F I J I

BASIC DESIGN SURVEY REPORT

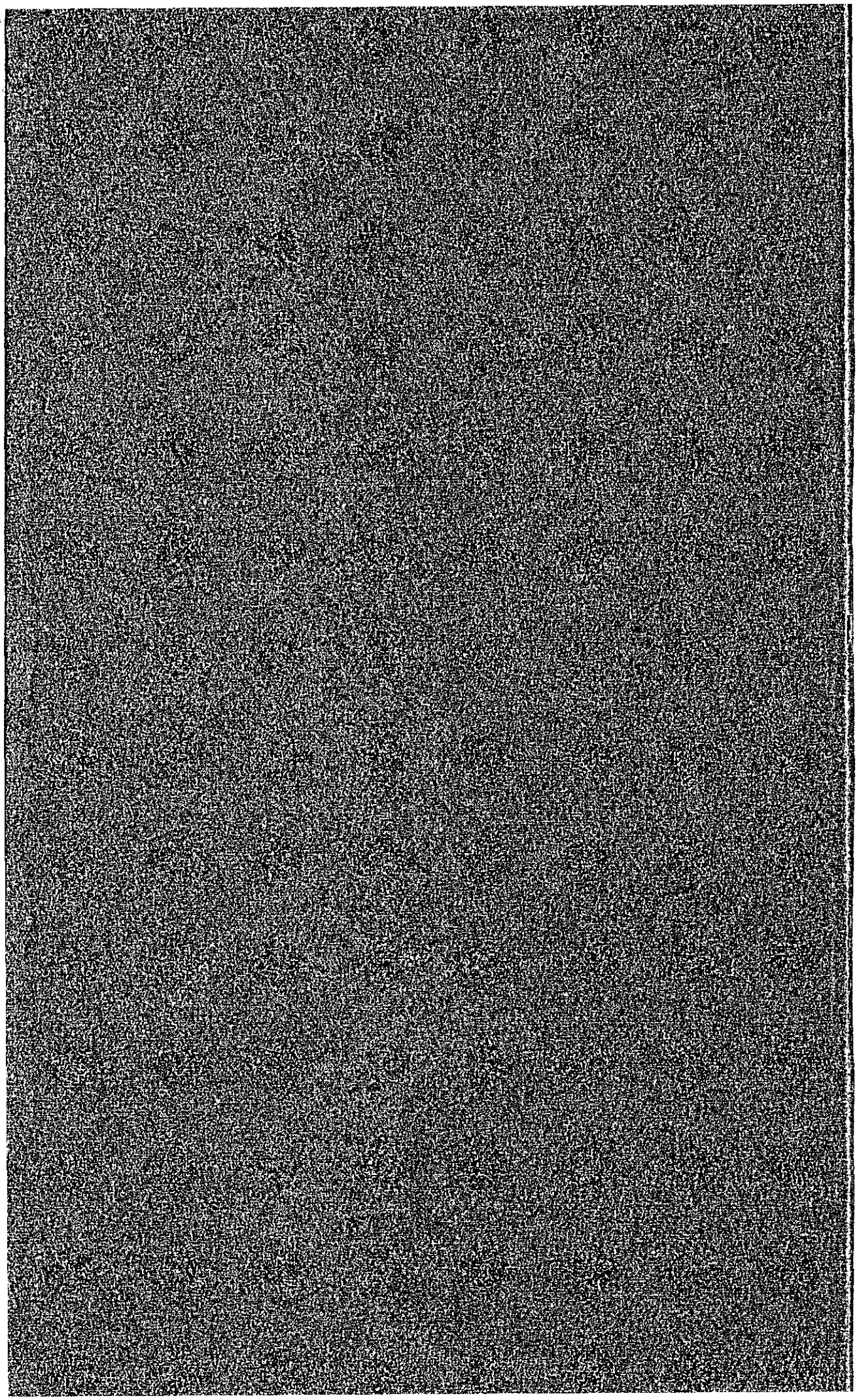
OF

THE FISHERIES DEVELOPMENT PROJECT

December 1979

JAPAN INTERNATIONAL COOPERATION AGENCY

(J I C A)



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PREFACE

In response to a request of the Government of Fiji, the Government of Japan has decided to conduct a basic design survey of the fisheries development project in Fiji, and the Japan International Cooperation Agency (JICA) conducted the survey.

The JICA dispatched to Fiji a 6-man survey team, headed by Mr. Shoichi Kudo, Director, Fishing Boat Division, Fisheries Agency, Ministry of Agriculture, Forestry and Fisheries from 28 September to 19 October 1979 to hold discussions with the Fijian Government officials concerned and to collect necessary information for the basic design survey. The team has now completed its survey report for submission to the Government of Fiji.

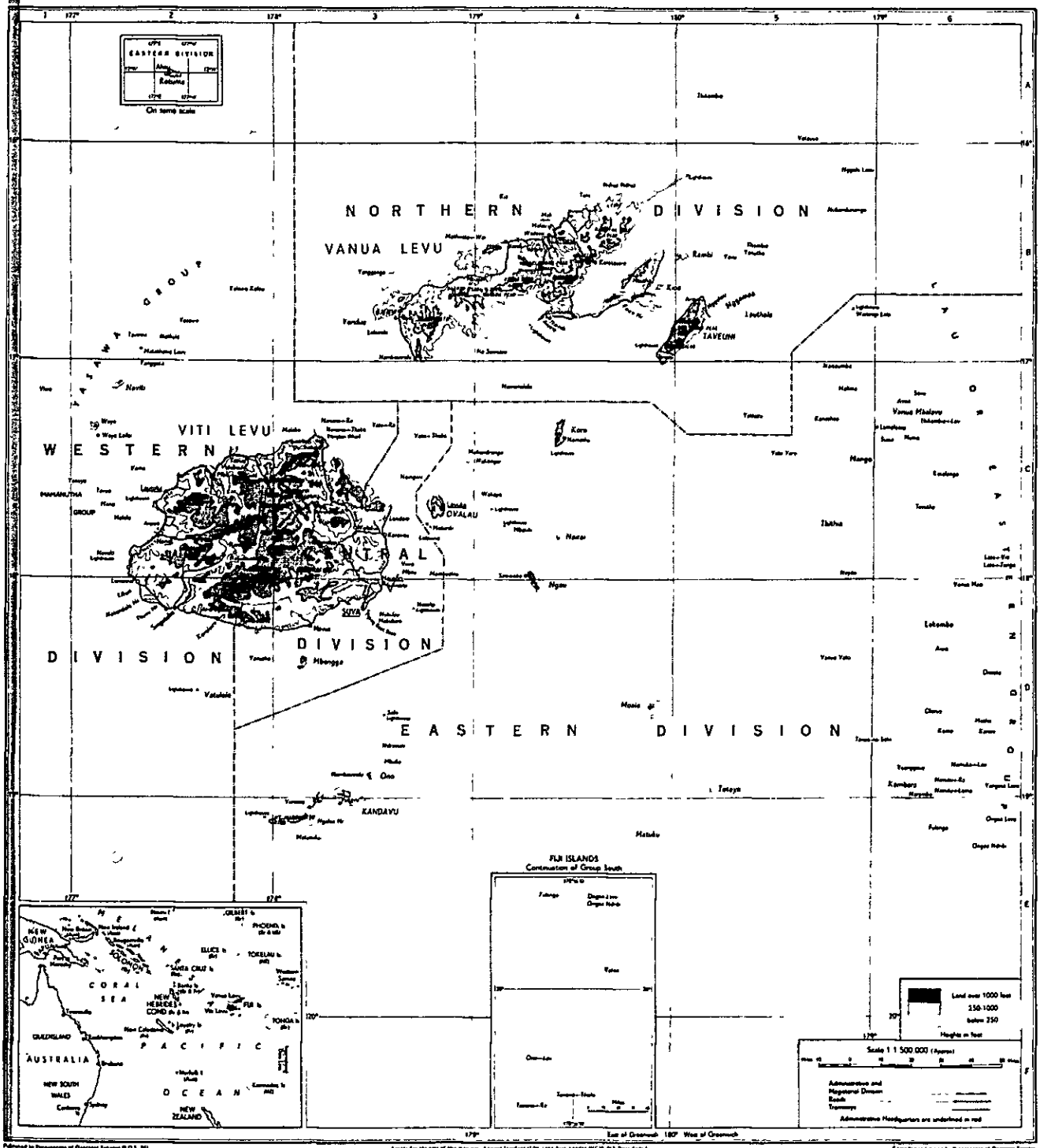
I hope that this report will prove to be useful for the progress of this project and contribute to the friendship and goodwill between our two countries.

I would like to express my heartfelt appreciation to the Fijian Authorities concerned for their cooperation and hospitality extended to the survey team.

December, 1979

Shinsaku HOGEN
President
Japan International
Cooperation Agency (JICA)

MAP OF FIJI



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SUMMARY

1. Outline of the Project

The Government of Fiji, in implementing the Fisheries Development Project, has formulated a request document under grant aid of the Government of Japan, and the outline of the Project is as follows:

(1) Skipjack Training Vessel

The introduction of skipjack training vessel aimed at the training of fishing vessel crew which is necessary for the expansion of skipjack fishery.

The training vessel will be based at Lami where the Fisheries Division of the Government of Fiji is located, and the operation will be entrusted to IKA Corporation by the Fisheries Division.

(2) Fisheries Research and Development Vessel

The introduction of fisheries research and development vessel aimed at the survey of resources in the waters around Fiji.

The research vessel will be based at Lami and will be operated and managed directly by the Fisheries Division.

(3) Rural Fisheries Development Scheme

The construction of trainees' hostel facility required to carry out fishery training towards young fishermen in the region, and introduction of machinery and tools such as fishing boat engine, fishing gear, various materials and the like required for the training to bring about development of rural fisheries.

The hostel facility will be built within the compound of the Fisheries Division complex at Lami, and will be operated and managed by the Fisheries Division.

(4) Fisheries Laboratory Complex

The introduction of facilities, machinery and tools required to perform all the scientific research related to resources assessment.

The laboratory will be set up within the compound of the Fisheries Division (Lami), and will be operated and managed by the Fisheries Division.

(5) Fisheries Workshop

The construction of fisheries workshop facilities aimed at repair and maintenance services for fishermen living around Savusavu of the North Island and for fishing vessels owned by the Fisheries Division.

The workshop will be operated and managed by the Fisheries Division.

(6) Mobile Workshop

The introduction of mobile workshop to provide mobile repair services for fishing boat engine and machinery, as well as to carry out fisheries extension activities in remote fishing villages based at Savusavu of the North Island.

The mobile workshop will be operated and managed by the Fisheries Division.

(7) Ice Making Plant

The construction of new ice making plants in Suva and Levuka in order to supplement the supply of ice for coastal fisheries use and which is in shortage.

The plants will be operated and managed by the Fisheries Division.

2. Appraisal of the Project

The Project is considered to be both useful and necessary for the fisheries development of Fiji.

The appraisal of each item of the Project is as follows:

(1) Skipjack Training Vessel

As a result of the survey of the present status of Fiji aiming at the expansion of skipjack fishery as a mainstay in the development of its fisheries, there was indeed a shortage of skilled crew for skipjack fishing vessel. Thus, the intoduction of the training vessel with which to carry out training is reasonable, and this scheme itself, including the part of entrusting the operation to IKA Corporation which is under direct control by the government having Lami as the base, is regarded as appropriate.

(2) Fisheries Research and Development Vessel

There is a high necessity of a research vessel which aims to survey the resources in order to seek the development of fisheries as well as the appropriate management of the resources. In order to promote the research activities which is lacking nowadays, this project to operate the vessel under control of the Fisheries Division having its base at Lami is appropriate.

(3) Rural Fisheries Development Scheme

This scheme to carry out fisheries training towards young fishermen of the region is necessary in order to seek the promotion of rural fisheries and the enlargement of fisheries production. The scheme to construct trainees' hostel facilities and to introduce fishing boat engine, other machinery and tools, fishing gear, and other equipments which cannot be procured in Fiji is appropriate.

(4) Fisheries Laboratory Complex

In order to seek the development of fisheries, scientific proof of data as regards the resources appraisal is necessary. Thus, it is necessary to have laboratory and research equipments to carry out the above mentioned scientific research. We, therefore, consider the construction of laboratory complex and this scheme under which the laboratory will be operated and managed by the Fisheries Division to be appropriate.

(5) Fisheries Workshop

The necessity for maintenance and repair services for fishing boat engines and the like along with the reinforcement of fishing vessels will naturally arise. Due to the fact that Savusavu, a subject area of the project, lacks this kind of facilities; this scheme to construct the workshop which will be operated under the control of the Fisheries Division is appropriate.

(6) Mobile Workshop

The mobile repair services for the fishing boat engines and the like at the remote fishing villages in the Savusavu region of the North Island as well as the mobile workshop for the purpose of fisheries extension are necessary. Thus, we consider this project in which the mobile workshop will be operated and managed by the Fisheries Division to be appropriate.

(7) Ice Making Plant

The necessity and the appropriateness of this project to set up a new ice making plant which will be operated and managed by the Fisheries Division are acknowledged, and we consider desirable that this project be implemented at the same time with the entire Project. However, if there is a difficulty in implementing it at the same time, it is desirable to seek to implement this scheme at an earliest possible time in the future according to the progress of the development of fisheries.

3. Basic Design

In accordance with the foregoing paragraph, the basic design was conducted for six items except ice making plant and the summary of it is as follows:

(1) Skipjack Training Vessel

The type of the vessel is of a single layered deck with long poop and low forecastle which is the ordinary type of Japanese skipjack pole-and-line fishing vessel. The steel vessel is designed to be of about 100 ton class in gross tonnage.

Main Specifications:

Length overall	about 35.00 m
Breadth moulded	about 5.70 m
Depth moulded	about 2.60 m
Draft moulded	about 2.34 m
Designed gross tonnage	about 100 tons
Complement	24 persons
Main engine	900 PS, 800 RPM
Maximum trial speed	about 11.5 knots
Service speed	about 10.5 knots
Cruising range	about 2,500 miles

Fishing Equipments:

Skipjack pole-and line
Stick-held dip net (Bouke-ami)
Small-sized skiff boat (by FRP)

(2) Fisheries Research and Development Vessel

The type of vessel is designed to be a single-layered deck vessel with low forecastle and made of FRP having the gross tonnage of about 28 tons.

Main Specifications:

Length overall	about 20.55 m
Breadth moulded (max.)	about 4.48 m
Depth moulded	about 1.60 m
Draft moulded	about 1.20 m
Gross tonnage	about 28 tons
Complement	7 persons
Main engine	240 PS, 1,600 RPM
Maximum trial speed	about 11.5 knots
Service speed	about 10.0 knots
Cruising range	about 700 miles

Fishing Equipments:

Tuna longline
Vertical longline
Shrimp pot
Stick-held dip net (Bouke-ami)
Trolling
Hand-line
Small-sized skiff boat (by FRP)

(3) Rural Fisheries Development Scheme

We have worked out a basic design for the construction of hostel comprising an area of 153 m^2 as trainees' hostel (for 18 trainees and 2 supervisors) next to the Fisheries Division at Lami, where the Fisheries Division is located. Moreover, the basic design of

fishing boat engine, other machineries and tool, fishing gear and equipments which are required in implementing the development programme was also worked out.

(4) Fisheries Laboratory Complex

We have worked out a basic design for the construction of fisheries laboratory comprising an area of 130.5 m^2 close to the Fisheries Division complex (Lami), as well as the basic design of chemical and biological research equipments required for the research activities.

(5) Fisheries Workshop

The basic design of the workshop comprising an area of 30.6 m^2 and of necessary machineries and tools was worked out so as to set up the workshop facilities for fishing boat engine or machineries in Savusavu.

(6) Mobile Workshop

We have worked out basic designs for the mobile workshop equipped with 2.5 ton diesel truck and based at Savusavu of the North Island, as well as for the machineries required for the repair services, and also for the equipments required for the fisheries extension by means of audio-visual aid.

4. Proposed Implementation Plan

As a result of the examination of each item of the Cooperation Request about its necessity, appropriateness, urgency and the like, we have formulated the implementation plan for only item 1 to item 6.

(1) Estimated Cost of Construction

The estimated cost of construction here includes the packaging cost, marine transportation cost and insurance fee, etc.; and is to be delivered at Suva Port of Fiji.

Skipjack Training Vessel	¥215,800,000
Fisheries Research and Development Vessel	98,500,000
Rural Fisheries Development Scheme	97,400,000
Fisheries Laboratory Complex	43,000,000
Fisheries Workshop	13,500,000
Mobile Workshop	9,200,000
	¥477,400,000
Consultants Fee	22,600,000
Grand Total	¥500,000,000

(2) Implementation Procedures

The implementation of this Project starts after the Exchange of Notes is concluded between the Government of Japan and of Fiji by working out on the Implementation Design.

The period required for construction is expected to be about 7 months from the start of construction.

Refer to the 4-3 Table of Implementation Procedures of the main text for the implementation procedures.

CHAPTER 1. OUTLINE THE SURVEY

1-1 Objectives of the Survey

The Government of Fiji has formulated a Fisheries Development Project as one of its National Development Plan, and is in the process of promoting its implementation. As a part of this implementation plan, the Government of Fiji had requested fisheries cooperation under grant to the Government of Japan.

The Government of Japan, in response to the request, has decided to examine it as one of the possible cooperation item and to dispatch a survey team through Japan International Cooperation Agency in order to carry out field survey and hold discussions with the Authorities concerned of Fiji required in examining the contents of the cooperation request and to work out a basic design.

1-2 Composition of the Survey Team

Leader	Mr. Shoichi KUDO	Chief of Fishing Vessel Division Fisheries Agency, Ministry of Agriculture, Forestry and Fisheries
Member (Fishing Vessel)	Mr. Masaji TSUKATANI	Universal Marine Consultant Co., Ltd.
Member (Marine Engine)	Mr. Hiroshi FUTAMI	Universal Marine Consultant Co., Ltd.
Member (Facilities & Refrigeration)	Mr. Kazunori DESHIMARU	Universal Marine Consultant Co., Ltd.
Member (Fishing gear & method)	Mr. Kiyoyasu MIYAHARA	Universal Marine Consultant Co., Ltd.
Coordinator	Mr. Eiji SAKIHARA	Social Development Cooperation Department, Japan International Cooperation Agency

1-3 Fijian Authorities Concerned

Ministry of Agriculture and Fisheries

Mr. R. Yarrow	Permanent Secretary
Mr. Den Ellison	Chief Economist
Dr. Peter C. Hunt	Fisheries Division Chief Fisheries Officer
Mr. Williams Travis	Principal Fisheries Officer
Mr. T. Lichatowich	Senior Fisheries Officer
Mr. Yuzo Masumoto	Fisheries Technical Adviser
Mr. Tevita Tanmaipeau	Fisheries Officer (Savusavu)
Mr. S. Sewae	Fisheries Officer (Labasa)

Ministry of Foreign Affairs

Mr. P. Thomsom	Chief Assistant Secretary

Central Planning Office

Mrs. Taina Tagicakibau	Officer

IKA Corporation

Mr. Takenao Ochi	General Manager
Mr. R. Stone	Operation Manager

1-4 Itinerary of the Survey

	Date	Outline of Activities
1.	Sep. 28 (Fri)	20:30 Lv. Tokyo (JL 771)
2.	29 (Sat)	6:50 Ar. Sydney 9:30 Lv. Sydney (CP 080) 15:20 Ar. Nandi 17:25 Lv. Nandi (FJ 473) 17:50 Ar. Suva Meeting with Mr. Iino, Secretary of Embassy of Japan
3.	30 (Sun)	Preparation of survey schedule and list of request material
4.	Oct. 1 (Mon)	Morning: Courtesy call on Embassy of Japan and meeting with officials Courtesy call on Ministry of Foreign Affairs, Government of Fiji Afternoon: Courtesy call on Fisheries Division and meeting on schedule Explanation of T/R by Fijian official
5.	2 (Tue)	Meeting with officials concerned of Fisheries Division
6.	3 (Wed)	Meeting with officials concerned of Fisheries Division, and survey on project site
7.	4 (Thu)	Morning: Meeting with officials concerned of Fisheries Division Afternoon: Lv. Suva Ar. Savusavu Visit Savusavu Branch Office of Fisheries Division Survey on project site, fishing vessel and fisheries facilities

	Date	Outline of Activities
8.	Oct. 5 (Fri)	Survey on fisheries condition in the areas around Savusavu
9.	6 (Sat)	Lv. Savusavu Ar. Suva
10.	7 (Sun)	Meeting and preparation of materials
11.	8 (Mon)	Meeting and preparation of materials
12.	9 (Tue)	Meeting with officials concerned of Fisheries Division Preparation of draft of Basic Design
13.	10 (Wed)	Courtesy call on Ambassador Ohtaka, Embassy of Japan Meeting with officials concerned of Fisheries Division
14.	11 (Thu)	Lv. Suva Ar. Levuka Visit and survey Pacific Fishing Co., Ltd. (PAFCO), and Levuka plant of Toyo Can Manufacturing Co. Lv. Levuka Ar. Suva
15.	12 (Fri)	Courtesy call on Permanent Secretary of Ministry of Agriculture and Fisheries Discussions on Minutes draft with officials concerned of Fisheries Division
16.	13 (Sat)	Meeting and preparation of materials
17.	14 (Sun)	Preparation of Minutes Draft
18.	15 (Mon)	10:15 Signing of Minutes at Ministry of Agriculture and Fisheries

Date	Outline of Activities
	Reporting of survey result to Ambassador Ohtaka, Embassy of Japan
	Afternoon: Observation of Shipyard
19. Oct. 16 (Tue)	Meeting and adjustment of materials
20. 17 (Wed)	13:15 Lv. Suva (FJ 127) 14:00 Ar. Nandi 17:30 Lv. Nandi (QF 575) 20:00 Ar. Sydney
21. 18 (Thu)	22:30 Lv. Sydney (JL 772)
22. 19 (Fri)	7:00 Ar. Tokyo

CHAPTER 2. OUTLINE AND APPRAISAL OF THE PROJECT

2-1 Outline of the Project

The Government of Fiji is planning the Fisheries Development Project of Fiji having the enlargement and development of offshore fishery and coastal fishery as their principle measures and has requested the Government of Japan for grant cooperation in connection with the implementation of the Project.

The outline of the Project is as follows:

(1) Skipjack Training Vessel

Purpose: To seek reinforcement and improvement of skipjack fishing vessel in order to exploit and seek effective use of skipjack resources of the water around Fiji.

Aiming at the training of fishing boat crew required in executing this project, the skipjack training vessel shall be introduced. The skilled fishing boat crews who are in shortage at present will be fostered in this way.

Base: Lami where the Fisheries Division is located will be the base, and the operation will be entrusted to IKA Corporation (fishery corporation) by the Fisheries Division.

(2) Fisheries Research and Development Vessel

Purpose: To seek the establishment of a commercial fishing industry through exploitation of fishing grounds brought about by researches on the fishery resources in the water around Fiji.

Thus this scheme aims at realizing the fisheries development by means of scientific survey and assessment of resources through the research vessel equipped with modern facilities required for this purpose.

Base: Lami will be the base, and the vessel will be operated and managed by the Fisheries Division.

(3) Rural Fisheries Development Scheme

Purpose: To seek the supply of marine products for the Fijians which is in shortage by seeking the development and extension of rural fisheries and the enlargement of fishery production; and even more to seek promotion of employment of fishery workers, thus stabilizing their fishery business, and consequently the development of the Fijian economy.

The scheme having young fishermen of the region as its object will offer trainings related to fishery.

The scheme shall proceed by seeking the introduction of trainees' hostel required to carry out fishery training, and of marine engines, machineries, equipments, fishing gears and various materials required for the training of manpower aimed at the development of rural fisheries.

Subject Areas: The hostel building of trainees will be set up adjacent to the Fisheries Division at Lami and will be operated and managed by the Fisheries Division.

(4) Fisheries Laboratory Complex

Purpose: To carry out scientific research from the oceano-biological point of view regarding resources through surveys on resources, ocean and fishing grounds, and to provide all the services related to resources assessment by means of introduction of required laboratory facilities and equipments.

Subject Area: The laboratory will be set up within the Fisheries Division complex at Lami, and will be operated and managed by the Fisheries Division.

(5) Fisheries Workshop

Purpose: To provide repair services for marine engines, fishing gears and machineries of vessels owned by both fishermen around Savusavu and the Fisheries Division, as well as to carry out trainings of repair techniques towards regional fishermen around Savusavu (an important fishing base in the North Island); and furthermore, to seek the enlargement of the rural fishery production.

Subject Area: The workshop will be set up in Savusavu in the North Island and will be operated and managed by the Fisheries Division.

(6) Mobile Workshop

Purpose: To provide mobile repair services for marine engine, and other machineries of the especially remote fishing villages in the Savusavu region which is a major fishery base of the North Island, as well as to carry out fishery extension and guidance activities through audio-visual aids.

Subject Area: Having the Savusavu Branch Office of the Fisheries Division in the North Island as the base, mobile workshop will be operated and managed by the Fisheries Division.

(7) Ice Making Plant

Purpose: To seek to cover the shortage of ice supply by establishing new ice plants in Suva and Levuka, since one of the factors hindering the development of fisheries in Fiji is the shortage of ice which is necessary in preserving the freshness of the catches.

Subject Areas: Ice plants will be set up at Lami and Levuka, and will be operated and managed by the Fisheries Division.

2-2 Appraisal of the Project

The Government of Fiji is considering the promotion of fisheries development as a key policy for the 7th National Development Plan (1976-1980) of Fiji.

By seeking to improve and furnish the training and research vessel and land primary facilities in order to advance the promotion and development of offshore fisheries and coastal fisheries, as well as to train fishery crew and engineers, and to have promotion and extension of rural fisheries; the future production of marine products will be enlarged. This will not only enable Fiji to meet the domestic demand of marine products, but to have a possibility to earn foreign currency by export; thus contributing to the economic development of Fiji.

The appraisal of each item is as follows:

(1) Skipjack Training Vessel

For the enlargement of skipjack fishery, the reinforcement of fishing vessel as well as the fostering of highly skilled crew are indispensable.

The present condition of Fiji is that she lacks the skilled fishermen for a great deal.

Thus, it is necessary for Fiji to have training vessels equipped with facilities and functions appropriate to the local condition and skipjack fishing training.

We have appraised this project, including the fact that the training vessel will be based at Lami where the Fisheries Division is located and that the operation and management will be entrusted to IKA Corporation (fisheries corporation) which is under direct control of the government, to be appropriate.

(2) Fisheries Research and Development Vessel

In proceeding with the implementation of measures to promote fisheries, it is necessary as well as important to conduct resources assessment based upon scientific survey data. At present, surveys are conducted by 3 research vessels owned by the Fisheries Division; however, from the point of view of its ability and equipments being about 12 m lengthed small-sized boat made of cement, we consider its use limited only to the survey of the nearby coast.

Research and development vessel appropriate to the region equipped with functions to conduct survey on offshore seas is necessary. The project to set up the base of research vessel at Lami where both the Fisheries Division and fishery base are located was judged to be effective in its function with staffs of the Fisheries Division; and thus this project was appraised to be appropriate.

(3) Rural Fisheries Development Scheme

In order to seek the enlargement of the supply of marine products which is in shortage as against the domestic demand in Fiji, the promotion of rural fisheries development is extremely significant.

The increased fishery production will naturally improve the income and living standard of the fishermen providing a basis for the development of fisheries.

Having the purpose to foster skilled fishermen by carrying out trainings on fishery towards young fishermen, this scheme which is to build a hostel facility for trainees required for the training and to introduce marine engine, various machineries and equipments, fishing gear, and material was judged to be appropriate.

Although this scheme was originally designed to request 90 sets: 5 years x 18 sets/year based upon a 5 year plan, considering the change of materials and specification of machinery and equipment which will take place by an ever-advancing technological improvement as well as the danger of the materials and machineries to get damaged while they are being stored for a long period of time; we have judged that 54 sets: 3 years x 18 sets/year was appropriate.

This scheme which have the subject area distributed in 4 areas of Viti-Levu Island, Vanua-Levu Island, Kandavu/Ovalau Island, and the Lau Islands; and aims to build the trainees' hostel adjacent to the Fisheries Division (Lami) was appraised as appropriate.

(4) Fisheries Laboratory Complex

In order to seek the promotion and development of fisheries, scientific backing of the data is necessary and the scientific basic survey and research activities based upon oceanic environmental and biological study on the resources of the marine animals are very significant. Presently, facilities and equipments required for the research activities are lacking, and thus the researches are hardly carried out. Therefore, this project which is to construct the required laboratory facility and introduce the research equipments which will be operated and managed by the Fisheries Division as appraised to be appropriate.

(5) Fisheries Workshop

If fishing vessels will be reinforced and their operation expanded along with the implementation of the Fisheries Development Project, the necessity to maintain and repair machineries such as marine engine will naturally increase; and thus facilities as well as various equipments for that purpose are very important. Since presently there are no workshop in Savusavu of the North Island, we have appraised this project to set up this workshop nearby the Savusavu Branch Office of the Fisheries Division and to commit the operation and management to the Fisheries Division as appropriate.

(6) Mobile Workshop

The necessity and the effect of the mobile workshop having the purpose to provide mobile repair services for marine engines and machineries in the remote areas around Savusavu region in the North Island and to carry out fisheries extension activities by audio-visual aids have been recognized, and thus this project in which mobile workshop will be managed and operated by the Fisheries Division was appraised to be appropriate.

(7) Ice Making Plant

For the preservation of freshness of catches while being stored on board and transported, ice is indispensable.

The necessity and appropriateness of this project to build a new ice plant which will be operated by the Fisheries Division at Lami in order to supplement the shortage of supply of ice towards coastal fishing boats around Suva have been recognized, and it is considered desirable to implement this project at the same time with other schemes. However, if there is a difficulty in implementing this at the same time, taking into consideration the fact that there already do exist an ice plant at Lami, we consider desirable that this project be realized at an earliest possible time in the future according to the progress of the development of the coastal fisheries.

CHAPTER 3. BASIC DESIGN

3-1 Skipjack Training Vessel

We have worked out a basic design of training vessel which is matching to the oceanic and meteological condition of the Fijian waters and is equipped with facilities required as a skipjack training vessel.

3-1-1 Vessel Type

The vessel type is to be the ordinary Japanese style skipjack pole-and-line fishing vessel. Paying a close attention especially on its safety aspect, the vessel was so designed as to have optimum stability, wave resistance, and maneuverability.

The steel vessel of which the gross tonnage is about 100 tons, optimum for the effectiveness of cruise, was made to have the cruising range of 2,500 miles, and the durable days of one voyage as 15 days thus making the long-term training cruise possible.

3-1-2 Main Specifications

Length overall	about	35.00 m
Breadth moulded	about	5.70 m
Depth moulded	about	2.60 m
Draft moulded	about	2.34 m

Deck height at vessel centerline	
Main deck to forecastle deck	about 1.00 m
Main deck to poop deck	about 1.95 m
Poop deck to bridge deck	about 2.10 m
Sheer	
Sheer at F.P.	about 1.093 m
Sheer at A.P.	about 0.826 m
Camber	about 0.114 m
Initial trim	about 0.80 m
Designed gross tonnage	about 100 tons
Complement	24 persons
Fuel oil tanks	about 36.64 m^3
Lub. oil tanks	about 2.76 m^3
Fresh water tanks	about 15.00 m^3
Main engine (4 cycle marine diesel engine)	900 PS x 800 RPM 1 set
Propeller (4-blade solid pitch)	1 set
Maximum trial speed	about 11.5 knots
Service speed	about 10.5 knots
Cruising range	about 2,500 miles
Capacity of fish hold (bale)	
Fish hold (8 untis)	about 27 m^3
Livebait well (4 units)	about 30 m^3
Total	about 57 m^3
Refrigeration (Brine System)	Fish hold -30°C

Fish hold insulation

	Fish hold	Livebait hold
Deckhead	220 mm	220 mm
Shell	200 mm	-
Intermediate Bhd.	150 mm	150 mm
For. Bhd.	200 mm	200 mm
Aft. Bhd.	200 mm	200 mm
Floor	100 mm	100 mm

3-1-3 General Arrangement

As indicated in the General Arrangement Plan, this vessel is an aft-engine type skipjack pole-and-line fishing training vessel which is a single-layer decked vessel with long poop and low forecastle deck.

Under the main deck, from the bow, bow store, forward, crew's space, and stern store shall be arranged respectively. Further, under the forward crew's space, fish hold, and engine room, the bottom is double-layered where there shall be fresh water tanks, fuel oil tanks, and lub oil tanks.

Above the main deck, the forecastle shall be the bos'n store, and in the interior of the poop, from the bow, refrigerating machine room, shower room, toilet, mess room, galley and food store shall be arranged. The poop section shall be used for steering engine room-cum-deck store. A bridge shall be installed above the poop, and from the bow, wheel house, cabin-cum-radio room, and engine casing shall be arranged. All the arrangements in this vessel have been rationally designed as to effectively use the limited space, and a special attention has been paid to the measures for preventing noise,

moisture, and vibration, ventilation, and insulation; so that life on board can be spent comfortably with good sanitation under the local weather conditions.

On the deck, capstan for anchoring and mooring shall be installed, and the skiff boat shall be set at the starboard stern part of the poop deck.

Fishing platform shall be installed all around the vessel, and the fishing platform at the rear part of the port and the stern shall be of lower level; while all the other platforms should be equipped with water spray device. Further, by equipping the FRP chute for the transportation of catch, the efficiency of fishing was sought.

3-1-4 Facilities

(1) Accommodations

The accommodations sector is divided into 3 sections: crew's space in the front part and the rear part under the main deck, and the cabin-cum-radio room above the poop. We have paid attention to make the on board life comfortable as much as possible by securing enough height for the rooms and giving consideration for the lights and wall colours.

We have furnished crews' room with such necessities as signle bunk, double bunk and wardrobe.

The mess-room is furnished with sideboard, refrigerator, water cooler, tables and chairs, and the galley is equipped with electrical range, stainless sink and manual fresh water pump.

(2) Captain's Room, Wheel House and etc.

In the captain's room-cum-radio room, we have equipped a unit which comprises chart table, ratio device and etc.

The wheel house is equipped with steering stand, main engine remote control device, radar indicator, gyro compass, magnetic compass, fish finder and etc. In order to widen the forward and side view, square windows are used, and 2 clear view screens (revolving windows) are installed at the front square window.

(3) Deck Facilities

At the bow and stern section of the deck, capstans for both anchoring and mooring are installed, and the required amount of fair-leader, bitt and etc. are also installed. As an auxiliary lighting for fishing and cruise during the night, a set of search light (1 kW) shall be installed at the upper bridge.

Further, as an illumination for the deck, 6 sets of 500 W projector are equipped. The upper bridge shall be covered by awning.

(4) Engine Facilities

Engine room is located in the aft section, and for the main engine, medium-speed engine was chosen in order to secure wider working space in the engine room.

As regards the power generator system, the required electric power will be met by operating 1 set at the time of navigation, while operating 2 sets at the time of fishing, and 2 sets of A.C. generator with diesel engine starter. Besides, necessary appliances which include 2 refrigerators, and 2 brine coolers shall be installed in the engine room.

The arrangement in the engine room was designed by paying attention to its passability of the doorway and ventilation so that the maintenance check-up can be easily done.

(5) Refrigeration System

A freezer system having the freezing ability of 5 ton/24 hr, with the method to brine-freeze the catch in the fish hold and then keep it cold in the debrined fish hold at -30°C by cooling coil, is installed.

(6) Electrical System

As an inboard power source, 2 sets of 100 kVA main power generator are installed. One (1) set will be operated while on voyage and loading; however, 2 sets will be operated while fishing. Furhter, when auxiliary generator is being exchanged, 2 machines will be operated in parallel in order to avoid stoppage of electrical supply so as to operate effectively.

(7) Fishing Gear

Fishing platform which are installed all around the vessel shall be equipped with a water spray device. In order to gather the catch in the working deck, FRP chutes are installed in the fore and aft section so that the efficiency in the work can be sought. The working deck will be covered by 65 mm thick wooden plate, and drainage mouths will be installed at bullwark to facilitate water drainage.

Moreover, 15 PS skiff with outboard engine made of FRP has been arranged at the starboard of poop deck.

(8) Fish Hold

There are 12 separate fish holds among which 4 are livebait well, and the other 8 being brine holds. For the livebait well, an independent mechanical circulating pump shall be installed in the engine room, and piping to forcibly circulate the sea water shall be installed. The system was so designed that the discharge of water would be carried out from the drainage groove out of the vessel by placing a drainage mouth at hatch coaming and by overflowing the water.

The brine in the brine well, cooled up by brine-cooler, will be circulated between brine wells by means of pump, and the amount of brine supply shall be controlled using such equipment as valves.

By covering inside the fish holds with steel in order to conduct brine-freeze, which is insulated by injecting urethane with vesication done on the spot,

we have given consideration to prevent leakage trouble and to obtain insulation effect and preserve freshness as well.

3-1-5 Specification of Equipments and Machineries

(1) Deck Section

1) Deck Machinery

Anchor hoist	Electric type 1.5 t x 13 m/min.	1 set
Mooring capstan	Electric type 1.0 t x 13 m/min.	1 set
Steering gear	Electrohydraulic type 1.5 t-m	1 set
Accessories of vessel	Legal equipment	1 set
Life saving and fire fighting equipment	- ditto -	1 set
Nautical equipment	- ditto -	1 set
Boatswains store		1 set
Furnishing		1 set
Skiff boat	15 PS, FRP with outboard motor	1 set
Boat davit for skiff	with electric hoist 0.5 t x 28 m/min.	1 set
Chute for transporting skipjack	FRP	1 set
Fish attraction lamp	above water lamp	2 sets

Fish attraction lamp	under water lamp AC 100 V with adjuster	2 sets
Bilge pump	6 m^3/hr x 12 m	1 set

2) Fishing Gear

Skipjack pole-and-line		1 set
Stick-held dip net (Bouke-ami)		1 set

(2) Engine Section

Main engine	4-cycle diesel engine 900 PS x 800 RPM	1 set
Counter shaft		1 set
Reduction gear	with hydraulic multi-plated clutch	1 set
Stern tube		1 set
Propeller	1 body 4 blade type Manganese bronze	1 set
Power generator engine	4-cycle diesel engine 140 PS x 1,500 RPM	2 sets
Main air compressor	21.4 m^3/hr x 30 kg/cm^2	1 set
Emergency air compressor	10.7 m^3/hr x 30 kg/cm^2	1 set
Air tank for main engine starter	80 ℓ x 30 kg/cm^2	2 sets
Auxiliary air tank	80 ℓ x 30 kg/cm^2	1 set
Main engine lub oil filter	95 ℓ/hr x max. 2 kg/cm^2	1 set
Flow meter	rotating volume type	1 set
Cooling sea water pump	32 m^3/hr x 20 m	1 set

Water pump for fire fighting and other purpose	50 m^3/hr x 20 m	1 set
Condenser pump for freezer	50 m^3/hr	1 set
Water spray pump	100 m^3/hr x 20 m	1 set
Circulation pump for livebait well	50 m^3/hr x 10 m	4 sets
Home pump	2 m^3/hr x 12 m	1 set
Bilge pump	9 m^3/hr x 15 m	1 set
Fuel oil transportation pump	6 m^3/hr x 30 m	1 set
Lub oil pump		1 set
Reserve lub oil pump	15 m^3/hr x 45 m	1 set
Lub oil pump for reduction gear		1 set
Manual fuel oil pump		1 set
Refrigerator cooling sea water pump	30 m^3/hr x 12 m	1 set
Refrigerator cooling sea water pump (for food storage)	7 m^3/hr x 12 m	1 set
Brine pump	15 m^3/hr x 15 m	2 sets
Double-headed grinder	205 mmø x 0.4 kW x 3,500 RPM	1 set
Table-type drilling machine	13 mmø x 0.2 kW x 1,750 RPM	1 set
Chain block	1.0 t	1 set

Refrigeration

For fish hold

freezer compressor	16.81 RT, 30 kW	2 sets
cooling temperature:	Brine-freezing -18°C	
	inboard cold storage -30°C	
processing capacity:	5 t/24 hrs	
refrigerant:	R 22 direct expansion system	

For food storage

freezer compressor	2.3 RT, 5.5 kW	1 set
cooling temperature:	+5°C	
refrigerant:	R 22 direct expansion system	

(3) Electrical Section

1) Electrical Equipments

Main power generator	AC 225 V, 100 kVA, 3ø, 50 Hz	2 sets
Main switch board		1 set
Battery charger	DC 35 V, 40 A (joined in main switch board)	1 set
Transformer	Drip-proof and drying type, AC 220 V/105 V, 5 kVA	3 sets
City power receiving panel	AC 220 V, 3ø, 100 A AC 100 V, 1ø, 60 A	1 set
Storage battery	DC 24 V, 200 AH	1 set
Steering room indicating panel		1 set

Distributing panel		1 set

2) Lighting Equipment

Navigation signal light	AC 100 V	1 set
General lighting	AC 110 V, 50 Hz	1 set
Projector	incandescent electric lamp, 500 W	6 sets
Search light	1,000 W	1 set

3) Navigational Instruments and Wireless

Gyro compass	remote controller with repeater	1 set
Magnetic compass		1 set
Engine telegraph	push bottom system built-in navigation console	1 set
Rudder angle indicator	built-in navigation console and sub steering stand	2 sets
Wind force/ direction meter		1 set
Clear view screen	250 dia.	2 sets
Fish hold thermo-meter	10 points system	1 set
Electric water thermometer		2 sets
Radar	10" 60 mile 10 kW	1 set
Fish finder	0-1,000 m, AC 100 V dry system	1 set
Fish finder	0-4,300 m, AC 100 V dry system	1 set
SSB radio telephone	100 W, AC 100 V	1 set

Emergency signal transmitter		1 set
Inboard announcement system		1 set
Voice tube		1 set
Inboard telephone	joint-type 1:4	1 set

3-2 Fisheries Research and Development Vessel

In order to carry out integrated surveys on coastal fishery resources in the Fijian waters, we have worked out a basic design of research and development vessel equipped with functions and appliances required to conduct multi-purpose fisheries research.

3-2-1 Vessel Type

The single decked vessel with low forecastle deck was chosen as the vessel type. We have chosen a sinking type bow for its resistance to wave in seeking safe cruise in the waters around reef, and we have given consideration to avoid the stern to be in deep draught by adopting a chine type stern for its buoyancy.

Further, considering its restorability and maneuverability, vessel type with skeg was chosen. FRP was chosen as the material of the vessel with its lightness and strength.

The vessel is a 28 ton gross tonnage type of which the average day per voyage is 5 days and cruising range is 700 miles.

3-2-2 Main Specifications

Length overall	about 20.55 m
Breadth moulded (max)	about 4.48 m
Depth moulded	about 1.60 m
Draft moulded	about 1.20 m
Gross tonnage (according to Japanese law)	about 28 tons
Complement	7 persons
Fuel oil tank	5.0 m^3
Fresh water tank	1.5 m^3
Main engine	4-cycle diesel engine 240 PS x 1,600 RPM
Propeller	Manganese bronze 1 set
Maximum trial speed	about 11.5 knots
Service speed	about 10.0 knots
Cruising range	about 700 miles
Fish hold capacity (bale)	
Fish hold	about 2.5 m^3
Ice hold	about 2.5 m^3

3-2-3 Vessel Structure

From the necessity to have comparatively shallow draft, we decided to use the FRP structure for the vessel for safety measures against crusing around reefs.

Especially, the structural part which is capable of concentrated stress was put into consideration, and the specification of the structure is as follows:

Shell	FRP single board structure
Deck	FRP single board or plywood covered with FRP
Bulkhead	- ditto -
Engine bed	made of steel
Rudder	made of steel (zinc-galvanized)
Rudder post	stainless steel
Propeller shaft	H.S. brass
Stern tube	H.S. brass casting

3-2-4 General Arrangement

In order to make the bow to have wave-resistancy, low forecastle deck shall be installed. As the General Arrangement Plan shows, in this vessel starting from the bow, low forecastle (partitioned into upper and lower section where boatswain store and fishing gear store will be allocated), crew's room, research room, engine room (fuel oil tanks shall be installed at both sides of the fore part and fresh water tank at both sides of the aft part), fish hold (port), ice hold (starboard), and steering engine room have been arranged respectively.

Above the main deck, deck room, engine room, galley, shower room and research room partition shall be set up. We have arranged the place of the wheel house to be above the engine room partition near the central part of the vessel.

3-2-5 Facilities

(1) Accommodations

In order to raise the habitability of life inboard in the tropical sea, we have allocated the accommodation under the fore main deck securing enough space and avoiding to locate it next to the engine room which generates high temperature. Further, we have given consideration for insulation and noise-prevention measures and have installed a mechanical ventilation system as well.

(2) Wheel House, Research Room

The wheel house was allocated at a place one floor higher than the main deck due to navigational safety reasons and convenience in steering.

The research room was arranged at the central part of the vessel where the effect of rolling is least, and we have secured a space wide enough to carry out researches.

(3) Fishing Gear

In order to conduct operation and researches of multi-purpose fisheries, the following fishing gears shall be installed.

Tuna longline	small-sized line hauler for longline	1 set
Vertical longline	small-sized winch for hauling	1 set
Shrimp pot	(the above mentioned winch will be jointly used)	-
Stick-held dip net (Bouke-ami)	winch jointly used by anchoring (2 warping ends)	1 set
Fish attraction lamp	above water lamp	1 set
	under water lamp	1 set
Hand line	manual reel	1 set
Trolling	trolling boom	2 sets

Other than the above, FRP skiff boat will be installed.

(4) Fish Hold

The storage of the catch was decided to be done by ice storage. Although the fish hold will be divided into ice hold (starboard) and fish hold (port), both fish holds will use urethane insulation material with which insulation processing will be carried out on the spot by vesication to get the effect.

(5) Engines

In order to facilitate the maintenance and check-ups of the main engine and auxiliary equipments, the space of the engine room must be used effectively. For that purpose, we have chosen an electrical starter type engine for the main engine with 1,600 RPM which is

comparatively small-sized but powerful enough to endure multi-purpose equipments.

(6) Electrical Equipments

The main power source shall be the three-phase type of AC 225 V, 50 Hz by joining the city power source in the base; whereas for small-sized equipments and lighting system, a single-phase type of AC 110 V, 50 Hz shall be used. Besides, sub-power source of DC 24 V for main engine starter and DC 24 V for emergency wireless shall be kept.

3-2-6 Specification of Equipments

(1) Deck Section

1) Deck Equipments

Steering gear	hydraulic double steering	1 set
Accessories of vessel	legal equipment	1 set
Anchor, anchor chain	- ditto -	1 set
Nautical equipment	- ditto -	1 set
Life saving and fire fighting equipment	- ditto -	1 set
Reef anchor	dan hose type 50 kg	1 set
Life raft	for 8 persons	1 set
Deck appliances		1 set

Warping end	hydraulic or electric type	2 sets
Winch for shrimp pot	electro-hydraulic 1.0 t x 40 m/min.	1 set
Baby line hauler	electro-hydraulic 300 kg	1 set
Trolling boom	10 m glass fiber	2 sets
Skiff boat	10 feet type FRP 3.5 PS with outboard engine	1 set
Above water lamp	AC 220 V 1,000 W	2 sets
Under water lamp	AC 220 V 500 W with light adjuster	2 sets

2) Fishing Gear

Vertical longline	for 20 baskets and other reserve materials	2 sets
Line for shrimp pot	polypropylene rope 14 mm x 200 m	10 coils
Stick-held dip net	bait fishing type	1 set
Tuna longline	for 50 baskets and other reserve materials	2 sets
Trolling line		2 sets
Hand line		1 set
Supplementary fishing gear	floats, lures, hooks, swivels, etc.	1 set

3) Ventilation

Axle fan	1.5 kW	2 sets
Axle fan	0.75 kW	3 sets
Axle fan	0.4 kW	2 sets

(2) Engine Section

Main engine	4-cycle marine diesel 240 PS x 1,600 RPM electrical starter	1 set
Main engine remote control device	wire system	2 sets
Reduction gear	with wet hydraulic multi-plated clutch	1 set
Propeller	4-blade type fixed pitch	1 set
Power generator	4-cycle marine diesel engine 38 PS x 1,500 RPM	1 set
Miscellaneous water pump	12 m^3/hr x 20 m x 2.2 kW	1 set
Fuel transport pump	3 m^3/hr x 15 m x 0.75 kW	1 set
Bilge pump	manual	1 set
Hydraulic pump	main engine driven	1 set
Main engine spares	for 2 years	1 set

(3) Electrical Section

1) Electric Equipments

Power generator	3-phase AC 220 V 30 kVA, 50 Hz	1 set
Main switchboard		1 set
Transformer	AC 220 V/105 V, 50 Hz	1 set
City power receiving panel		1 set
Storage battery	DC 24 V, 200 AH	2 sets
Wheel house indicating panel	Navigation light indicator, starter built-in	1 set

Clear view screen	AC 100 V 250 ømm	1 set
Electric refrigerator	120 ℓ (galley)	1 set
Sea water thermo-meter		1 set

2) Lighting System

Navigation and signal light	AC 100 V	1 set
Search light	AC 100 V, 500 W swivel type	1 set
Portable light	DC 24 V, 40 W with 15 m code	1 set
General lighting	AC 100 V, 50 Hz	1 set

3) Navigational Instruments and Wireless

Magnetic compass		2 sets
Radar	AC 100 V, 48 miles 7 inches	1 set
SSB wireless telephone	AC 100 V, 100 W, 11 CH	1 set
Direction finder	AM/FM radio transceiver built-in 100 V	1 set
Fish finder	28/200 kHz 2,000 m multi-style (dry paper 50 coils)	1 set
Sonar	AC 100 V, 150 kHz, 1 kW, 1,000 m	1 set
Inverter for radio power		1 set

4) Others

Freezer	500 ℓ for storing samples	1 set

3-3 Rural Fisheries Development Scheme

3-3-1 Selection of Project Site

Trainees' Hostel Facilities

The planned construction site of the hostel facilities is a land belonging to the Fisheries Division. Since the planned site is located adjacent to the Fisheries Division complex, it would work well for the staff of the Fisheries Division, and would be convenient from operational and managerial point of view.

The planned site is situated in a spacious environment (about 2 ha) which is nicely calm and equipped with many favourable conditions: for example, it is closely situated to the shipyard of the Fisheries Division while shipbuilding training is one of the major item of the training programme; to the fishing gear practice building of the Fisheries Division which could be of good use for the training on fishing gear and method; and further to the port which facilitates navigation trainings.

At present, the planned site is used as an auto graveyard and some private houses are present; however, it is supposed to be rearranged by the Fisheries Division. The sewage disposal facilities are already established.

3-3-2 Scale and Specification of Facilities

The hostel was so designed as to accommodate 20 persons comprising 18 trainees and 2 supervisors.

The average area per person shall be 7.65 m^2, with the total floor area of 153 m^2 (15 m x 10.2 m).

The 2 supervisors will have individual rooms of 13 m^2; while the 18 trainees will have common rooms according to the desire of the Fijian side of which the total room space is about 79 m^2. In addition, kitchens, shower, and toilets shall be installed. The details are as illustrated in the attached plan.

The implementation designing as well as the entire construction works shall be conducted by the Government of Fiji. Therefore, building materials will be procured by the Government of Fiji.

3-3-3 Specifications of Machineries and Materials

The specifications of machineries and materials comprising 54 sets (18 set/year x 3 years) required to implement the Rural Fisheries Development Scheme are as follows:

Here, 18/year x 3 years = 54 hulls of fishing vessel (wooden, plywood 8.5 m-type) are supposed to be built by trainees in the course of training.

Marine diesel engine	20 PS inboard engine with electric starter and standard spares	54 sets
Fuel oil pump		54 sets
Kingston cock	with cooling hose and strainer	54 sets
Bilge pump	with hose and strainer	54 sets
Water-mixing elbor with hose cooling water		54 sets

Extension wire	for engine operation 3 m	54 sets
Battery and battery switch		54 sets
Propeller	430 mm x 300 mm	54 sets
Propeller shaft	28 mm dia.; 3,120 mm with flexible coupling	54 sets
Stern tube	28 mm dia.; 2,150 mm	54 sets
Half coupling	for propeller shaft 28 mm, solid type	54 sets
Spare parts set	standard specification	54 sets
Remote controller		54 sets
Tachometer and sender		54 sets
Anchor	fishermen-type 12 kg, 7.5 kg	54 sets each
Anchor rope	Polyethylene 220 mm x 12 mm	54 sets
Fishing winch	engine-driven 300 kg sheave size 4-12 mm, 60 m/min.	54 sets
Polyethylene rope	4 mm x 600 m dark colour	54 sets
Fish finder	12 V, 50 Hz, 160 fathoms, with tranducers and dry recording paper (12 sheets)	54 sets
Gill net	net specification: mono-filament 200 m x 4 m 3" stretched mesh, 6 threads	54 sets
Gill net	net specification: multi-filament, 200 m x 4 m 3" stretched mesh, 210d x 9 threads	54 sets

Hand line	Tetlon/nylon mixed 60# x 100 m, 6 coils	54 sets
Mending twine	Mono-filament 6# 0.5 kg	54 sets
Mending twine	Multi-filament 210d x 9 threads 0.5 kg	54 sets

3-4 Fisheries Laboratory Complex

3-4-1 Selection of Project Site

The planned site of construction is a land belonging to the Fisheries Division. The site which is located very close to the entrance of the Fisheries Division complex can function effectively with the staff of the Fisheries Division. Thus, the site lies on a very desirable environment from the point of view of research activities, operation and management.

Although the planned site is already an improved land with enough space, the Fisheries Division is scheduled to raise the ground level for about 1 meter.

3-4-2 Scale and Specification of the Complex

The total floor area is to be 130.5 m^2. The complex shall comprise laboratory room, conference room, office room, manager's room, service room, and toilet.

The details of the general arrangement is as illustrated in the attached plan.

The specifications of the facilities and equipments are as follows:

Building

Type	Prefabricated building	
Total area	130.5 m^2	
Body frame	Light gauge steel	
Wall material	Insulated plywood	
Roof material	Iron sheet and insulated asphalt, plywood	
Door	Aluminium sash 2.0 m x 0.9 m 2.0 m x 0.8 m	 9 sets 1 set
Window and screen	Aluminium sash 1.8 m x 1.2 m	 18 sets
Partition	40 mm thick plywood	1 set
Distributing panel	300 mm x 600 mm	1 set
Electric wiring materials	wire, tube, switch, socket	1 set
Lightings	40 W, double-line type 40 W, fluorescent light	18 sets 4 sets
Toilet	European style	1 set
Ventilation fan	0.2 kW	1 set
Piping materials	pipe, elbow, socket	1 set
Air conditioner	for laboratory room 3,000 Kcal/hr	1 set

Service Room

Sink	Stainless steel	1 set
Electric water heater		1 set

Overhead shelf		1 set
Ventilation fan		1 set

Staff Office Room

Desks	steel	10
Chairs	steel	10
Filing cabinets	with 4 drawers	5 sets
Storage cabinet	steel	1 set
Electric typewriter		1 set
Electric calculators	pocket type	6 sets
Duplicating machine	rotary type	1 set

Office Room

Desks	steel	2
Chairs	steel	2
Filing cabinets	steel	2
Bookshelves	steel	2

Conference Room

Conference tables	180 cm x 60 cm	4
Chairs		10
Blackboard	2.0 m x 1 m	1
Projection screen	1.5 m x 1 m	1

Chemical and Oceanic Research Equipments

Lab. table	Colorcelana top 180(W) x 120(D) x 80(H) cm power supply: 220 V, 50 Hz	1 set

Lab. sink	stainless steel with tap about 120(W) x 75(D) x 80(H) cm	1 set
Lab. stool	folding type about 33 cm x 37 cm x 51 cm	4 sets
Water bottle	1,300 cc	1 set
Reversing thermometer	for deep sea, pressure-proof type, -2°C ∿ +30°C	2 sets
Turbidimeter	with 50 m cabtyre cable DC 12 V, scale: 0 - 100 measuring range: 0.8 PPM	1 set
SDT meter	rechargeable battery type measuring range: salinity .. 31 - 36 ‰ water temp. .. -2°C - +35°C depth .. 0 m - 1,000 m	1 set
Electric winch	with 500 m wire (1.8 mm dia) 1.5 kW, AC reeling load: 70 kg reeling speed: 1.9 m/sec	1 set
Sieves	for soil sedimentation analysis, brass made 8" x 45 mm mesh size: 2", 1-1/2", 1", 3/4", 3/8"	1 set
Current meter	depth limit: 200 m power source: 9 pcs of dry battery cells recording period: 20 days including standard accessories	1 set

Biological Research Equipments

Research microscope	AC 220 V, 50 Hz paired hygenian eyepieces B5X, BWF 10X, B15X with illuminator and intensity regulator	1 set

Zoom stereo-scopic microscope	paired wide field 10X - 40X	2 sets
Fish measuring board	1 meter	5 sets
Thermometer	Stick type, mercury filled length: 300 mm measuring range: 0°-50°C	5 sets

3-5 Fisheries Workshop

3-5-1 Selection of Project Site

We have selected Savusavu in Vanua Levu Island (North Island) as the planned site of construction. The planned site is a land belonging to the Fisheries Division.

The back of the site is a forest where the power plant of Savusavu is located. The front part of the site faces the sea having a road in between and at about 200 m distance, there is a loading pier for fishing vessel and merchant ship.

As one of the basic point of the Rural Fisheries Development Scheme, Savusavu is an important base for coastal fisheries. The site meets the environmental condition of a facility which provides maintenance and repair services for engines and machineries of the nearby fishing vessels.

3-5-2 Scale and Specification of Machineries

The total area of the workshop shall be 30.6 m^2. The facility will include workshop room, material room, warehouse and office room. The details are as illustrated in the attached plan.

The specifications of the facilities and equipments are as follows:

Building

Type	Prefabricated building	
Total area	30.6 m^2	
Body frame	light gauge steel	
Wall material	insulated plywood panel	
Roof material	iron sheet, insulated asphalt and plywood panel	
Door	Aluminium sash	3 sets
Window and screen	Aluminium sash	6 sets
Partition	Plywood	
Electric receiving panel	160 mm x 600 mm	1 set
Distribution panel	300 mm x 400 mm	1 set
Electric wiring materials	wire, tube, switch, connection, socket	1 set
Lightings	40 W, Fluorescent light	6 sets

Equipments

Tool set		3 sets
Gas welders	portable	1 set
Electric hoist	0.5 ton, with beam	1 set
Air compressor	0.4 kW	1 set
Drilling machine	standard set	1 set
Gas torch		1 set
Electric power drill	0.5", heavy duty	2 sets
Electric grinder	with bench	1 set
Bench vice	8", 4"	2 sets
Dies and taps		1 set
Pipe bender	Max. 1.5"	1 set

Office Room Article

Desk	steel	1
Chairs	steel	2
File cabinet	steel	1
Table	steel	1

Equipment Room

Wall-mounted rack	steel (for material room)	1
Wall-mounted rack	steel (for warehouse)	1

3-6 Mobile Workshop

3-6-1 Selection of Project Site

With Fisheries Division at Savusavu, which is one of the major fisheries base of Vanua-Levu Island, as a base, the repair services for marine engines and the like of the fishing villages of the same region will be provided, and the fisheries extension activities for the rural villages by equipping audio-visual aids will be carried out.

The traffic road of Venua-Levu Island is not yet consolidated. Especially, since most of the roads running through the remote fishing villages are mountain roads with bad conditions, the traveling repair service vehicle will be equipped with double tires and will be of a heavy-duty 2.5 ton diesel truck (van type) type. It shall be equipped with power generator as well as with other necessary equipments.

3-6-2 Specifications of the Mobile Workshop and its Equipments

Diesel truck	Van type 2.5 ton	1
Power genrator	Engine driven 220V, 2.4 kW, 24A, 50 Hz, 3,000 RPM	1 set
Welding set	Engine driven 24 V, 3.12 kW, 120 A, 4,000 RPM, 40% including accessories	1 set
Air compressor	0.75 kW	1 set
Welding cord	10 m cord holder and metal fittings	2 sets

Welding helmet		2 pcs
Leather gloves	for welding	2 pairs
Welding chipping hammer		2 pcs
Welding rods	2.6 mm, 3.2 mm	10 kg each
Basic hand tool set	metric type	2 sets
Electric drill	heavy-duty 13 mm portable	1 set
Drill point set	standard set up to 13 mm	1 set
Electric grinder	bench type, 150 mmø	1 set
Bench vise	reed type 8" swivel type 6" including accessories	1 pc 1 pc
Work bench	with drawer	1 set
Electric cord	30 m with reel	1 set
Working lamp	DC	1
Room lamp	DC	1
Fuel oil can	18 ℓ	1
Fire extinguisher	3 kg	1 set
Cabinet for visual aids		1 set

Visual Aids Equipment

Cine-sound projector	16 mm, with zoom lens AC 50 Hz, F/1.2, 50 mm lens, 24 V - 250 W including accessories	1 set
Zoom lens	F/1.7, 50 - 100 mm	1 set
Projection screen	portable, tripod type 1.5 m x 1.5 m	1 set

Slide projector	for 35 mm, F/3.5, 100 mm 24 V - 150 W, AC, 50 Hz	1 set
Slide magazines	35 mm, rotating type (100 slides)	2 sets
	35 mm, straight type (50 slides)	10 sets

3-7 Matters to Pay Attention on Construction Designing of the Facilities

Geology: The geological feature of the project site, being a mixed foundation of lime stone and granite, is characterized by its strongness.

The planning shall be done estimating the durability of the foundation as 10 ton/m^2; and for the foundation work, foundation pillar are not necessary.

Climate: Belonging to the tropical climate zone, the site has high temperature and high humidity.

Therefore, in order to have better ventilation, it is necessary to secure enough space for ventilation purpose such as having more and wider windows. Screen for insecticide purpose shall be installed to each window.

As regards the wind pressure, the designing should be done by assuming the maximum wind velocity to be 60 m/sec. taking into consideration the strikes by hurricanes. As regards the earthquake proof measures, there is no special need to consider about it.

Electric Equipment: The power will be in 415 V x 50 Hz x 3 ø x 4-wire system (among 1 is neutral). The lightings will be in 220 V x 50 Hz x single-phase 3-wire system. The power supply will be stable. There are no regulations as regards the electric equipment, and it will be sufficient if equipments are designed with the Japanese standard.

Water Quality: Since the water supply of the project site is sufficient and the water quality is good, there is no special problem.

3-8 Plans of Basic Design

Skipjack Training Vessel
- General Arrangement Plan

Fisheries Research and Development Vessel
- General Arrangement Plan

Trainees' Hostel Building
- Front Elevation
- Side Elevation
- Floor Arrangement

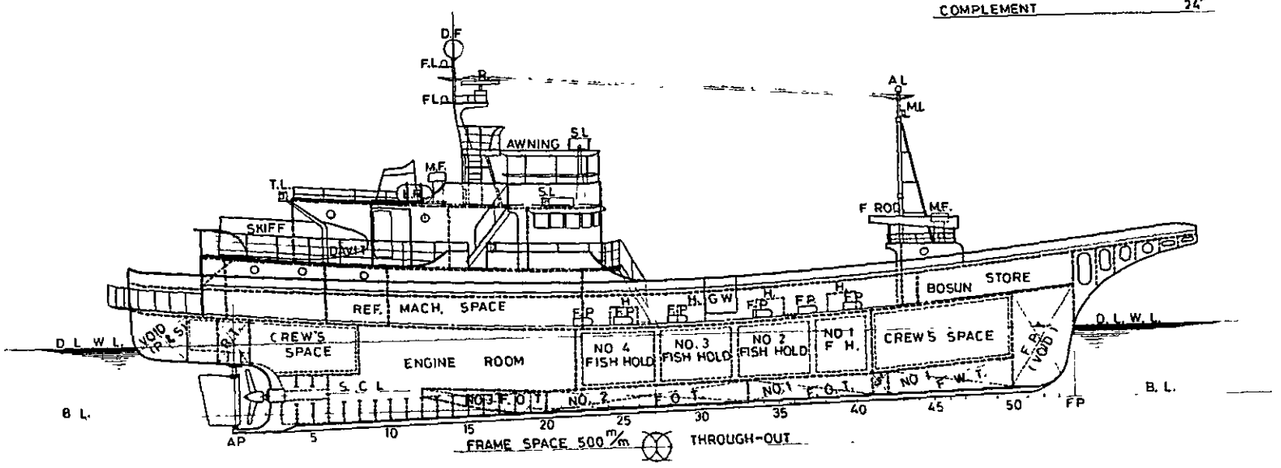
Fisheries Laboratory Complex
- Front Elevation
- Side Elevation
- Floor Arrangement

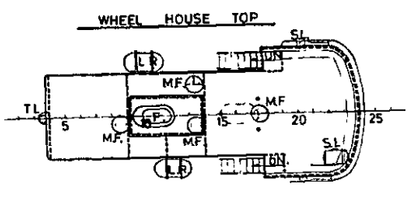
Fisheries Workshop
- Front Elevation
- Side Elevation
- Floor Arrangement

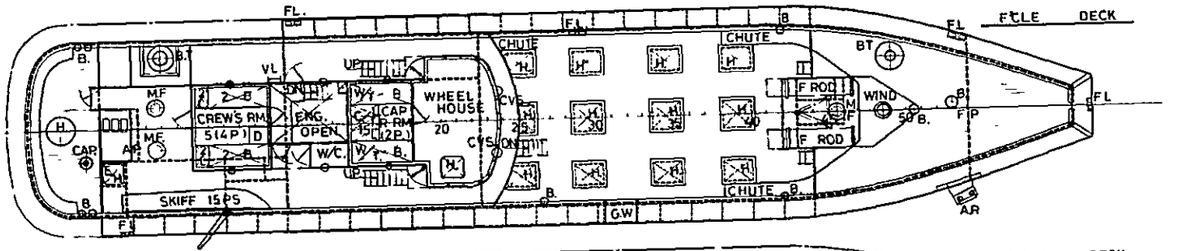
SKIPJACK TRAINING VESSEL

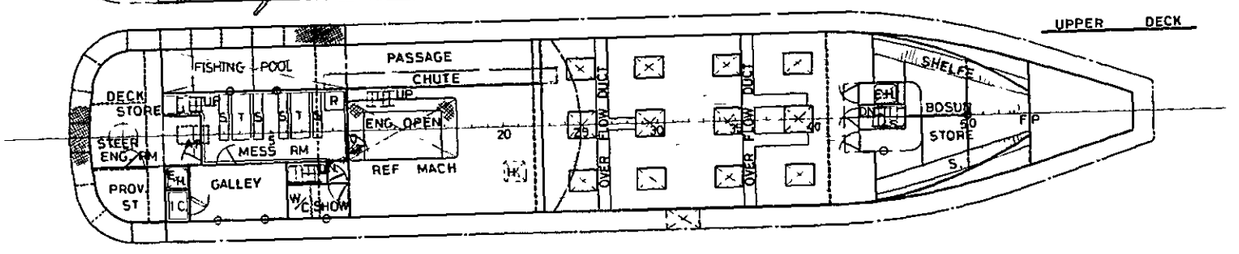
GENERAL ARRANGEMENT

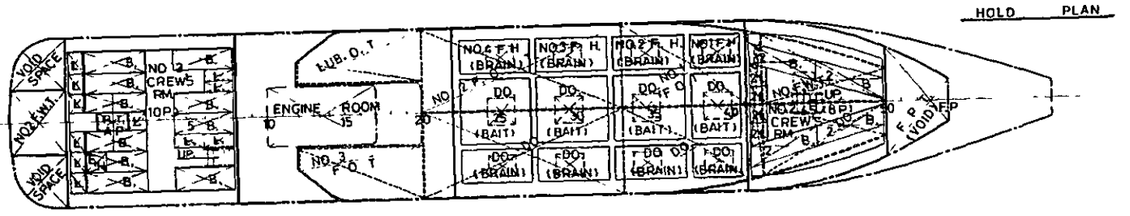
PRINCIPAL DIMENSIONS	
LENGTH (O.A.)	(ABT.) 35.00 m
LENGTH (REG.)	27.00 m
LENGTH (P.P.)	27.00 m
BREADTH (MLD.)	5.20 m
DEPTH (MLD.)	2.50 m
DRAFT (MLD.)	2.34 m
GROSS TONNAGE	(ABT.) 100.00 t
MAIN ENGINE	900 x 900 ps rpm
COMPLEMENT	24 P









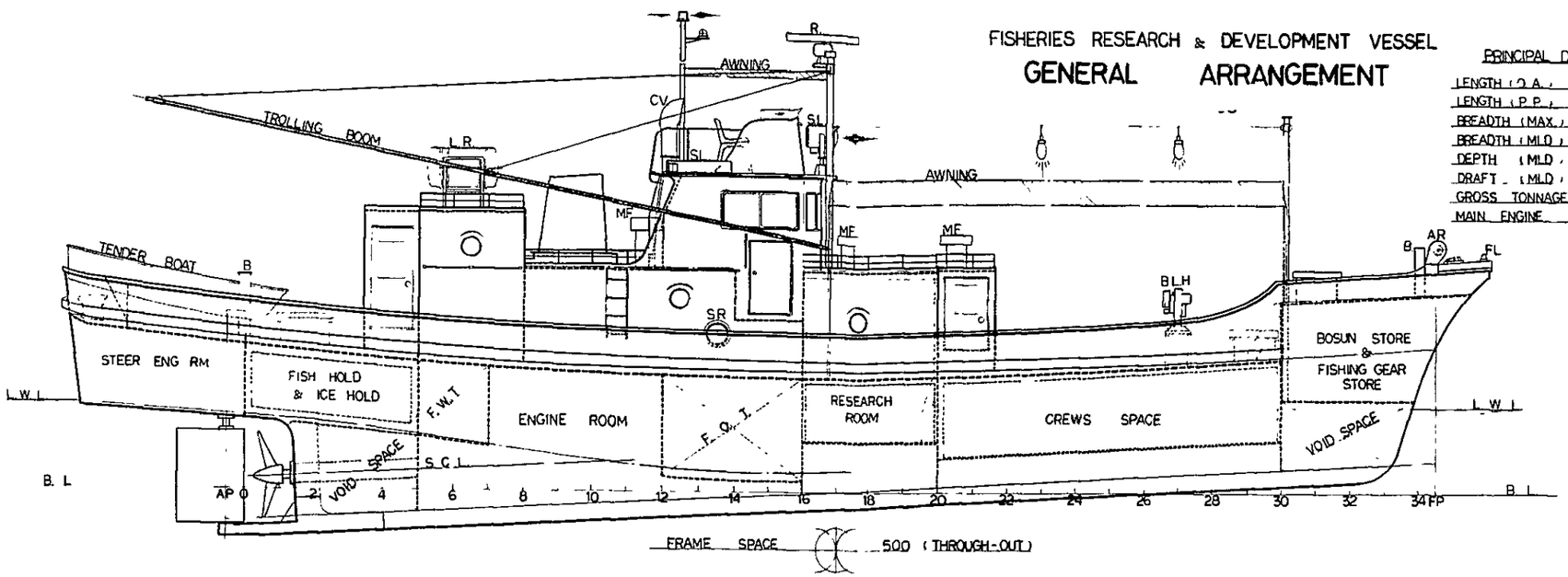


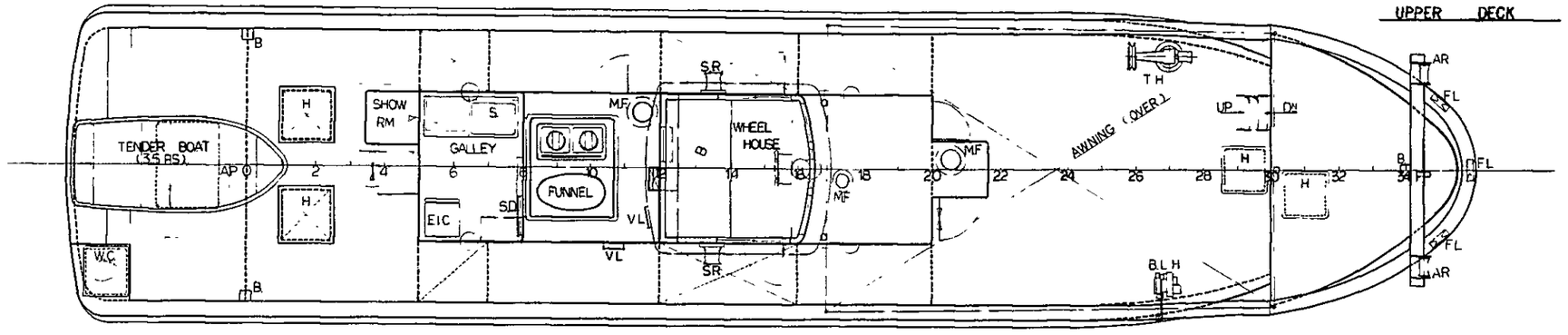
FISHERIES RESEARCH & DEVELOPMENT VESSEL

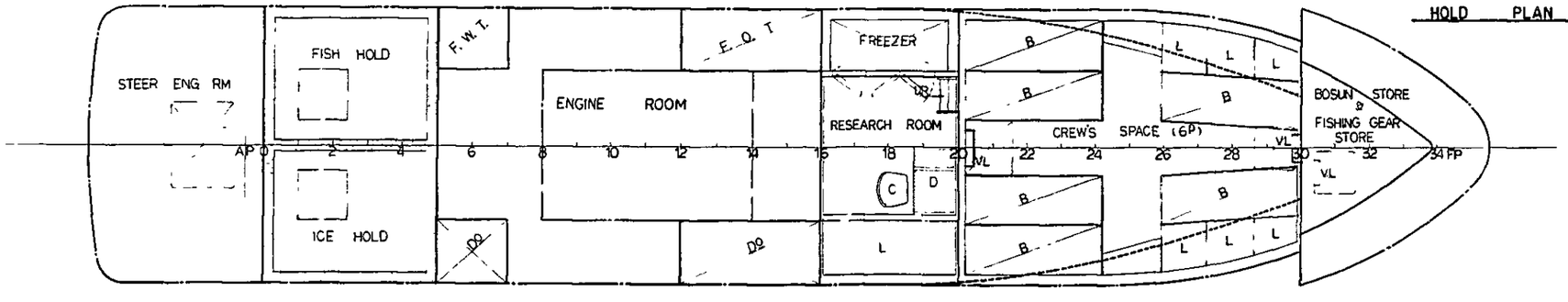
GENERAL ARRANGEMENT

PRINCIPAL DIMENSIONS

LENGTH (O.A.)	ABT. 20.55 m
LENGTH (P.P.)	17.50
BREADTH (MAX.)	4.48
BREADTH (MLD)	3.96
DEPTH (MLD)	1.60
DRAFT (MLD)	1.20
GROSS TONNAGE	ABT. 28 t
MAIN ENGINE	240 PS x 1S

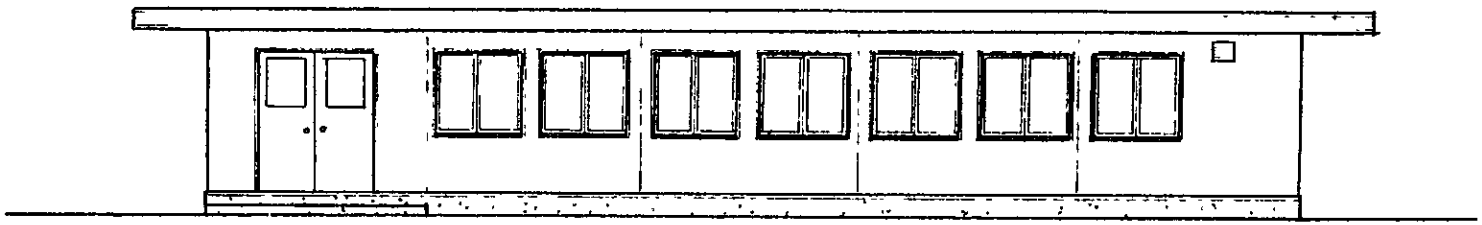




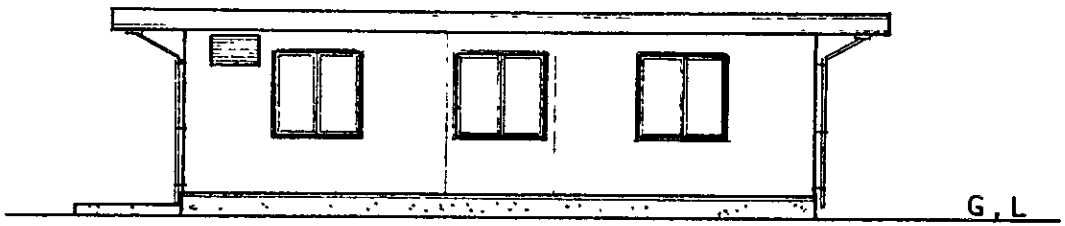


TRAINEES' HOSTEL BUILDING PLAN

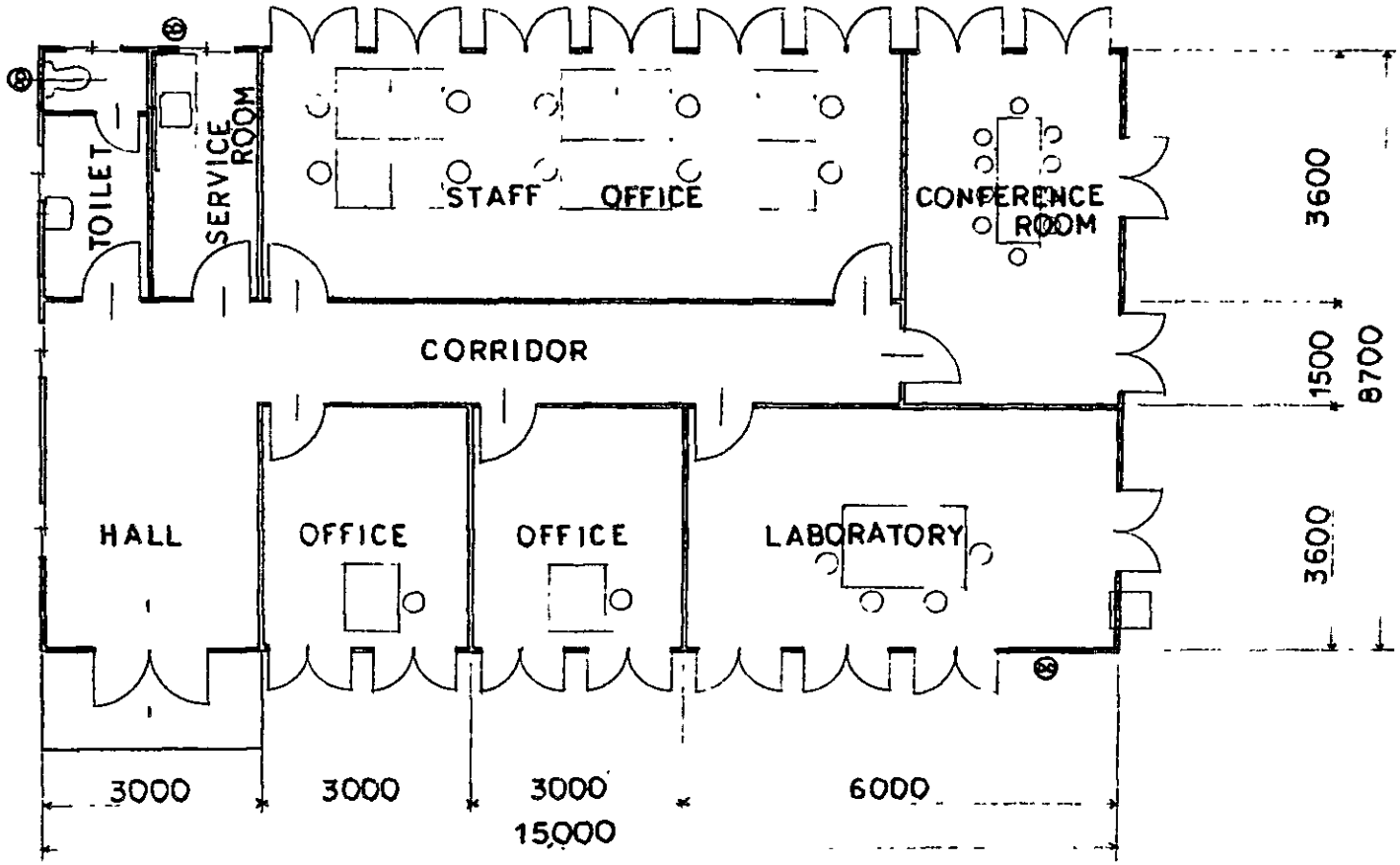
SCALE : 1 : 100
AREA : 153.00 m^2
LOCATION: LAMI



FRONT ELEVATION



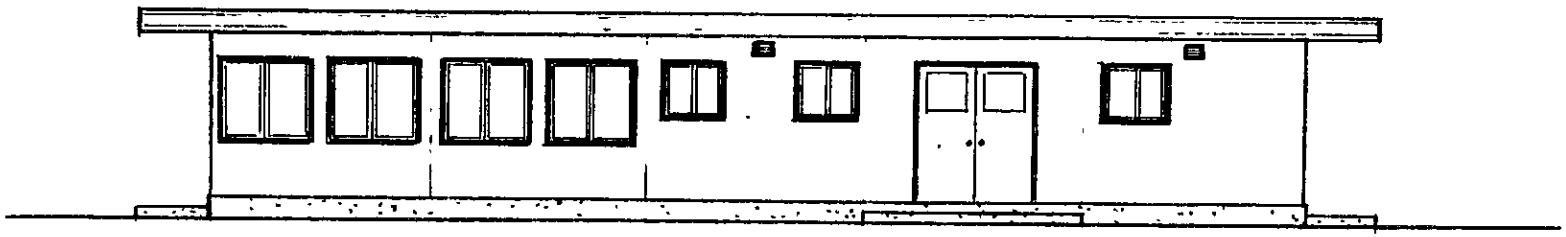
SIDE ELEVATION



FLOOR ARRANGEMENT

FISHERIES LABORATORY COMPLEX PLAN

SCALE : 1 : 100
AREA : 130.50 m^2
LOCATION: LAMI



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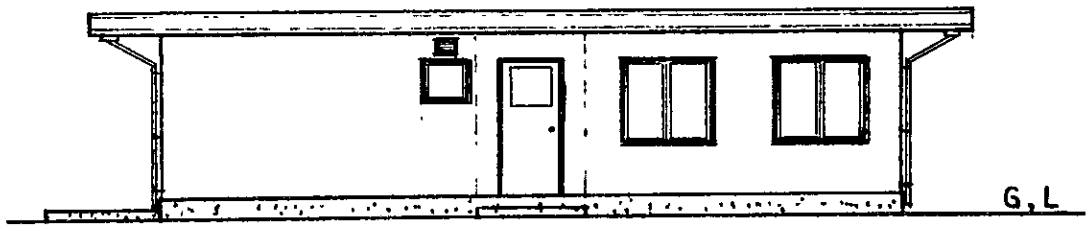

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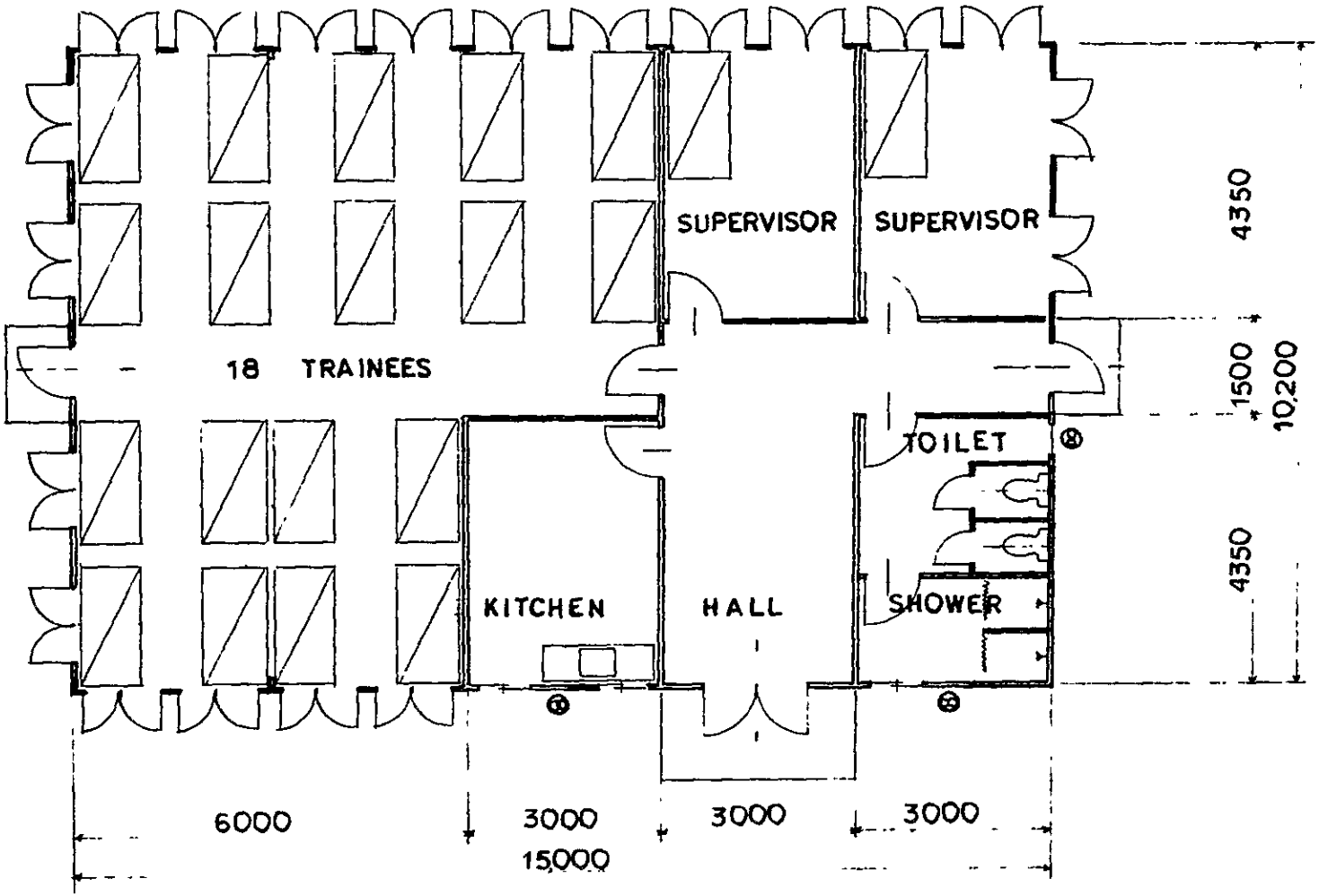
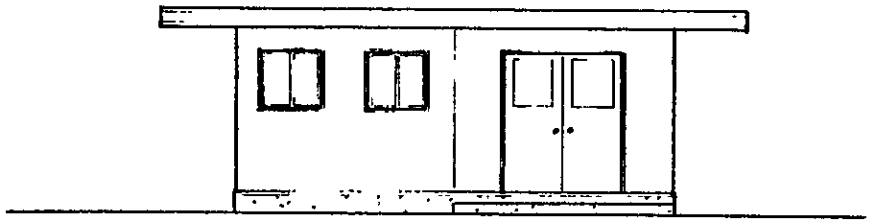


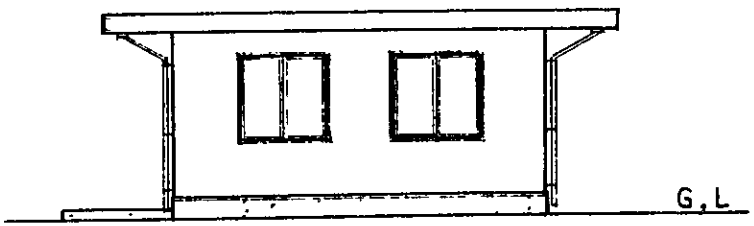
FLOOR ARRANGEMENT

FISHERIES WORKSHOP PLAN

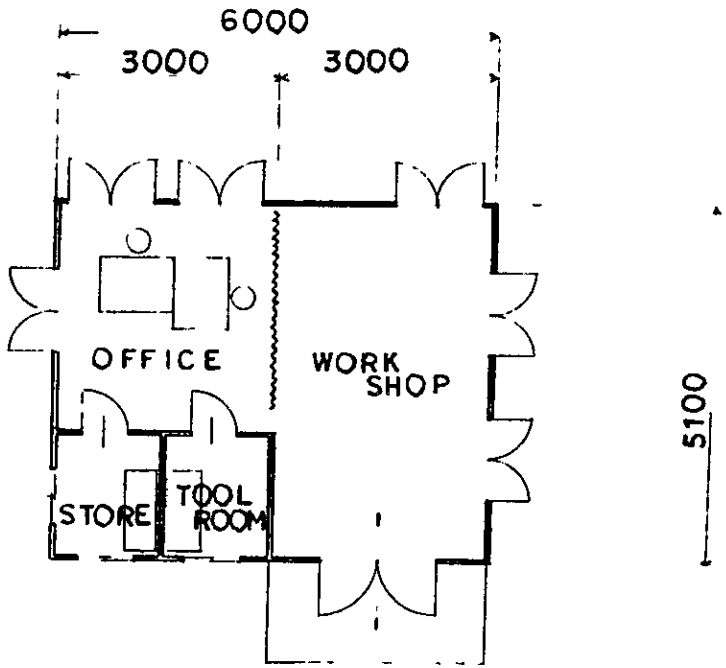
SCALE : 1 : 100
AREA : 30.60 m^2
LOCATION: SAVUSAVU



FRONT ELEVATION



SIDE ELEVATION



FLOOR ARRANGEMENT

CHAPTER 4. PROPOSED IMPLEMENTATION PLAN

In implementing this programme, the survey team, after fully understanding the content of cooperation request of the Government of Fiji and examining the result of the field survey, made a draft of implementation plan with consideration to maximize the cooperation.

As a result of carefully studying the content of the cooperation request comprising seven items as regards their necessity, appropriateness and degree of urgency; the urgency was recognized for the first to sixth items in implementing the Fisheries Development Project of Fiji. Thus, an implementation plan was laid out for those items.

As regards the seventh item (Ice plant), we did not include it in this implementation plan.

4-1 Measures to be Taken by the Fijian Side

-- a part of contents of Minutes --

(a) To ensure the land necessary for the construction of the facilities of the Hostel Building, Fisheries Laboratory, Ice Plant and Fisheries Workshop and to clear the site.

(b) To provide facilities for distribution of electricity, water supply and drainage and other incidental on site facilities.

(c) To complete foundation work for the construction of Training Hostel, Fisheries Laboratory and Workshop.

(d) To ensure that the facilities constructed and equipment purchased under the grant be maintained and used effectively.

(e) The inward freight-clearance, storage and internal transport of all materials and equipment from Port-of-Entry to their respective work or errection sites.

4-2 Estimated Cost of Construction

In obtaining the estimate of the construction cost, we have set up the following conditions.

(1) Time of calculation ..... as of November 1979

(2) Vessel, equipment, material, etc. ..... In principle, they are to be Japanese made, and for items imported from Japan, fee for packaging, marine transportation and insurance are included.

However, the import duties imposed upon the above mentioned items shall be exempted.

(3) Construction materials for facilities ..... In principle, they are to be Japanese made and partially locally made. For materials imported from Japan, fee for packaging, marine transportation and insurance are included.

However, the import duties imposed upon the above mentioned items shall be exempted.

(4) Vessels and all other equipments and materials are to be delivered at Suva port.

(5) Effective period of estimation ..... The effective period shall be the 5 months from November 1979. The slides caused by the change of commodity price and wage onward is not calculated.

Estimated Cost

I.	Skipjack Training Vessel	¥215,000,000
	Construction of Vessel, bringing the vessel to Fiji	
	Equipment, fishing gear, materials	
II.	Fisheries Research and Development Vessel	¥98,500,000
	Construction of Vessel, bringing the vessel to Fiji	
	Equipment, fishing gear, materials	
III.	Rural Fisheries Development Scheme	¥97,400,000
	Construction work	
	Equipment, fishing gear, materials	

IV.	Fisheries Laboratory Complex	¥43,000,000
	Construction work	
	Equipment and materials	
V.	Fisheries Workshop	¥13,500,000
	Construction work	
	Equipment and materials	
VI.	Mobile Workshop (including equipment)	¥9,200,000
I + II + III + IV + V + VI	Total	¥477,400,000
Consultants fee		¥22,600,000
	Grand Total	¥500,000,000

4-3 Implementation Procedures

As regards the implementation of this Project, the designing of implementation shall start after the Exchange of Notes had been concluded between the Government of Japan and the Government of Fiji.

Then various blueprints and list of specifications required for construction work shall be drawn up and documents necessary for the contract of construction work bidding shall be prepared.

After completing the document for implementation design, approval from the orderer about the content of the design shall be obtained followed by bidding.

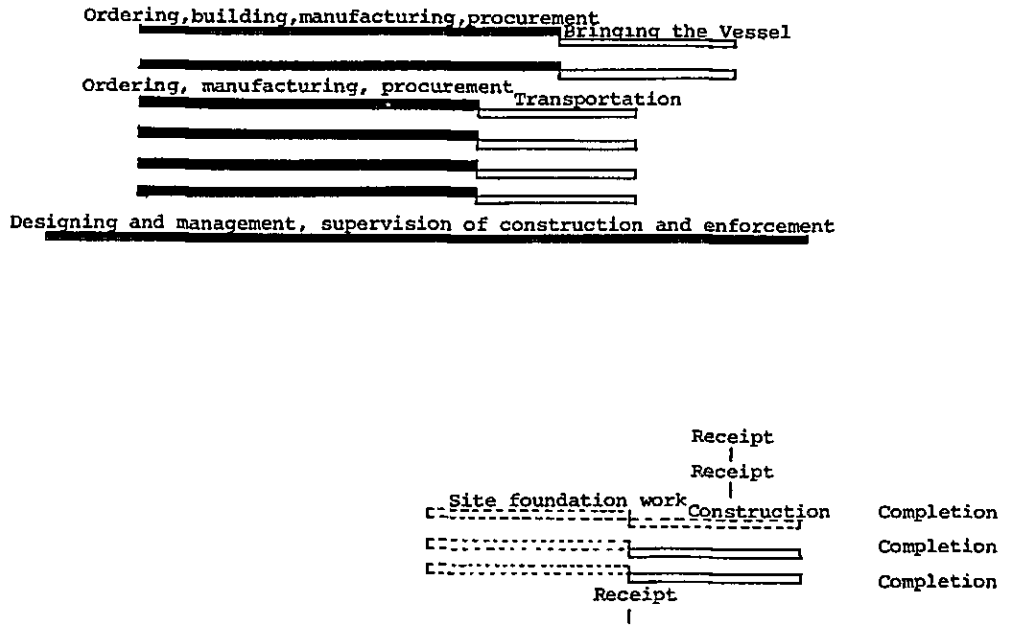
Nextly, contract shall be signed between the successful bidder and the Government of Fiji, and then the construction will start after obtaining the approval by the Government of Japan.

The period required in this construction work from the start of construction is expected to be about 7 months.

The implementation procedures of the Project is as shown in the following table.

IMPLEMENTATION PROCEDURES

Number of Months	1	2	3	4	5	6	7	8	9	10	11	12
Matters to be implemented by the Japanese side												
Signing of Exchange of Notes												
Approval of Consultants Company												
Designing												
Bidding												
Contract												
Enforcement												
Skipjack Training Vessel												
Fisheries Research & Dev. Vessel												
Rural Fishries Dev. Scheme												
Fisheries Laboratory Complex												
Workshop												
Mobile Workshop												
Consultants												
Matters to be implemented by the Fijian side												
Signing of Exchange of Notes												
Selection and Contract of Consultant												
Skipjack Training Vessel												
Fisheries Research & Dev. Vessel												
Rural Fisheries Dev. Scheme												
Fisheries Laboratory Complex												
Workshop												
Mobile Workshop												



Notes: Implies enforcement by Fijian side

Implies enforcement by Japanese side

APPENDIX

MINUTES OF MEETING ON THE BASIC DESIGN STUDY FOR THE FISHERIES DEVELOPMENT PROGRAMME IN FIJI.

In response to a request of the Government of Fiji for the basic design Study on the Fisheries Development Programme in Fiji, the Government of Japan has sent through Japan International Cooperation Agency (herein after refered to as JICA) a survey team headed by Mr Shoichi Kudo, Director, Fishing Boat Division, Fishery AGency, Ministry of Agriculture, Forest and Fishery to Conduct aforementioned study for 22 days from September 28, 1979.

The team has carried out field surveys and has held a series of discussions and exchanged views with the Authorities concerned of the Government of Fiji on the project.

As a result of the exchange of views and discussions, both parties, Fiji Authorities and Japanese Survey Team, have agreed to recommend to their respective Government to take necessary measures toward accomplishing the Fisheries Development Programme in Fiji under the possible grant that will be extended by the Government of Japan on the basis of the Minutes of the discussions attached herewith.

S. Kudo

Shoichi Kudo
Leader of the Japanese
Survey Team

Permanent Secretary for
Agriculture and Fisheries

Peter C. Hunt

Chief Fisheries Officer
Ministry of Agriculture and
Fisheires

October 15, 1979
Suva, Fiji.

MINUTES

I. GENERAL

The establishment of a new 200 mile exclusive economic zone and identification of unexploited fish resources has significantly increased Fiji's obligations under the Law of the Sea to manage the exploitation of the renewable fish resources, to ensure their preservation, to fully exploit these resources and maximise benefits to Fiji. Fish are extremely important to rural development and to exports in Fiji but to enable this potential to be realised, the Ministry of Agriculture and Fisheries must implement training and development programmes. To facilitate this, the Fisheries Division has identified projects that will significantly benefit the development of both low technology subsistence and commercial fisheries and high technology export orientated fisheries. Detailed technical discussions and site visits on all aspects have been undertaken and the Fisheries Division has presented specifications and comprehensive plans for all projects which have been studied and evaluated by the Japanese Basic Design Team.

II. Measures to be taken by the Government of Japan will take necessary measures to provide the Government of Fiji with facilities and equipment of which specification and equipment as listed in Annex "I" and general arrangement in Annex "II".

III. Measures to be taken by the Government of Fiji. The Government of Fiji will take necessary measures:

(a) to ensure the land necessary for the construction of the facilities of the Hostel Building, Fisheries laboratory, Ice plant and Fisheries Workshop and to clear the site.

(b) to provide facilities for distribution of electricity, water supply and drainage and other incidental on site facilities.

(c) to complete foundation work for the construction of Training Hostel, Fisheries Laboratory and Workshop.

(d) to ensure that the facilities constructed and equipment purchased under the grant be maintained and used effectively.

(e) the inward freight-clearance, storage and internal transport of all materials and equipment from Port-of-Entry to their respective work or errection sites.

IV. REPORT

The JICA will prepare the final Report on Basic Design within 3(three) months after completion of field survey and will submit 20 copies to the Government of Fiji.

ANNEX I. BASIC SPECIFICATION AND QUANTITY

1 Skipjack Training Vessel

1) Principal Dimensions

Length overall	about 35.00^{m}
Breath moulded	about 5.70^{m}
Depth moulded	about 2.60^{m}
Draft moulded	about 2.34^{m}

Deck height at Vessel centerline

Main deck to fo'c'aste deck	about 1:00^{m}
Main deck to poop deck	about 1.95^{m}
Poop deck to Bridge deck	about 2.10^{m}
Sheer at F.P.	about 1.093^{m}
Sheer at A.P.	about 0.826^{m}
Camber	about 0.114^{m}
Initial trim	about 0.80^{m}

2) Designed gross tonnage about 100 tons

3) Schedule of capacities

Compartment	(Bale m^3)
8 Fish holds	about 27m^3
Livebait wells	about 30m^3
Total	about 57m^3
Fuel oil tanks	about 36.64m^3
Lub oil tanks	about 2.76m^3
Fresh water tanks	about 15.00m^3

4) Main engine

Type and number of units	4-cycle marine diesel engine 1 unit
output	900PS x 800 RPM
Propeller	4-blade solid pitch

5) Speed and cruising range

Maximum trial speed	about 11.5 knots
Service speed	about 10.5 knots
Cruising range	about 2500 miles

6) Complement

Total complement officers and crew 24 persons

7) Refrigeration System

Brine system
Fish hold- 30°C
Freon compressors electric driven
Condenser, Receiver, Chilled Water Pump, Valve, Header & Alarm System

Insulation

Location	Deckhead	Shell	Intermediate Bhd.	For. Bhd.	Aft.Bhd.	Floor
Dry holds	200mm	200mm	150mm	180mm	200mm	100mm
Brine holds	220mm	200mm	150mm	200mm	200mm	100mm
Bait holds	200mm		150mm	200mm	200mm	100mm

8) Rules

The vessel including its equipment and machinery, shall be built under supervision by and according to the standard equivalent to the stipulations of the Japanese Government Ship Safety Rules and related rules.

DECK MACHINERY AND FISHING EQUIPMENT

Item	Specification	Q'ty	Remarks
Anchor hoist	Electrolic capstan type	1 set	
Mooring capstan	Electrolic capstan type	1 set	
Steering gear	Electrohydraulic types	1 set	
Fish Chute	F R P	1 set	
Boat davit for skiff	electric hoist 0.5 ton	1 set	
Skiff boat	15 ps, outboard motor	1 set	
Life saving equipment		1 set	
legal equipment	complete		
Nautical equipment			
legal equipment	complete	1 set	
Boatswains store		1 set	
(Deck consumption)	complete		
Furnishing	complete	1 set	
Particulars			
Main engine	4 cycle marine diesel engine	1 set	
Intermediate propeller shaft		1 set	
Propeller	Manganese Bronze 4 blade	1 set	
Stern tube		1 set	
Air compressor No. 1	$20.8m^3/hr \times 30kg/cm^2$	1 set	
Air compressor No.2	$10.5m^3/hr \times 30kg/cm^2$	1 set	
Ventilation fan	$100m^3/min \times 30^{mm}$	complete	
Main air reservoir	$80^l \times 30kg/cm^2$	2 set	
Aux. air reservoir	$80^l \times 30kg/cm^2$	1 set	
Pumps			
Seawater cooling	centrifugal $30m^3/hr$	1 set	
Seawater cooling	" $32m^3/hr$	1 set	
G/S, fire fighting	" $50m^3/hr$	1 set	
For condensor	" $50m^3/hr$	1 set	

Brine	centrifugal $15m^3/hr$	2	sets	
Spray	" $100m^3/hr$	1	set	with control on flying bridge
Circulation bait holds	" $50m^3/hr$	4	sets	
Bilge	" $9m^3/hr$	1	set	
Deck bilge	" $6m^3/hr$	1	set	
Fresh water	home pump $2m^3/hr$	1	set	
Lub oil	gear $15.2m^3/hr$	1	set	
Spare Lub Oil pump	gear $15m^3/hr$	1	set	
Reduction gear lub oil	gear $2.72m^3/hr$	1	set	
Fuel feed pump	gear $0.32m^3/hr$	1	set	
F.O. transfer	gear $6m^3/hr$	1	set	
F.O. Hand emergency		1	set	

Miscellaneous

Lub oil filter for M/Eng.	$95^l/H$, Max $2kg/cm^2$	1	set	
M/Eng. overhauling device	Chain blocks, 1 ton	1	set	
Drilling machine	table head type $13^{mm} \times 0.2^{kw} \times 1.750$ rpm	1	set	
Grinder	double head type $205^{mm} \times 0.4^{kw} \times 3,500$ rpm	1	set	
Flow meter		1	set	

Electrical part

Electrical power system

Power circuit	AC220V, 50 HZ			
Lighting circuit	AC 110V, 50 HZ			
Emergency	DC 24V			
Main generator	AC 220V, 100KVA, 3 Phase 50HZ	2	sets	
Transformer	5KVA, 220V/105V	3	sets	
Storage batteries	24V 200AH	1	set	
Battery charger	DC 35V, 40A	1	set	

Lighting schedule	complete	
Navigation lights and signal lights		
Inter-communication system	complete	
Fish-hold thermometer	10 points	1 set
Electronic water thermometer		2 sets
Navigational instruments		
1 Gyro with repeater on flying-bridge		1 set
1 small magnetic compass		
Steering gear unit		1 set
Radar	10", 60 miles, 10kw	1 set
Fish finder	0-1000m, 50HZ AC100V	1 set
Fish finder	0-4300m, AC100V	1 set
Wind force/direction meter		1 set
Clear view screen	250mm dia	2 sets
Wireless		
SSB Radio telephone	100W, Ac100V	1 set
Emergency signal transmitting buoy		1 set
Fishing gear		
Skipjack pole-line	complete with spare gear	24
Bouke-Ami	complete set with spare	1 set

2. FISHERIES RESEARCH & DEVELOPMENT VESSEL

Item	Specification	Q'ty	Remarks
1. Principal dimensions			
Length overall	about 20.55$^{m.}$		
Length between perpendiculars	about 17.50^{m}		
Breadth (max)	about 4.48^{m}		
Breadth moulded	about 3.86^{m}		
Depth moulded	about 1.60^{m}		
Draft moulded	about 1.20^{m}		
Main engine	4 cycle Vertical diesel engine 240PS x 1600 rpm		
Speed(max)	about 11.5 knots		
Speed (Service)	about 10.0 knots		
Cruising range	about 700^{N}/miles		
2. Designed Gross Tonnage	about 28 tons		
3. Schedule of Capacity			
Ice hold	about 2.5m^{3}		
Fish hold	about 2.5m^{3}		
Fuel oil tanks	about 5.0m^{3}		
Fresh water tanks	about 1.5m^{3}		
4. Complement	7 persons		
5. Construction			
Shell	F R P		
Deck and Bulkhead	FRP or plywood covered with FRP		
Engine bed	Steel	1 set	
Rudder	steel galv.	1 set	
Rudder post	SUS	1 set	
Propeller shaft	H.S. brass	1 set	
Stern tube	Brass casting	1 set	
Propeller	Manganese bronze	1 set	

6.	Deck machinery and fishing equipments		
	Steering gear	Hydraulic type with upper Bridge	1 set
	Tender boat	Length 10ft with 3.5 H.P.Outboard	1 set
	Powered warping end	Hydraulic or Electric type, 0.5^{t} x 40^{m}/min	2 sets
	Winch	Hydraulic type, 1^{t}x40^{m}/min	1 set
	Baby line hauler	300kgs type with winch	1 set
	Trolling boom	10^{m}	1 set
	Under water light	AC220V, 500W with dimmer switches	2 sets
	Overboard fish-attraction lights	AC220V, 1000W	2 sets
	Bottom longlines	longlines and 20 baskets with spares	2 sets
	Trap line	Polypropylene 14^{m}/m x 200^{m}	10 coils
	Bouke-Ami	Bait fishing type	1 set
	Tuna longline	50 baskets big-eye type with spares	2 sets
	Ancillary fishing gear	Floats, Lures, Hooks Swivels etc.	1 set
7.	Ventilation		
	Mechanical Fan	electro-FAN, AC220V	4 sets
	Natural Ventilation		-
8.	Lighting		
9.	Fire fighting equipments		-
10.	Life saving equipments	complete	1 set
	Inflatable life raft	7 persons	1 set

11.	Nautical equipment legal equipment	complete	1	set
12.	Anchor and anchor line legal equipment	complete	-	
	Reef anchor	50kg, danforth type	1	set
	Mooring rope	24^{mm}, 25^{m}	2	pcs
13.	Main engine with starting system	electric start system	1	set
14.	Main engine reduction gear	hydraulic multi-disc type	1	set
	Main engine remote control device	Wire system	2	sets
15.	Pumps			
	General service pump	AC220V	1	set
	Fuel oil shifting pump	AC220V	1	set
	Manual hand-pump		1	set
16.	Hydraulic oil pump unit	Main engine drive system with clutch	1	set
	Main engine parts for 2 years		1	set
17.	Electric power system			
	Power circuit	AC220V, 50HZ	-	
	Lighting circuit	AC100V, 50HZ	-	
	Main engine starting system	DC24V		
	Emergency lighting	DC24V	-	
18.	Main generator output	about 30KVA	1	set
	Self-powered diesel auxiliary engine	about 38 ps		

19.	Transformer	AC220V/105V, 50HZ	1	set
20.	Battery	DC24V, 200AH	2	sets
21.	Navigation lights and signal lights	complete	-	
22.	Switch panel			
	Main switch panel		1	set
23.	Clear view scree	AC100V.	1	set
24.	Electric refrigerator	120 litre(galley)	1	set
25.	Freezer	500^{l}	1	set
26.	Search light	500W, swivel type	1	set
27.	Sea Water thermometer	Calibrated in C^{o} with indicator	1	set
28.	Portable light	DC24, 40W, 15^{m} cord	1	set
29.	Electronic equipments			
	Radar	AC100V, 48 miles with variable range-marker	1	set
	SSB. Radio Telephone	AC100V, 100W 11 channel as stipulated	1	set
	Radio direction finder	AM/FM receiver type, DC24V. with radio buoy frequency	1	set
	Fish finder	28/200 KHZ, 2000^{m} multi-stylus, dry paper 50 rolls	1	set
	Sonar	AC100V, 1000 mtrs max. range with stabilised system.	1	set

3. RURAL FISHERIES DEVELOPMENT SCHEME

Hostel Building

According to local design specification for attached layout.

Equipments 54 units.

Each unit consists of following items.

Anchors	Fishermen-type weight 12kg, 7.5kg	1	pc each
Anchor ropes	Polyethylene 220^{m} x 12^{mm}	1	pc
Propeller	size 430 x 300^{mm}	1	pc
Propeller shaft with flexible coupling	28^{mm}dia., 3120^{mm}	1	pc
Stern tube	28^{mm}dia., 2150^{mm}	1	pc
Marine diesel engine with accessories	20 HP	1	set
L.O. evacution pump		1	set
Kingstone cock with CW hose and strainer		1	set
Bilge pump with hose and strainer		1	set
Water-mixing elbow with hose cooling water		1	set
Wire harness extension	3^{m}	1	set
Battery switch		1	set
Propeller-shaft half-coupling	28^{mm} solid type taper bored	1	set
On-board spare parts kits		1	set
Remote control cable for decompression		1	set
Tachometer and sender		1	set
Fishing winches	engine-driven 300kg pull Sheave size 4-12^{mm} hauling speed 60^{m}/min.	1	set
Polypropylene rope	600^{m}x4^{mm}, dark colour	1	coil
Fish finder	12V, 160 fathoms 50 HZ, transducers with 12 spare dry recording paper	1	set

Gill nets	50m x 4m monofilament 3" stretched mesh, No.6 thread	1 set
Gill nets	50m x 4m multi-filament 3" stretch mesh, 210d. 9 ply	1 set
Fishing handline	100m coils, Tetlon/ nylon No.60	6 coils
Mending twine	Monofilament No.6	½ kg
Mending twine	multifilament 210d/ 9 ply	½ kg

4. FISHERIES LABORATORY COMPLEX

Item	Specification	Q'ty	Remarks
Building			
Type	pre-fabricated building		
Area	130.5m^2		
Body Frame	Light Gauge Steel		
Wall Materials	Combined by Flexible Board and Insulation		
Roof Materials	With Decorated Plywood Panel coloured iron sheet with Asphalt Roofing and Insulation 50^{mm} Decorated Plywood Panel.		
Door	2.0^{m} x 0.9^{m}	9 sets	
	2.0^{m} x 1.8^{m} Aluminium Sash	1 set	
Window with Screen	1.8^{m} x 1.2^{m} Aluminium Sash	18 sets	
Partition	2 Panel 40^{mm} thick Decorated Plywood	1 set	
Electric Receiving Panel	300^{mm}x 600^{mm}	1 set	
Electric Wiring materials	Wire, Tube, Switch, connection, socket	1 set	
Lightings	40W, Double-Lined Type	18 sets	
	40W Lined Type Bare Flvorescent Light	4 sets	
Toilet	Western type	1 set	
Ventilation Fan	0.2 KW	1 set	
Piping Materials	Pipe, Elbow, Socket	1 set	
Air Conditioner for Laboratory	3,000 Kcal/hr.	1 set	
Service room Wash sink		1	
Electric water-heater		1	
Overhead shelf		1	
Fan		1	

Staff Office			
Desks		10	
Chairs		10	
Filing cabinets	4 drawer	5	sets
Storage cabinets		1	set
Electric typewriter		1	set
Electric calculators	pocket type	6	sets
Rotary duplicating machine		1	set
Office (2 Rooms)			
Desks		2	
Chairs		2	
Filing Cabinets		2	
Bookshelves		2	
Conference room			
Table	$180^{cm} \times 60^{cm}$	4	
Chairs		10	
Blackboard with projection screen	$2.0^{m} \times 1^{m}$ $1.5^{m} \times 1^{m}$	1	
<u>Chemical & Oceanology</u>			
Lab. table	Colorcelana Top $180^{cm} \times 120^{cm} \times 800^{cm}$ approx. power supply: AC220V, 50HZ	1	set
Lab Stainless steel Sink with tap	$120^{cm} \times 750^{cm} \times 101^{cm}$ approx.	1	set
Lab. stool	$33^{cm} \times 37^{cm} - 51^{cm}$ approx.	4	sets
Water bottle	1,300cc	1	pc
Deep Sea reversing thermometer	protected $-2 - +30^{\circ}c$ in $0.1^{\circ}c$ deg.	2	sets

Turbidmeter	with 50^{m}cabtyre cable DC12V. Scale 0-100 Measuring range: 0.8ppm	1	set
S D T Meter	self-contained rechargeable batteries Salinity: 31-36^{o}/.. temp: -2-35^{o}C Depth: 0-1,000^{m}	1	set
Electric Winch	500^{m} Wire (1.8^{mm}dia) 1.5 Kw Ac Reeling load: 70kg Reeling speed: 1.9^{m}/sec	1	set
Sieves	Brass made for soil sedimentation analysis 8"dia x 45^{mm}(depth) mesh size: 2", 1½",. 1", ¾", ⅜2	1	set
Current meter with standard accessories	Depth limit 200^{m} approx. power source: 9 pcs dry battery cells Recording period: 20 days, Depth limit: 200^{m} approx.	1	set
<u>Biology</u>			
Research microscope	AC220V, 50HZ paired hygenian eyepieces B5X, BWF10X, B15X with illuminator & intensity regulator	1	set
Zoom Stereoscopic microscope with built in illuminator	paired wide field 10X magnification 10 x - 40 X	2	sets
Fish measuring board	1 metre	5	sets
Thermometer	Murcury filled Range: 0.50^{o}C in 1^{o}C Length: 300^{mm}	5	sets

5. WORKSHOP

Item	Specification	Q'ty		Remark
Building				
Type	Pre-fabricated Building			
Area	$30.6m^2$			
Body Frame	Light Gauge Steel			
Wall Materials	Combined by Flexible Board and Insulation with Decorated Plywood Panel			
Roof Materials	Coloured iron sheet with Asphalt Roofing Insulation 50^{mm} and Decorated Plywood Panel			
Door	Aluminium Sash	3	sets	
Window with screen	Aluminium Sash	6	sets	
Partition	Decorated Plywood	1	set	
Electric Receiving panel for power	600^{mm} x 600^{mm}	1	set	
Electric Receiving Panel	300^{mm} x 400^{mm}	1	set	
Electric Wiring Materials	Wire, Tube, Switch Connection, Socket	1	set	
Lightings	40W Lined Type, Bare Fluoresent Light	6	sets	
Equipment				
Tool set	metric	3	sets	
Portable welders		1	set	

Hoist with beam	electric type, 0.5 ton	1	set
Air Compressor	0.4 KW	1	set
Drilling machine		1	set
Gas torch		1	set
Electric power drill	½", heavy duty	2	sets
Electric bench-mounted grinder		1	set
Bench vice	8", 4"	2	sets
Dies and taps		1	set
Pipe bender		1	set
Office room			
Desk		1	
Chair		2	
Filing Cabinet		1	
Table		1	
Tool room			
Wall mounted rack		1	
Store			
Wall-mounted rack		1	

6. MOBIL WORKSHOP

Item	Specification	Q'ty	Remarks
Diesel truck with cabin	2.5 ton	1	
Portable generator	Gasoline engine driven 220/240V, 2.4KW: 24 Amp 50 HZ, 3,000RPM, 100%		
Welding set	portable, Gasoline engine driven 24V, 3.12 KW. 120A 4000 RPM, 40%	1 set	
Accessories for welding			
Welding cord	10m	2 sets	
Welding cord holder and clamp		2 sets	
Welding helmet		2 pc	
Welding leather gloves		2 pair	
Welding chipping hammer	(2.6mm & 3.2mm)	2 pc	
Welding rods	2 kinds-each 10 Kg	20 Kg	
Basic hand tool	metric type approx 42 pcs contain/ set	2 sets	
Electric drill	portable heavy duty type, 13mm dia.	1 set	
Drilling point set	Up to 13mm dia.	1 set	
Electric Grinder	Bench type, 150mm dia.	1 set	
Bench Vice	Reed type 8"	1 pc	
	Swivel type 6"	1 pc	

Additional equipments			
Work bench with drawer		1	set
Electric extention cord reel	30^{m}	1	pc
Working lamp	DC	1	pc
Room lamp	DC	1	pc
Fuel can for generator and Welder engine	18^{l}	1	pc
Fire extinguisher	3Kg	1	pc
Cabinet for visual aids		1	set

Visual aids equipment

Cine-sound projector	16^{mm}, Zoomlens Single phase AC, 50HZ, lens F/1.2, 50^{mm}, 24V-250W	1	set
Accessories			
Zoom lens	F/1.7 50-100^{mm}		
Portable projection screen	tripod type 1.5^{m} x 1.5^{m}	1	set
Slide projector	35^{mm} lens F 3.5, 100^{mm} 24V-150W Single phase AC. 50HZ	1	set
Slide magazine	35^{mm} film		
Rotary system	100 pcs films	2	pcs
Straight system	50 pcs films	10	pcs

7. ICE MAKING PLANT

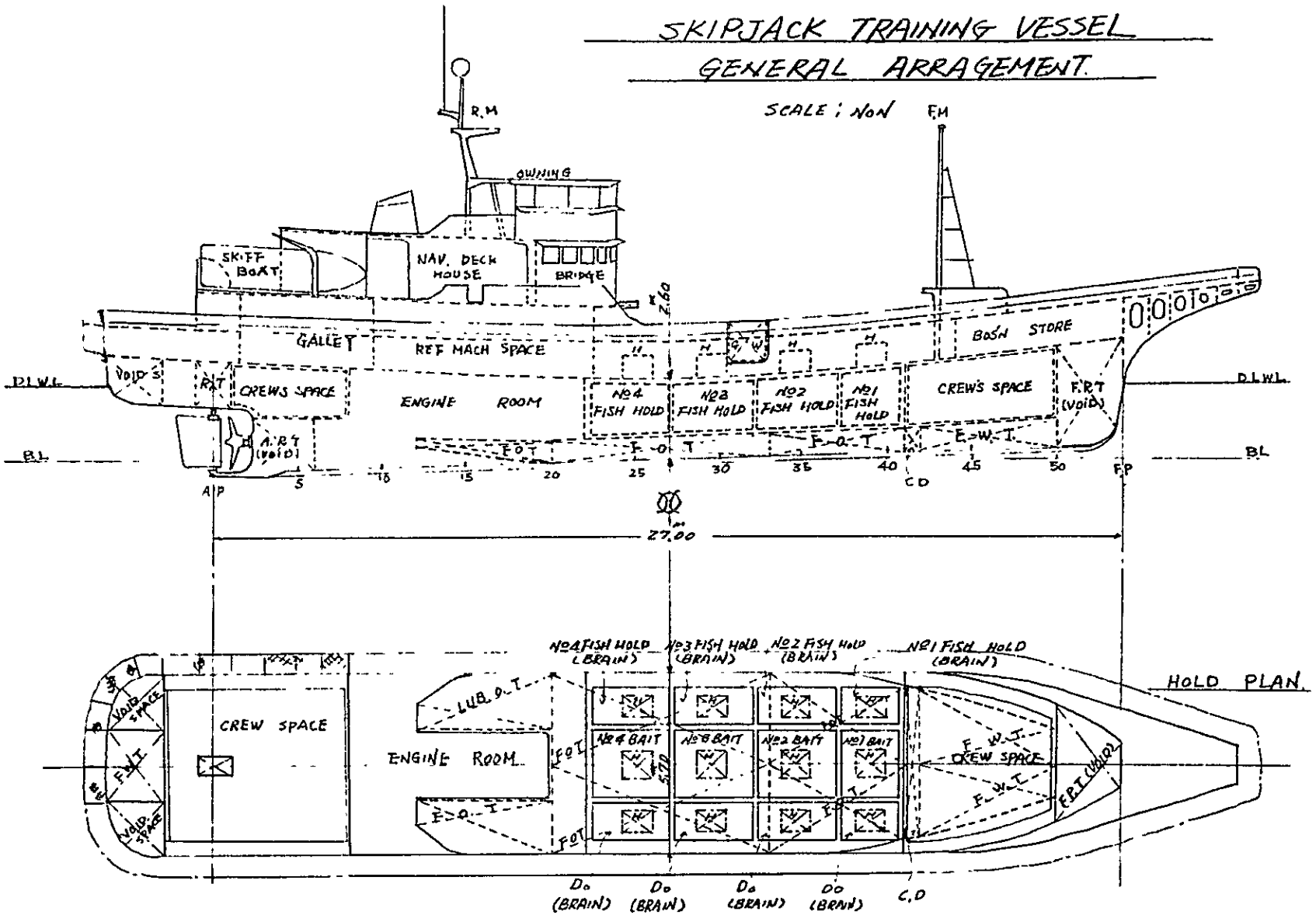
Item	Specification	Q'ty	Remarks
Type	Packaged Type Flake Ice Machine	1 set	
Capacity	10 Ton/24 hr.		
Freon Condensing Unit	56 KW	1 set	
Raw Water Pump	0.4 KW	1 set	
Cooling Tower	60 RT	1 set	
Cooling Water Pump	2.2 KW	1 set	
Ice Storage	Prefabricated type	1 set	
Capacity	30 Ton Flake Ice		
Freon Condensing Unit for Ice Storage	7.5KW	1 set	
Unit Cooler	0.4 KW	1 set	
Ice Delivery Screw Conveyer	300^{mm}dia x $5,500^{mm}$ x 1.5 KW.	1 set	
Electric Receiving & Distributing Panel	900^{mm} x 1200^{mm}	1 set	
Ice Making Tower Structure	Heavy Gauge Steel	1 set	
Electric Wiring Materials	Wire, connection, insulation, Tube, socket	1 set	
Electric Control Panel	600^{mm}x800^{mm}	1 set	
Water Piping Materials	Pipe, Socket, Union Socket, Flange, Valve	1 set	

The following items were requested on the original proposal by the Government of Fiji but have been omitted from the agreement described in these minutes:

1. Ice plant at Levuka
2. All squid fishing gear on the Fisheries Research and Development Vessel.
3. Purse seine, purse davit and skiff with motor from the Fisheries Research and Development Vessel.
4. Sophisticated navigation equipment on the Skipjack Training Vessel (Omega satellite navigation system and VHF multipoint radio telephone and electromagnetic log).
5. Thirty six (36 units of equipment and machinery for the Rural Fisheries Development Scheme.

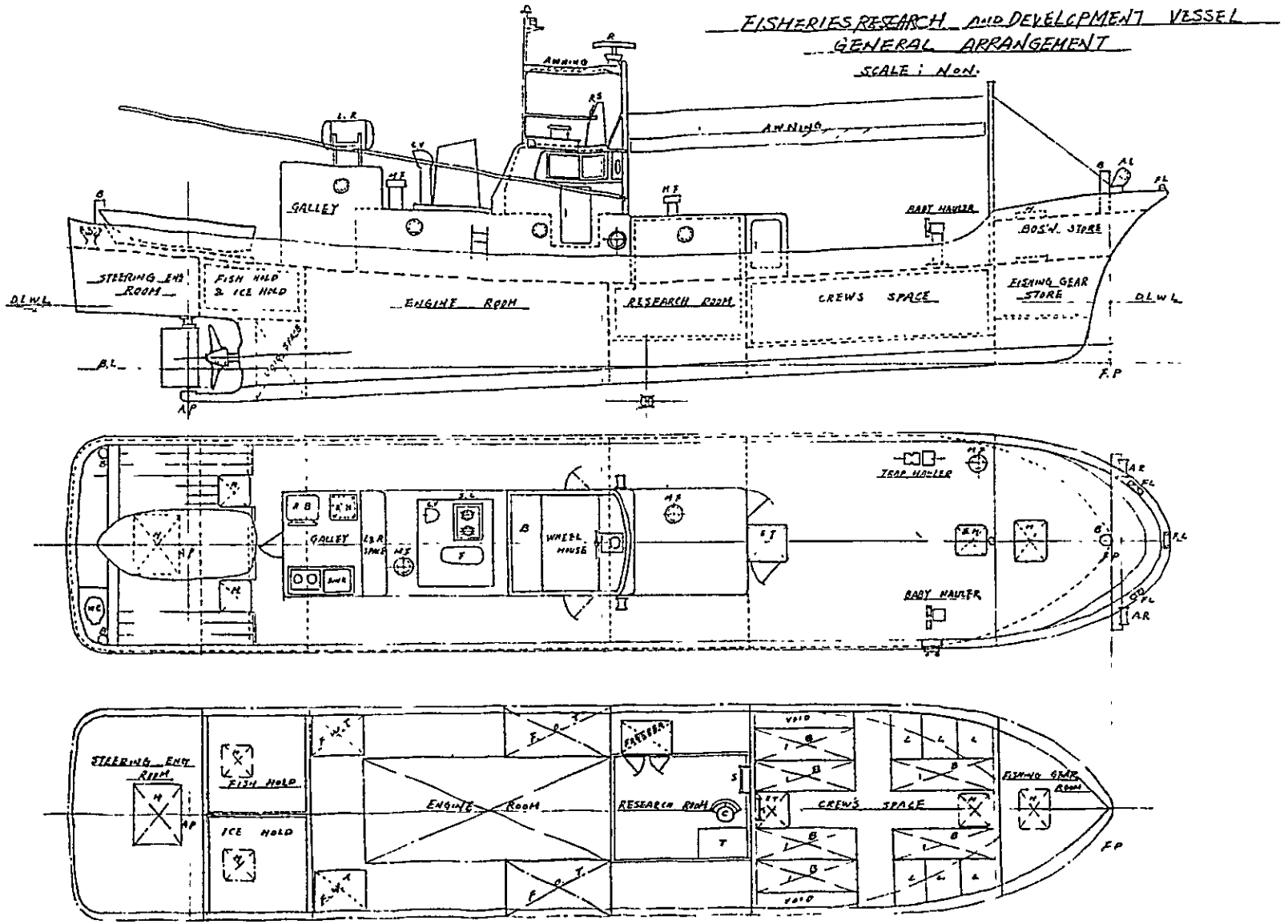
SKIPJACK TRAINING VESSEL
GENERAL ARRAGEMENT.

SCALE ; NON



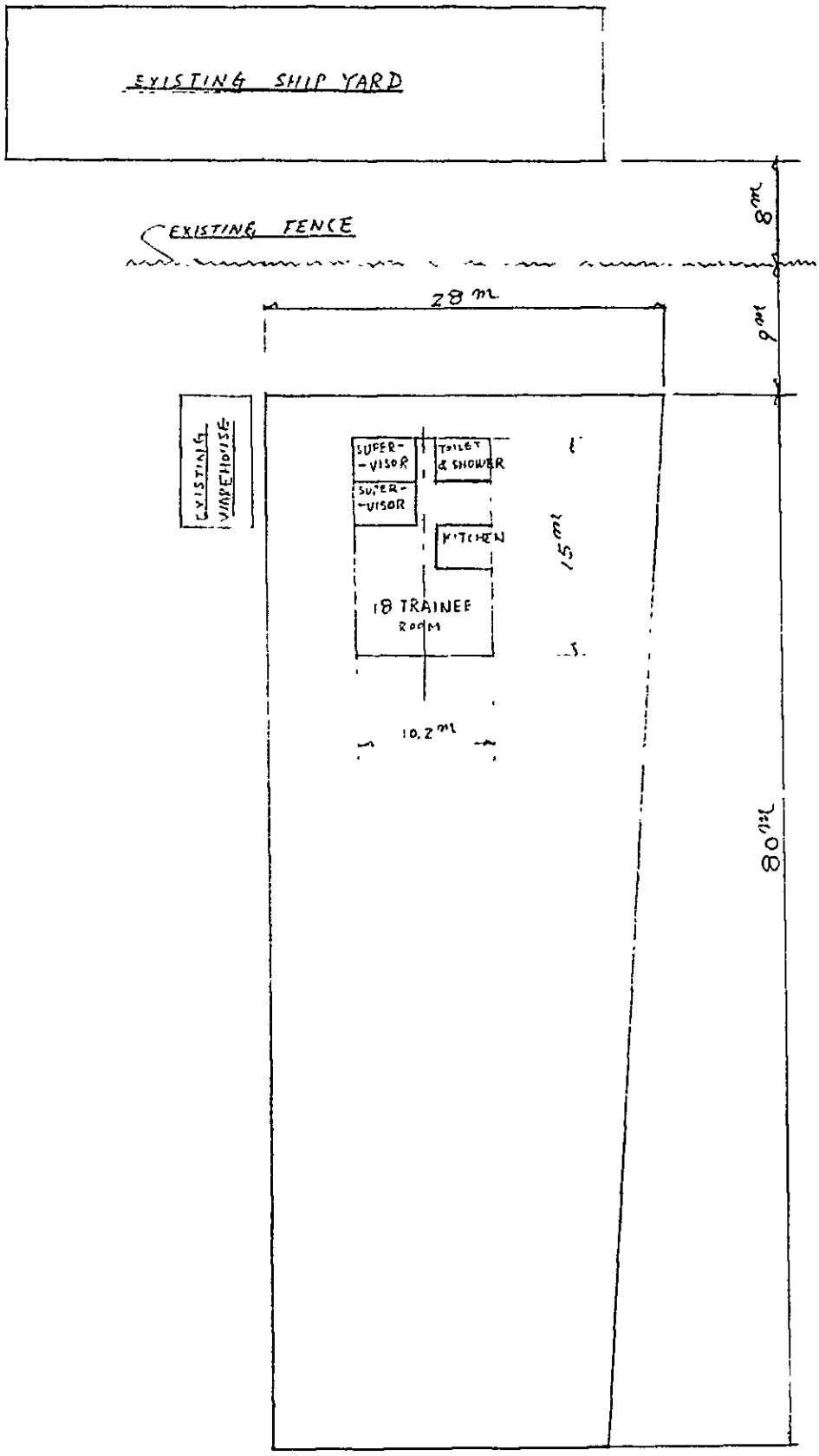
FISHERIES RESEARCH AND DEVELOPMENT VESSEL
GENERAL ARRANGEMENT

SCALE : NON.



GENERAL ARRANGEMENT OF HOSTEL BUILDING SCALE : NON

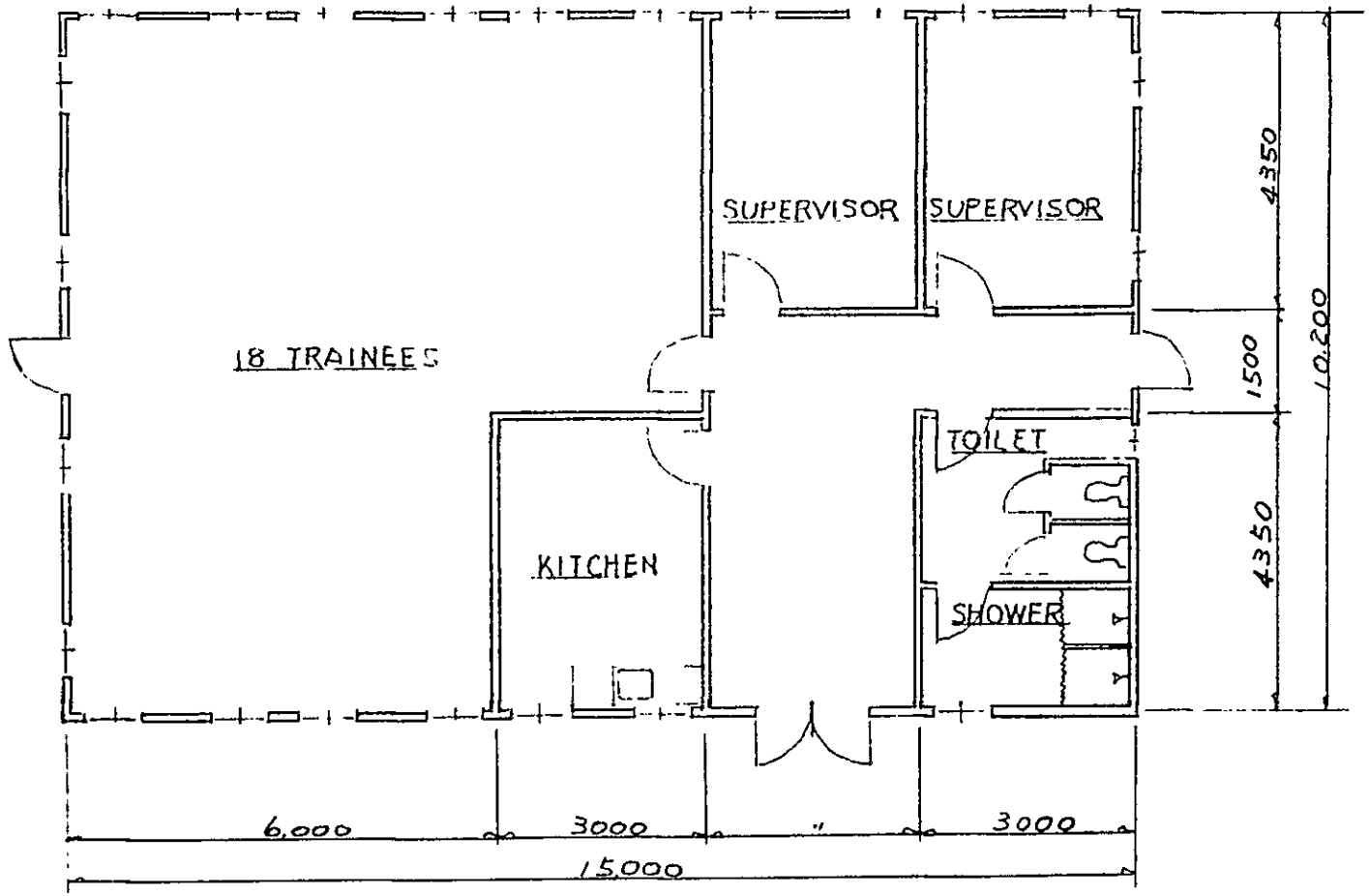
LOCATION : FISHERIES DIVISION AREA IN LAMI



HOSTEL BUILDING (18 TRAINEES) GRAND FLOOR PLAN SCALE: NON.

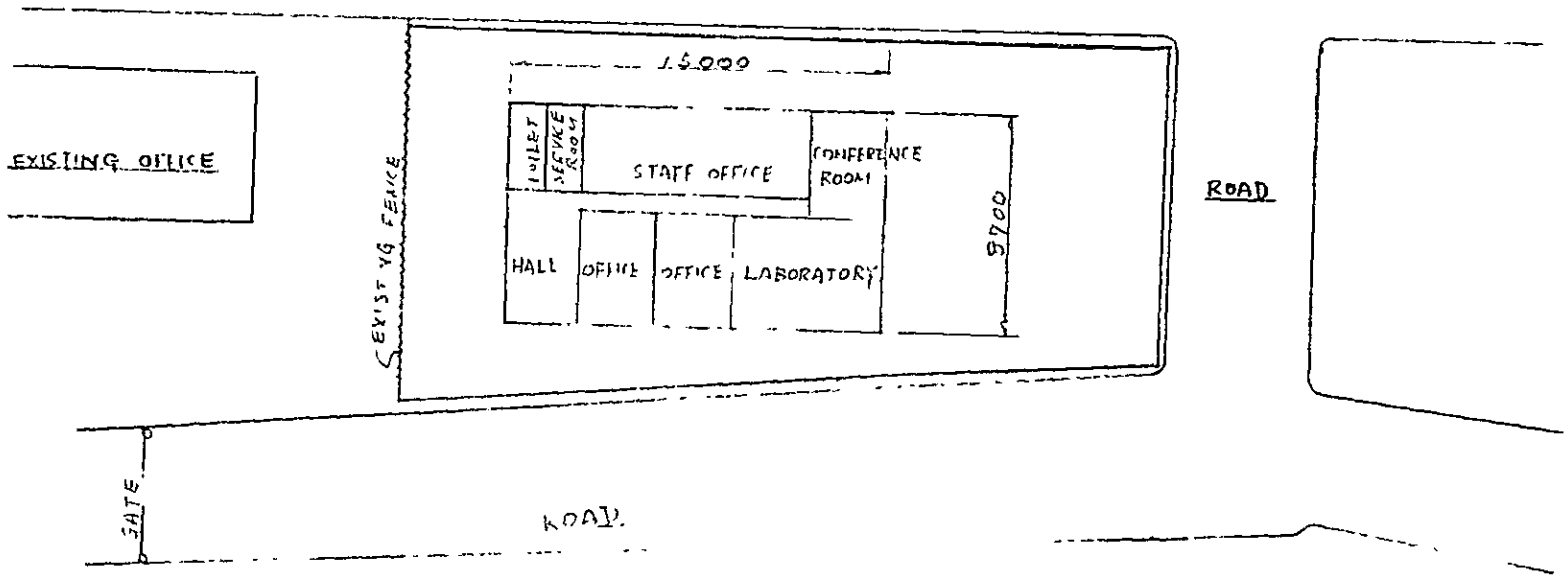
FLOOR AREA : 153 m^2

LOCATION : FISHERIES DEVISION AREA IN LAMI



GENERAL ARRANGEMENT OF FISHERIES LABORATORY COMPLEX. SCALE: NIL

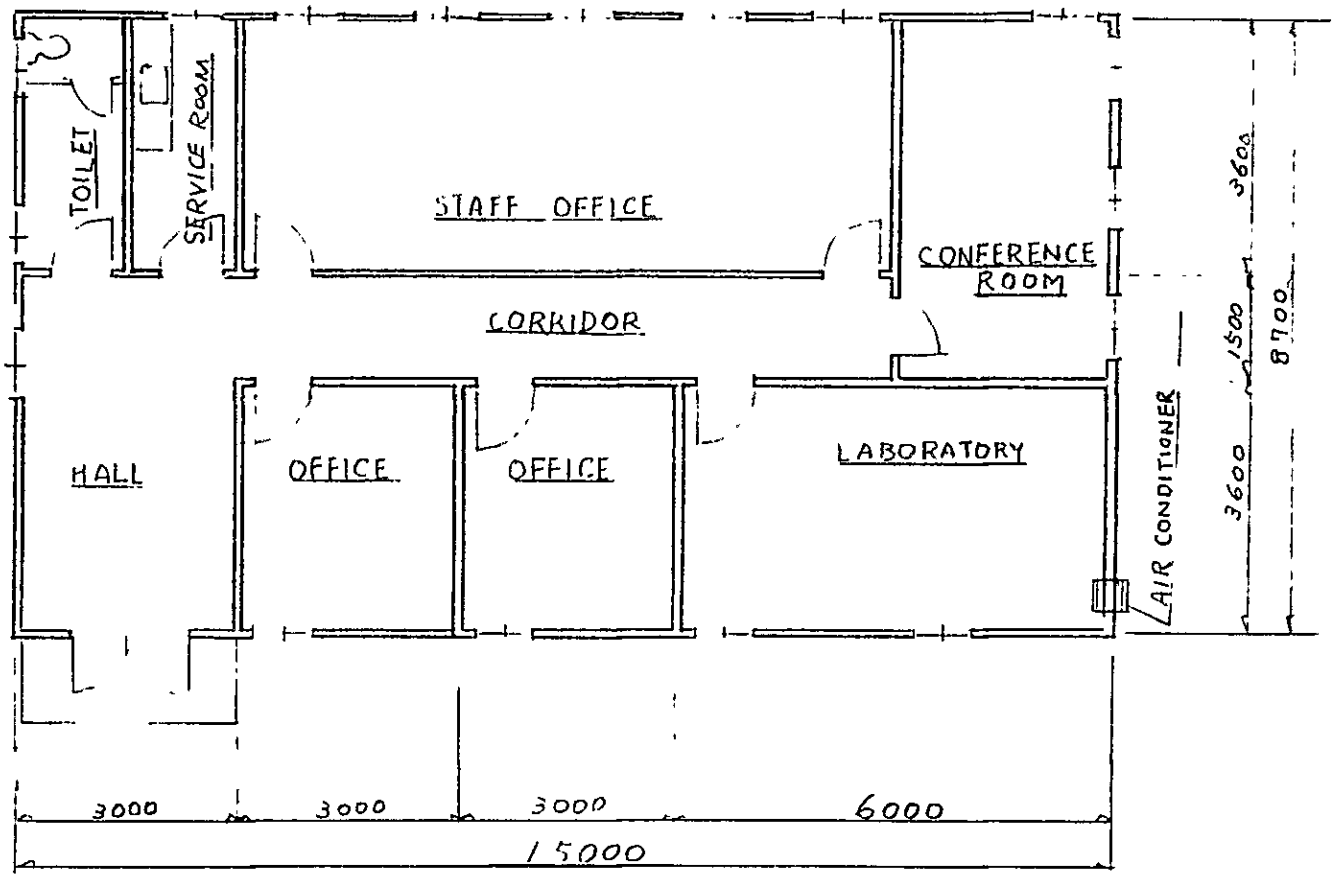
LOCATION : FISHERIES DIVISION AREA IN LAMI



FISHERIES LABORATORY COMPLEX. GRAND FLOOR PLAN SCALE: NON

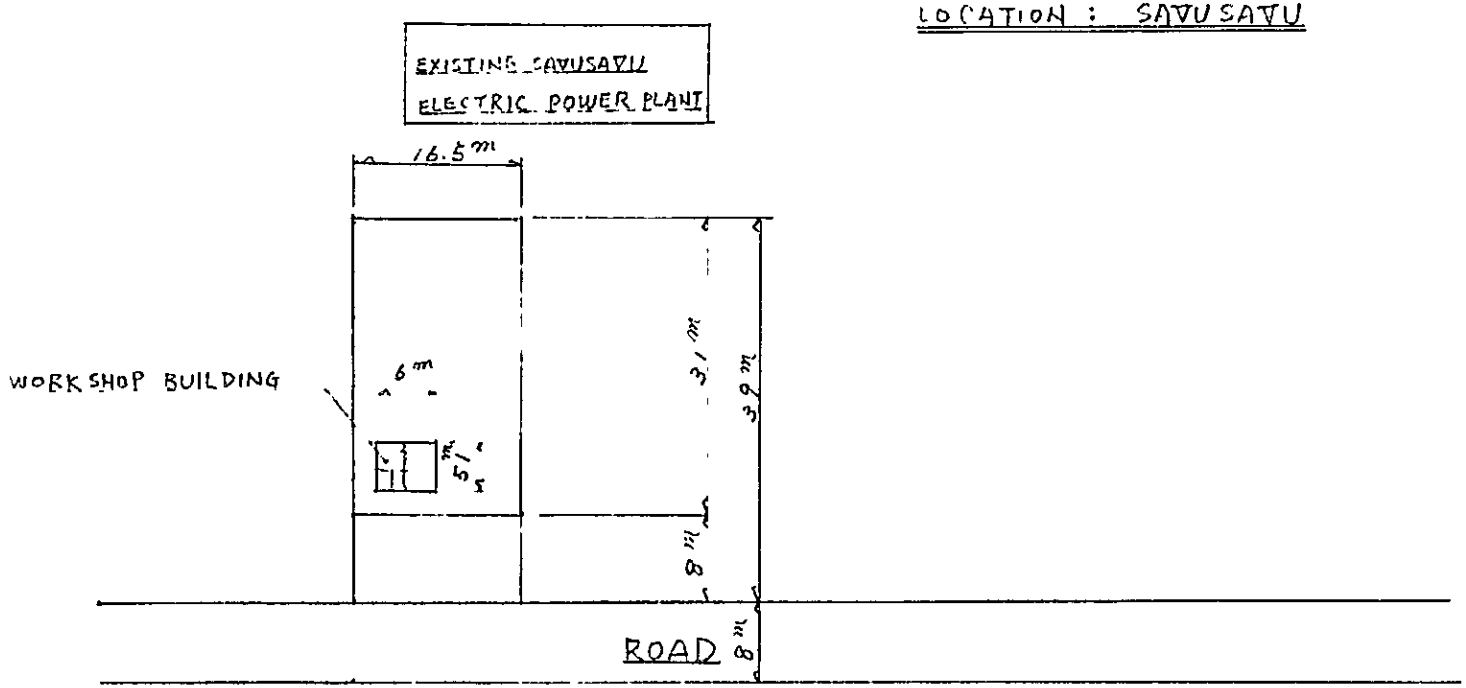
FLOOR AREA : 130.5 m²

LOCATION : FISHERIES DIVISION AREA IN LAMI



GENERAL ARRANGEMENT OF WORKSHOP BUILDING SCALE : NON

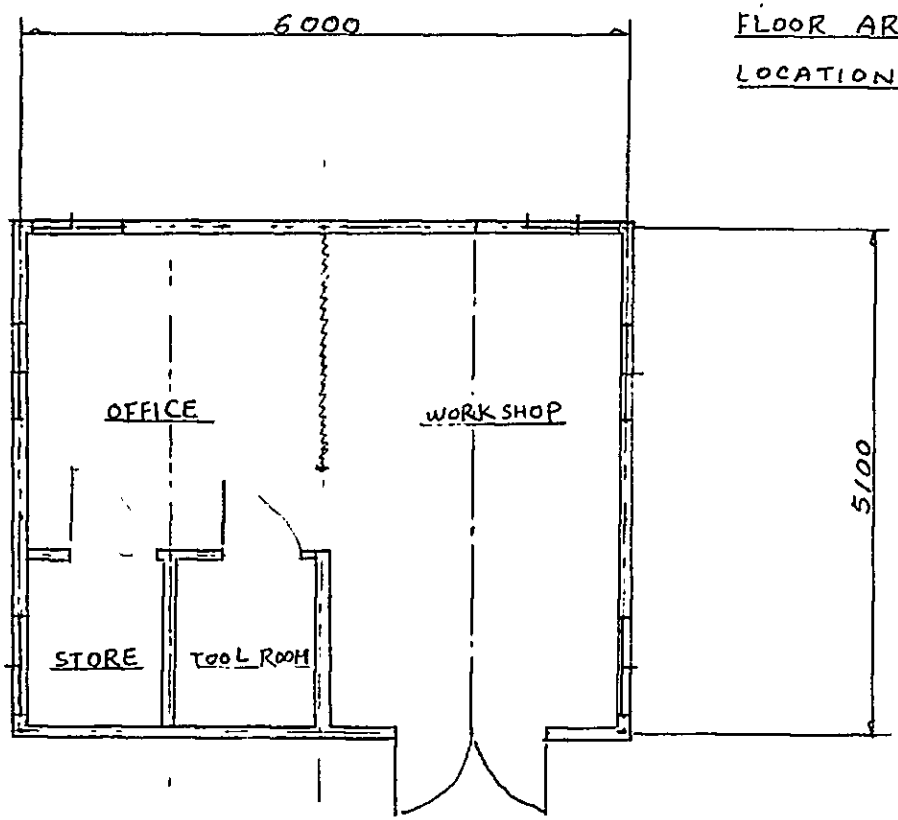
LOCATION : SAVU SAVU



WORKSHOP . GRAND FLOOR PLAN scale: NON

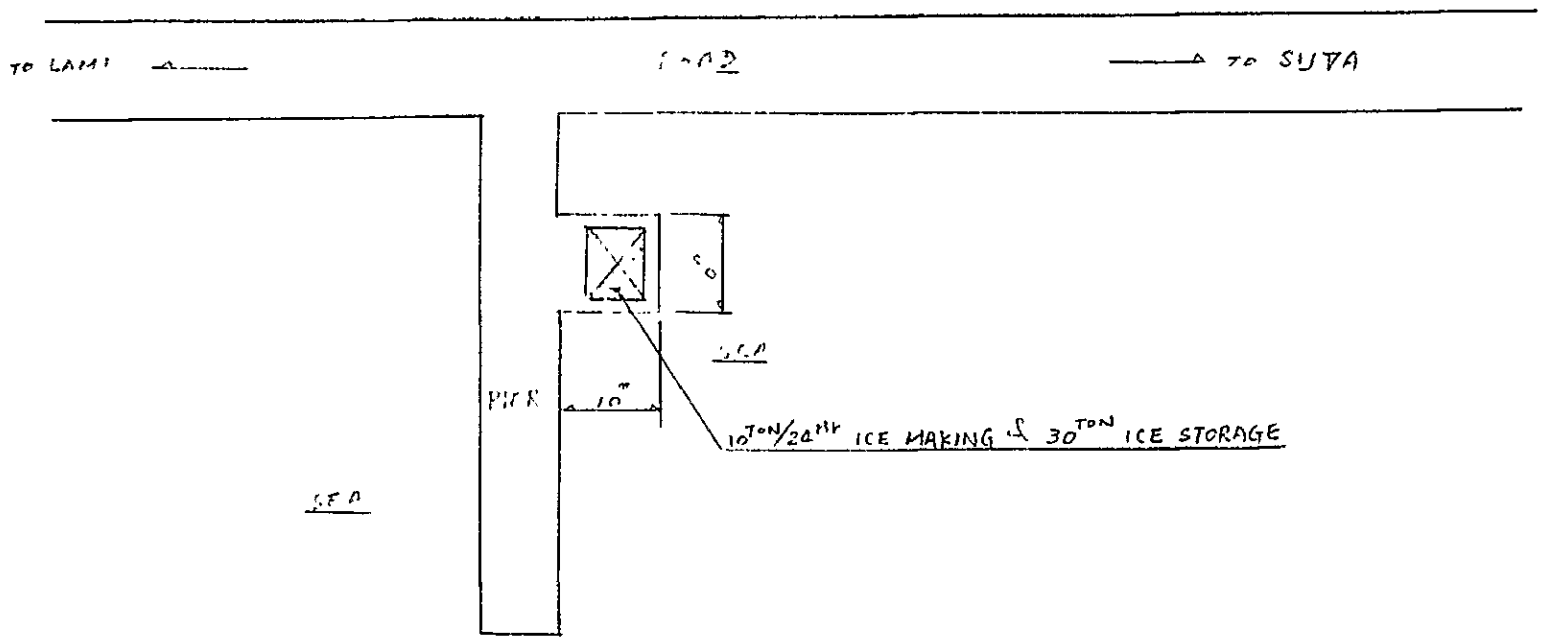
FLOOR AREA : 30.6 m^2.

LOCATION : SAYU SAYU



GENERAL ARRANGEMENT OF ICE PLANT SCALE : NON

LOCATION : LAMI HARBOR



ICE MAKING PLANT FLOOR PLAN scale. Non

LOCATION : LAMI HARBOR