx. 7.0 m^3
Fuel tank: " 4.0 m^3
Fresh water tank: " 3.0 m^3
Main engine: Less than 150 HP
Auxiliary engine: 50 HP
Electric generator: 40 KVA
Cruising speed: about 9.0 knots/hour
Compelement: 15 men
Magnet compass: 1 unit
Radar: 1 unit
Direction finder: 1 unit
Fish finder: 1 unit
SSB trnasmitter-receiver
Fishing gear for live bait:
4.0-m FRP boat: 1
20-HP outboard motors: 2
Bouke-ami (20 x 20 m): 1 set
Beach seine net (100 x 4 m): 1 set
Fish-luring lights: 1 set

(3) Rough Estimate of Total Expenses

20-ton Training Vessel	¥ 69,564,000
Fishing Gears for Live Bait and Accessory Fishing Gears	¥ 4,345,000
Total	¥ 73,909,000

(Note) This excludes transportation fee and reserve

4-2-3 Ice Making and Refrigeration Facilities

(1) Construction Site

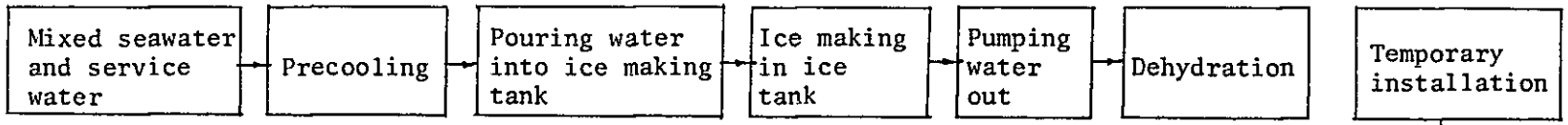
The east causeway of Betio Port has been chosen as the proposed construction site. The causeway, the end of which is shaped like a fan, has an area of about 5,778 m^2. Neither survey maps nor boring data are available but judging from the existing buildings, the soil-bearing strength may be estimated at five tons per square meter. The surface of the site is flat and there are no obstacles to be seen. The location of the buildings will be determined with due consideration given to the monument at the end of the causeway and future expansion work nearby (plans for reclamation on the eastern side of the causeway).

(2) Arrangement Plan

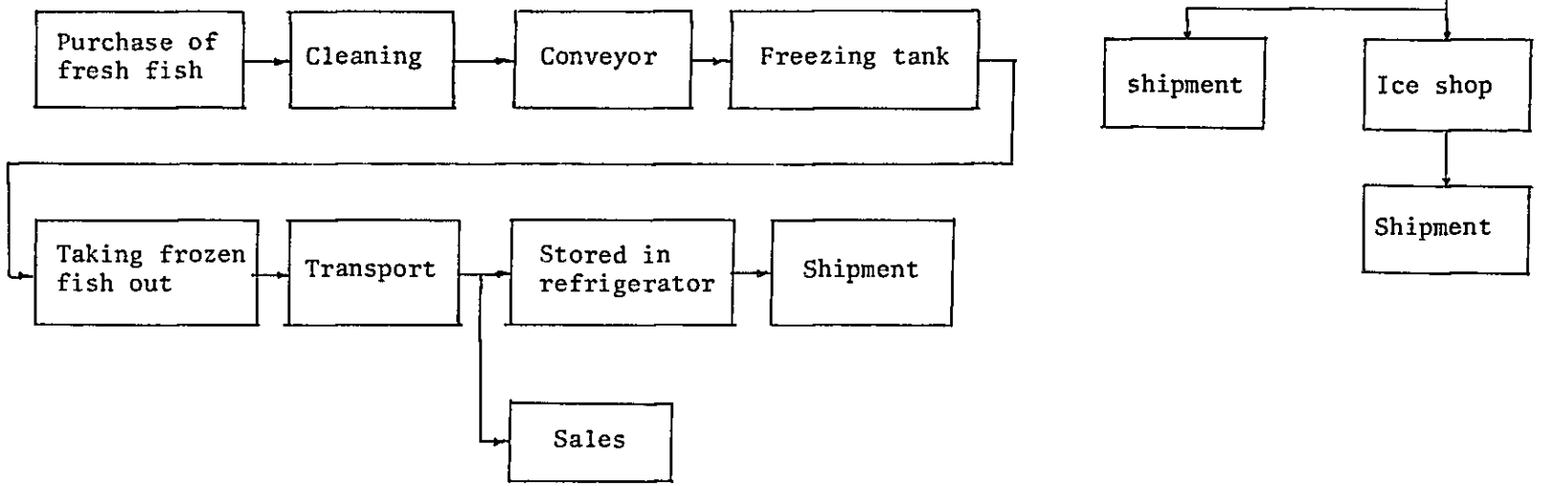
The proposed construction site is connected to the Fish Marketing Center by a simply paved road and the distance between them is about 850 m. The building will be placed so that its main entrance is on the western side or faces the port. In front of this entrance, a space for parking trucks will be secured with consideration of loading and unloading of cargo. The buildings will be comprised of an ice plant, a freezing chamber, an ice store, an office and a machinery room, and an electric generator will be set up outdoors.

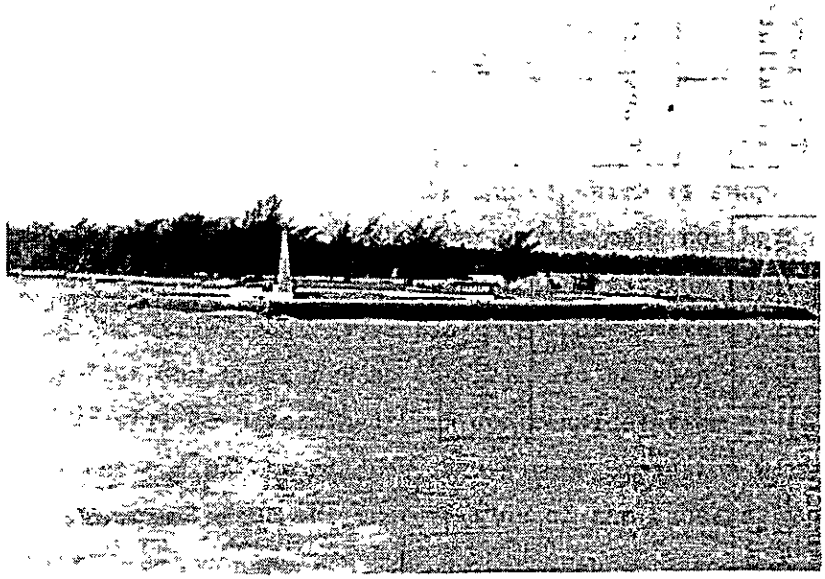
The work process for ice production and freezing is shown in the following flow chart.

Flow chart for ice making facilities



Flow chart for freezing facilities





Proposed Construction Site for Ice Making/Brine Freezing Facilities

(View from outside of Betio Port)

Proposed Construction Site for Ice Making/Brine Freezing Facilities

(View from inside of Betio Port)

(3) Estimate of Demand

a. Ice Production

In normal circumstances, one ton of ice is required for one ton of hauled fish.

1)	Fish hauls by 20-ton skipjack ship	320 tons/year
2)	Fish (skipjack and tuna) hauls by speedboat	320
3)	Fish (reef fish) hauls by canoe	100
4)	Others or for distribution	100
	Total	840

On the basis of the above values, the output of block ice in the initial year is estimated at 840 tons/year.

b. Freezing

On the assumption that the brine tank will be used exclusively for the freezing of skipjack and tuna,

1)	Fish hauls by 20-ton skipjack ship	320 tons/year
2)	Fish hauls by speedboats	320
	Total	640

On the basis of the above values, the output of skipjack and tuna in the initial year is estimated at 640 tons/year.

(4) Facilities' Capacity

On the basis of the estimate of demand in the initial year, the capacity will be made great enough to cope with future demand in a flexible manner.

1) Ice making capacity at 10 tons/day or freezing capacity at 10 tons/day

or

2) Ice making capacity at 5 tons/day and freezing capacity at 5 tons/day

The design plan will be made for one of these two capacities.

If the number of production days is set at 240 days a year, with the capacity in 2) adopted, ice production and freezing capacities will be 120 tons a year each.

3) With the ice making capacity, 20 tons of ice can be stored for 2 days.

(5) Outline of Specifications

1) Refrigerating System and Incidental Facilities ¥ 79,448,000

* Ice-making-freezing refrigerator 2 units
  Air-cooling type Condenser
  Brine cooling system
  Electric motor 3 ϕ 415 V 50 HZ
* Ice making tank, brine used, steel-made 1 unit
  External radiation
* Freezing tank, brine-freezing, 1 unit
  steel-made, external radiation
* Ice making can, 50 kg of block 200 cans
  ice per can, galvanized steel
  plate, 950 (H) x 450 x 190 mm
* Auxiliary equipments: Circulating pump, heat exchanger, precooler, brine radiator and other incidental equipment
* Cooler for ice store, ceiling-type unit cooler, ice store, heat-absorbing materials
* Secondary electric work and automatic control work: Electric construction work and automatic control construction work to be done after ice making, freezing facilities and refrigerator
* Water for ice production, seawater and service water will be mixed and used.

2) Generating Plant ¥ 15,578,000

Electricity will be supplied from the Betio Central Power Station. (50 HZ, 3 ϕ 415 V. 1 ϕ 240 V)
One generator will be installed to hardle any possible power suspensions. The output will be half of the load of the main refrigerator with a capacity of five tons or half of 10 tons a day. The lamps and tap-holes should be operatble when the electricity is cut off.

3) Building ¥ 41,940,000

One-story ferroconcrete building
Roof: Waved, colored steel plates
Walls: Waved, colored steel plates (heat-proof panels for the ice store)
Foundation: Ferroconcrete

4) Water Supply and Sewerage ¥ 7,984,000

Service water will be supplied for ice production, the workshop and the toilet. For drinking pruposes, a rainwater tank (outdoors on the ground) will be installed outdoors. Rainwater on the roof will be led into the rainwater tank by means of a conduit and a water tap will be installed inside the building for water supply. Both miscellaneous foul water and sewerage will be let in a sewerage pipe.

Rough estimate of total expenses is calculated at the conversion rate of 1 US$ = ¥240 and 1 A$ = ¥270 and also on a turn-key basis, according to which se transportation fee and field construction fee as well are included.

4-2-4 Fishing Gears and Equipment

(1) Design Plan

(1) Materials for Stick-held Net: Net, vinylon ropes, vinylon mending thread, Kuremona ropes, FRP pipes

(2) Skipjack glass fiber poles: 3.1, 3.3 and 3.5 m

(3) Skipjack pails and fishing gears various skipjack pails,

(4) Nylon gut for skipjack fishing: various types, 100 m per reel

(5) Ropes: For the training ships and the capture of live bait

(6) Beach seine materials: Russell net, chains, etc.

(7) Accessory fishing gears: Net needles, nylon gloves, rubber boots, Kuremona raincoats, helmets, rope scissors, underwater glasses, FRP repair tools, flashing buoys, batteries, etc.

(2) Basic Specifications

(1)	Gear for pole-and-line fishing of skipjack	The specifications are the same as those for Nei Mangabunika Nei Arintetongo
(2)	Repair tools for nets and fishing gear for the capture of live bait	Same
(3)	Accessory fishing gears to the above	Same

(3) Rough Estimate of Total Expenses

1.	For 59 GRT training vessel	¥ 17,416,000
2.	For 20 GRT training vessel	¥ 6,448,000
	Total	¥ 23,864,000

4-3 Rough Estimation

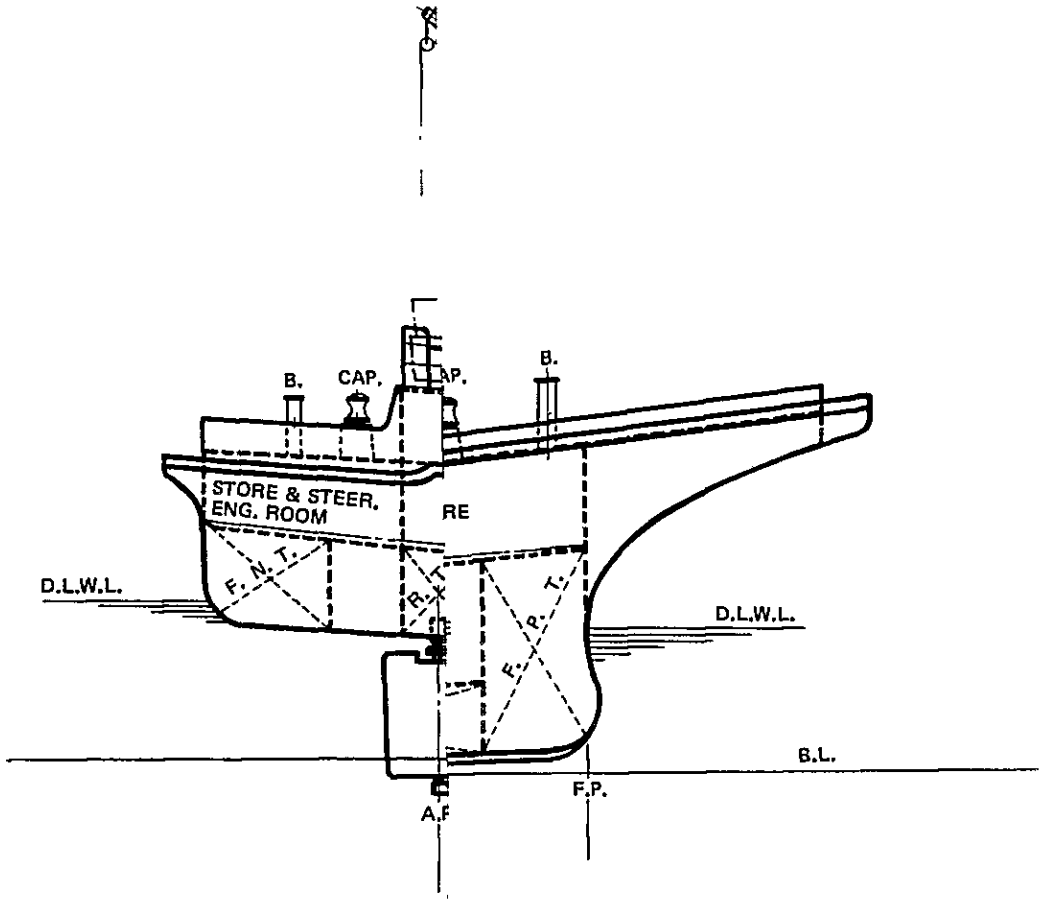
			As of 30 May, 1982
1)	59-ton training and research vessel	1	¥ 201,609,000
2)	20-ton skipjack vessel	1	¥ 73,909,000
3)	Ice making and refrigerating facilities	1 bldg.	¥ 144,950,000
4)	Fishing gears and equipment	1 set	¥ 23,864,000
5)	59-ton and 20-ton vessels' transportation fee	1 set	¥ 23,659,000
6)	Consultant fee		¥ 27,497,000
7)	Reserve fund	1 set	¥ 4,512,000
		Total	¥ 500,000,000

Taking account of fluctuation of exchange and price rise, reserve fund is summed up about 1 percent.

4—4 Basic Design Plan ARRANGEMENT

4-4-1 59 GRT Training VE AND LINE TRAINING AND RESEARCH VESSEL

SCALE: 1/100



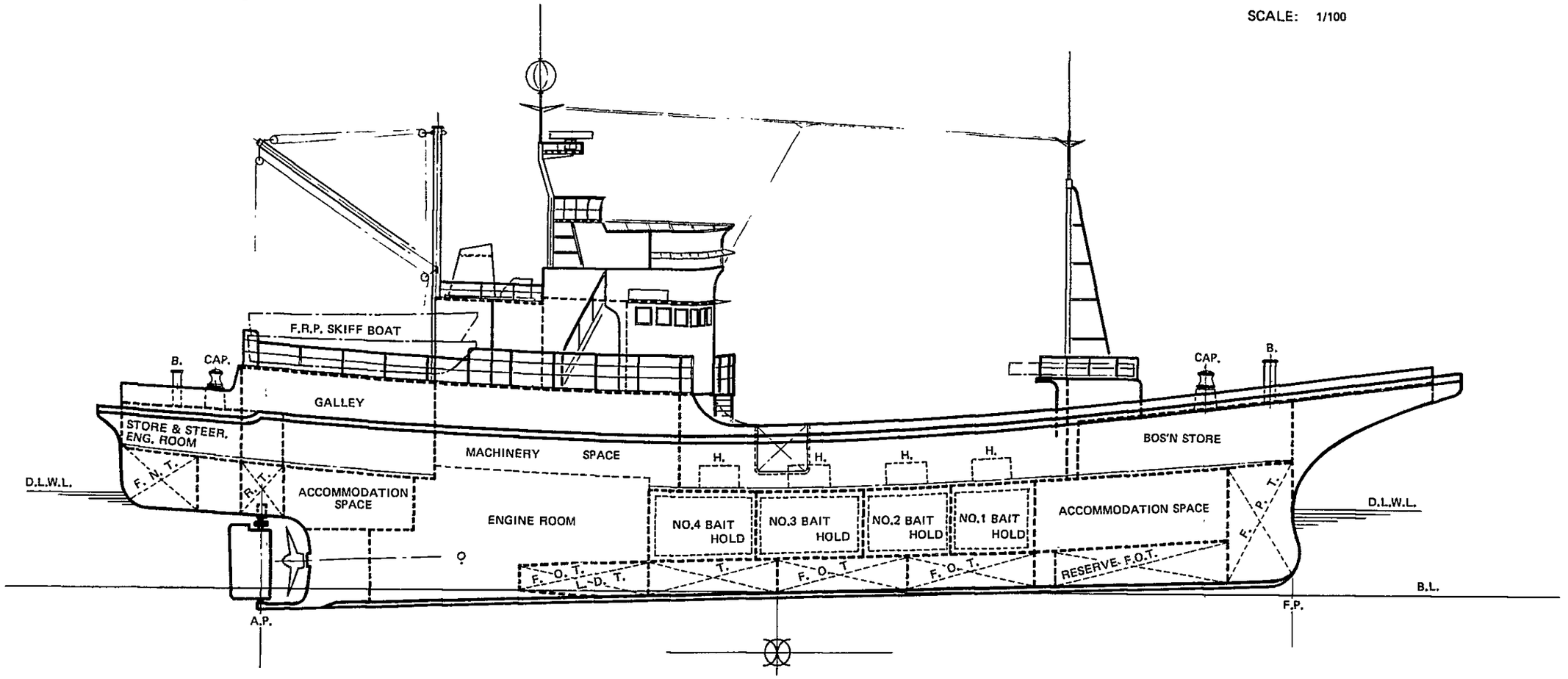
4—4 Basic Design Plan

4-4-1 59 GRT Training Vessel

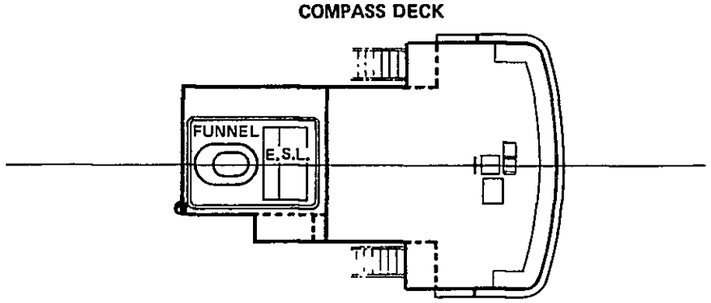
ROUGH GENERAL ARRANGEMENT

59G/T TYPE POLE AND LINE TRAINING AND RESEARCH VESSEL

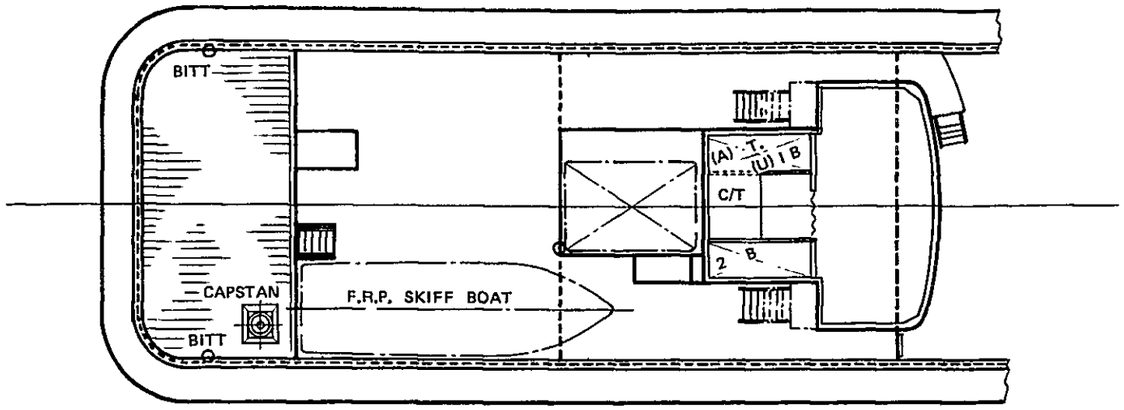
SCALE: 1/100



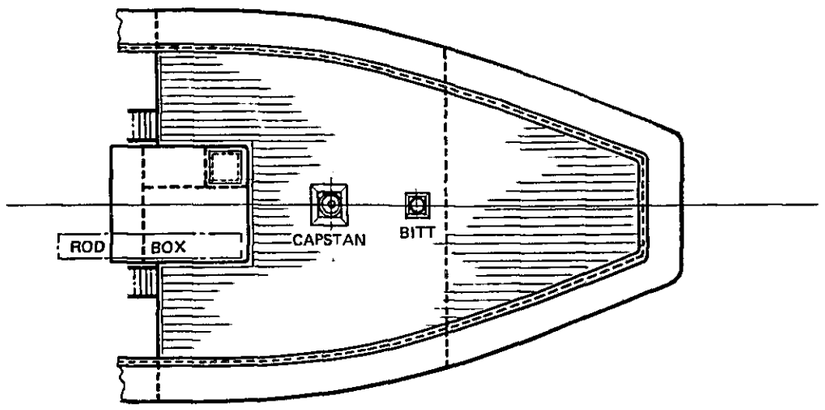
COMPASS DECK



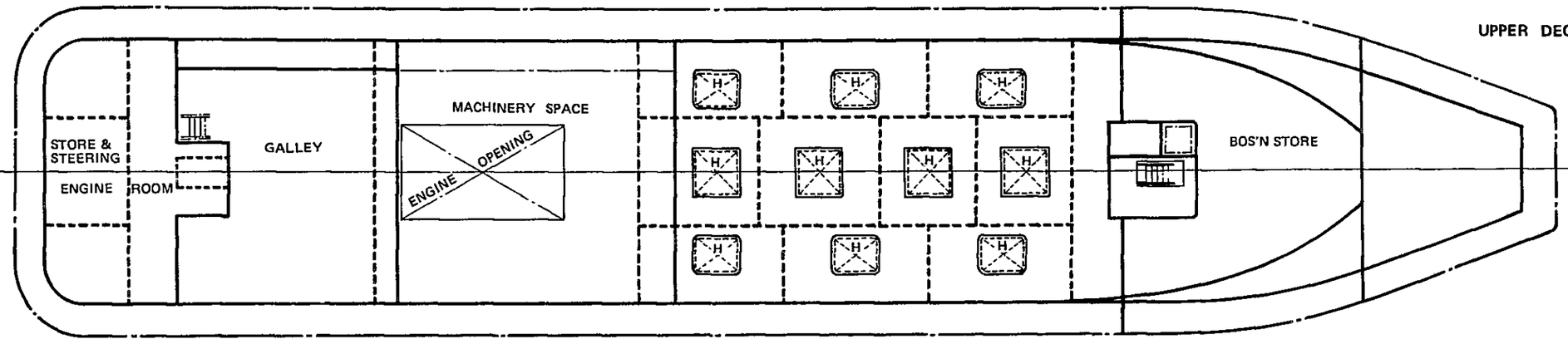
POOP DECK



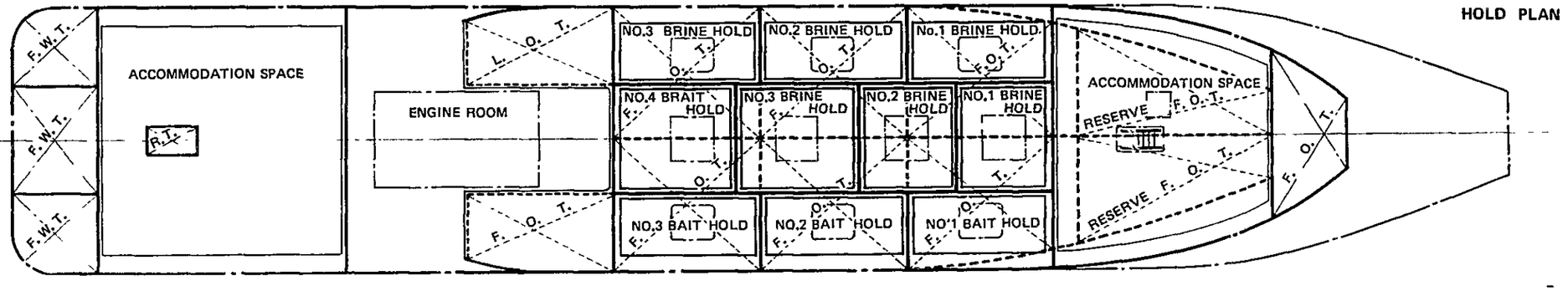
F'CLE DECK



UPPER DECK



HOLD PLAN

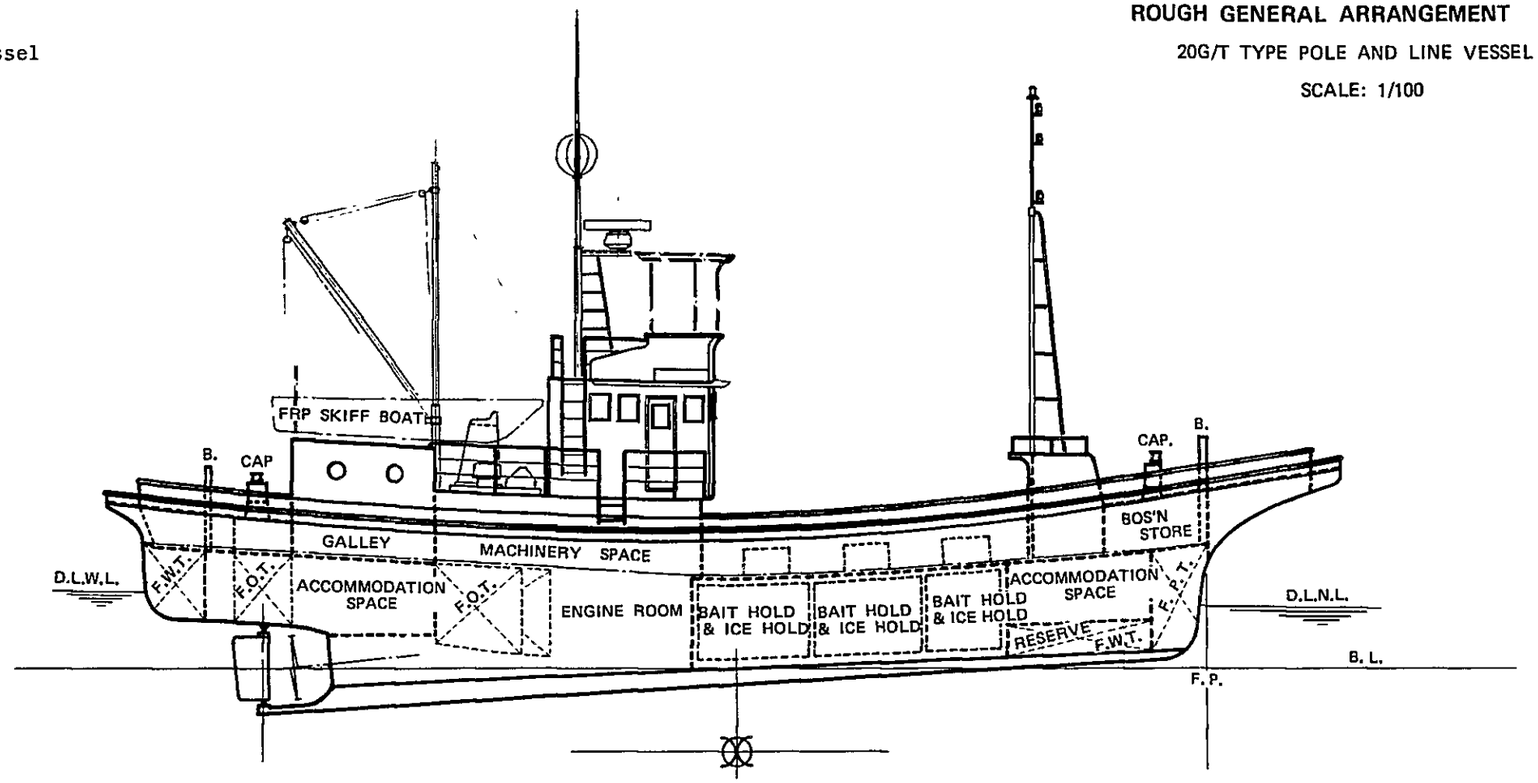


4-4-2 20 GRT Training Vessel

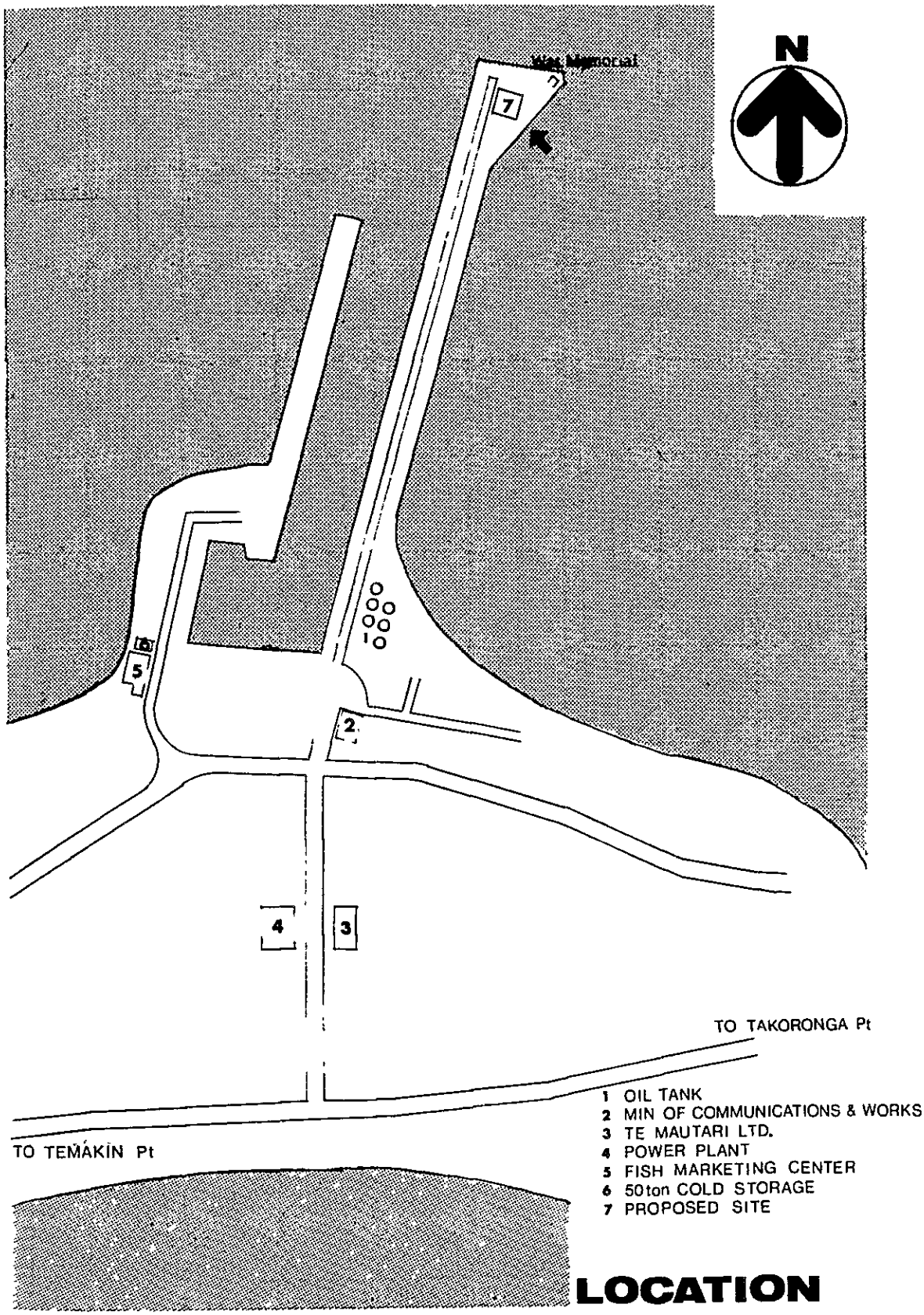
ROUGH GENERAL ARRANGEMENT

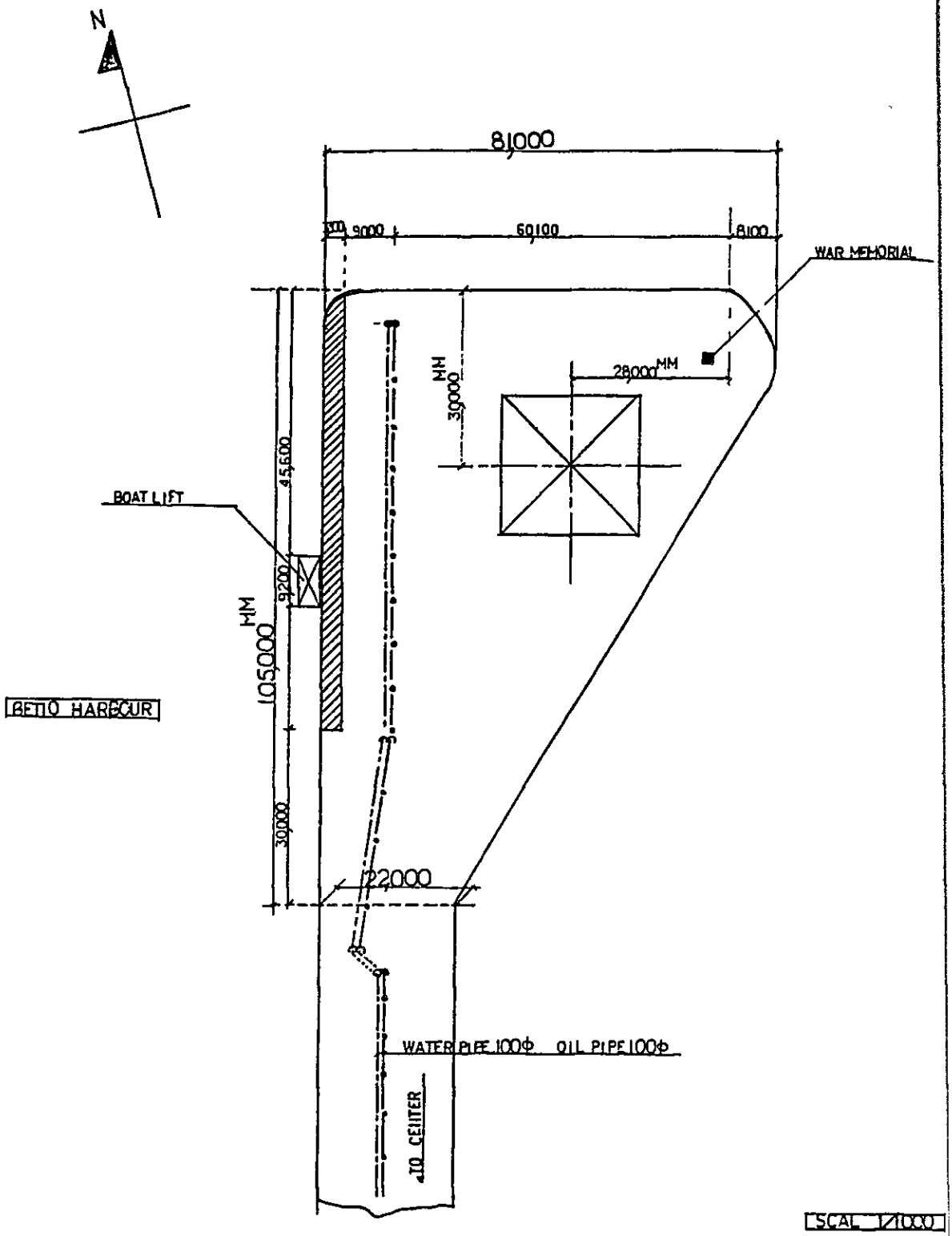
20G/T TYPE POLE AND LINE VESSEL

SCALE: 1/100



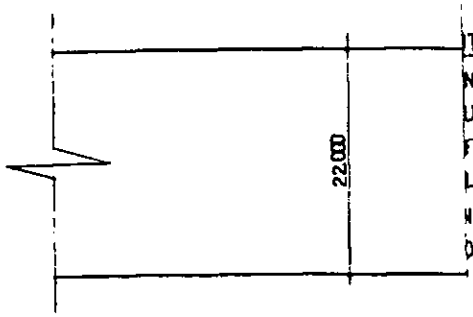
4-4-3 Ice Making/Brine Freezing Facilities





LOCATION MAP

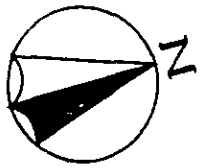
ICE MAKING/BRINE FREEZING FACILITY PLAN

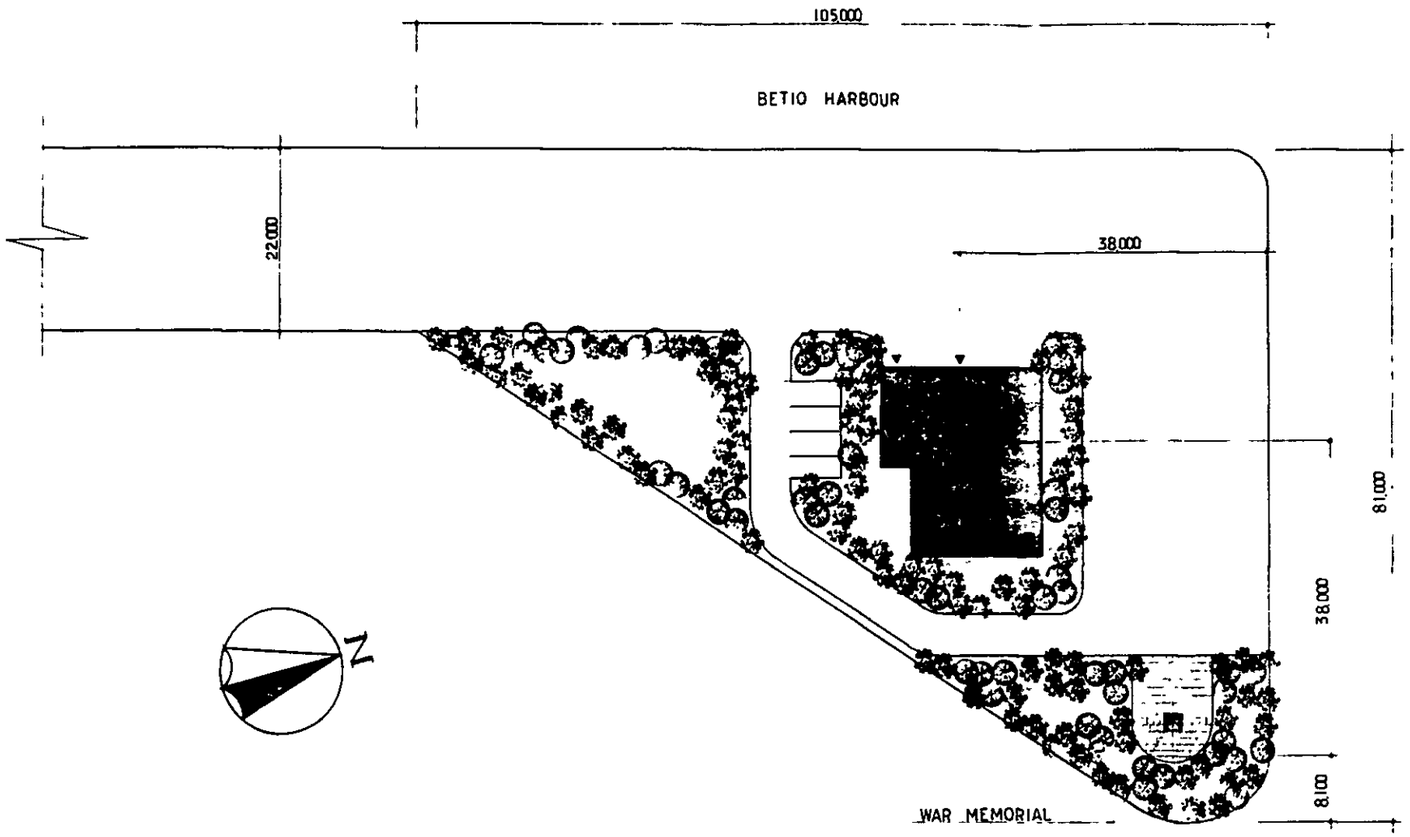


TLINE OF BUILDING

NDATION : REINFORCED CONCRETE
UCTURES : STRUCTURAL STEEL 1-STORY
F : METAL ROOF
L : METAL WALL
NSCOT : FAIR FACE CONCRETE
OR AREA

PROCESSING RM	58.5 M²
FREEZING RM	90
ICE MAKING RM	108
ICE STORAGE	31.5
GENERATOR MACHINE RM	50
CONDENSER SPACE	30
OFFICE	54.54
TOTAL	422.54 M²

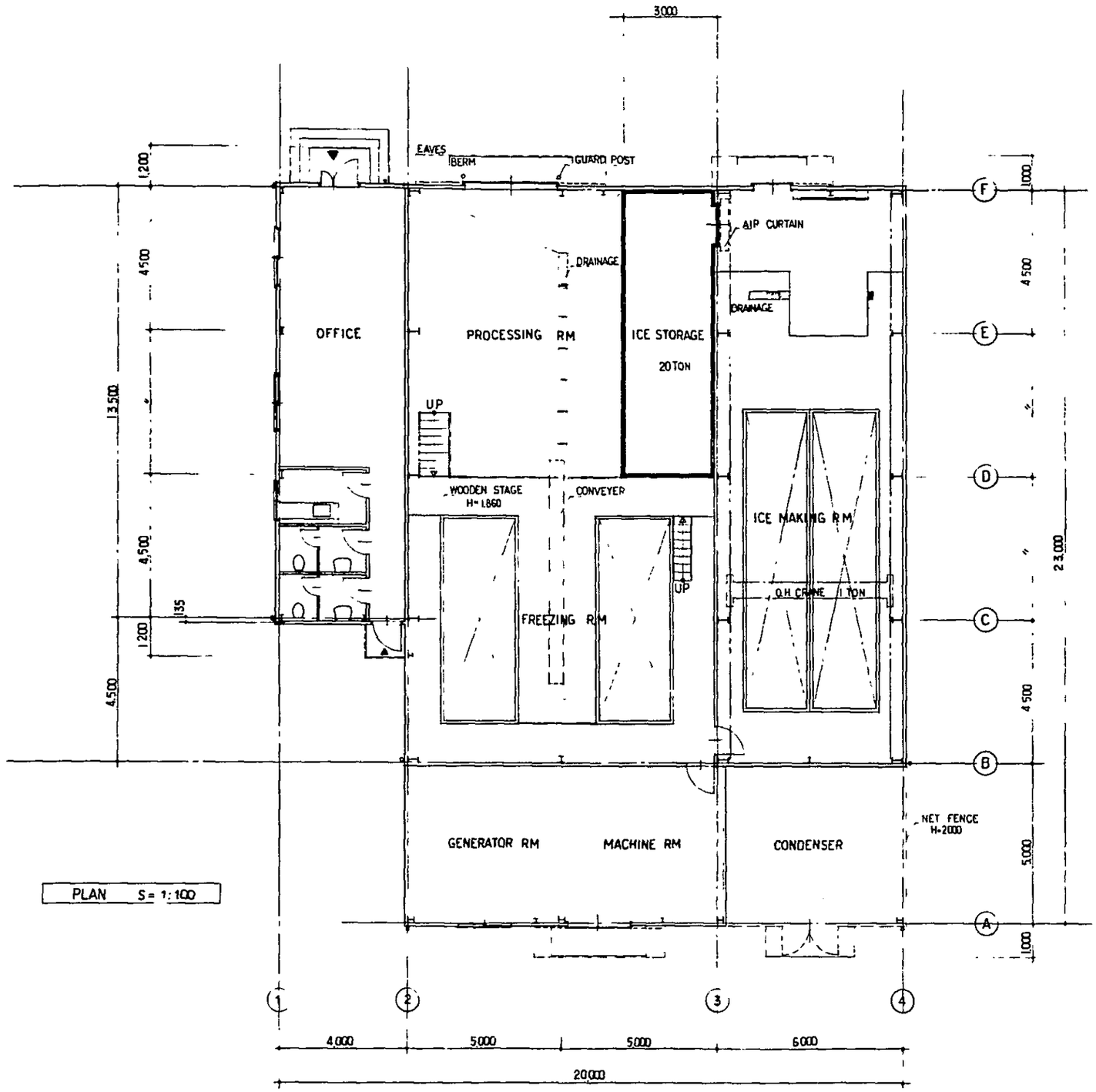




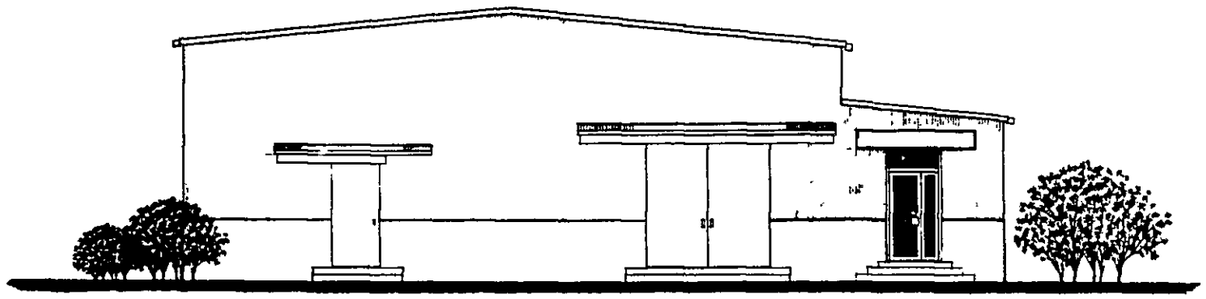
SITE PLAN S= 1:500

OUTLINE OF BUILDING

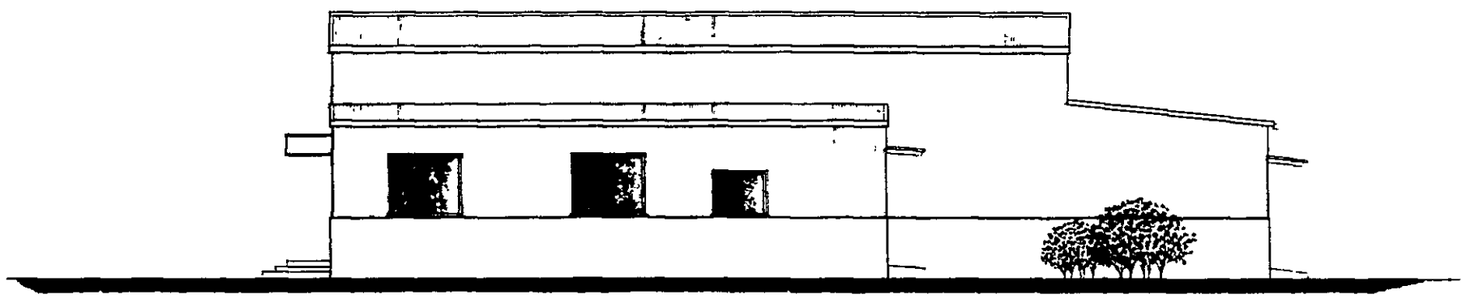
FOUNDATION	: REINFORCED CONCRETE	
STRUCTURES	: STRUCTURAL STEEL	1-STORY
ROOF	: METAL ROOF	
WALL	: METAL WALL	
WAINSCOT	: FAIR FACE CONCRETE	
FLOOR AREA		
PROCESSING RM	58.5	M²
FREEZING RM	90	
ICE MAKING RM	108	
ICE STORAGE	31.5	
GENERATOR MACHINE RM	50	
CONDENSER SPACE	30	
OFFICE	54.54	
TOTAL	422.54	M²


3000
EAVES
BERM
GUARD POST
AIR CURTAIN
DRAINAGE
DRAINAGE
OFFICE
PROCESSING RM
ICE STORAGE
20TON
UP
WOODEN STAGE
H=1.860
CONVEYER
ICE MAKING RM
O.H CRANE 1 TON
FREEZING RM
GENERATOR RM
MACHINE RM
CONDENSER
NET FENCE
H=2000
1200
4500
3500
4500
135
1200
4500
4500
4500
5000
1000
23000
1000
F
E
D
C
B
A
1
2
3
4
4000
5000
5000
6000
20000

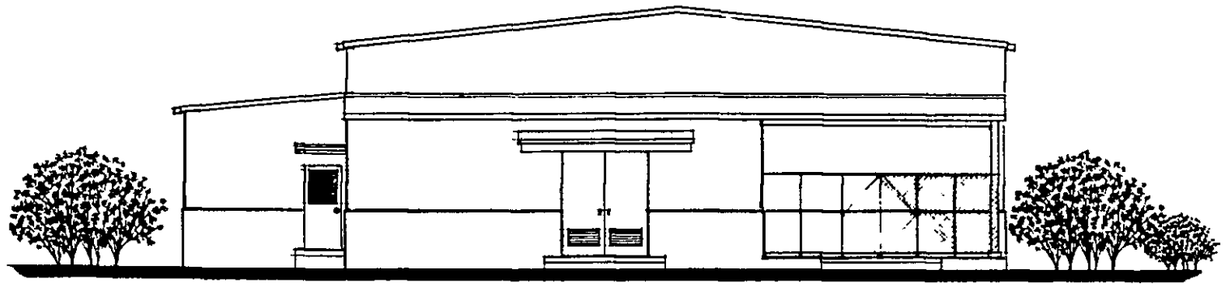
PLAN S = 1:100



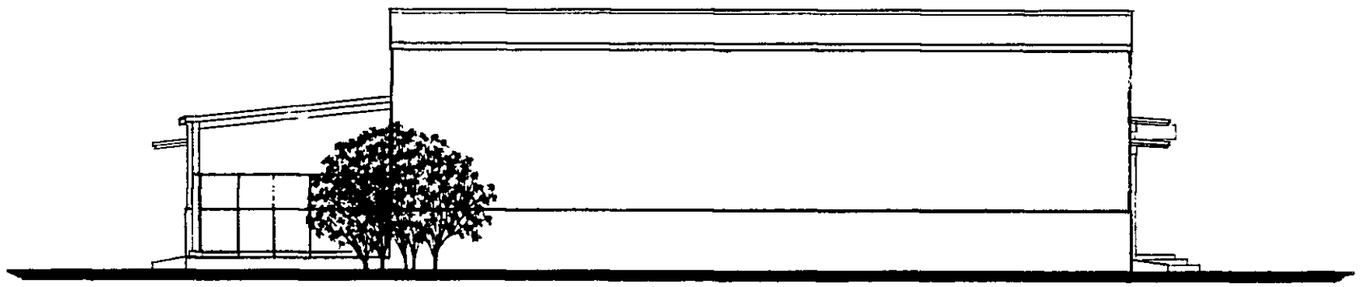
WEST ELEVATION S=1:100



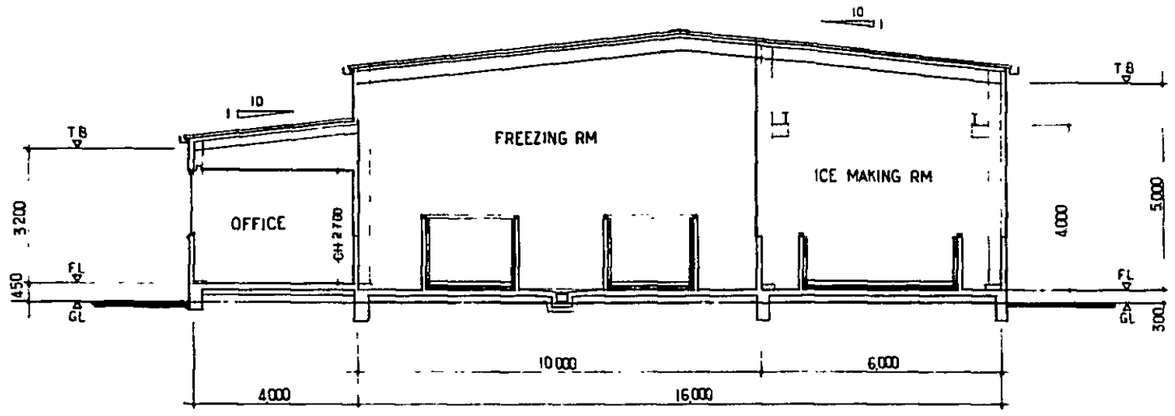
SOUTH ELEVATION S=1:100



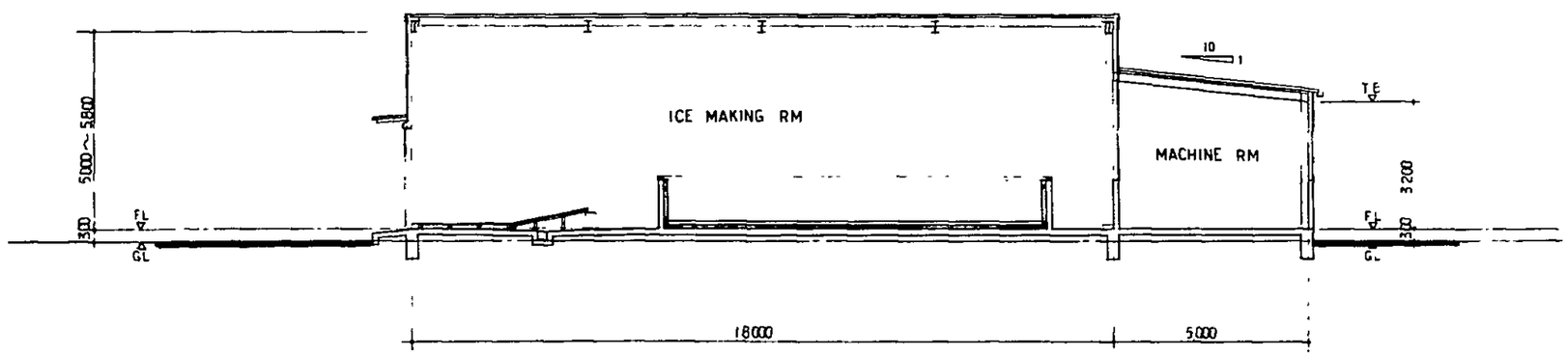
EAST ELEVATION S=1:100



NORTH ELEVATION S=1:100

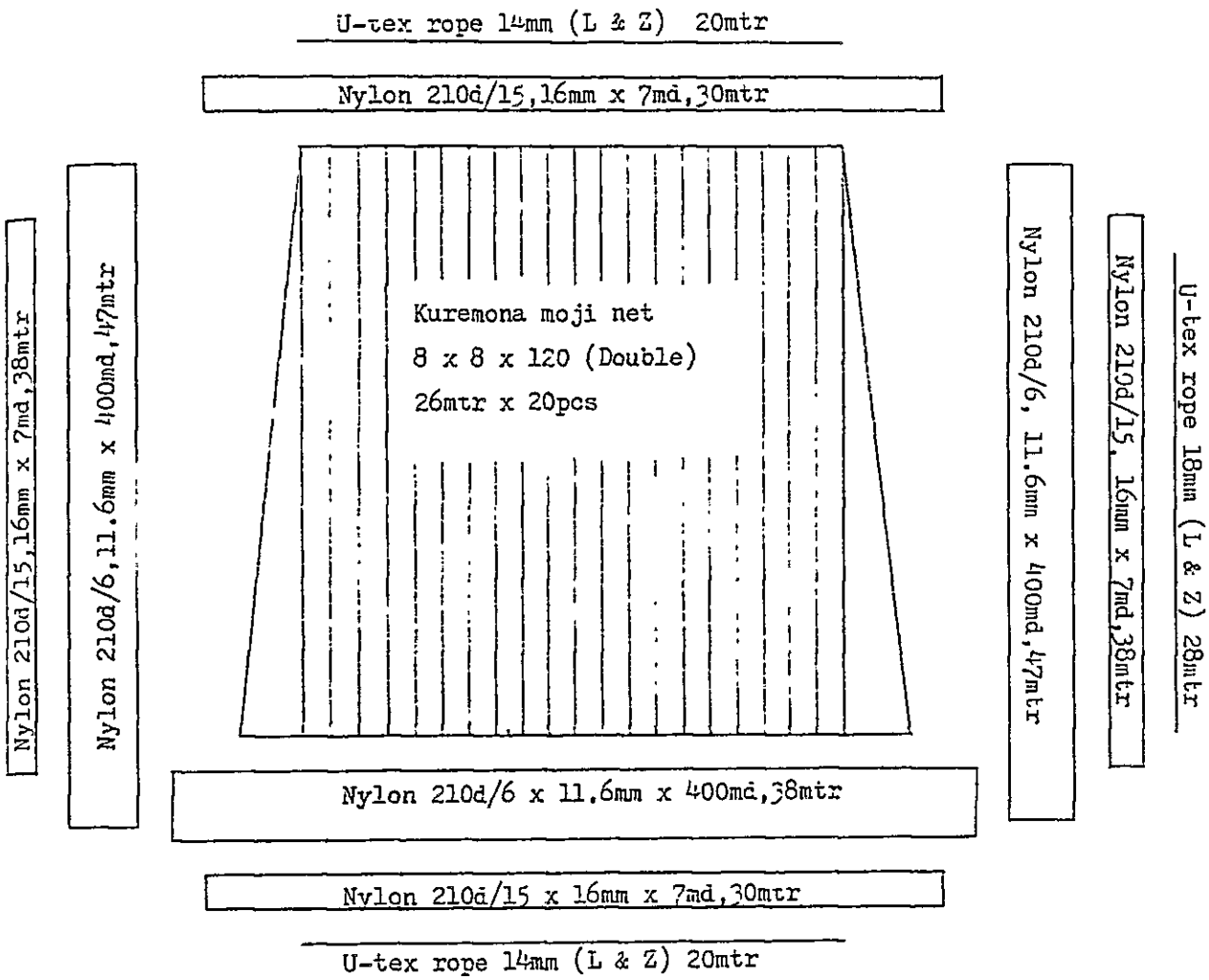


SECTION S= 1:100



SECTION S= 1:100

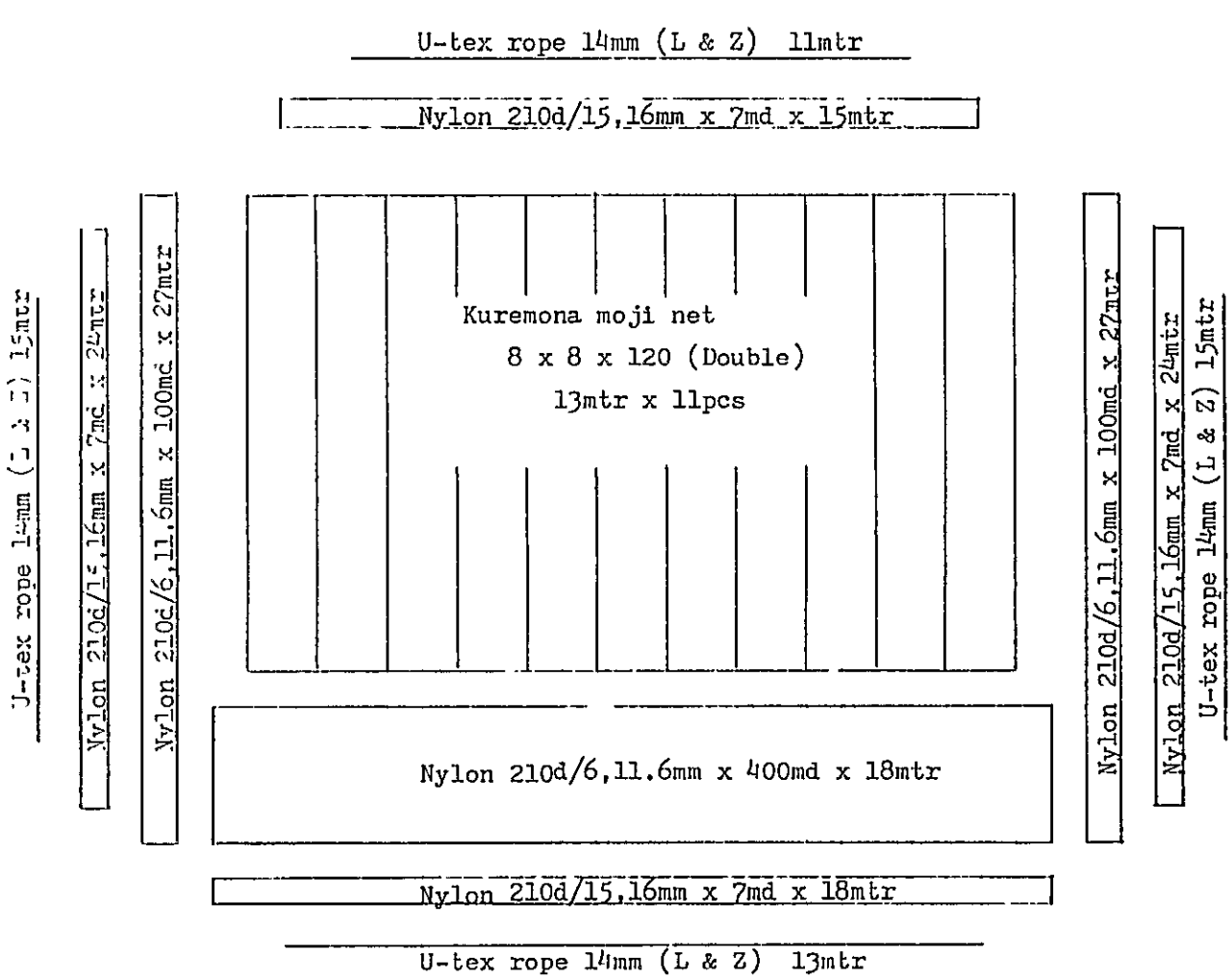
STICK HELD DIP NET



Materials;

Kuremona moji net (Brawn) 8 x 8 x 120 Double		;	20 pcs
Nylon 210d/6 11.6mm x 400md 38mtr		;	1 pce
" /15 16mm x 7md 30mtr		;	2 pcs
" /6 11.6mm x 400md 47mtr		;	2 pcs
" /15 16mm x 7md 38mtr		;	2 pcs
U-tex rope 14mm dia (L & Z) 52mtr		;	1 pce
" 18mm dia (L & Z) 72mtr		;	1 pce
" 10mm dia 150mtr		;	1 coil
Float	C-7	;	60 pcs
Sinker	Lead 19g 190g/pce	;	140 pcs
"	Lead 20kgs/pce	;	6 pcs
Mukoodake	Plastic 200mm x 21mtr	;	20 mtr
Push pole	Bamboo	;	2 units
Wire rope	8mm x 50mtr	;	6 pcs

STICK HELD DIP NET

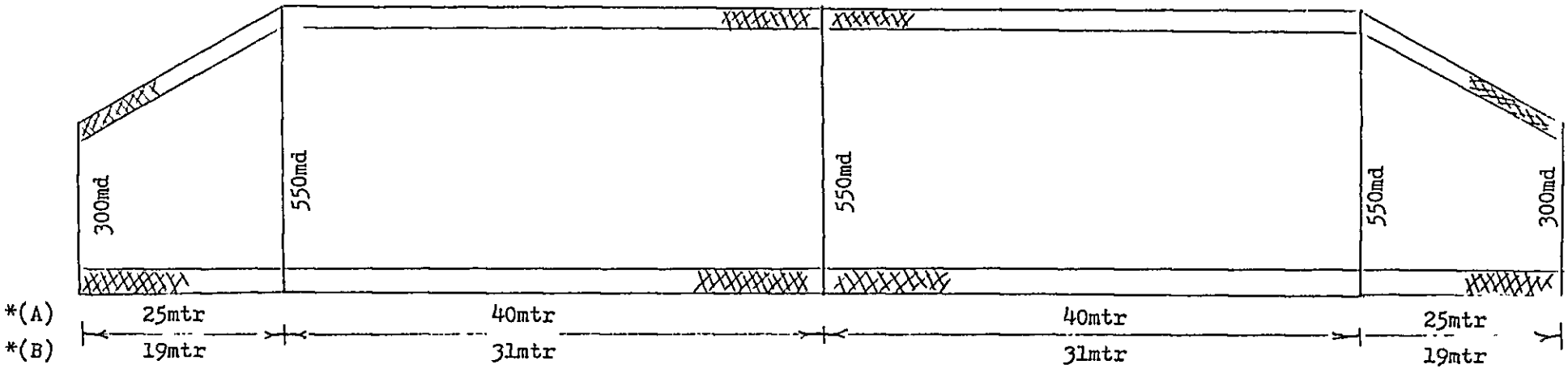


Materials;

Kuremona moji net (Brawn) 8 x 8 x 120 Double		; 150mtr
Nylon 210d/6,11.6mm x 400md		; 18mtr
" " " x 100md		; 54mtr
" /15, 16mm x 7md		; 81mtr
U-tex rope 14mm (L & Z)		;Each 70mtr
U-tex rope 14mm		; 130mtr
Wire rope 8mm x 40mtr		; 4pcs
Float C-7		; 30pcs
Sinker	Lead 75g	; 130pcs
	Lead 7.5kgs	; 2pcs
	Lead 15.0kgs	; 2pcs
Ring	Iron 9mm x 70mm	; 30pcs
Mukoodake	Plastic 200mm	; 11mtr
Push pole	Bamboo	; 2unit

NYLON RACHEL BEACH SEINE NET

(Hanged in 100mtr)



*(A) ... length of netting
*(B) ... length after hanging.

MATERIALS	SPECIFICATIONS	Q'ty
1) Nettings :	Nylon Rachel 210d/8 32' 550md x 65mtr	2 pcs
	Nylon 210d/15 20' 7md x 65mtr	4 pcs
2) Float Line :	Polyethylene 8ø dia. x 100mtr/coil	1 coil
3) Sinker Line :	U-tex 8ø dia. x 100mtr/coil	1 coil
4) Float :	Synthetic Float "T-4"	125 pcs
5) Sinker :	Lead 375grs/pce	275 pcs
6) Extention :	for Float Line ... P.E. 8ø dia.x20mtr	2 coils
	for Sinker Line .. U-tex 8ø dia.x20mtr	2 coils

CHAPTER 5

EXECUTION PLAN

Chapter 5 EXECUTION PLAN

5-1 Execution Organization

As a contact agent of the Kiribati Government and execution organization for this project, the Ministry of Natural Resources of Kiribati is to be in charge of coordinating business among its ministries concerned, for both smooth and efficient execution of this project. Particularly, as for the construction of land facilities, because it involves various ministries and related construction work to be done entirely by the Kiribati Government, the project needs to be executed with close cooperation among ministries concerned.

5-2 Construction Plan

As for the procurement of construction materials for this project, on the basis of the results of the survey almost all materials are to be transported and brought in from Japan. For the procurement of locally procurable construction materials is expected to be rather insecure in the light of delivery date, performance and availability of necessary quantity, most of them being dependent upon import.

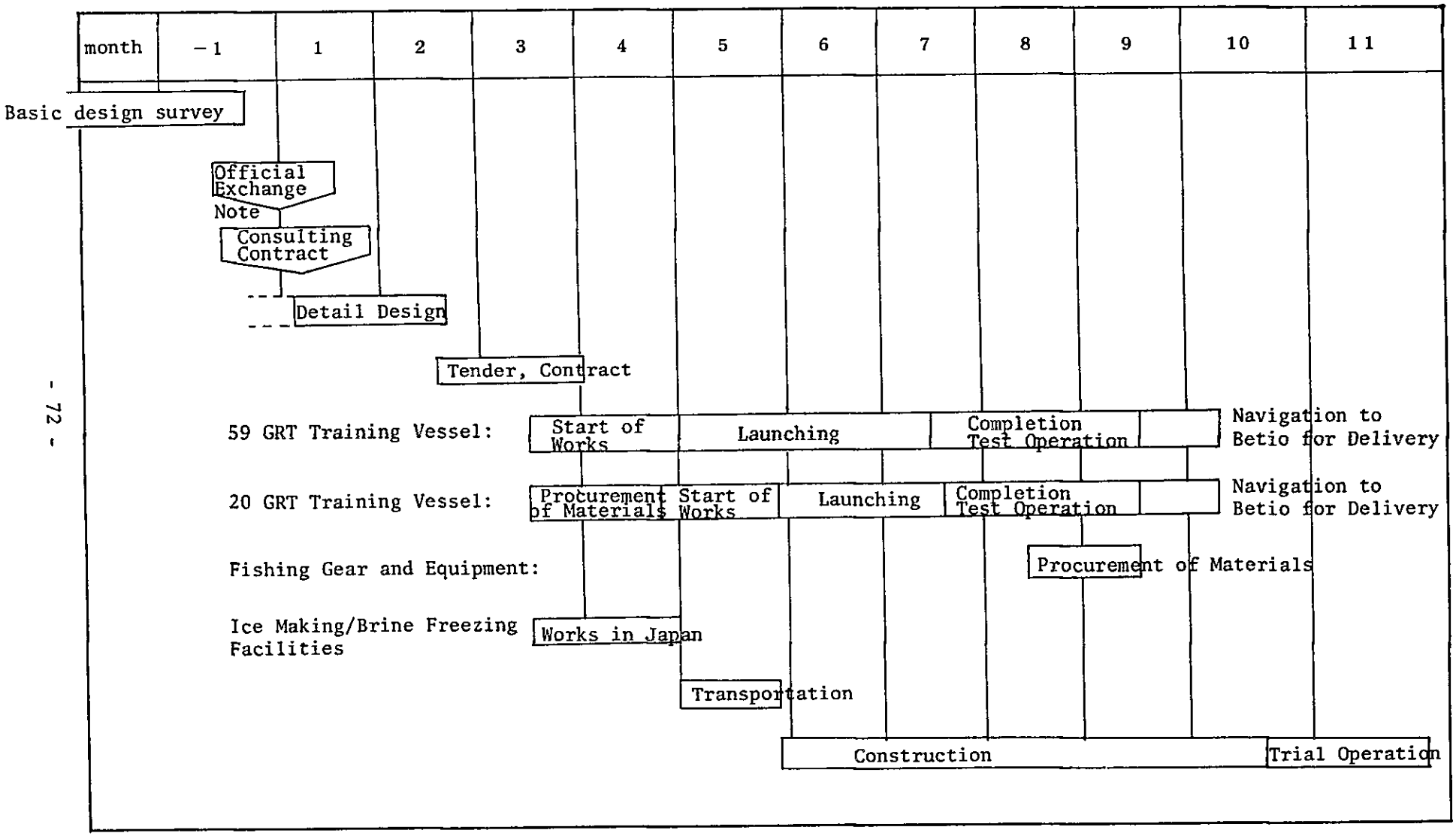
Given below are the services related to construction which the Kiribati Government is to conduct ahead of the construction of facilities. The Government of Kiribati will:

(1) Offer vast enough land for the construction of facilities,
(2) Level the land and heap soil on necessary parts, and
(3) Lay on electricity, water supply and drainage as far as the outside of buildings.

5-3 Process Plan

This project is so designed that it may be put into action by the end of March, 1983, so it is hoped that the project will be begun promptly after the conclusion of an official exchange note.

Schedule for Implementation of Project



5-4 Management and Control Plan

5-4-1 59-ton Type Training Vessel and 20-ton Skipjack Vessel

(1) Personnel Plan

After completion of this project, the two ships will be assigned to the Operations Department of Te Mautari Ltd. and operated along with the two 100-ton training ships.

a. Deckhands: Experienced seamen will be mixed with those without experience to carry out on-the-job training.

b. Oilers: Oilers will be selected from among those graduates of the Seamen's Training Center who have experience in serving on an ocean-going vessel.

c. Deck officers: Deck officers will be chosen from those who are working as such or those whose educational background is sufficient to be qualified as deck officers.

d. Engineers: Engineers will be selected from those who are working as such or apprentice engineers.

At present, there are no facilities in Kiribati where sophisticated technology could be learned to acquire higher qualifications. The training at the Seamen's Training School and the Tarawa Vocational Training Center is done over extremely short periods of time and the courses do not go beyond common sense. Given this situation, inboard training (including dock repair) is necessary over a long period of time to enalble the Kiribati people to take care of all maintenance work.

At present, Ne Manganibuka is running only by I-Kiribati seamen, and the fishing master and chief engineer of Ne Arintetongo are Japanese. The Japanese chief engineer does maintenance work on both ships. For the 59-ton training ship, which has recently been requested, as well as the two existing training ships, it seems necessary for experts to pass technology over to Kiribati for several more years.

As regards the 20-ton skipjack vessel, it is understood that there is no problem about its operation and maintenance, as its engine

is small in horsepower and its chief engineer from Kiribati has a license. Now that this ship is equipped with a small refrigerator for cold seawater, some guidance from the above Japanese experts will be required.

(2) Plan for Income and Expenditures

In working out a plan for income and expenditures, the following criteria for calculation are formulated on the basis of the actual recorded operation of Nei Arintetongo, which operated near Tarawa with its base at Betio Port throughout 1981, though there are some unconfirmed factors. Incidentally, from the standpoint of promoting Kiribati's fisheries in the future, any unexpected factors concerning cost-effectiveness arising from the training vessels being used as fishing boats should be clarified in various points so as to provide for sound management of the skipjack fishing industry.

Outline of Operations and Criteria for Computation of Management Costs

a. 59-ton Type Training Boat:

1) Number of Operation Days per Year

Return trips to and from fishing grounds and number of operation days	166 days
Number of berthing days for landing of hauled fish, replenishing supplies, rest for crewmen, etc.	134
Docking, repair, etc.	65
Total	365

2) Navigation and Operation Hours

Surveys and return trips to and from fishing grounds	10 hrs.
Operations	2
Bait operations at night, drifting, berthing	12
Total	24

3) Cost for Operations

a) Direct Outlays

1. Fuel (Marine diesel oil as fuel)

Main engine:	175 g x 400 HP x 10 hrs. x 166 days	116.2 kl
aux. engine:	175 g x 120 HP x 24 hrs. x 166 days	83.7
aux. engine:	175 g x 120 HP x 8 hrs. x 166 days	27.9
Total of marine diesel		227.8 kl

Marine diesel	227.8 kl x A$480/kl	A$109,344
Lubricant, miscellaneous oils		
	A$109,344 x 0.03	A$ 3,280
Total fuel outlay		A$112,624

2. Food

A$2.0/day/person x 30 men x 330 days	A$ 19,700

3. Labor

Fixed pay	A$4,297 x 11 months	A$ 47,267
Production incentives		
Actual record of Te Arintetongo 1 S/T - A$1/person		
400 S/T x A$1 x 30 men		A$ 12,000
Total labor outlay		A$ 59,267

4. Brine salt

80-lb bags: A$9, CIF, Betio	
A$10 worth of salt used for 1 S/T	
according to the actual record of	
Ne Arintetongo	
400 S/T x A$10	A$ 4,000

5. Fresh Water

A$6.50/ton including barge cost	
8 tons x 16 trips x A$6.50	A$ 832

6. Deck, Engine and Other Expendables

A$100/months x 12	A$ 1,200

7. Bait

In principle, bait will be self-sutained.
To raise the work efficiency, milkfish will be purchased.
30 pails of milkfish per day of operation
30 pails x 3 kg x A$2.50 x 166 days A$ 37,350

b) Indirect Outlays

1. Insurance (including insurance for the ship, fishing gear, dinghy, outboard motors, etc.)
¥224,000,000/¥270 ≒ A$830,000 at ¥270 to A$1
A$830,000 x 0.018 A$ 14,900

2. Depreciation

A$830,000 x 0.1 A$ 83,000

b. 20-ton Skipjack Ship

1) Number of Operation Days per Year

Number of days of return trips to and from fishing grounds and days of operation	200 days
Number of berthing days for landing of hauled fish, replenishing supplies, rest for crewmen, etc.	100
Docking, repair, etc.	65
Total	365

2) Navigation and Operation Hours

Surveys, return trips to and from fishing grounds	10 hrs.
Operations	2
Bait operations at night, drifting, berthing	12
Total	24

3) Costs for Operations

a) Direct Outlays

1. Fuel (marine diesel as fuel)

Main engine: 175 g x 150 HP x 10 hrs. x 200 days	52.5 kl	
Aux. engine: 175 g x 50 HP x 22 hrs. x 200 days	38.5	
Total of marine diesel	91.0	
Marine diesel: 91.0 kl x A$480/kl		A$ 43,680
Lubricant, miscellaneous oils:		
A$43,680 x 0.03		1,310
Total fuel outlay		A$ 44,990

2. Food

A$2.0/day/man x 20 men x 330 days	A$ 13,200

3. Labor

Fixed pay: A$3,027 x 11 months	A$ 33,297
Production incentives:	
320 S/T x A$1 x 20 men	6,400
Total labor outlay	A$ 39,697

4. Fresh water

0.5 ton x 200 days x A$2.20	A$ 220
(without using barges)	

5. Deck, engine and other expendables

A$70/month x 12 months	A$ 840

6. Bait

Bait will be self-sustained in principle, but milkfish will be purchased at about 70% of the total bait outlay to raise the work coeficiency.

20 pails of milkfish per day of operation

20 pails x 3 kg x A$2.50 x 200 days	A$ 30,000

b) Indirect Outlays

1. Insurance (including insurance for the ship, fishing gear, dinghy outboard motors, etc.)

¥89,900,000/¥270 ≒ A$330,000

A$330,000 x 0.018 A$ 5,940

2. Depreciation

A$330,000 x 0.1 A$ 33,000

Table of Crewmen and Pay for Training Ships by Tonnage

	Nei Arintetongo			59-ton Trainer			20-ton Skipjack Ship		
	Authorized personnel	Fixed pay	Com-mis'n	Authorized personnel	Fixed pay strgh	Com-mis'n	Authorized personnel	Fixed pay	Com-mis'n
		A$/mo.			A$/mo.			A$/mo.	
Fishing master	1	330	2.5	1	330	2.5	1	330	2.5
Captain	1	250	1.8	1	250	1.8	1	250	1.8
Navigators	2	180	1.4	2	180	1.4	1	180	1.4
Chief deckhand	1	165	1.3	1	165	1.3	1	165	1.3
Bait sprayers	2	136	1.2	2	136	1.2	2	136	1.2
Deckhands	14	120	1.0	14	120	1.0	8	120	1.0
Chief engr.	1	200	1.7	1	200	1.7	1	200	1.7
Appr. engr.	1	180	1.1	1	180	1.1	1	180	1.1
Firemen	5	120	1.0	5	120	1.0	3	120	1.0
Cooks	1	130	1.1	1	130	1.1	1	130	1.1
Total	1	130	1.1	1	130	1.1			
Total	30	4,297	34.8	30	4,297	34.8	20	3,027	28.3

Trial Computation of Estimated Income and Expenses of Skipjack Vessels by Tonnage

(In Australian dollars)

	Actual record of Ne Aritotengo in 1981		59-ton Trainer		20-ton Skipjack ship	
Fishing Haul	364 t x $707/S/T	257,300	400 t x $707/S/T	282,800	320 t x $555/S/T	177,600
Cargo to Majuro, etc.	$37/S/T	13,500	$37/S/T	14,800		
Balance on hand		243,800		268,000		177,600
Direct outlays						
Fuel	Marine diesel, other oils	158,415		112,624		44,990
Food	$20 x 30 men x 330 days	19,699		19,700		13,200
Pays, commis'n		51,385		59,267		39,697
Brine salt	16 t	3,618	17.6 t	4,000		-
Fresh water		958		832		220
Expendables		1,235		1,200		840
Labor outlay for loading of fresh water		1,626		-		-
Bait		18,779		37,350		30,000
Fishing, clothing		1,232		1,200		1,200
Total direct outlays		256,947		236,173		130,147
For inventory		7,900		7,900		4,000
Net total direct outlays		249,047		228,273		126,147
Profit/loss after direct outlays		-5,247		39,727		51,453

Miscellaneous		819	819	548
Paid holidays		994	994	666
Travels	Bus, ferry-boat fares	2,952	1,000	670
Insurance		15,988	14,900	5,940
Profit/loss before depreciation		-26,000	22,014	43,629
Depreciation	Ship, dinghy fishing gear	91,397	83,000	33,000
Profit/loss after depreciation		-117,397	-60,986	10,629

5-4-2 Ice Making, Freezing Facilities

(1) Personnel Plan

For the management of the ice making and freezing facilities, the following necessary personnel are computed on the basis of the following types of work.

a. Maintenance and control of ice making, freezing facilities

b. Ice making and freezing work

c. Administration and control

Personnel Required for Ice Making, Freezing Facilities

Position	Number of persons	Scope of work
Manager	1	Overall supervision
Freezing technicians	2	Maintenance and control of freezing facilities; maintenance and control of electric facilities
Workers	6	Ice making and freezing work, store keeping
Clerk	1	Voucher slips, etc.
Total	10	

As a result of a fact-finding tour of the Fish Marketing Center, there seem to be no problems in the maintenance and control of the freezing facilities.

(2) Plan for Incomes and Expenses

A plan for incomes and expenses for one year after the completion of the facilities is worked out as follows:

Number of Work Days and Output

It is assumed that the number of work days will be 300 (including 300 for precooling) per year and that ice production and freezing will be set at 840 tons and 640 tons, respectively, on the basis of an estimate of the initial demand.

	Production days/year	Output/year
Ice production	240	840 t
Freezing	240	640

a. Income

1) Annual Proceeds from Ice

At the Fish Marketing Center, ice is sold for A$0.11 per kilogram or A$110 per ton. As it is assumed that block ice, though better in quality, will be sold at the same price, the annual ice making proceeds will be:

A$110 x 840 to= A$92,400

2) Annual Income from Frozen Fish

A trial computation is made on the assumption that the balance between the domestic price of fresh fish and the FOB price of frozen fish for export is the freezing cost or commission. A$115 x 640 t = A$73,600

b. Outlays

1) Outlay for Electric Power

The following computation is made on the assumption that

the electric power rate for ice production and freezing and the number of operation hours a day represent the operation load and the use rate, respectively.

	Power load	Operating hours	Machine load	Use rate	Total annual power
Ice making facilities	52%	24 hrs/day	70%	82%	152,582 KWH
Freezing facilities	48	24	70	82	140,845 KWH

The electric power cost is 1 KWH = A$0.24

The annual electric power running cost is:

Ice making facilities A$0.24 x 152,582 = A$36,619

Freezing facilities A$0.24 x 140,845 = A$33,802

Total A$70,421

2) Supply and Price of Brine

The purchase price of brine is 1 t = A$250

Supply: Ice making 12t a year x 250 = A$3,000

Freezing 18t a year x 250 = A$4,500

Total A$7,500

3) Water for Ice Making

Of the water which is to be used for ice production, 50% will be seawater and 50% will be service water.

The price of local service water is 1 t = A$0.44

A$0.44 x 420 t = A$184.8

4) Pay for Maintenance Men

Position	Number of Personnel
Manager	1
Refrigerator and electric technicians	2
Workers	6

Clerk	1
Total	10

Total of annual pay: A$20,100

5) Maintenance and Control Costs

2% of the construction cost of the facilities	A$10,740

6) Depreciation

¥144,950,000 x ¥270 x 0.0833	A$44,720

7) Table of Plan of Income and Expenses of Ice Making and Freezing Facilities in the Initial Year

A. Income	A$166,000
1. Ice making	92,400
2. Freezing	73,600
B. Expenditures	A$112,124
1. Electric power	73,600
2. Brine	7,500
3. Service water	184
4. Pays	20,100
5. Maintenance	10,740
Profit before depreciation	63,876
6. Depreciation	44,720
Net profit	9,186

CHAPTER 6

OVERALL EVALUATION OF THE PROJECT

Chapter 6 OVERALL EVALUATION OF THE PROJECT

6-1 Priorities of the Programs

At the top of the economic plans of the National Development Program of the Government of Kiribati, the development of marine resources, especially the skipjack/tuna export industry is listed as a replacement of the phosphate industry.

It is hard facts that since Kiribati faced the phosphate resource exhaustion from around 1979, the export started to decline drastically. In 1980, it amounted to A$2,209,000, which is about 90% decrease as compared with the year before. On the other hand, the import increase to A$16,848,000, which is 14% up on the average every year in the past four years. Moreover, GDP per capita dropped to A$355 in 1980, which is nearly the half of A$687 of 1978. Thus, the impact of phosphate exhaustion was so great, and the influence not only remained as a domestic problem but also reflected to its foreign trade. In such circumstances, the Government of Kiribati felt the pressing need to develop a new industry which will replace the phosphate industry. Making approaches from the study of existing industries and also seeking for new industries, it was a natural decision for Kiribati to choose the program of skipjack/tuna fishing industry promotion. The resources required in the program are already confirmed in Kiribati for a certain extent and also the marketability is expected very high. Therefore, considering from the nature of an economic cooperation program which aims at bringing the nation to a self-supporting level, the first priority should be given to this program.

Equipments to be supplied within the framework of the program are:

1. 59 GRT skipjack training and research vessel
2. 20 GRT skipjack fishing boat
3. Ice making/brine freezing facilities
4. Fishing equipments and gears

1. and 2. will be the direct means to increase the fish catch. And, at the same time, they are meant and planned to raise the efficiency of the existing two 100 GRT skipjack fishing boats.

3. and 4. are the suplementary provisions to 1. and 2., but they are, no doubt, indispensable items.

6-2 Scale Selection of the Investment Items

(1) 59 GRT training vessel and 20 GRT skipjack fishing boat

Following scales had been selected for the skipjack/tuna fishery operations around Betio of Kiribati by analyzing from fishery and economic standpoints the actual results obtained from the two 100 GRT skipjack fishing boats, which are now "Nei Manganibka" and "Nei Arintetongo", in operation.

a. Fishing area and the sizes of the boats

If the operations will be conducted centering around Betio, the most well-equipped fishery base in Kiribati, the operation area will be naturally limited to its radius of no more than 60 miles of the bait stations (Tarawa, Butaritari, etc.) from the stand point of the baits' life span. Therefore, it is better to have a boat of much smaller than 100 GRT in size in order to minimize the overall running cost including the fuel cost if there is not much difference in the catch efficiency, despite the seasonal fluctuations of a shoal of skipjack. And 20 GRT scale boat taking safety into account would be sufficient in the fish area such as Miana Bank, south of Betio, where the fish catch can be expected constantly.

b. Life span of live bait and suppliable quantity

Live baits taken from the Tarawa Lagoon are not good in quality. They can not keep long. Wherever the bait station would be, Tarawa or Butaritari, the people are forced to make a day trip operation which is possibly lying enough for baits to be fresh. Also, not much quantity of baits can be expected, either. Milk fish culture,,on the other hand, is being carried out in Tarawa. Although milk fish, as a live bait for skipjack, has quality and along life span as well, it will be a subject of the future to realize a large and stable supply of the kind.

c. Catch efficiency

The catch efficiency of pole-and-line skipjack fishery is in proportion to the skill and the number of crew on board. Therefore, in order to lessen the running cost of the skipjack fishing boat, it is necessary to make the boat size smaller and then to increase the number of crew to its maximum. The wind condition of Kiribati sea area allows about 25 crewmen on the 59 GRT boat, and almost the same amount of catch of the 100 GRT can be expected. Even for the 20 GRT fishing boat, it is advantageous because its running cost per ton of catch is cheaper than that of boats in a larger size.

(2) Ice Making / Brine Freezing Facilities

Supply of ice making/brine freezing facilities came up in consequence of increase of the fish catch brought about by the supply of the above mentioned skipjack fishing boats. The capacity of each facility has been decided according to the present and the future demands.

6-3 Estimation of the Effects

59 GRT, 20 GRT skipjack fishing boats, ice making/brine freezing facilities are related to each other, and the following effects can be prospected.

(1) Expansion of the export due to the catch increase

The fish export of about A$460,000 will improve the international balance of payments and will stimulate the repayment ability of the debts.

(2) Increase of earnings from domestic fish sales

Supply of high quality of protain to the nation will reduce the import of such foods and will yield the same effect as in (1).

(3) Training of skipjack fishing boat crewmen

Regarding Kiribati crewmen's capability aboard the 100 GRT skipjack fishing boats now in operation, it is considered advanced as a fishery technician. Therefore, it will be very effective to give them further more trainings. And the fishery technology transfer will be much promoted by the supply of 59 GRT and 20 GRT fishing boats.

(4) Increase of job opportunities

According to Chapter 6, 6-3 "Personnel Planning" of this report, more than 60 new direct job opportunities will be created. And if including indirect employment opportunities, it would be a tremendous effect in the labor employment compared to the total population of Kiribati that is about 58,000.

(5) Extended effects

a. In case four fishing vessels operate to cover the fishing ground surrounding the Gilbert Islands, a certain increase of the fish catch would be expected by the cooperative operation with close exchange of information among vessels.

b. Supply of block ice of good quality would further ensure the quality control of fish on board, and which would:

   1) Improve the quality of fish on skipjack fishing vessels without refrigeration facilities and eventually lessen the rejection of export fish,
   2) Promote the quality improvement at the time of distribution, and
   3) Stimulate the coastal fishermen and bring about the increase of fish catch.

c. Up to the present, the refrigeration of skipjack/tuna has been done with a method of air refrigeration which already sees the limit of its capacity in case of reef fish added. However, the installation of Brine refrigeration equipment to be provided by this project would lighten a burden of the Fish Marketing Center in the light of freezing capacity, and assure further improvement of quality of skipjack/tuna.

d. With more demand on milk fish and, as a result, its production increase as live bait due to the increase in number of skipjack fishing vessels, there would be a possibility of both employment and income increase for fishermen.

CHAPTER 7

CONCLUSION AND RECOMMENDATIONS

Chapter 7 CONCLUSION AND RECOMMENDATIONS

This program is meant to expand and to develop the on-going Fisheries Development Program in order to realize the self-supporting economy of the Republic of Kiribati. The development of fishery businesses there should be promoted by all-out efforts of every citizen of the nation.

Fortunately, harmonizing with the hard-working Kiribatis, development of fisheries by use of the training vessels and establishment of the distribution center is making it possible to improve the every day life of the Kiribatis from the foundation. Also, monetary economy is progressing rapidly through Tarawa island and is intending to spread over other islands as well.

Of course, there still remain some problems in profitability of the operation of the training vessels and land facilities already provided by both Japan and Britain and yet to be supplied in this project.

However, this project aims at systematic fishing vessels fisheries. Therefore, it is not too much to say that the promotion of National Development Program of the Kiribati Government would become difficult, particularly lest the man-power training of the later mentioned personnel should be started immediately.

(1) Training and Securing of Senior Crew Members

The skipjack fishing vessels provided by Japan have been repeatedly studied and improved in the fishing industry for a long time.

From now on as well, more positive, strenuous efforts are needed to reinforce the technical training of Kiribatis' managing staff, especially organizational managing staff engineers, with the help of guidance by experts from abroad.

(2) Necessity of Land Fleet Manager

For a fishing vessel to get a good result out in the sea without accidents, both phisical and mental back-up from the land staff members is indispensable.

(3) Completion of Maintenance Facilities/Equipments and Training of Maintenance Staff Members in Fisheries Industry

For Betio to grow and operate favorably as a fishing port in the future, readjustment of maintenance facilities becomes important. In consequence, the training of the maintenance staff members and the port engineers would be one of necessary measures to be taken.

In any event, a well-balanced advancement of fishing vessels, land facilities and a man-power education will be indispensable in Kiribati's fisheries development.

On the other hand, at present, the milk fish culture business has been successfully carried out step by step with the cooperation from the United Nations. Therefore, in the light of securing the live bait essential for the skipjack fisheries, the milk fish culture business is a subject of great importance and should be well-positioned in this project together with the reinforcement of man-power education.

In any event, this project is extremely significant to the Self-Supporting Economy Plans in the National Development Program of the Republic of Kiribati.

Therefore, the implementation of this project will greatly contribute to the further economic development of the Republic of Kiribati and surely bear fruit.

Lastly, it is hoped that the Government of Japan will immediately execute this project, while the Government of the Republic of Kiribati as well will promote it by taking necessary measures on such items as:

1. Securing essential personnel, particularly, at least one excellent candidate for an engineer captain with fundamental engineering knowledge per one training vessel, and
2. Securing the budget for both operating funds for training vessels at an early stage and related construction work to be conducted solely by Kiribati in the construction of land facilities.

ANNEX

Annex I

MEMBERS OF THE SURVEY TEAM

Charge	Name	Position
Team director	Tatsuhiko Iwasawa	International Division, Fisheries Department, Fisheries Agency
Grant aid	Yoshiaki Hata	Oceania Division, European and Oceanic Affairs Bureau, Ministry of Foreign Affairs
Project Coordination	Hideki Tomobe	First Equipment Division, Survey Department, Japan International Cooperation Agency
Fishing	Tokuichiro Kamei	D & A Engineering Co., Ltd.
Refrigeration	Tomio Ikeda	Ditto
Fishing Boat	Hideji Koyanagi	Ditto

Annex II

Itinerary for Survey

1. 2/8 (M) - Leave Tokyo at 2120 by JL-775 for Nadi.
2. 2/9 (T) - Arrive Nadi at 0850.
   - Leave Nadi at 1300 by FJ-016, arriving Suva at 1355.
   - Courtesy call at Japanese Embassy in Fiji.
   - Meeting with Japanese Ambassador Ikebe, Councilor Sugimoto and Second Secretary Takayama on the Basic Design Survey.
3. 2/10 (W) - Briefing on local conditions by Mr. Nakamura, ex-JICA expert sent to Kiribati.
4. 2/11 (T) - Leave Suva at 0830 and arrive Tarawa at 1455 by ON-920.
   - Meeting with Mr. Dalley, Chief Fisheries Officer about survey itinerary.
5. 2/12 (F) - Courtesy call on the Minister of Natural Resources Development, Minister of Finance and Minister of Foreign Affairs.
   - Observation of the Parliament House
   - First joint conference with the related ministries at the Ministry of Natural Resources Development.
   - Proposition of Kiribati's request contents from the Director of the Fisheries.
6. 2/13 (S) - Visit Betio Fish Distribution Center and hearing from the persons concerned.
   - Consultation with Mr, James, general manager of the Te Mautari Ltd. (here in after referred to as GM)
   - Briefing by JICA experts Mr. Shindo and Mr. Sugiyama on the actual conditions of skipjack training vessels and on the local conditions.
7. 2/14 (S) - Observation of the skipjack training vessel "Arintetonge" and the proposed construction site of the shore facilities.
   - Discussion with the General Manager of the National Fishing Corporation.

8. 2/15 (M)
- Discussion on the shore facilities at the Ministry of Works and Development and the South Tarawa Port and Harbor Planning Commission.
- Preliminary discussion with the Director of the Fisheries on the Minutes of Discussions (M/D).
- Preparation and study of the M/D draft.

9. 2/16 (T)
- Explanation of grant aid program at the Ministry of Finance.
- Second joint meeting with the related ministries.
- Discussion on the contents of the M/D (at the Ministry of Natural Resources Development).

10. 2/17 (W)
- Third joint meeting with the related ministries.
- Last Discussion on the contents of the M/D (at the Ministry of Natural Resources Development).
- M/D signing.
- Reception given by the Survey Team.
- Field survey on skipjack fishing operations on-board the Arintetongo.

11. 2/18 (T)
- Field survey on skipjack fishing operations.
- Discussion with the General Manager of the National Fishing Corporation.
- Meeting with the Ministry of Foreign Affairs on matters related to E/N (at the Ministry of Natural Resources Development).
- Collection of data on economic development at the Ministry of Finance.

12. 2/19 (F)
- Team Director: Leave Tarawa at 1425 by ON-150 and arrive Nauru at 1535.
- Team Members: Hearing from Mr. Marriotte of the Atoll Unit on the conditions of costal fishermen.
- Collection of data employment at the Ministry of Trade, Industry and Labor.

13. 2/20 (S)
- Team Members: Data adjustment

14. 2/21 (S)
- Team Director: Leave Nauru at 1430 by ON-921, arriving Suva at 1920
- Report making to the Ambassador Ikebe and the Second Secretary Takayama at the Japanese Embassy in Fiji
- Team Members: Visit mild fish hatchery (Temaiku) under the UNDP Project

15. 2/22 (M)
- Team Members: Fact-finding survey at the Marine Training School
- Visit Betio Ship-building yard
- Hearing on present circumstances of the Transport Corp.
- Supplementary survey at the South Tarawa Distribution Center and the Ministry of Communication and Works
- Survey on the conditions of electric power supply and water supply conditions
- Discussion with the General Manager of the National Fishing Corporation

16. 2/23 (T)
- Team Director: Leave Suva at 1600 by FJ-027, arrive Nadi at 1635
- Team Members: Fact-finding survey on school system at the Ministry of Education
- Supplementary survey on economic matters at the Ministry of Finance

17. 2/24 (W)
- Team Director: Leave Nadi at 1310 by FJ-776, arrive Tokyo at 1905
- Team Members: Leave Tarawa at 1115 by ON-921, arrive Nadi at 1800 via Nauru

18. 2/25 (T)
- Team Members: Report making to the Second Secretary Takayama at the Japanese Embassy in Fiji
- Completion of the Survey

19. 2/26 (F)
- Team Members: Leave Nadi at 1230 by T-230, arrive Tokyo at 1830

Annex III

PARTICIPANTS TO THE DISCUSSION MEETINGS

Organization	Name	Position
- Ministry of National Resources Development	Rotini Teiwaki	Minister
	Marae Irata	Senior Assistant Secretary
	Tenanora Tekanene	Assistant Secretary
	Brendan Dally	Chief Fisheries Officer
	Barerei R. Onorio	Fisheries Officer
	Sean Marriotte	Fisheries Statician
(Te Mautari Ltd.)	R.H. James	General Manager
(ditto)	George Kum Kee	Marketing Manager
(ditto)	David Lowther	Cold Storage Engineering Staff
(FAO/UNDP)	V. Gopal Krishnan	Project Manager
- Ministry of Finance	Baraniko Baaro	Assistant Secretary
	Jack H. Jones	Chief Planning Officer
	Martin Surr	Economist
- Ministry of Foreign Affaires	I.C. Batten	Deputy Minister
- Ministry of Communications and Works	Ian G. Grainger	Chief Public Works Officer
- South Tarawa Wharf Area Planning Board	Dominic Moss	Chief Surveying Officer

Annex IV

MINUTES OF DISCUSSIONS

ON

THE BASIC DESIGN SURVEY FOR THE FISHERIES DEVELOPMENT PROJECT

IN THE REPUBLIC OF KIRIBATI

In response to the Government of the Republic of Kiribati for assistance in providing the training vessels, facilities and equipments for the purpose of promoting the Fisheries Development Project (hereinafter referred to as "The Project") in the Republic of Kiribati, the Government of Japan, acting through Japan International Cooperation Agency (JICA), has sent a survey team (hereinafter referred to as "The Team") headed by Mr. Tatsuhiko Iwasawa to conduct a basic design survey on the Project from February 11th, 1982.

The Team held a series of discussions and exchanged views with the authorities of the Republic of Kiribati concerned in respect of the desirable measures to be taken for the successful implementation of the Project.

Both parties have agreed to recommend their respective Governments and the authorities concerned to examine the result of the survey attached herewith toward the realization of the Project.

February 17th, 1982

Tarawa

Republic of Kiribati

岩澤辰彦

.....

Mr. Tatsuhiko Iwasawa
Head of the Japanese
Basic Design Survey Team

.....

Hon. Roniti Teiwaki
Minister of Natural
Resource Development

ATTACHMENT

1. The objective of the project is to provide Fishery Training and Research Vessels and the necessary facilities and equipments for encouraging the Fisheries Development Programme.

2. The Team will convey the desire of the Government of the Republic of Kiribati to the Government of Japan to take necessary measures for cooperation in implementing the project. The Government of Japan will provide the items as listed in order of priority in the Annex within the budgetary limits of Japanese economic cooperation in grant aid form.

3. Following arrangements are required to be taken by the Government of the Republic of Kiribati:

   1) To provide data and information necessary for the design and construction.

   2) To secure a lot of land necessary for the construction of facilities.

   3) To clear, fill and level the site as needed before the start of the construction.

   4) To provide facilities of electricity, water supply and drainage and other incidental facilities outside the Building.

   5) To ensure prompt unloading and customs clearance in Kiribati of imported materials and equipments for the construction and also to facilitate the internal transportation for them.

   6) To exempt Japanese nationals concerned from customs duties, internal taxes and other fiscal levies which may be imposed in Kiribati on the occasion of the supply of materials and services under the verified contracts.

   7) To accord Japanese nationals whose services may be required in connection with the supply of the products and the services under the verified contract such facilities as may be necessary for their entry into Kiribati and stay therein for the performance their work.

   8) To bear all the expenses, other than those to be borne by the Grant, necessary for the construction of the facilities as well as for the internal transportation of the products and services under the Grant.

THE ANNEX

(1) 59 GRT POLE AND LINE TRAINING AND RESEARCH VESSEL 1

1) GRT	59
2) Construction	Steel
3) Bait and Fish hold capacity	$45m^3$
4) Complement	25
5) Main Engine	450 p.s.
6) Aux. Engine	100 p.s. x 2
7) Spray pump	$75m^3/h$
8) Bait Circulation pump	6 tims of bait tank c
9) Refrigeration capacity	3.5 tonnes/day
10) Hold temperature	$-25^{\circ}C$
11) Skiff	x 2
12) 25 hp outboard engine	x 3
13) Bouke net with full set FRP poles	x 1
14) Beach Seine net	x 1
15) Pole and Line fishing gears	x 1 full set

(2) 20 GRT POLE AND LINE VESSEL

1) Standard vessel of this type	x 1
2) Main engine less than 150 ps	x 1
3) Construction	FRP
4) Skiff	x 1
5) 25 hp outboard engine	x 2
6) Bouke Ami net with full set FRP poles	x 1
7) Beach seine net	x 1
8) Pole and Line fishing gears	x 1 full set

(3) ICE MAKING/BRINE FREEZING FACILITY x 1

1) Block Ice making/Brine freezing	Each 10 tons/day
2) Holding Bin capacity	20 tons
3) Office	1 room