GOVERNMENT OF YAP STATE
THE FEDERATED STATES OF MICRONESIA

BASIC DESIGN STUDY REPORT ON THE PROJECT FOR DEVELOPMENT OF SMALL SCALE FISHERIES IN YAP OF THE FEDERATED STATES OF MICRONESIA

MARCH, 1996

JAPAN INTENATIONAL COOPERATION AGENCY
OVERSEAS AGRO-FISHERIES CONSULTANTS CO., LTD.

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PREFACE

In response to a request from the Government of the Federated States of Micronesia, the Government of Japan decided to conduct a basic design study on the Project for the Development of Artisanal Fisheries in Yap and entrusted the study to the Japan International Cooperation Agency (JICA).

JICA sent to FSM a study team from November 28 to December 24, 1995.

The team held discussions with the officials concerned of the Government of FSM, and conducted a field study at the study area. After the team returned to Japan, further studies were made, and as this result, the present report was finalized.

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

I wish to express my sincere appreciation to the officials concerned of the Government of the Federated States of Micronesia for their close cooperation extended to the teams.

March, 1996

Kimio Fujita
President
Japan International Cooperation
Agency

LETTER OF TRANSMITTAL

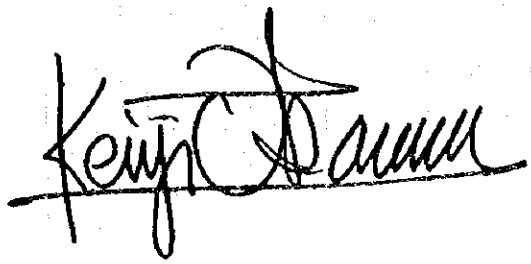
March, 1996

We are pleased to submit to you the basic design study report on he Project for the Development of Small Scale Fisheries in Yap of the Federated States of Micronesia.

This study was conducted by Overseas Agro-Fisheries Consultants Co., Ltd., under a contract to JICA, during the period from November 22, 1995 to March 29, 1996. In conducting the study, we have examined the feasibility and rationale of the project with due consideration to the present situation of FSM and formulated the most appropriate basic design for the project under Japan's grant aid scheme.

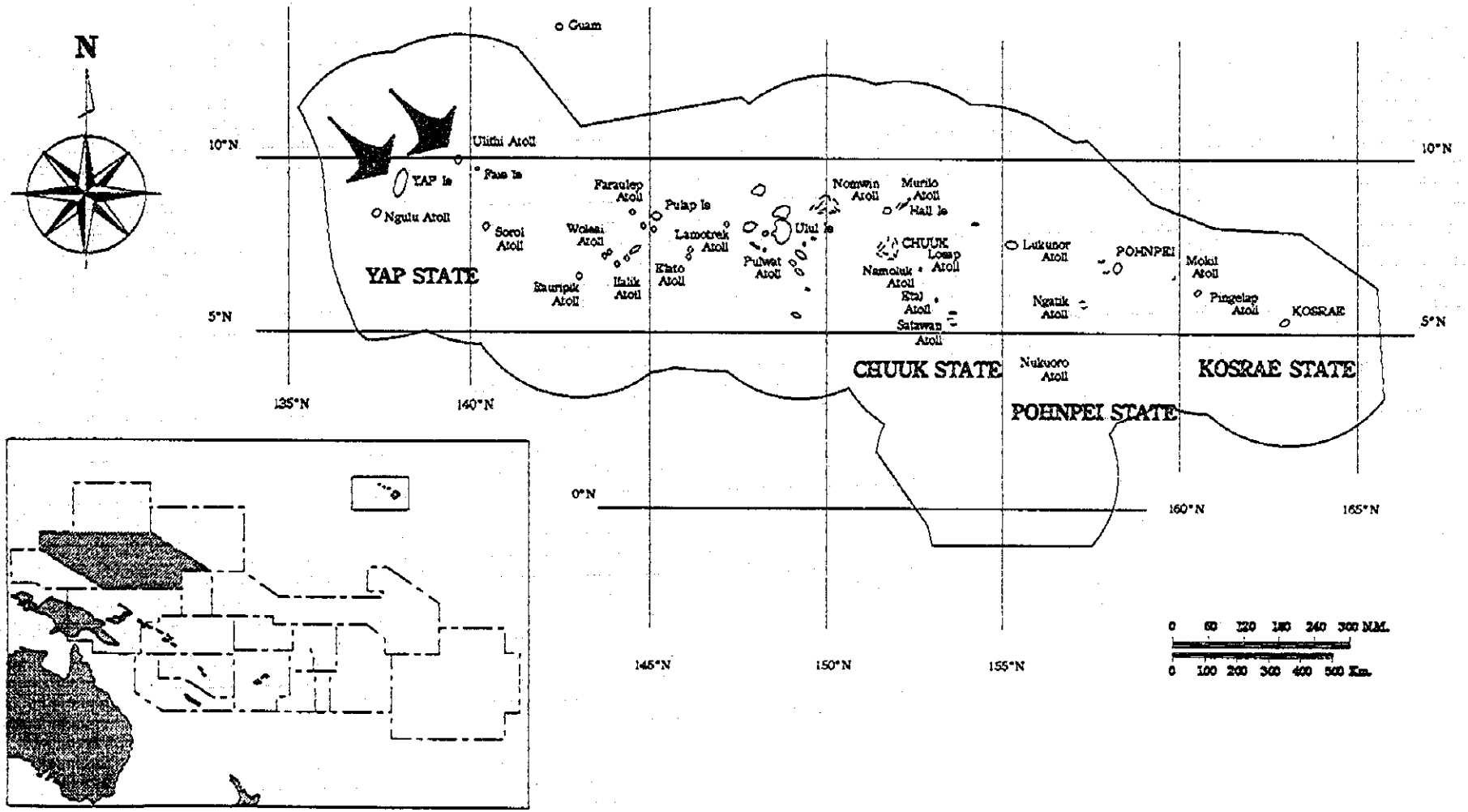
Finally, we hope that this report will contribute to further promotion of the project.

Very truly yours,



Kenji Okamura
Project manager,
Basic design study team on
the Project for the Development of Small Scale
Fisheries in Yap
Overseas Agro-Fisheries Consultants Co., Ltd.

Federated States of Micronesia



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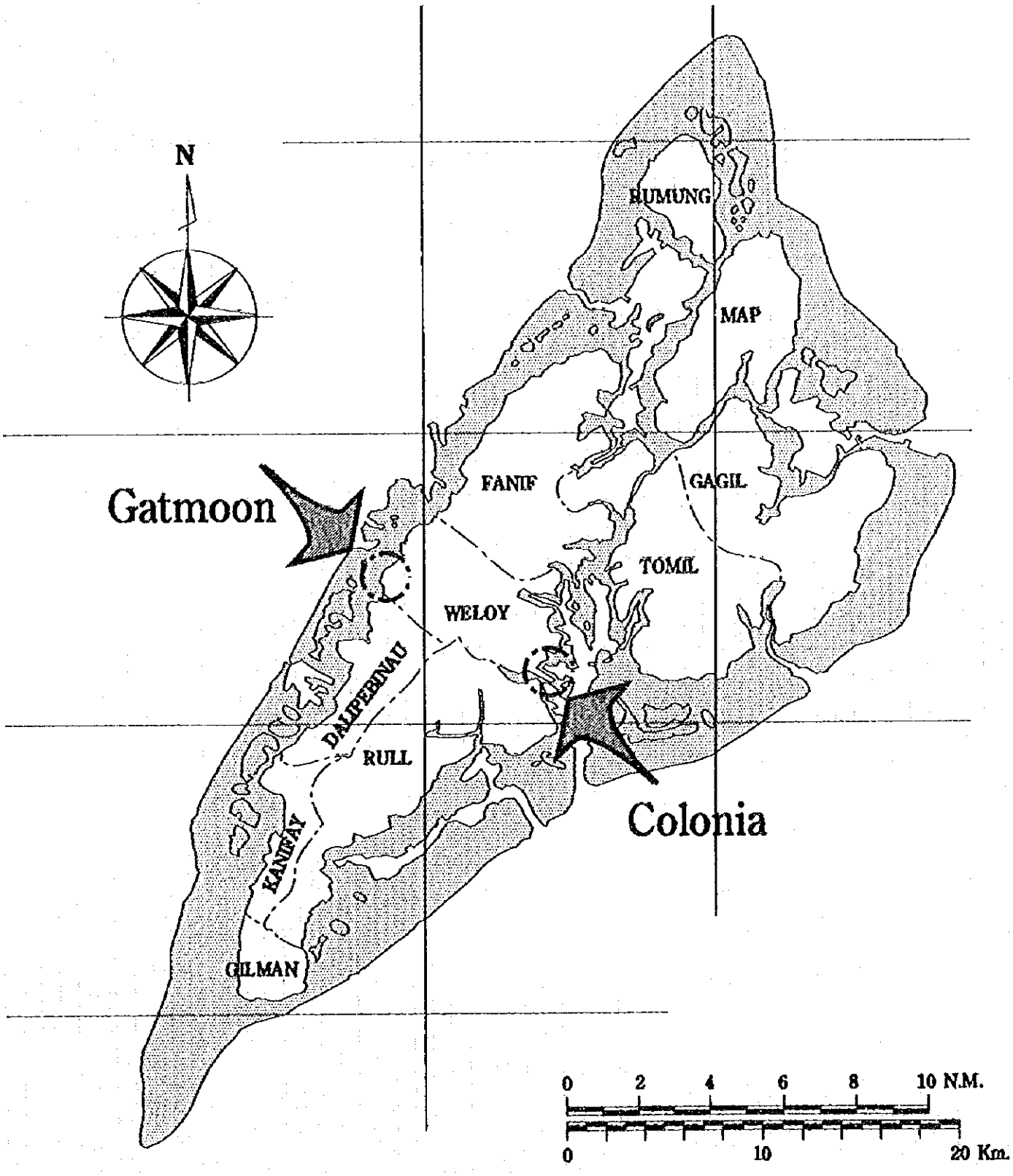
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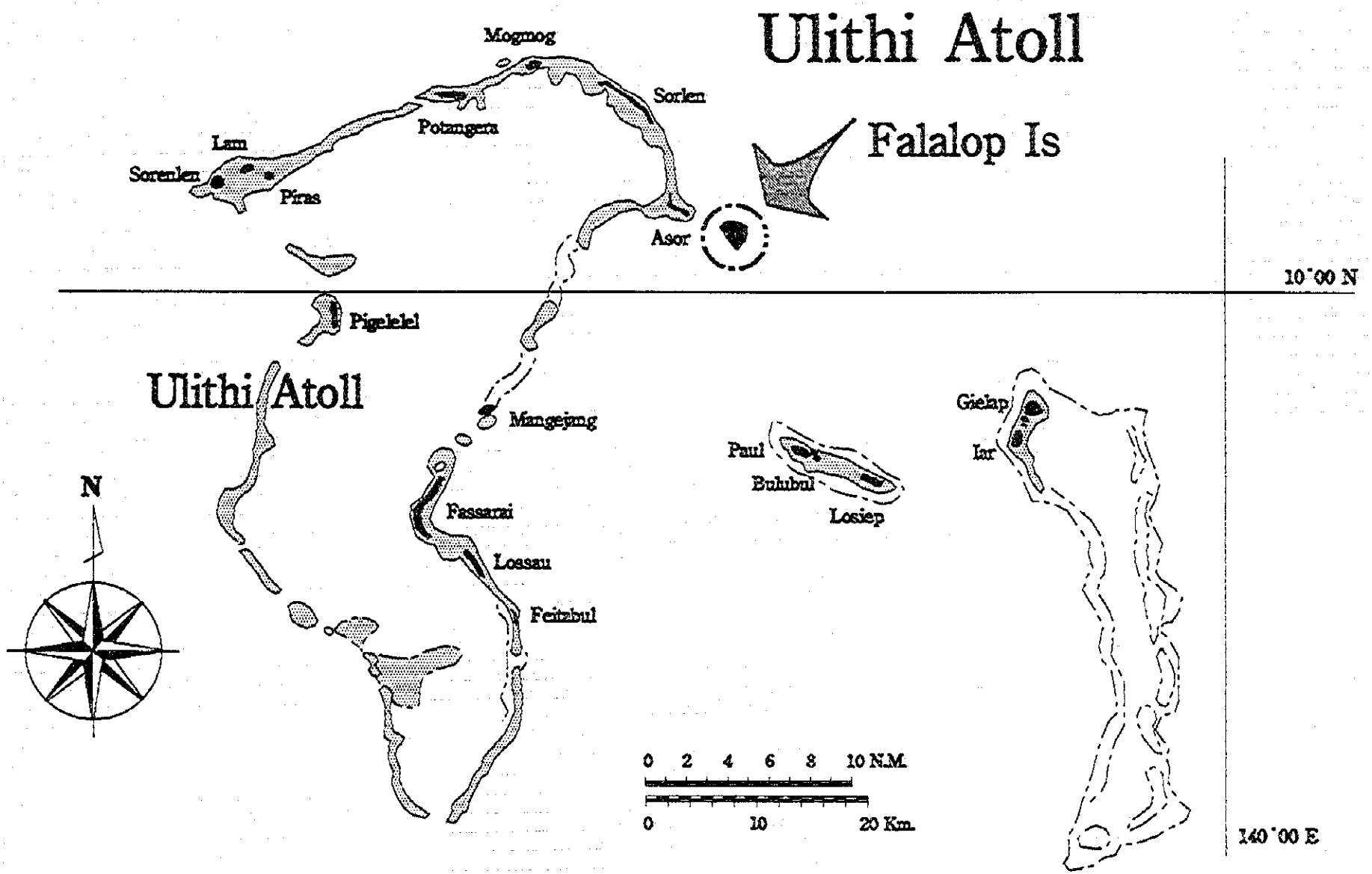
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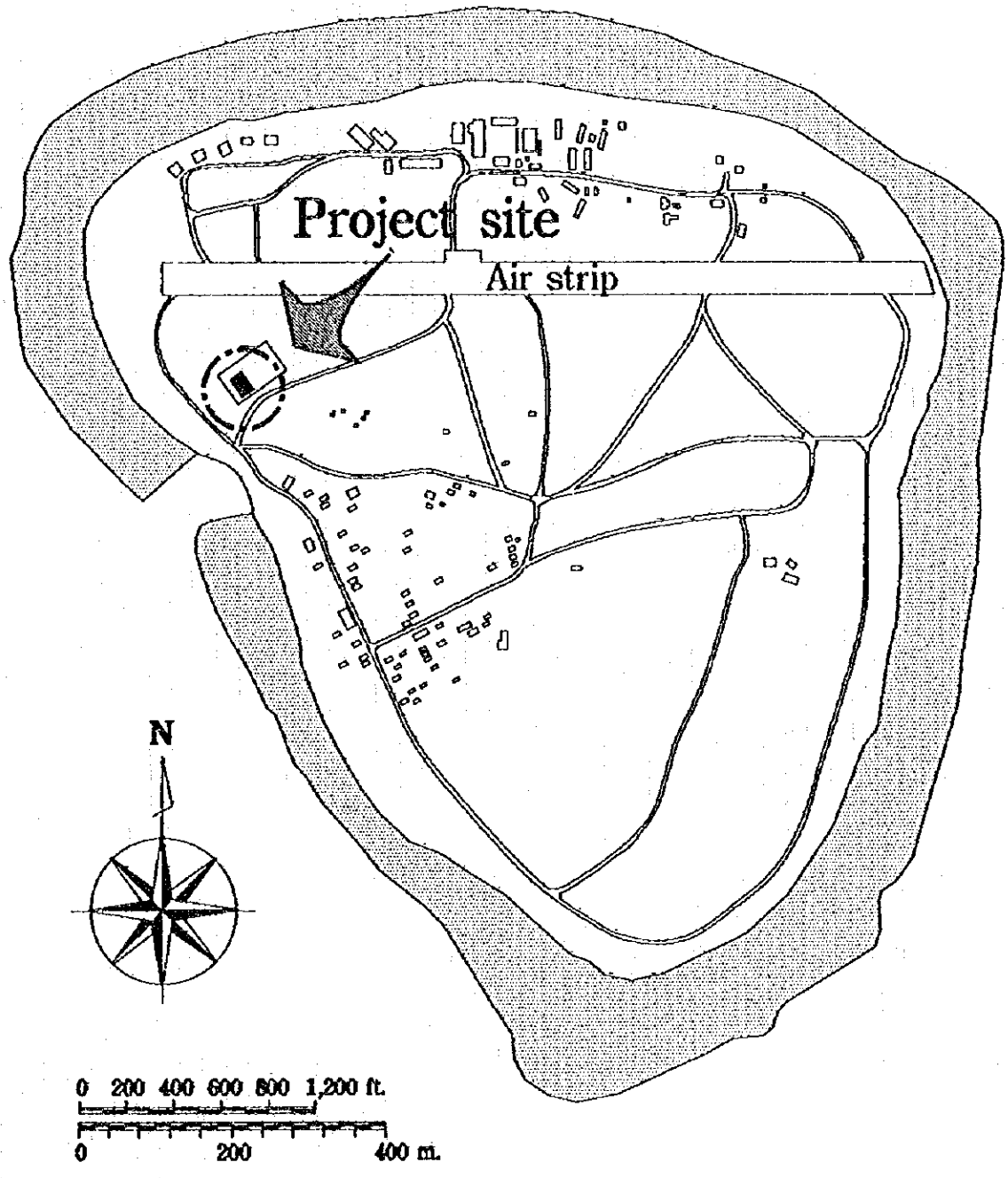
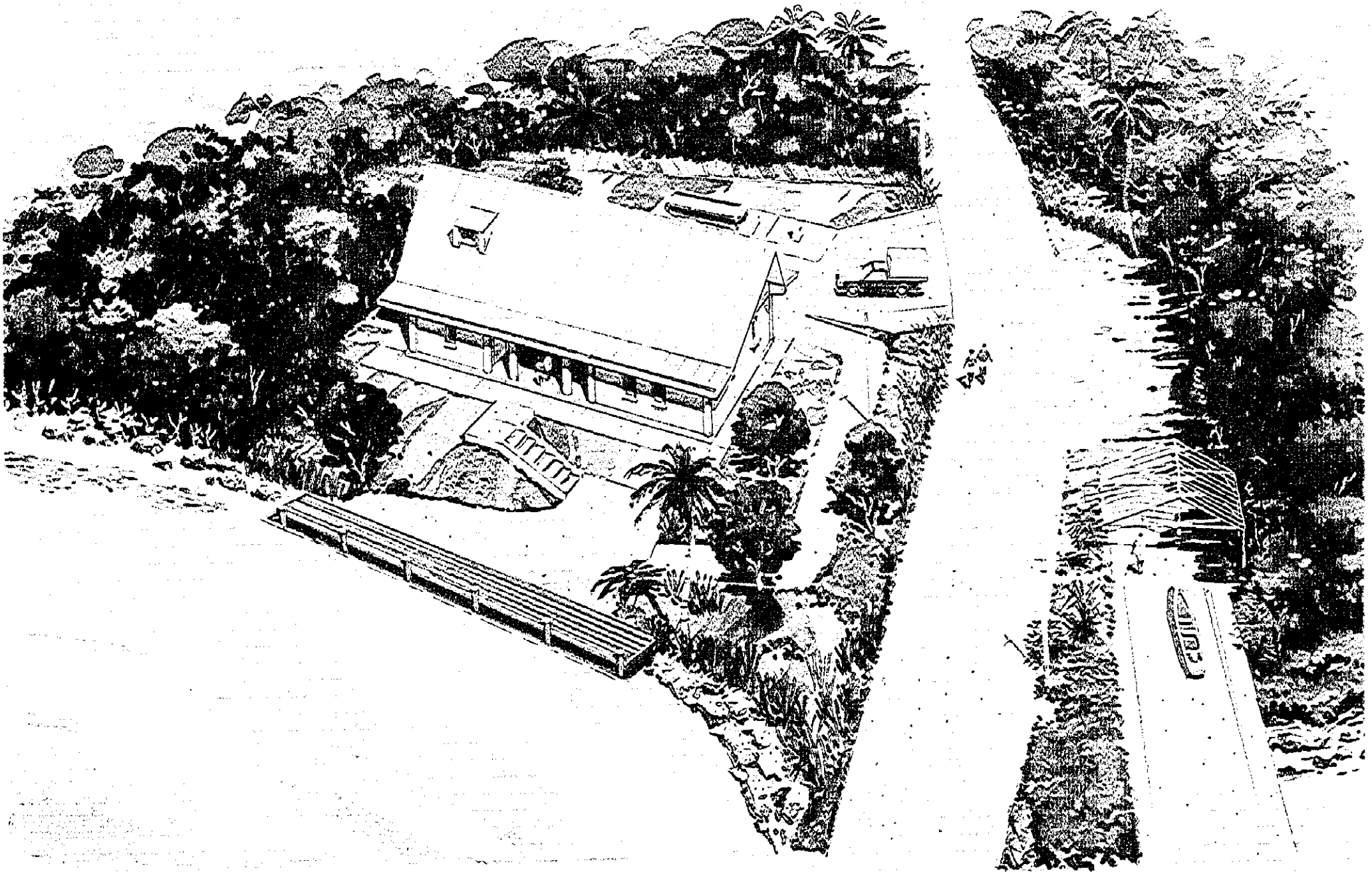
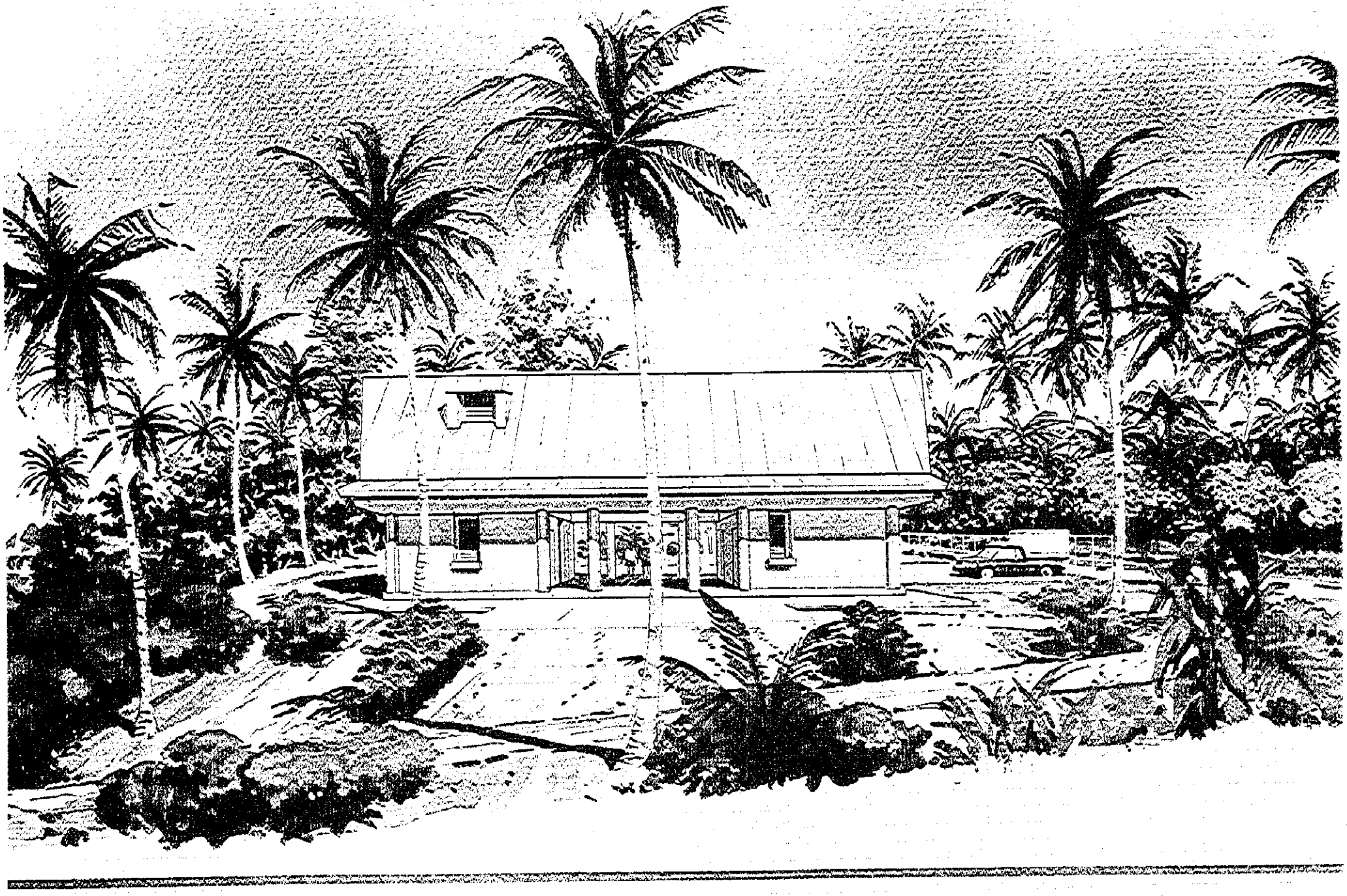
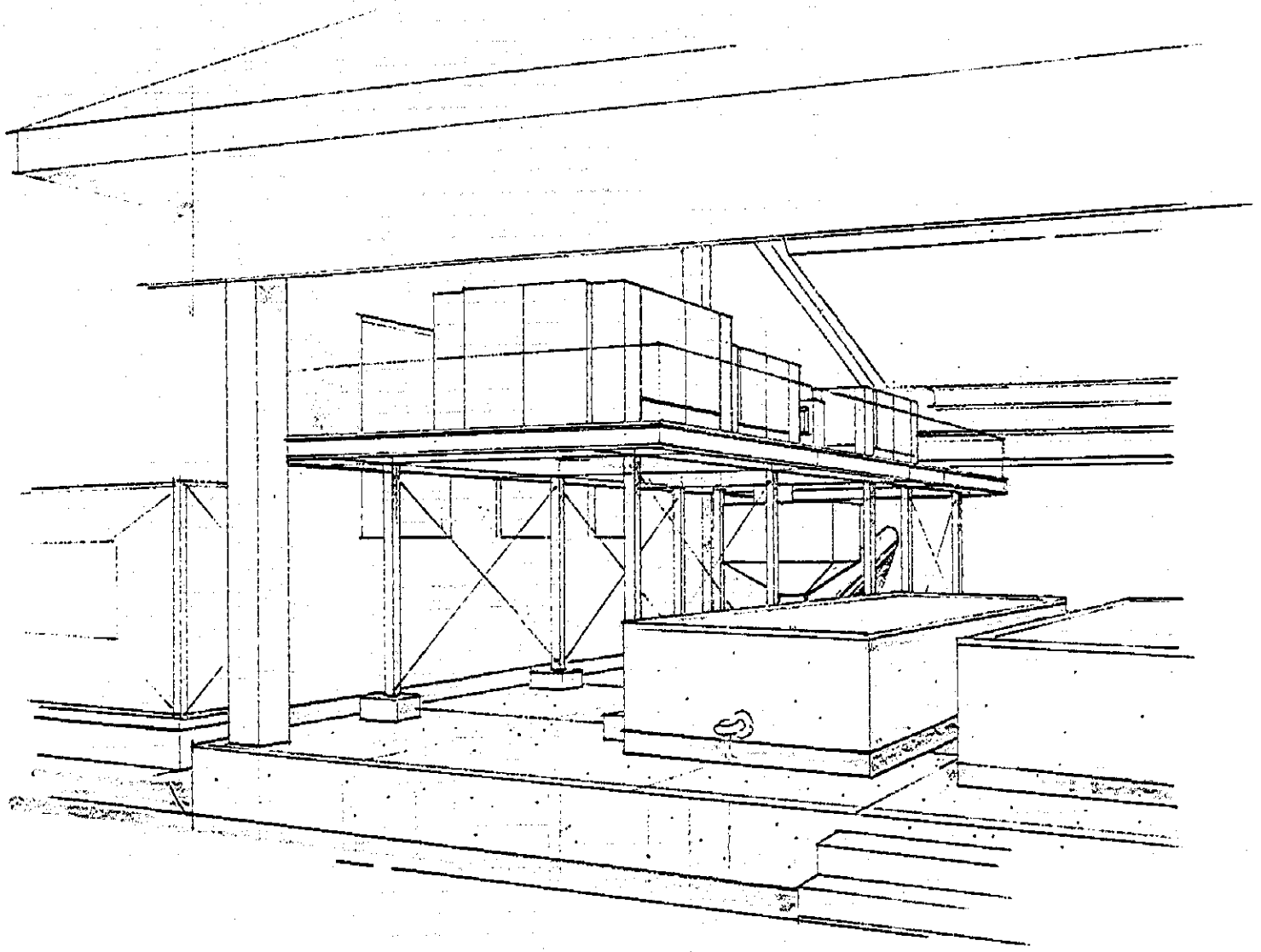




WEST HARBOR, GATMOON, YAP PROPER



FALALOP ISLAND, ULITHI ATOLL



YFA, COLONIA, YAP PROPER

CONTENTS

CHAPTER 1

BACKGROUND OF THE PROJECT

CHAPTER 1 BACKGROUND OF THE PROJECT

1-1 Background of the Project

The Federated States of Micronesia concluded the Compact of Free Association with the United States of America in 1986, to develop national economy which meant that it would receive aid from the USA for the ensuing 15 years. The GDP of the FSM in 1989 was US$ 150 million (per capita GDP was US$ 1,467), however, a large proportion of the GDP was dominated by government expenditure and US$ 60 million of the income was accounted for by the compact provided under the free association. The fund assistance from the USA is scheduled to be suspended in 2001, and the amount of aid in the third phase of the compact starting in 1996 has already been reduced to US$ 45 million.

Although the FSM covers a vast exclusive economic zone in terms of ocean area, stretching approximately 3,500 km east to west and 1,300 km north to south (2.9 million square kilometers), the national land area is a mere 701 km^2, which is just 0.02% of the ocean area. Most of the 607 islands that form the archipelago consist of coral sand not suited to agriculture, and imports of foodstuffs and luxury foods amount to approximately US$ 40 million, which represents around 35% of total imports.

In view of the said situation, FSM has made the effective utilization of its fisheries resources a top priority and is striving to develop its coastal and offshore fisheries. In particular, the country has made the construction of the fisheries-related infrastructure and the development of human resources major issues. However, despite having some of the best tuna fishing grounds in the world, these resources are totally exploited by foreign fishing vessels, and all the caught fish are exported. As for the coastal fisheries resources, development is advancing centered around artisanal fisheries and all the catches are consumed domestically, however, the coastal fisheries is unable to fully satisfy the domestic demand for fish and the lacking portion is having to be imported.

In view of this situation, the Government of Japan has implemented numerous fisheries grant aid projects in FSM since 1981. In the Project site of Yap State, too, a Fishing Harbor Preparation project was implemented under the grant aid scheme of the Government of Japan in 1986, and this project helped attract industrial fisheries and thus contributed to the economic improvement of Yap State. The Government of Yap state has conducted various artisanal fishermen support measures via the Yap Fishing Authority, however, it has been unable to fulfill its objectives due to insufficient funds and equipment and the difficulty of expanding its facilities, etc.

The Yap state as project site, the population is 11,178. The area of Yap State is approximately 120 km^2, 80% of which is covered by Yap Proper, however, apart from coconuts and agroforest, arable land accounts for only 12%. The combined area of the 120 outer islands of Yap State amounts to only 19 km^2, and approximately 4,000 people live on these islands.

In these circumstances, the people of Yap State have long relied on the sea for their artisanal food and the importance of sea products within their diet is great. Every household has its own craft and it can even be said that all people in Yap state are fishermen to some extent. According to statistics from 1994, the annual volume of landed marine products is 1,600 tons and the amount of fish consumed per person is as much as 143 kilos per year, which goes to show just how important marine products as the people's subsistence food.

In the past age of artisanal economy, families only caught the fish they required and the time spent on fishing was short, and this meant that conservation of fresh fish was not regarded as very important. The ratio of households with zero income in Yap State was 55% in 1980, however, this had fallen to 23% by 1992 and is now somewhere between 10-20%. In line with this shift to a money economy, the numbers of city dwellers earning salary-based livings have increased, and this has resulted in a greater demand for larger volumes of fish landing and the distribution of fish to the cities. However, due to the poor means of fresh fish conservation, catches are struggling to increase and distribution is sluggish, meaning that it is very difficult for the city dwellers to obtain fresh fish. This problem has become extremely serious in both Colonia on Yap Proper and in Ulithi Atoll, which is the second largest concentration of the population in Yap State.

The State Government made fisheries development the top target in the Second Five year Development Plan (1992-1996), and it has been especially aiming to achieve the following in the artisanal fisheries sector:

① to increase catches and strengthen marketing,
② to reduce imported food quantities and improve the foreign currency balance through expanding marine products for local demand,
③ to obtain foreign currency through the export of marine products,
④ to promote more employment opportunities through the development of fisheries.

The request is in line with the policy to promote the small scale fishery raised within the Second Five year Development Plan (1992-1996) of Yap State. It aims to construct artisanal fishery support stations to supply ice on Yap Island and on Falalop Island in Ulithi Atoll (which has the second largest population concentration in Yap State), and to encourage the food self

sufficiency setup through securing means conservation of fresh fish and so increase fishing hours, increase fish hauls and promote the marketing of fresh fish.

1-2 Outline of the Request and Main Components

① West Harbor (Gatmoon, Yap Island)

Steel framed building	240 m² (including rainwater catchment) Artisanal fisheries support station with ice making facilities, storage, office, rest room, toilets/showers, fishermen's lockers, etc.
Ice making machine, ice crusher, ice storage	Block ice making machines (1 ton/day × 2) 40 m³, -5°C
Emergency generator	10KVA × 1 set
Water tank Fuel oil tanks & dispensers	FRP, 40 m³ × 1 tank Gasoline (550 gallon) tank × 1 set Diesel oil (550 gallon) tank × 1 set
Radio telephones	VHF, 15w × 1 , SSB, 150 watt × 1
Equipment for working	
Heat Insulated box	160 liter × 60 boxes
Scales	200, 100, 50, 20, 10 pound × 1 each
Plastic fish box	70 liters × 20 boxes
Carts	800 kg loading × 2 carts
Office supplies	1 set (desk, chair, cabinet, shelf, etc.)
Protection of Jetty	
Mooring jetty	Approx. 20 m
Protection of jetty	Approx. 200 m
Leading light for navigation	1 set

② Yap Fishing Authority (Colonia, Yap Island)

Ice making machine	Block ice making machine (2.5 ton/day) × 1

③ Fatalop Island (Ulithi Atoll)

Steel framed building	120 m² (including rainwater catchment) Artisanal fisheries support station with ice making facilities, storage, office, rest room, toilets/showers, fishermen's lockers, etc.
Ice making machine, ice crusher, ice storage	Block ice making machines (0.5 ton/day × 2) 30 m³, -5°C
Water tank	FRP, 10 m³ × 1 tank
Radio telephones	VHF, 15 watt × 1 , SSB, 150 watt × 1
Emergency generator	10 KVA × 1
Equipment for working	
Heat insulated box	160 liter × 30 boxes
Scales	200, 100, 50, 20, 10 pound × 1 each
Plastic fish box	70 liters × 20 cans
Carts	800 kg loading × 2 carts
Office supplies	1 set (desk, chair, cabinet, shelf, etc.)

CHAPTER 2

CONTENTS OF THE PROJECT

CHAPTER 2 CONTENTS OF THE PROJECT

2-1 Objectives of the Project

The Yap State Government made fisheries promotion the top target in the Second Five year Development Plan (1992-1996), and it has been especially aiming to achieve the following in the artisanal fisheries sector:

① to increase catches and strengthen marketing,
② to reduce imported food quantities and improve the trade balance through expanding marine product for the local demand,
③ to obtain foreign currency through the export of marine products,
④ to promote employment opportunities through the development of fisheries.

The request is in line with the policy to promote the small scale fishery raised within the Second Five year Development Plan (1992-1996) of Yap State. It aims to construct artisanal fishery support stations to supply ice on Yap Proper (West Harbor) and on Falalop Island in Ulithi Atoll (which has the second largest population concentration in Yap State), and also intends to expand the ice supplying capacity in Colonia, Yap Proper.

Through Project implementation securing means to conserve fresh fish will enable fishing vessel operating times to be lengthened, fish hauls to be increased and fresh fish distribution to be encouraged. Through achieving the targets of the Development Plan, the Government aims to promote the establishment of a self-sufficient food supply system that can respond to the lack of foreign currency which will occur after the end of assistance by the USA, and the ultimate target is to increase employment opportunities and income by means of a self-supporting economy.

2-2 Basic Concept of the Project

2-2-1 West Harbor (Gatmoon, Yap Proper)

There are an estimated 1,000 boats (including rafts) on Yap Proper, plus 233 outboard engine boats engaged in artisanal fishing. Of these artisanal fishing boats, 53 are based in the area facing the eastern coast, 93 are on the southern coast and 87 are on the western coast (based on OFCF report).

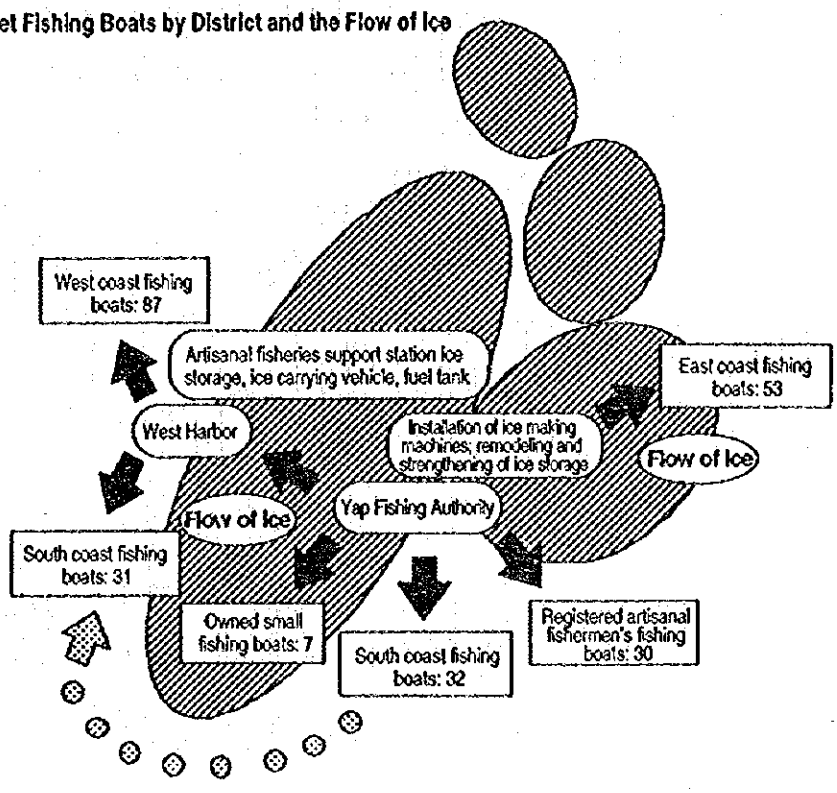
The eastern coast of Yap Proper has large waves rolled up by east-north-easterly to north-easterly prevailing trade winds, which blow throughout the year (October to June), and the sea conditions makes hard for the boats engaged in artisanal fisheries. Conversely, the western coast of Yap Proper only, prevailing west-south-westerly winds blow from July to September and conditions are generally calm, which means that fishing boats can operate throughout the year. For this reason, in addition to the 87 artisanal fishing boats already based on the western coast, many of the 93 boats based on the southern coast operate in the western side waters (coastline is approximately 12-13 nautical miles).

Despite the fact that the good fishing ground is located on the western offshore because of a shallow reef that stretches along the coast about one kilometer in width from the coastline, it had been difficult for fishing boats approaching to the shore here. The Yap State Government spent 20 years on cutting open the reef and eventually managed to develop an access route for fishing boats. Currently, only the almost completed dredged waterway is for artisanal fishing boats, however, in view of the future development that can be expected, it has been judged that construction of the requested artisanal fisheries support station here is appropriate.

The Project aims to construct a artisanal fisheries support station at West Harbor, which is near to the good fishing ground, to supply ice and fuel oil to the artisanal fishing boats, and at the same time, to provide benefits to the fishermen by function as a fish distribution center. This will not only reduce sailing times to and from the fishing grounds, but through providing means conserving the caught fish, will increase fish hauls as a result of increasing fisheries activity and will also promote the distribution of fisheries products.

As a result of studying the requested facilities and equipment, it has been decided to install ice making facilities at the Yap Fishing Authority in Colonia and to secure higher efficiency through concentrated control and operation. The supply of ice to the West Harbor fisheries support station from Colonia shall be transported by small vehicle. (The ice supply plan and outline of facilities are shown below).

Target Fishing Boats by District and the Flow of Ice



As a result of conducting the study, the following revision in the facilities and equipment contents were carried out.

① Steel Framed Building

The building shall be of reinforced concrete structure in order to give priority to local materials.

② Ice Making Machines

The request was for the installation of ice making machines at both West Harbor and the Yap Fishing Authority in Colonia on Yap Proper. Upon studying this, it was decided to install ice making machinery at the Yap Fishing Authority in Colonia and to remove this facility from the plan for West Harbor for the following reasons.

- Although the access road between West Harbor and Colonia is unpaved, it is well compacted. The passage of large vehicles during the rainy season may not always be smooth, however, access by small vehicles or during dry spells does not present a problem. It was thus judged that there would be no major difficulties in supplying ice from Colonia to West Harbor through using a small ice carrying vehicle.

- The Yap Fishing Authority in Colonia is blessed with good conditions to be a marketing center in that it is situated in the center of the consumer districts of Rull and Weloy. Moreover, an existing block ice making machines are currently in operation here and, in terms of utilizing the currently employed refrigeration engineers and ice retailing functions, etc., improvements in efficiency can be anticipated through conducting concentrated control and operations.

③ Ice Carrying Vehicle

As was mentioned above, a small vehicle for ice carrying has been added to the Project.

④ Emergency Generator

Every Saturday on Yap Proper, the power is cut off for 6-8 hours due to maintenance of electric cables, however, apart from this the power supply condition is good. The Project includes plans to remodel and strengthen the existing large ice storage and, moreover, because it is possible to make extra ice prior to the power cuts, it has been decided to omit the emergency generator from the Project.

⑤ Water Tank

Branch pipe of the small water supply system used by the village next to the Project site is laid. Moreover, because the ice making machine will be installed in the Yap Fishing Authority in Colonia, the water consumption level will fall and it is judged that the existing small water supply should be able to cope. For this reason, the rainwater storage tank have been omitted from the Project.

⑥ Buoys

Because rocks at the mouth of waterway in West Harbor make the very narrow, entry to the harbor is difficult. Therefore, in addition to providing leading lights on land, battery-powered fishing light buoys shall be included in the Project. The buoys shall be set in shallow waters of approximately 1 m, and this work shall be done by the implementing agency as this falls in the category of equipment provision.

⑦ Office Supplies

The office supplies were omitted from the Project because they are not contained within the bounds of grant aid system.

2-2-2 Yap Fishing Authority (Colonia, Yap Proper)

Of the 233 artisanal fishing boats on Yap Proper, the 93 boats (40%) based on the southern coast have the opportunity to utilize the Yap Fishing Authority, however, due to the insufficient ice supply volume, only the seven vessels belonging to the authority plus around another 30 registered artisanal fishing boats with outboard engines are constantly able to utilize the ice here.

The districts of Rull and Weloy, which have Colonia at their center, are home to 3,156 or around half of the population of Yap Proper and, as many of these people have salary earning lifestyles, the demand for fish here is large. However, due to the distance away from the landing area and the fact that fresh fish distribution is insufficient due to the shortage of ice, the 15 or so fish stores in these districts usually sell out by mid day. It was judged that ice making capacity needs to be strengthened in order to overcome this situation.

The ice making machines shall be installed in the existing Yap Fishing Authority building and its capacity shall be designed to include the aforementioned supply of ice to West Harbor. The existing ice storage shall be remodeled and strengthened, and no new storage shall be installed. The contents of the study of the requested ice making machines, including change of machine type, are described below.

① Block Ice Making Machine

The requested block ice making machines have been changed to plate ice making machines. Plate ice making machines can make ice that is suited to both marketing and fishing operations uses, and are being widely used in small scale fisheries in recent years. The inclusion of this in the Project was decided upon discussing characteristics and necessary operating and maintenance technique, etc. with the implementing agency.

The obsolete and inoperable old block ice making machine shall be removed, and the Project's ice making machines shall be installed in its place. The characteristics of both types of ice making machine are given below.

Studying Item	Plate Ice Making Machine	Block Ice Making Machine
Operation Machine maintenance	Simple Slightly difficult	Slightly difficult Slightly easier
Energy efficiency/Time required to start ice making	Good. Ice manufactured within 30 minutes of start-up.	Much loss. Ice production takes 24 or 48 hours following start of operation.
Installation space	Small	Big
Ice removal	Automatic	Manual

② Remodeling and Strengthening of Ice Storage

Currently in Yap Fishing Authority, two block ice making machines are in operation and an ice storage is being used. In line with implementation of the Project, the existing ice storage shall be remodeled and strengthened, and part of it shall be used as the ice storage for the new plate ice making machines.

2-2-3 Falalop Island (Ulithi Atoll)

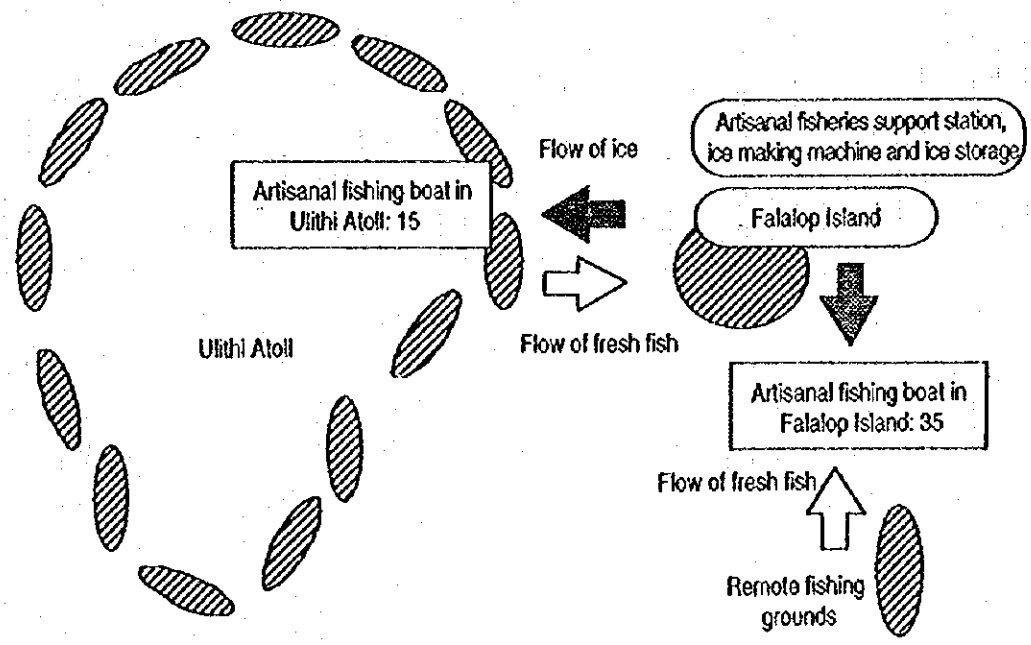
Ulithi Atoll has the second largest population in Yap State of 1,006. On Falalop Island, three out of four households are civil servants (annual income: US$ 5,000-10,000) engaged in outer island affairs, and the purchasing power of these residents is strong. However, because this island is located outside of Ulithi Atoll, the waters around it are deep and there are no good fishing grounds and few fishermen, which means that it suffers from a chronic shortage of fish.

Incidentally, in the all-boarding high school for outer island children (160 students) on Falalop, meals are provided through public funds, and the budget for these meals amounts to US$ 20,000 over a quarter. Of this, side dish expenses amount to US$ 15,500 (US$ 1 per student per day) and, because it is so difficult to obtain fresh fish, expensive and relatively scarce imported foods are being used. The governor representative and principal, who are concerned in the execution of the budget, are trying to increase the supply of fresh marine products to the school, however, fish are being distributed on the landing beaches before ever reaching the market, and the school is unable to use up it fresh fish purchase budget. In response to this situation, the school makes ice using a small prefabricated refrigerator and, at the weekends, the teachers and students go down to the sea to catch fresh fish together. In contrast to the situation here, the islands of Mogmog, Fassarai, Lossau and Sorenlen within the adjoining Ulithi Atoll

are surrounded by abundant fishing grounds and have consuming city nearby, however, because they do not have proper fish conservation methods, they are having difficulties forwading fresh fish.

There are around 50 fishing boats with outboard engines and 15 crafts (including rafts) on Ulithi Atoll. As the residents here have long sought their food from the sea, there is a deep-rooted custom of borrowing the fishing boats of other people and paying them back with the fish that one catches. In a similar way, the salary earning residents, who find it difficult to obtain fresh fish, buy FRP boats and the fishermen use these boats so that the needs of both groups are complemented and both groups obtain fish.

In Ulithi Atoll, because large increase in fish hauls and fish consumption can be anticipated from the introduction of the proper means of fish conservation, and because the beneficial effects would be great, it has been judged that construction of the requested artisanal fisheries support station is appropriate. Through constructing the artisanal fisheries support station (installed with ice making machines), the Project will encourage the distribution of fish from Ulithi Atoll by ensuring a supply of ice to the fishermen and, at the same time, the Project shall aim to increase fish hauls through exploiting fishing grounds of the remote islands for which the residents of Falalop Island possess the fishing rights to. The Project flows of fresh fish and ice are shown below.



Upon conducting the study, the following revisions were made to the requested facilities and equipment.

① Steel Framed Buildings

The buildings shall be of reinforced concrete structure in order to give priority to local materials.

② Block Ice Making Machine

Upon consulting with the implementing agency, it was decided to change the requested block ice making machine to plate ice making machine. The reasons for this decision were described earlier.

③ Emergency Generator

Every Thursday on Falalop Island, there is a power cut for 4-8 hours due to maintenance of electric cables, however, apart from this the power supply condition is stable. In consideration of ice storage capacity, it is thought that the power cuts can be coped with and the emergency generator has been omitted from the Project.

④ Office Supplies

The office supplies were omitted from the Project because they are not contained within the bounds of grant aid system.

In view of the above study, the basic concept of the Project shall involve supplying ice required for marketing and the operation of the 290 artisanal fishing boats on Yap Proper and in Ulithi Atoll. As for the scale of the facilities and ice making machines, the required capacity shall be set so that it is able to supply one-third of the total boats-days of operation per month of 2,024 boats (37 boats already using ice and 253 boats of newly supplied ice). To this purpose, the artisanal fisheries support station installed with an ice storage shall be constructed at West Harbor on Yap Proper, and the similar artisanal fisheries support station installed with ice making facilities capable of producing 1 ton of ice per day shall be constructed on Falalop Island in Ulithi Atoll. Furthermore, in order to supply ice to the West Harbor facilities and artisanal fishing boats in Colonia, ice making facilities with a daily production capacity of 4 tons shall be installed at Colonia.

2-3 Basic Design

2-3-1 Design Concept

In conducting the design, consideration shall be given to the current conditions in the Federated States of Micronesia and attention shall be paid to the following points to ensure that the Project results in the construction and improvement of the facilities and equipment most appropriate for dealing with the issues which form the basis of the request.

(1) Basic Concept

The public buildings and some of the hotels, offices, stores, and the like in Yap State are constructed with thin reinforced concrete frames and walls made from lightweight concrete blocks. Most roofs are consist of large sections of laminated timbers or two-by-four frames. There are a few steel framed building or concrete residence.

In view of these local conditions, the structure of the Projected buildings shall be of reinforced concrete structure and roofs shall consist of wooden trusses and corrugated plates. Coral or coral sand are mainly used as the aggregate for concrete locally, and reliability of reinforced concrete is low. For this reason, the design concrete strength shall be based at a low level. Moreover, the applying of reinforced concrete shall be minimized, and lightweight concrete blocks shall be used in partitioning walls.

In consideration of long-term salt damage caused by the high salt concentrations in aggregate and the water used for the works, epoxy resin coated reinforcing bars shall be used. Regarding the setting of the facilities, the design shall pay attention to the purposes and ease of use. Below are described the contents of examination relating to each element.

(2) Concept with Respect to Natural Conditions

① In consideration of the high temperatures, which exceed 30°C throughout the year, and the heavy rainfall, which reaches as high as 2,800 mm per year, ample attention shall be paid to the shading and ventilation of the facilities.

② Because rainwater is relied on for living purposes on Falalop Island, the facilities shall provide catchment of rainwater as a source of water for the ice

making. Moreover, in order to counter the water shortage in the low rain season (January to May) and secure water for cleaning fresh fish, a small water supply system shall be provided by means of a shallow and brackish water well.

③ The height of the site ground level is enough to ensure that there are no problems in terms of rainwater and wastewater drainage, and to ensure that the sites are not inundated by rises in tide level and maximum wave heights when typhoons approach.

④ Because Falalop Island lies on a course where typhoons are formed, consideration shall be given to the designed wind loads by 70 m/sec. The design of facilities on Yap Proper shall ensure that they can withstand winds of 50 m/sec.

⑤ As the Project sites are situated close to the coastline, salt resistant building materials shall be applied.

⑥ Regarding the facilities layouts, the optimum positions in terms of topographical, natural, ground and geological conditions shall be selected.

⑦ Attention shall be paid to wastewater treatment methods, discharging of soil and the prevention of sediment to the reefs, to ensure that the frontal sea waters are not polluted.

⑧ Ample attention shall be paid to the materials, colors and forms of the buildings to ensure that they match their surroundings.

(3) Concept with Respect to Construction Conditions

① Regarding application for construction permission, it is obligatory to present detailed drawings to the Department of Public Works and Transportation for examination two or three weeks in advance, and to receive site inspections by the said department during the period of construction. Construction periods shall be set based on consideration of the time required for examination of the drawings and permission by the Department of Public Works and Transportation, and consideration of the site inspections, etc.

② Prevention of sediment to coral reef, discharging soil and wastewater to the sea is examined by the Environmental Protection Agency. Prior to starting the work (approximately 1-2 weeks in advance), the detailed drawings are required, the application shall be obtained in enough time so as not to affect the construction period.

③ Design standards, rules and regulations in Japan and the USA (JIS and ASTEM) shall be applied for construction of the building as FSM does not possess standards of its own. As for environmental standards, European and American and/or Japanese standards shall be applied.

④ Regarding heavy construction machinery such as cranes and bulldozers and the like, Department of Public Works and Transportation in the Yap State owns and leases such items at settled rates, and it is possible for them to be utilized in the Project.

⑤ As Falalop Island possesses no landing piers, all cargo is received through offshore delivery. It is possible to use the outer ferry, which comes to the island once per month, to carry the small items and small quantities of equipment, however, regarding materials in large quantities and also large construction heavy machines such as the cranes and the like, the landing craft owned by the Government of the Federated States of Micronesia (anchored in Pohnpei) will have to be used. Use of the landing craft has to be applied for to the national government via the state government in question, and because schedule adjustments with each state will be needed, a transportation plan with sufficient time allowance will be required together with strict control of the implementation schedule.

⑥ Regarding concrete to be used in the Projected building works, it is general for coral and coral sand to be used as the raw materials. Moreover, because brackish (slightly salty) water will be used on Falalop Island, reinforcing bar and cement that have been treated for salt damage shall be adopted.

(4) Concept with Respect to the Utilization of Local Contractors, Local Equipment and Materials

① Representative construction companies are Black Micro Co., Ltd., Warp Construction Co., Ltd. and Yap Cooperative Association Co., Ltd., and each has a work force of around 30 employees. It is judged that two of the local

companies possess the capacity to handle the general building works of the Project. Incidentally, there are no local companies capable of installing refrigeration facilities.

② There are limitations regarding the numbers of engineers and technicians possesses by the local construction companies, and not much can be anticipated from the technical capacity with respect to the processing of roof materials and roofing works. Thus, designs that match the local technical levels shall be adopted for connecting sections such as joint and connection processing, etc.

③ Construction materials that can be procured locally as much as possible (including imported items), that can utilize local technology and that are durable shall be used.

(5) Concept with Respect to the Operation and Maintenance Capacity of the Implementing Agency

Local materials and construction methods shall be adopted in the design as far as possible in order to ensure that the locally required maintenance and repair work are possible. The type of ice making machines to be applied has been selected based on consideration of ease of use and economic feasibility. Moreover, the compressors to be introduced are the same open type ones that have been operated and maintained by the three engineers of the implementing agency for many years. The mechanical items will be imported, however, types for which the local procurement of parts and technical support is easy shall be introduced, and other attention shall be paid in ensuring that minimum problems arise in the running of the facilities. During the implementation stage, Japanese technicians shall carry out technical transfer to the engineers of the implementing agency by using the opportunities provided by the equipment installation and trial running. Moreover, with regard to the facilities running costs, the three sites will be run on a consolidated account and an annual profit of US$ 40,750 per year can be anticipated, so there are no elements which will place a burden on the implementing agency.

(6) Concept with Respect to the Setting of Ranges and Grades of Facilities and Equipment

Regarding the building, construction methods and structural materials that are commonly used locally shall be used as far as possible. As for the equipment, in consideration of ease of operation and the procurement of parts, models or their equivalent which are currently used locally shall be selected.

With respect to the quantities of equipment, the amounts required for the time being shall be provided. The provided spare parts shall amount to 5% of the cost of main equipment bodies. The setting of facilities and equipment grades shall be done based on the following considerations.

① The structural materials that are commonly used locally shall constitute the main materials of the building facilities. Walls shall be made of lightweight concrete blocks, and the use of reinforced concrete pillars, beams and floors shall be kept to a minimum. In order to ensure the corrosion resistance (salt resistance) and lightness of roofs, frame work and linings shall be wood and the finishing material shall be galvinized steel plate.

② Plate ice making machines shall be adopted because they can make ice suited to both marketing and fishing purposes, are easy to operate and do not take up much space. This type of machine is already in use at the support station in Pohnpei, and there are no problems. As for the compressor, the same open-type compressor already in use at the Yap Fishing Authority shall be adopted. The condenser shall be the air cooled type, because of its relatively small scale and easy to maintain.

③ Items of equipment which are commonly used locally shall be selected. In cases where neighboring third countries items meet specifications, their utilization shall be conducted based on consideration of ease of procurement and cost of transportation, etc. Moreover, in consideration of operation and maintenance, items that are similar to equipment supplied by makers in the past to FSM and surrounding countries shall be adopted.

(7) Concept with Respect to Construction Period

Although the Projected facilities are small scale, they are scattered over three sites, one of which is a outer island. Many of the building materials to be used in the Project are imported and transportation services to the outer island are poor. Moreover, the heavy rainfall makes the natural conditions unfavorable and, because the construction period will be limited by the constraints of the Grant Aid Scheme of the Government of Japan, the situation is very difficult. Therefore, the buildings shall be single story and built according to local methods; the use of reinforced concrete which requires timbering support works shall be minimized; and wall structures made of concrete blocks shall be fully applied, in order to reduce the construction period. The detailed implementation schedule is indicated below. This

shows that the period following the E/N is 11 months, meaning that implementation of the Project is possible in a single fiscal year.

Detailed design	2 months
Tendering and verification of contracts	1.5 months (1.0 month + 0.5 month)
Construction preparation and works, following contractor selection	7.5 months (1.5 month + 6.0 months)
Total	11 months following E/N

2-3-2 Basic Design

(1) Site and Facilities Layout Plan

The scheduled construction sites of the artisanal fisheries support stations are West Harbor in Gatmoon, Yap Proper, and Falalop Island in Ulithi Atoll. However, the ice making facilities on Yap Proper shall be installed at the Yap Fishing Authority in Colonia, and reduced operating costs and stronger control shall be aimed for through the concentrated operation of the machines. The design of the building facilities at West Harbor shall take into account the possibility of future installation of ice making facilities.

(1)-1) Building Facilities at West Harbor

The western coast of Yap Proper has calm seas throughout the year and contains good fishing grounds which can be fished a whole year. The access road to Colonia is not paved, however, it is firmly compacted. Although the traffic of large vehicles during the rainy season may not always be smooth, there are no problems regarding the access of small vehicles or access during dry spells.

West Harbor was developed after 20 years were spent cutting a waterway through the coral reef, and it conforms to the land utilization plans of the Yap State Government. The planned construction site is private land, however, the landowner and local residents are eager to invite the facilities, and the State Governor has even issued a confirmation of land use. Thus, there are no problems concerning the use of the land.

The Project site is located on the western coast of Yap Proper on the inner side of a coral reef of approximately 1 km in width. The sea side consists of a 3 m high corroded gradient, and behind the site are hills. The site ground raises gently by about 2.5-3.0 m from the sea side on the north to the hills on the south, and is advantageous in that it has never been inundated by high waves whipped up by typhoons. A site area of approximately 900 m^2 (30 m^2 × 30 m^2) has been secured here. The north-south running road comes downhill towards the sea and faced with a corner of the site. The height difference between the Projected site and the road is almost non-existent on the south side and approximately 1 m (site is higher than the road) on the sea side facing north.

In order to make effective use of such a site, the building shall be constructed parallel to the coast. By placing the office on the sea side and putting an covered work space in the north-south direction, so that good ventilation shall be secured. On the gradient area towards the sea, a slope and steps shall be provided to make the movement of people, ice and caught fish smooth. The fuel tank shall be placed on the south side to make the access by tank lorry simple.

The Project site contains concrete benches, which are used by picnickers and fishermen, and a hut mode of nipa palm, sheltered from weather, however, the Yap State Government will clear the site of these things by the time of Project implementation. The Department of Public works and Transportation cleans the area of 900 m^2. The period of soil preparation will be approximately one week and the cost is estimated at approximately 260,000 yen.

(1)-2) Building Facilities on Falalop Island

The Project site is situated on the western side of the island and is shaded from the easterly trade wind. It is near the town center and covers an area of approximately 900 m^2 (30 m^2 × 30 m^2) of the publicly owned oil storage station, which is placed between the coast and the road. There are no problems regarding the use of the land. The island's coast has protruding rocks, however, the rock on the beach in front of the site has been cut away and fishing boats are able to come and go safely.

The Project site is located on ground 7 m above sea level, and it has the advantage that it has never been inundated by high waves whipped up by typhoons. The west and south sides facing onto the sea run down to the landing beach at a gradient of approximately 45 degrees. The road passes the south-east edge of the Project site, from where it curves away to the north-east. The gradient of the site is an approximately 2.5 m rise from the road side to the north-west edge of the site.

The facilities shall be constructed facing the landing beach in consideration of access. The office shall be placed facing the landing beach, and a covered work space shall be put in the north-south direction to ensure good ventilation. On the gradient area towards the sea, a slope and steps shall be provided to make the movement of people, ice and caught fish smooth. A rainwater tank shall be provided to secure raw water also brackish water from a shallow well shall be prepared to cope with the drier seasons and provide water for general use.

The Project site contains the concrete floor and kitchen walls of a dilapidated guest house, however, there are no plans for the reconstruction of this and the remains will be removed by the government by the time of Project implementation. The area to be cleared is 900 m2, and this shall be undertaken by the Department of Public Works and Transportation. The period of soil preparation will be approximately two weeks and the cost will come to approximately 610,000 yen.

(1)-3) Building Facilities at the Yap Fishing Authority

The Yap Fishing Authority is located in Colonia on Yap Proper, and it consists of the Fisheries Complex, including fishing harbor facilities which was constructed under a 1986 grant aid project of the Government of Japan. The facilities face onto the main road where the government offices are concentrated, and the other side of them forms a pier for fishing vessels. The land owned by YFA covers approximately 6,000 m^2 and forms a trapezoidal shape. Within this area is a fresh fish processing block of 450 m^2. The Project ice making machines are to be installed in an area of the processing block, in the place of the old, now inoperable block ice making machine, which will be removed. The ice will be taken out from the building facing the wharf, as is currently done.

(2) Building Plan

(2)-1) Floor Plan

(2)-1)-1) West Harbor Building Facilities (Yap Proper)

The support station in West Harbor will sell ice, fuel, outboard engine parts with large demand and fishing gear to the artisanal fishermen, provide fish transportation to markets, will consign the selling of fish, and provide rental service of heat insulated boxes, and so forth. The space required for all these activities shall be secured. There shall be four members of staff here: a station manager, accountant, driver and one part time staff.

Block	Area	Subtotal/Total
Ice storage space	38 m^2	
Office space (for 3 people) and selling counter	30 m^2	
Store room (carts, scales, boxes, etc.)	15 m^2	
Toilets	6 m^2	(Subtotal: 89 m^2)
Covered work space: Vehicle entry and fish processing space	26 m^2	
Cart corridor (carrying ice)	13 m^2	(Subtotal: 52 m^2)
Fish selling space	13 m^3	
Total floor area	141 m^2	

The reasons for the calculation of the above space areas are described below.

① Ice Storage

In the event of the future installation of an ice making machine, it will be installed over the Projected ice storage on steel frames. The floor area required for ice making machine installation is 27 m^2, however, due to space restrictions on installation of ice machine and the roof gradient, a floor area of 38.4 m will be required for the installation of the ice storage and the ice making machine.

② Office

The office area was set assuming three desks for the four staff (station manager, accountant, ice carrying vehicle driver and one part time staff during the good fishing season). The office space per person in a small scale is given as 8 m^2. In the Project, areas of a sales counter

at the entrance to the office and a display shelf showing various fishing gears and spare parts of outboard engines have been included. Upon studying the required office area from the layout plan, this was found to come to 30.7 m^2.

③ Store Room

A store room shall be provided to keep three sets of scales, nine 160 liter boxes, the carts, etc. Studying from the equipment storage layout plan, 15 m^2 is required.

④ Toilets

The toilets area has been set at the standard 6 m^2.

⑤ Work Space

Space shall be provided for entry of the ice carrying vehicle, and this area shall also be used for the fish processing work. The space for fish processing is assumed to be 9 m^2 per person, thus, in consideration of a fishing crew of three fishermen working together, the area of 25.6 m^2 has been set.

⑥ Selling Space

12.8 m^2 of space each has been secured for on consignment selling (using insulated boxes) of fresh fish, carrying of ice and a corridor, etc.

⑦ Fuel Oil Supply Facilities

The fuel oil tank and dispenser shall be placed outside.

(2)-1)-2) Building Facilities of Falalop Island (Ulithi Atoll)

The station on Falalop Island will sell ice, outboard engine parts with large demand fishing gears to the artisanal fishermen, provide on consignment selling services of fish, rental of boxes, and so forth. The space required for all these activities shall be secured. There shall be three staff here: a station manager, freezer engineer and one part time staff.

Block	Area	Subtotal/Total
Ice making machine and ice storage space	38 m^2	
Office space (for 2 people) and selling counter	23 m^2	
Store room (carts, scales, boxes, etc.)	9 m^2	
Toilets	6 m^2	(Subtotal: 76 m^2)
Covered work space: Fish processing space (for 3 people)	26 m^2	
Cart corridor (carrying ice)	13 m^2	
Fresh fish on consignment selling space	13 m^3	(Subtotal: 52 m^2)
Total floor area	128 m^2	

The reasons for calculation of the above space areas are described below.

① Ice Machine

The ice making machines shall be installed over the ice storage on steel frames. The floor area required for installation of ice making machines is 27 m^2, however, due to the restrictions on installation of the machines and the roof gradient, a floor area of 38.4 m will be required for the installation of the ice storage and the ice making machines.

② Office

The office space was set assuming two desks for the three staff (station manager, freezer engineer and one part time staff during the good fishing season). The office space per one staff in a small scale is given as 8 m^2. In the Project, areas for a sales counter at the entrance to the office and a display shelf showing various fishing gears and spare parts of outboard engines have been included. As the floor areas required for these are 7 m^2 in total, upon studying the required office area from the layout plan, this was found to come to 30.7 m^2.

③ Store Room

A store room shall be provided to keep three sets of scales, two 500 liter insulated boxes, six 160 liter insulated boxes, the carts, etc. Estimating from the equipment storage layout plan, 10 m^2 is required.

④ Toilets

The toilets area has been set at the standard 6 m^2.

⑤ Work Space

Space shall be provided for the processing of fresh fish. The area for fish processing assumed to be 9 m^2 per person here, and an area to allow three fishermen of one crew to work together was designed. In consideration of pillar intervals, and so on, the area here has been set at 25.6 m^2.

⑥ Selling Space

13 m^2 of space each has been secured for on consignment selling (using insulated boxes) of fresh fish, carrying of ice and a corridor, etc.

(2)-2) Sectional Plan

In order to suppress indoor temperature rises caused by direct sunlight in this tropical region, the roofs shall have louver windows on both gables. Moreover, the sectional plan shall be such that the roof gradient promotes gravitational ventilation. No ceilings shall be provided, except for the toilets. The height of the support station at West Harbor shall be made 2.9 m, so that it is possible to install an ice making machine in the future. The roof gradient shall be right angular (1:1) in order to accommodate the height of the ice making machine and installation frames.

(2)-3) Structural Plan

① Design standards : ASTEM and JIS shall be applied.

② Wind load : The facilities shall be designed to withstand wind speeds of 50 m/sec. on Yap Proper and 70 m/sec. on Palalop Island.

③ Foundations plan : Spread foundations with reinforced concrete shall be applied. The concrete strength shall be 150 kg and the long-term ground bearing strength shall be deemed 7 ton/m^2.

④ Skelton work plan : Wall structures using lightweight concrete blocks shall be applied, so that reinforced concrete structure for skelton work, which require support works, can be minimized.

⑤ Roof structure : Roofs shall be wooden trusses that are lightweight and are not affected by salt damage. Iron hardware shall be used for connecting sections because the local joint and connection processing techniques are poor.

(2)-4) Facility Plan

Upon conducting studies, the outline of the facilities to be installed in the artisanal fisheries support stations at West Harbor (Yap Proper), Falalop Island (Ulithi Atoll), and at the Yap Fishing Authority in Colonia, Yap Proper was determined as follows.

Site	Equipment Name, Scale, Specifications	Breakdown
West Harbor (Gatmoon)	Ice storage, 16 m^3, prefabricated 3,500 gallons of fuel oil tank and dispenser Two green leading lights for navigation	125 mm in thickness of insulation board For gasoline 100 watts
Yap Fishing Authority (Colonia)	Ice making machine, 2 tons/day × 2 Screw conveyor, 5 m Set of heat insulated partition board and door Coolers, 1.5 kW × 4	Plate ice 1.5 kW 100 mm in thickness of insulation board Wall mounting type
Falalop Island (Ulithi Atoll)	Ice making machine, 0.5 ton/day × 2 Ice storage, 8 m^3 Water tank, 18 m^3 Small water supply system including shallow well and 400 W of pump	Plate ice 100 mm in thickness of insulation board Concrete

(2)-4)-1 Project Outline

In addition to the 37 fishing boats which have used ice until now, the Project will supply ice for fishing operation and distribution purposes to an additional 253 artisanal fishing boats. The Project targets 290 artisanal fishing boats with outboard engines in total. The distribution and types of

these boats by area and support station are indicated in the following table.

Area	Support Station	New/ Existing	Targeted Fishing Vessels	Vessels Distribution and Types
Yap Proper	Colonia	Existing Existing	7 vessels 30 boats	Fishing vessels owned by YFA Registered artisanal fishing boats in Colonia
	Colonia	New	85 boats	Artisanal fishing boats from southern and eastern coasts
	West Harbor	New	118 boats	Artisanal fishing boats from West coast
Ulithi Atoll	Falalop Island	New	50 boats	Artisanal fishing boats in Ulithi Atoll

The Project shall supply the ice required for fishing operations and marketing to the target powered fishing boats, under the following conditions.

① Regarding the 37 powered fishing boats which have always used ice, the amount of ice supplied shall be based on past consumption levels.

② The 230 artisanal fishing boats are operated by part-time fishermen on Yap Proper, and the total boat-days of operation per month is 1,624. In the Project, ice shall be supplied to one-third of these, or total number of 541 boats-days per month.

③ The number of fishing boats with outboard engines owned by part-time fishermen in Ulithi Atoll is 50, and the total boat-days operation per month is 400. In the Project, ice shall be supplied to one-third of these, or marketing 133 boats-days per month.

④ The amount of ice supplied for operating and marketing purposes shall be equivalent to the caught fish volumes being recommended by the FAO.

(2)-4)-2) Determination of Scale of the Ice Making Machines on Yap Proper

The production capacity of the ice making facilities being operated at the Yap Fishing Authority in Colonia will be 77 tons per month (nominal daily capacity: 5 tons; and actual daily capacity: 3.1 tons) after repairs. Yet the total requirement will be 173 tons for ice for current YFA fishing vessels and registered artisanal fishing boats (exclusive fishing boats), and for ice for fishing operations and marketing purposes on the West Harbor and eastern coast. In the Project, ice making facilities that are capable of producing the deficient 96 tons of ice shall be installed. (The required amount of ice per month is calculated in the manner shown in the following table).

Ice required for execution of the Project	See table below	173 tons
Current ice making capacity	YFA ice making capacity after repair	77 tons
Newly required ice	Monthly ice making volume	96 tons

The required capacity of ice making facility will be 3.84 tons/day assuming the number of operating days per month to be 25. In consideration of the present space for installation, specifications of ice making machine, building structure, maintenance, coping with breakdowns, etc., two ice making machines of the same model each with a nominal capacity of 2 tons/day shall be installed.

The amount of ice required each month for fishing operation and marketing purposes are as follows.

Type of fishing boat, Operating Mode	Ice Required for Operating and Marketing	Ice Demand (Subtotal)		Remarks
3 fishing vessels in YFA	Fishing operation: 45kg×75×4trips/month	40.5	64.8 tons	Based on actual values
	Marketing: 6.25tons (fish haul/month)	6.25		
4 fishing vessels in YFA	Fishing operation: 45kg×2.5×5days/week×4trips	9.0		
	Marketing: 9tons (fish haul/month)	9.0		
30 registered artisanal fishing boats	Fishing operation: 45kg×1×5days/week×4trips	27.0	54.0 tons	Based on actual values
	Marketing: 27tons (fish haul/month)	27.0		
118 artisanal fishing boats in West coast	Fishing operation: 315vessels/month×50kg	15.75	31.5 tons	Applied to one-third of boats
	Marketing: 15tons (fish haul/month)	15.75		
85 artisanal fishing boats in southern and eastern coasts	Fishing operation: 227 vessels/month×50kg	11.35	22.7 tons	Applied to one-third of boats
	Marketing: 11.25tons (fish haul/month)	11.35		
	Monthly ice demand resulting from execution of the Project	Total	173 tons	

(2)-4)-3) Determination of Scale of the Ice Making Machines on Falalop Island

The target fishing boats here are the 50 artisanal fishing boats with outboard engines in Ulithi Atoll. The required amount of ice shall be calculated according to the set conditions. The total number of operating fishing boats-days per month comes to 400, and the Project shall supply ice to one-third or total number of 133 boat-days per month. The average fish haul of one artisanal fishing boats with outboard engine is 50 kg per day and the required daily amount of ice comes to 532 kg in total.

Ice required for operating per month (133 boats-days × 50 kg)	6,650 kg
Ice required for marketing and conservation per month	6,650 kg
Ice required each day (25 operating days/month)	532 kg

As the staff will work eight hours every day, the operating time of the ice making machines shall be set at 12 hours. Therefore, the required capacity is 1 ton/day. In consideration of breakdowns, standard

specifications of the ice making machines and ease of operation and maintenance, etc., two ice making machines of capacity 0.5 ton/day each shall be installed.

(2)-4)-4) Type of the Ice Making Machines, Installation Method and Specifications

Plate ice making machines, which can be operated easily and can make ice that is suited to both fishing operations and marketing, shall be installed. The machines shall be installed using frames since the ice will be discharged from the bottom parts of the machines. In consideration of installation, works periods and outfitting of other devices, etc., steel frames shall be used. At the support station on Falalop Island, the ice storage shall be installed underneath the ice making machines. The contents of the study of the ice making machines are shown below.

① Machine Type

Plate ice making machines, which can be operated easily and can make ice that is suited to both fishing operations and marketing, shall be installed.

② Type of Compressor

The refrigeration engineers of the Yap Fishing Authority (implementing agency) have long experience of using the Japanese made, open-type compressor; thus, a similar compressor shall be introduced in the Project.

③ Condenser

In view of the fact that the ice making machines are small, maintenance is easy and building ventilation is good, air cooled condensers shall be applied.

④ Installation of Ice Making Machines

The ice making machines shall be installed on steel frames and be given ice outlets at the bottom, in order to enable ice to be transferred directly or by screw conveyor into the ice storages.

As a result of the study, the specifications of ice making machine have been set as follows.

Item	Colonia (YFA)	Falalop Island (Ulithi Atoll)
Ice making type	Plate	Plate
Ice discharge and storage	Transfer by screw conveyor	Drop directly into ice storage
Capacity, Machines	2 ton/day × 2	0.5 ton/day × 2
Water and temperatures	25°C of fresh water and 35°C of outside temperature	25°C of fresh water and brackish water (TDS 2,200) and 35°C of outside temperature
Design temperatures	45°C of condensation and -20°C of evaporation	45°C of condensation and -20°C of evaporation
Type of compressor, output	Open type, 12,000 Kcal/hr, 11 kW × 1 machine/set	Open type, 3,000 Kcal/hr, 3.7 kW × 1 machine/set
Condenser	Air cooled, 25,000 Kcal/hr × 1 unit/set	Air cooled, 8,000 Kcal/hr × 1 unit/set

(2)-4)-5) Ice Storage in Yap Fishing Authority and Auxiliary Facilities (Colonia, Yap Proper)

The old and inoperable block ice making machine at Yap Fishing Authority shall be removed, and this shall be replaced with the new plate ice making machines. In order to utilize the existing ice storage, an approximately 5 m long, 1.5 kW screw conveyor shall be used. A heat insulating partition wall shall be placed in the existing ice storage, and 60% of the space shall be taken up by the storage of the existing block ice making machines, while the remaining 40% shall be used for a new plate ice machines. Four coolers shall be installed in the ice storage and a new heat insulation door for carrying out the ice shall be provided.

When installing the ice making machines, no remodeling of the existing building structural members shall be performed, and the steel frames for the ice making machines shall be placed in a position away from the existing individual footings. The movable range of the currently used overhead crane shall be limited to the two present block ice tanks.

(2)-4)-6) Ice Storage in West Harbor (Gatmoon, Yap Proper)

As the scale is small, a prefabricated ice storage, which is easy to assemble and has stable performance, shall be applied, and the thickness

of the heat insulation boards shall be 125 mm. The floor area of the ice storage shall be wide enough to allow plastic ice boxes to be carried in and out. The size of the ice storage shall thus be 2.7 m (width of 3 panels) x 3.6 m (width of 4 panels), and its height shall be a standard of 2.2 m, giving it a capacity of 16 m^3. Moreover, two small wall mounting coolers (0.4 kW) shall be installed to keep the temperature inside the ice storage held down to 0°C. The size of the ice storage was calculated in the following way.

Number of plastic boxes Size of plastic boxes	6 × 2 tiers × 2 rows (0.53 × 6 = 3.2 m) 700 × 530 × 450 mm (height) × 25 boxes (= 1.4 m)
Central space in ice storage (corridor)	1 m
Required floor area of ice storage (inner dimensions) Floor area of ice storage (outer dimensions)	3.2 m × 2.4 m 3.6 m × 2.7 m (standard panels) × 2.6 m (height)

(2)-4)-7) Ice Storage on Falalop Island (Ulithi Atoll)

The ice storage shall be the prefabricated type and, in consideration of stopping of the machines due to power cuts and maintenance, its capacity shall be equivalent to a three day production of ice. As space for the storage of fish must also be added, the dimensions shall be 2.7 m wide by 1.8 m deep, and the capacity shall be 8 m^3.

(2)-4)-8) Fuel Oil Tank at West Harbor (Gatmoon, Yap Proper)

A Gasoline tank and dispenser shall be installed at West Harbor in order to sell fuel oil to artisanal fishing boats with outboard engines. The oil will be supplied by Mobil Oil company, however, the capacity of the fuel oil tank will need to be at least 3,500 gal. (13,200 liters), in view of the fact that the capacity of a tank lorry is 3,000 gal. (11,400 liters) and some extra has to be allowed for because number of tank lorries are limited and road conditions to the site are poor, the amount transported each time shall be one tank lorry load.

(2)-4)-9) Leading Lights at West Harbor (Gatmoon, Yap Proper)

West Harbor lies at the end of a water way of approximately one nautical mile in length that has been cut through a coral reef. In order to ensure

the safe passage of fishing boats through the narrow mouth of the water way, leading lights consisting of two 100 watt green lights shall be installed on land. The fishing boats will safely sail up the water way by making sure that the lights appear to be on top of one another during the approach.

(2)-4)-10) Water Tank and Small Water Supply System on Falalop Island (Ulithi Atoll)

As there are no fresh water wells on Falalop Island, rainwater shall be used as the raw water for ice making. 600 kg of water is required to make 500 kg of ice, which means that 18 tons of water will be necessary every month. The roof area of the support station is 200 m^2 and, assuming that all rainwater can be gathered from here, 3.6 inches of rain would need to fall every month. However, in 20 of the last 30 years, the monthly rainfall in the light rainy season has been less than 3.6 inches, and there have been 12 occasions in the last 30 years where this has continued for two or more consecutive months. Regarding the water storage volume, it would be ideal to save a two or three month supply during the rainy season, however, as this would make the tank size too large, the tank for the Project shall be given a capacity of 18 tons (one month supply). The tank shall be concrete, have the dimensions of 3 m × 3 m × 2m and be provided outside.

Moreover, it is planned to use brackish water (low concentration salt water) for processing fresh fish and other general purposes, and as a measure to counter drying up during the light rainy season. Thus, a shallow well shall be excavated some 150 m away from the site and a small water supply system, which includes a well pump, shall be prepared.

(2)-5) Building Materials Plan

Regarding the finishing materials, as many locally procurable materials as possible shall be selected in consideration of their ease of maintenance. The results of the study for the materials are given below.

(2)-5)-1) Exterior Finishing

① Roofs Two by four substrate and coated galvanium steel

② Exterior walls — Concrete and concrete block backing, mortar and finish coating
③ Gutters — Two by four substrate and galvanium steel
④ Floor — Concrete, steel trowel finishing and epoxy resin coating

(2)-5)-2) Interior Finishing

① Roof behinds — Anti-corrosion and insect repellent coating of roof substrate
② Interior walls — Same as for exterior walls. However, mortar part shall be steel trowel finished
③ Baseboards — Steel trowel finishing for mortar parts and coating
④ Fittings — Windows shall be aluminum glass louvers and doors shall be wooden

(3) Equipment Plan

(3)-1) Outline

The following equipment shall be procured for use in the selling and transportation of ice.

Equipment, Purpose of Use, Specifications	West Harbor	YFA	Falalop Island
Small ice carrying vehicle Scales for ice and fish selling (for vehicle)	1 2	– –	– –
Radios: SSB/150 watt, VHF/25 watt	1 each	–	1 each
160 liter heat insulated boxes 500 liter heat insulated boxes	24 boxes –	5 boxes –	16 boxes 2 boxes
Plastic fish boxes for carrying ice and fish, 50 kg	25 boxes	5 boxes	10 boxes
Scales for ice and fish selling; 20, 15, 300 lb. Carts for ice carrying, 500 kg	3 1	1 platform scales 1	3 1
Battery-powered buoys (including anchors)	5 sets	–	–

(3)-2) Specifications

(3)-2)-1) Small Ice Carrying Vehicle

① Type — 4-wheel -drive, diesel, pickup truck
② Car body — Approx. 4,500 mm (L) x 1,700 mm (W) x 2,500 mm (H)

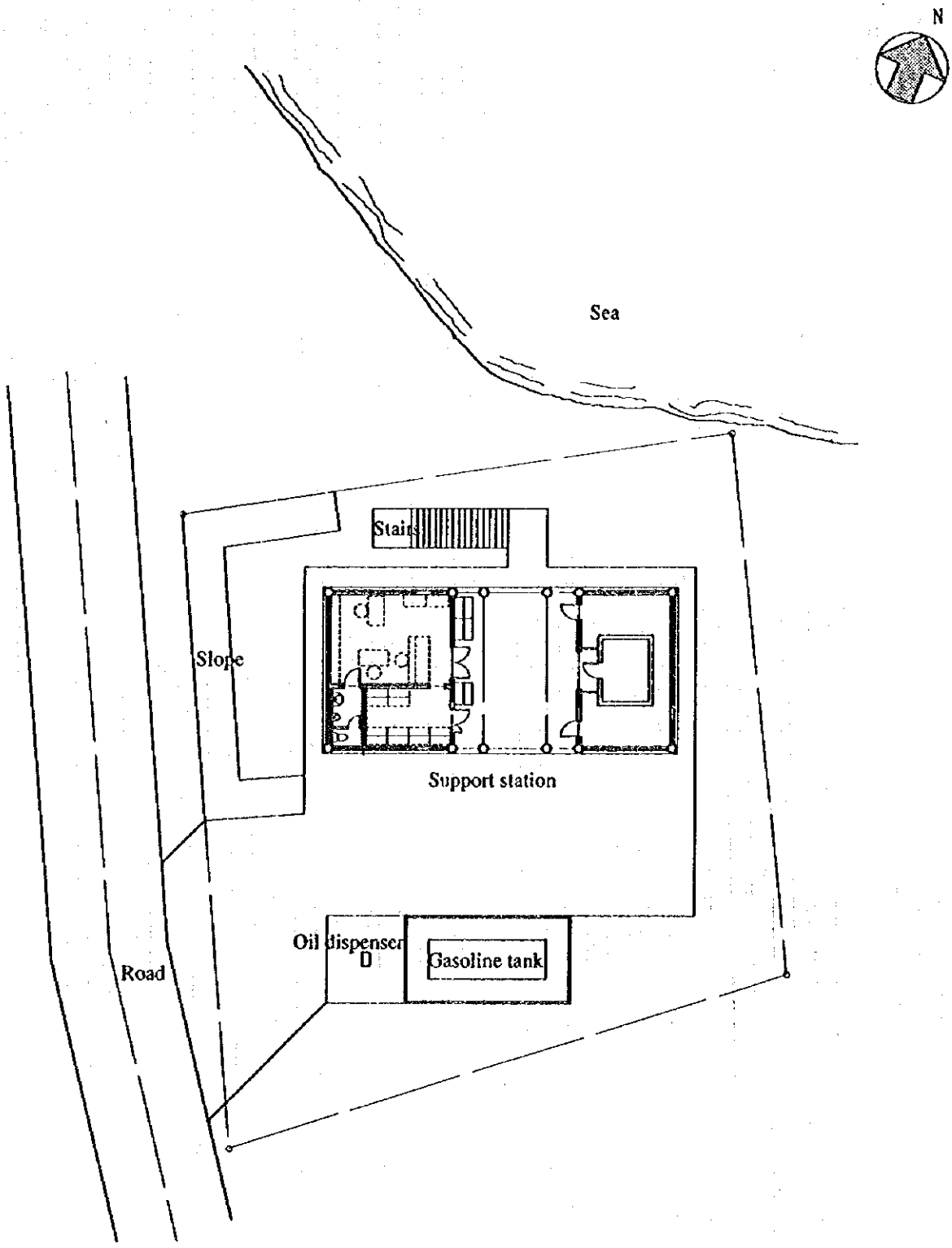
③	Heat insulated container	Approx. 2,250 mm (L) × 1,700 mm (W) × 1,190 mm (H)
④	Output	Approx. 87 HP

(3)-2)-2) SSB Radios

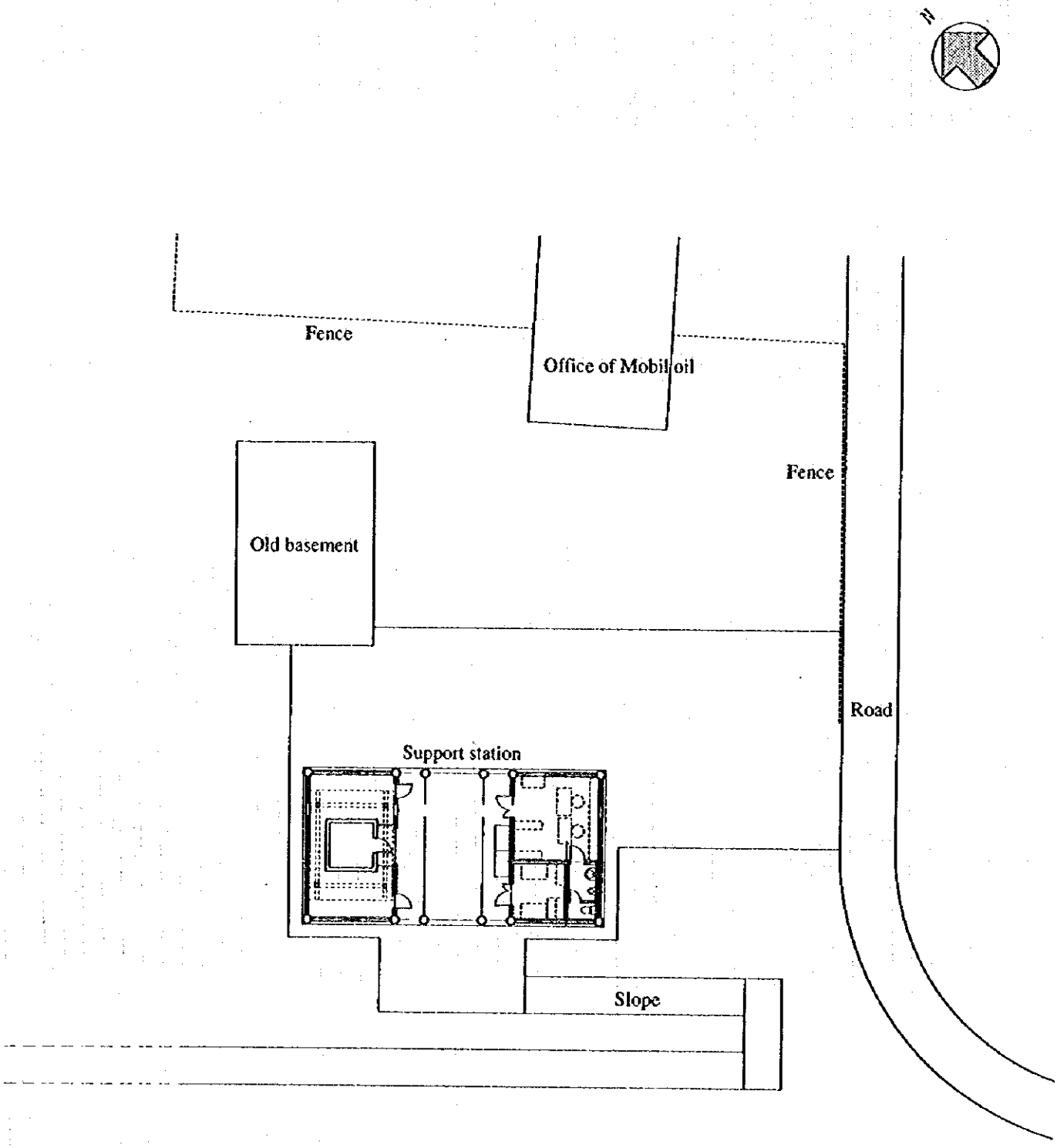
①	Frequency and output	1.5-30 megacycles, 150 watts
②	Power unit	AC 115 V
③	Attachments	Antenna, cable and automatic antenna tuner

(3)-2)-3) VHF Radios

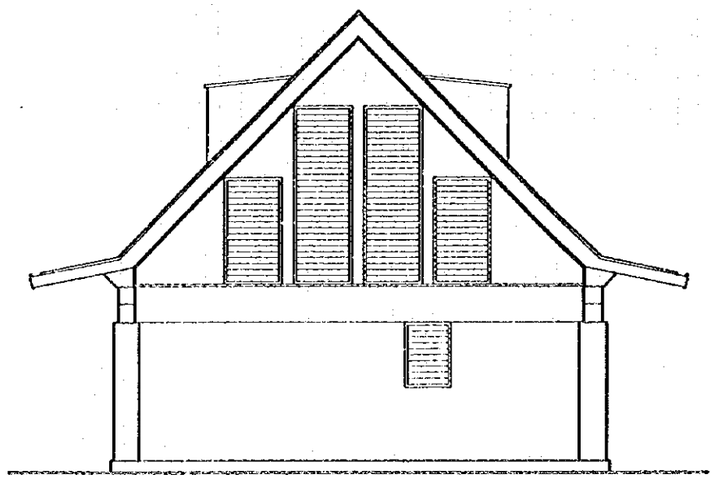
①	Frequency, output	156-163 megacycles, 25 watts
②	Power unit	AC 115 V
③	Attachments	Antenna and antenna cable



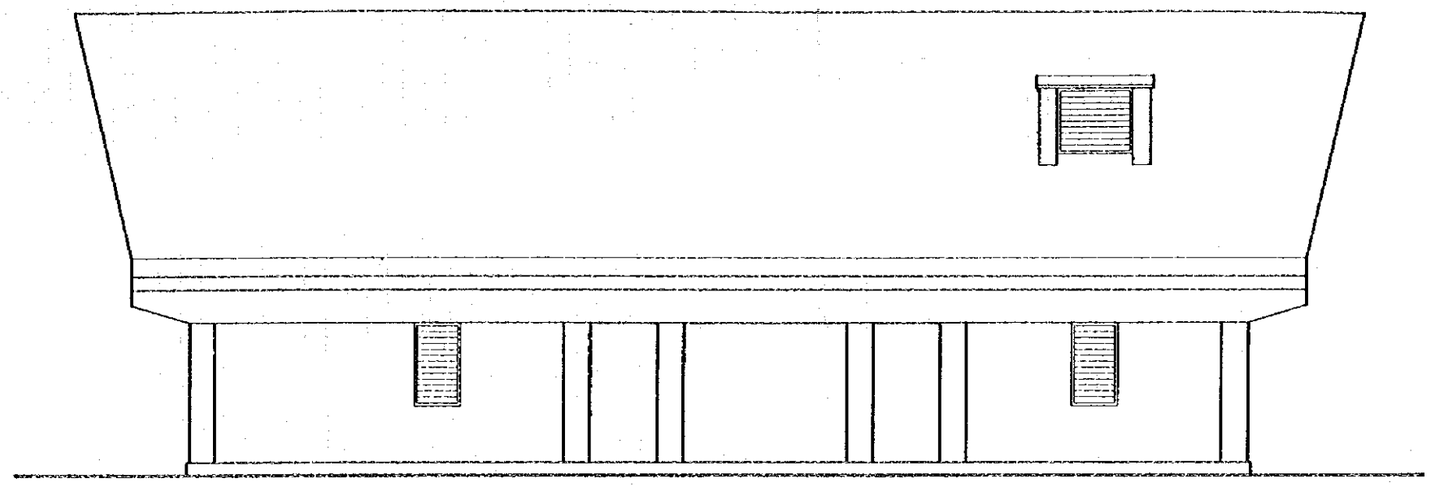
SITE MAP OF SUPPORT STATION
WEST HARBOR , YAP ISLAND S=1/300



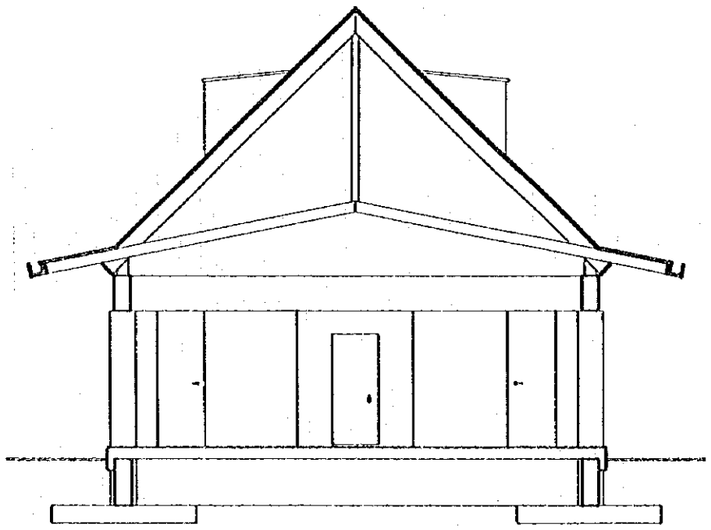
SITE MAP OF SUPPORT STATION
FALALOP ISLAND , ULITHI ATOLL S=1/300



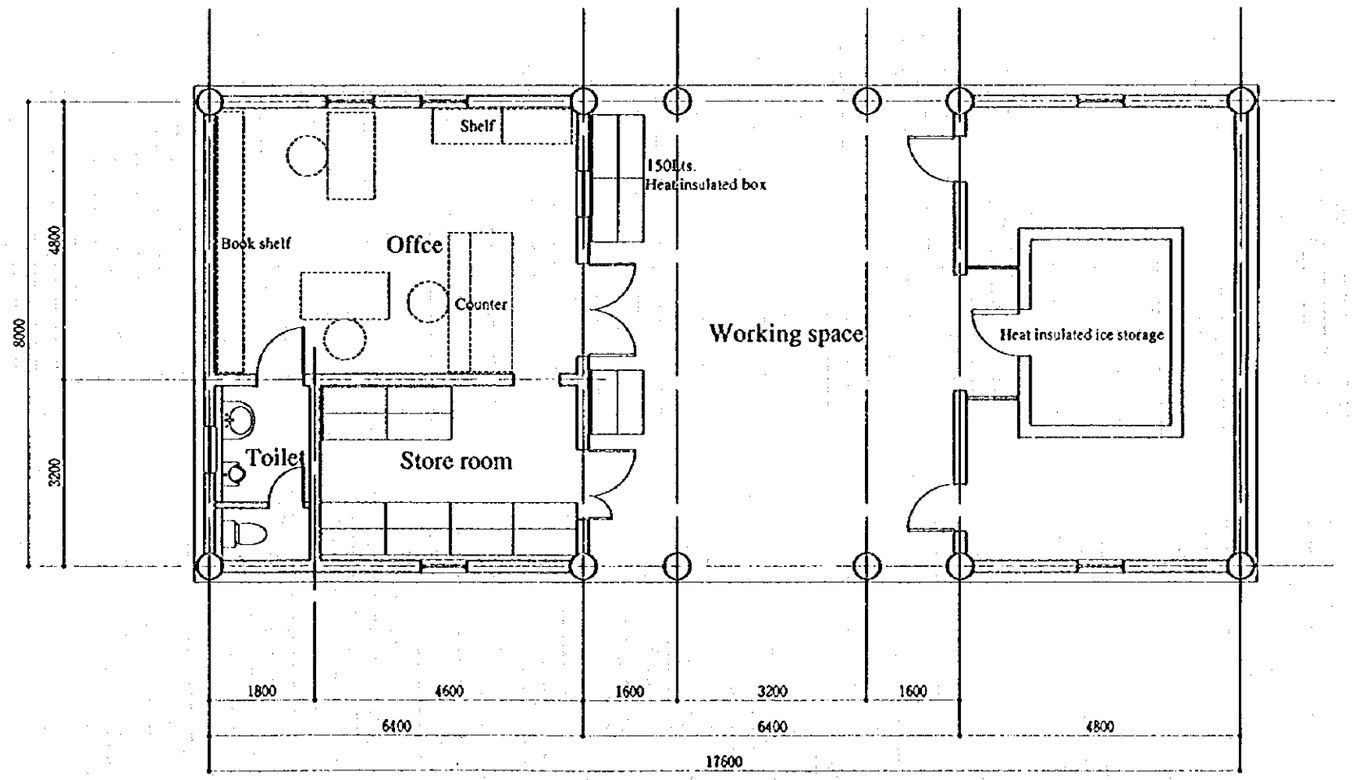
WEST ELEVATION S=1/100



SOUTH ELEVATION S=1/100



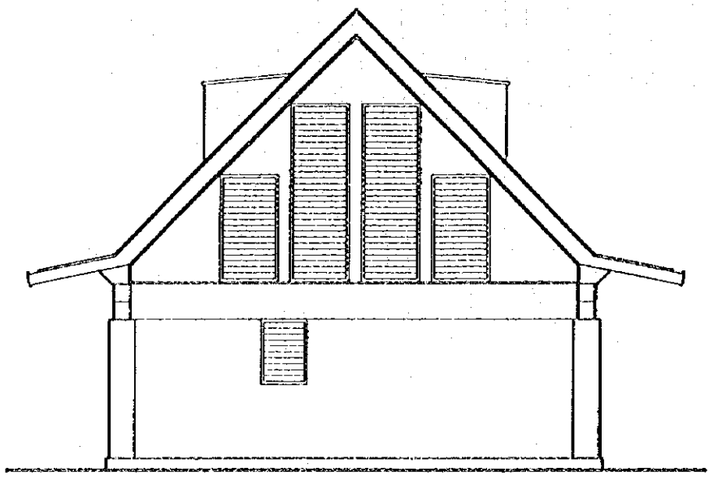
SECTION S=1/100



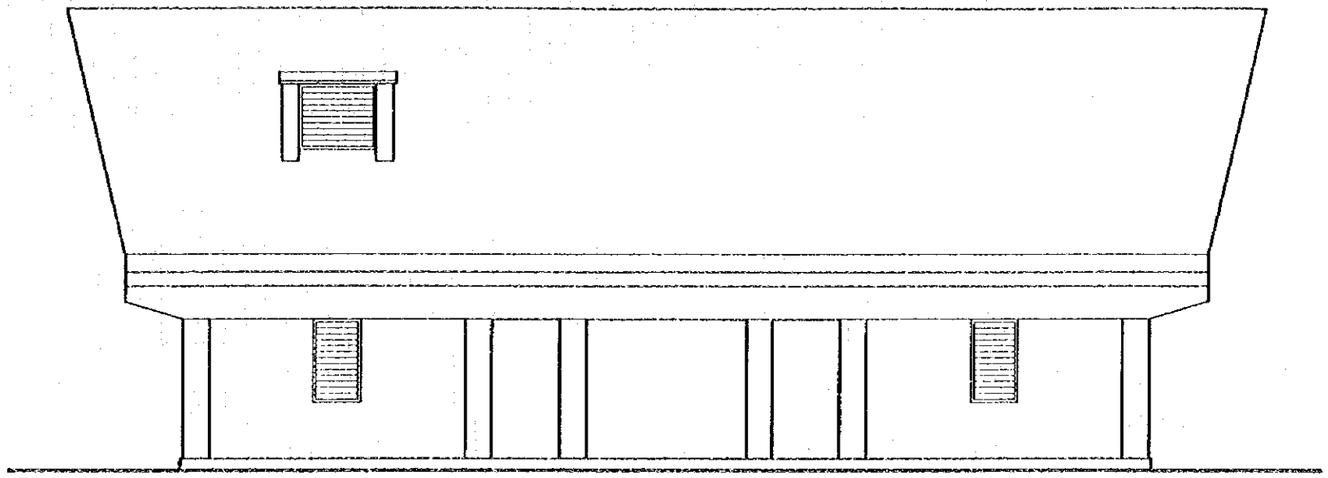
GROUND FLOOR PLAN S=1/100

SUPPORT STATION FOR SMALL-SCALE FISHERIES

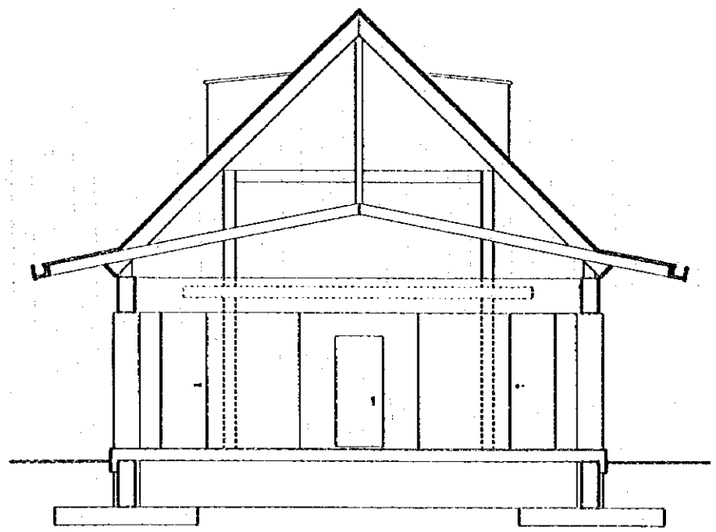
WEST HARBOR , YAP ISLAND



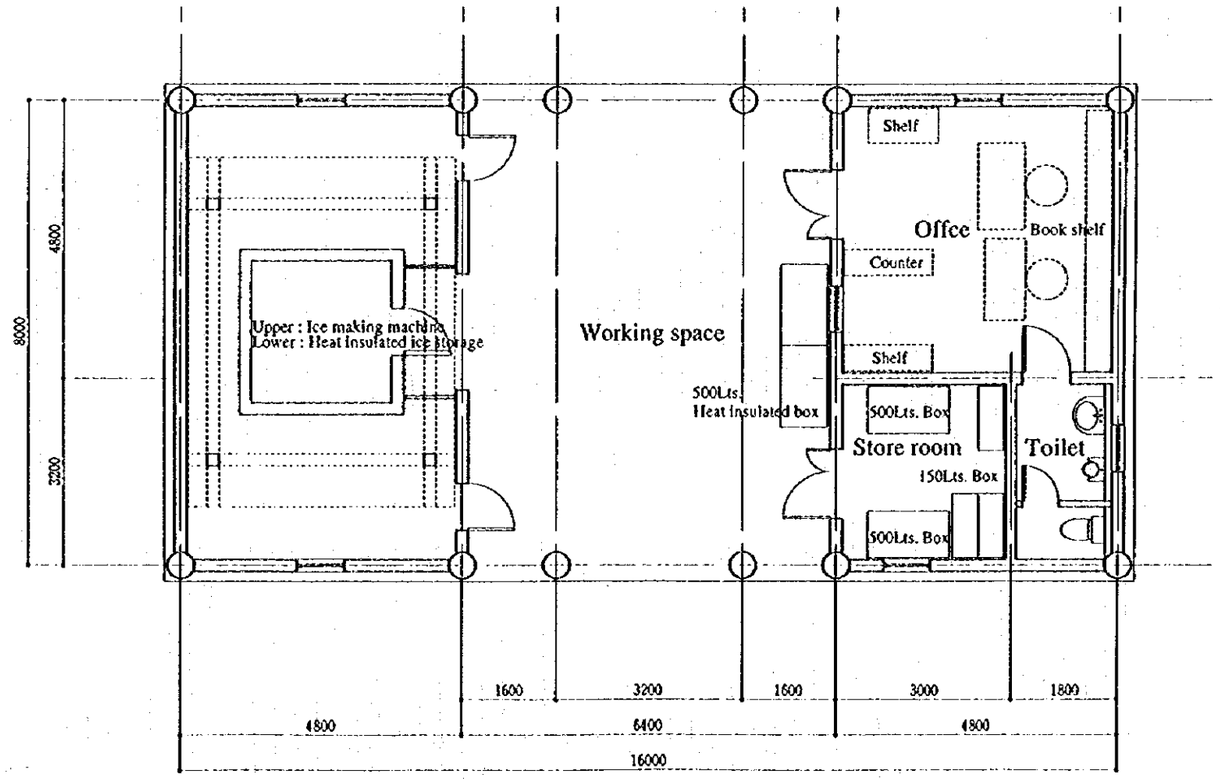
EAST ELEVATION S=1/100



SOUTH ELEVATION S=1/100

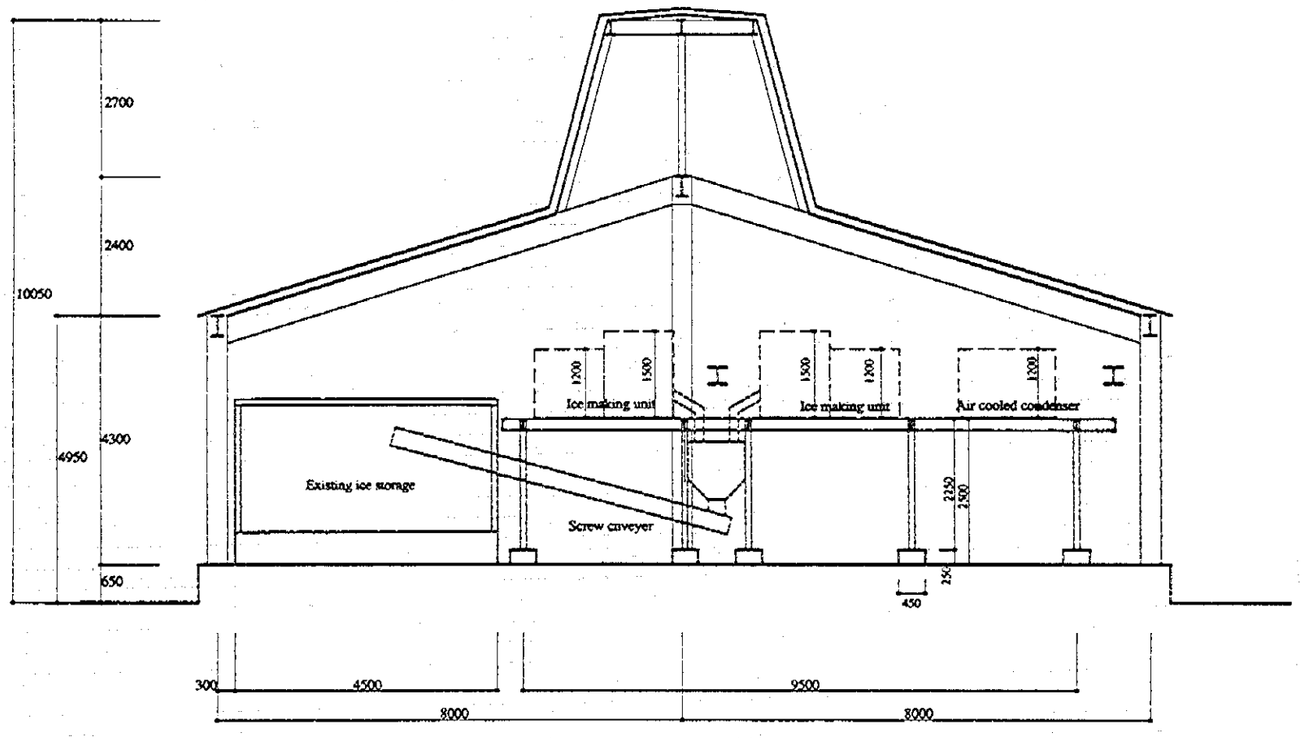


SECTION S=1/100



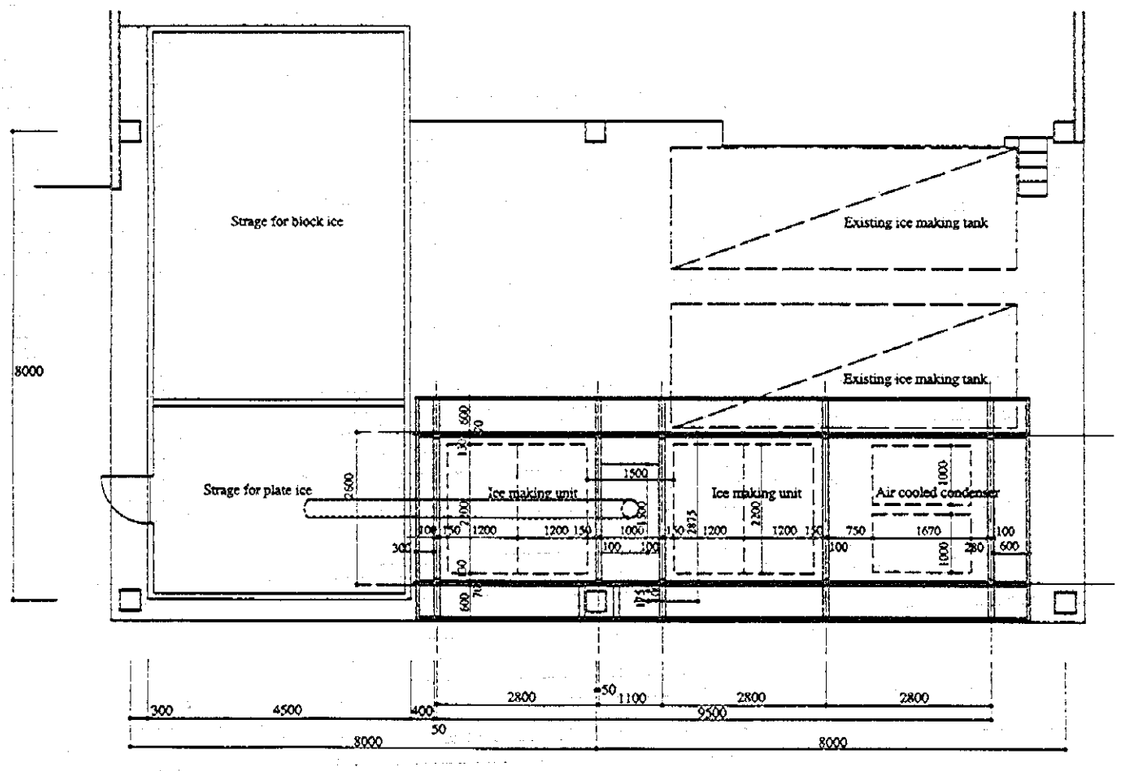
GROUND FLOOR PLAN S=1/100

SUPPORT STATION FOR SMALL-SCALE FISHERIES
FALALOP ISLAND , ULITHI ATOLL



INSTALLATION OF PLATE ICE MACHINES IN YFA, COLONIA, YAP ISLAND

SECTION S=1/100



INSTALLATION OF PLATE ICE MACHINES IN YFA, COLONIA, YAP ISLAND

GROUND FLOOR PLAN S=1/100

CHAPTER 3

IMPLEMENTATION PLAN

CHAPTER 3 IMPLEMENTATION PLAN

3-1 Implementation Plan

3-1-1 Implementation Concept

(1) Basic Concept

The Project shall be completed within the designated period in accordance with the Grant Aid Scheme of the Government of Japan. Therefore planning of the procurement schedule for construction material and equipment shall be carried out carefully. Implementation of the construction works shall be carried out based on the following basic policies.

① Local manpower, equipment and materials shall be utilized as much as possible.
② Attention shall be paid to the environmental protection policies laid down by the state governments (prevention of discharge of soil and sediment to the coral reef, wastewater treatment, etc.)
③ The contents of the Project shall be fully explained to the local residents in order to avoid any respected.
④ The culture, customs and traditions of the Federated States of Micronesia shall be upheld.
⑤ Equipment that is both durable and easy to operate shall be selected.
⑥ Equipment for which the easy procurement of spare parts and technical support for breakdowns shall be selected.

(2) Scope of Sub-contractor Utilization

In the Yap state, there currently are no consultants in the construction industry. The construction sector in Yap State has three large companies (with work forces of around 30 employees) which satisfy the demand for public works and it is judged that two of these companies are suitable for constructing the Project facilities. There are no local companies capable of installing the ice making machines and assembling panels, etc., so the dispatch of engineers from Japan will be needed.

(3) Implementation Setup on the Micronesian Side

① The Office of Planning and Budget and the Department of Resources and Development shall be responsible for coordinating conformance of the Project with the development plans of the state.

② The Department of External Affairs of the National Government shall be the responsible agency for the E/N and other diplomatic matters.
③ The Department of Public Works and Transportation shall be the responsible agency for securing clearing and leveling the construction lands and also for carrying out power supply works, etc.
④ The Department of Public Works and Transportation shall be the responsible agency for authorization of the building facilities.
⑤ The Environmental Protection Agency shall be the responsible agency for the examination and supervision of environmental control.
⑥ The Yap Fishing Authority shall be the responsible agency for the operation and management of the facilities, and the storage and lending out of the equipment.
⑦ It is scheduled that the Department of finance of the National Government will be responsible for all affairs conducted between banks.

3-1-2 Implementation Conditions

The two sets of facilities at West Harbor on Yap Proper and on Falalop Island in Ulithi Atoll shall be constructed with reinforced concrete structure, single story buildings of 140 m^2 and 128 m^2 in area respectively. In addition to these facilities, ice making machines and auxiliary facilities shall be installed at the Yap Fishing Authority in Colonia.

Two local construction companies, with Philippine engineers and technicians, are considered to be capable of building the Project facilities. However, neither company has a sufficient numbers of skilled engineers, therefore ample guidance and supervision will be necessary for the processing technique of roofing materials, the quality control of concrete work, arrangement of reinforcing bars, management setup, and so on.

Many of the local construction materials are imported from the United States of America (mainland USA and also Guam and Hawaii), the Republic of Palau, Japan, and other countries. Also, as there are no landing pier facilities on Falalop Island in Ulithi Atoll, it will be necessary to use the landing craft owned by the National Government in order to transport the heavy machines for construction. Although the Project facilities are small in scale, transportation conditions are difficult as the sites are in three separate areas, and inventories of some local materials are insufficient. In view of this background, it is necessary to give consideration to the following points.

① Ample attention shall be paid to the stock conditions of local materials and control of delivery dates, etc.

② As the landing craft is anchored in Pohnpei harbor and there are numerous applications for use from every state, prior coordination and careful planning for transportation shall be carried out.

③ In view of this situation, careful study of the implementation schedule and control of works will be necessary.

④ Coral sand will be used as fine aggregate, and on Falalop Island, coarse aggregate also comes from coral rocks and the water contains salt. Therefore, ample attention shall be paid to the quality control of the concrete.

3-1-3 Scope of Works

The scope of works for the Project are outlined below.

(1) Scope of Works

① Securing and leveling of the construction sites

② Construction of the two artisanal fisheries support stations, and related construction works (installation of gasoline tank and dispenser at West Harbor)

③ At the Yap Fishing Authority in Colonia, installation of the Projected ice making facilities and auxiliary equipment, remodeling and strengthening of the existing ice storage, etc.

④ In Falalop Island, excavation of a shallow well of brackish water, and installation of the small water supply system and rainwater tank.

⑤ Procurement of the equipment in the Project.

⑥ Provision of services in line with implementation of the Project and supervision of works.

⑦ Taking of the various procedures and obtaining of the permits related to implementation of the Project.

(2) Items to be Borne by the Government of the Federated States of Micronesia and the Government of Japan

1) Items to be Borne by the Government of the Federated States of Micronesia

① Securing of the construction sites in the Project areas

② Removal of obstacles and leveling of the construction sites

③ Laying of power and water supply lines to the Project sites, securing of drainage from the sites, and other works incidental to this

④ Taking of the various procedures and obtaining of the various permits necessary to Project implementation

⑤ Ensuring rapid unloading, tax exemption and custom clearance at ports of disembarkations in the recipient country and internal transportation therein of the product purchased under the Grant Aid.

2) Items to be Borne by the Government of Japan

① Construction of the two artisanal fisheries support stations, and provision of the equipment, materials and manpower required for facilities construction including the gasoline tank with dispenser; and

② Provision of equipment, materials and manpower required for the installation of the ice making facilities including auxiliary equipment, remodeling and strengthening of the existing ice storage at the Yap Fishing Authority in Colonia.

③ In Falalop Island, excavation of a shallow well of brackish water and installation of the small water supply system and rainwater tank, etc.

④ To bear expenses of the marine and inland transportation including insurance of all products required for the construction and installation works.

⑤ Provision of consulting services such as assistance of the detailed design, tendering, supervision and control of construction work.

⑥ Procurement of the equipment stated in the Project.

⑦ Supervision and provision of services related to the implementation of the above items.

3-1-4 Consultants' Supervision

Following the conclusion of the consulting contract with the Government of the Federated States of Micronesia, the consultants shall conduct site surveys and hold final meetings with the Government of the Yap state, then prepare the detailed design drawings, structural calculation sheets, material and quantities lists, specifications and other necessary documentation for the tender process in Japan. Following completion of the tender documentation, the consultants shall assist in selection of a contractor through the proper procedure including prequalification, bidding and tender evaluation.

After making the constructor's contract, the consultants shall examine the drawings presented by the contractor, supervise the manufacture of the processed materials, quality be present during testing of the products and materials to be shipped, and also carry out

inspections for shipping of the said items. Concurrent with the commencement of the work in the Yap state, the consultants shall dispatch the required supervisory engineer to carry out supervision and inspect the state of control of local subcontractors, the testing in quality control and the amount of work completed. The supervisory engineer will also prepare a report of works completed.

3-1-5 Procurement Plan

Of the construction materials required in the Project facilities works, coarse aggregate, fine aggregate, cement, lightweight cement blocks, two-by-fours, glass, sanitary ware, piping, finishing materials, paints, and light fixtures can be procured locally. As for the ice making machines and related equipment, and other items such as anti-corrosive reinforcing bars, roofing materials, aluminum window frames and some other finishing materials, timber and special electrical appliances, for which problems exist in terms of amount of local stock, type and model of equipment and delivery deadline, these shall be procured from Japan. With regard to heavy construction machines, the department of Public Works and Transportation has set a series of rental prices and the hiring setup is in place, so there are no particular problems in this area.

Regarding products from third-countries and local items for which specifications conform, these shall, in consideration of opperation and maintenance, be procured from Guam or local agents. The particular items to be procured from third-countries and locally are as follows.

Gasoline tank and dispenser	:	Guam (for receiving services)
Radios	:	Local agent (for receiving services)
Scales	:	Local agent or USA (to ensure pound graduated scale)

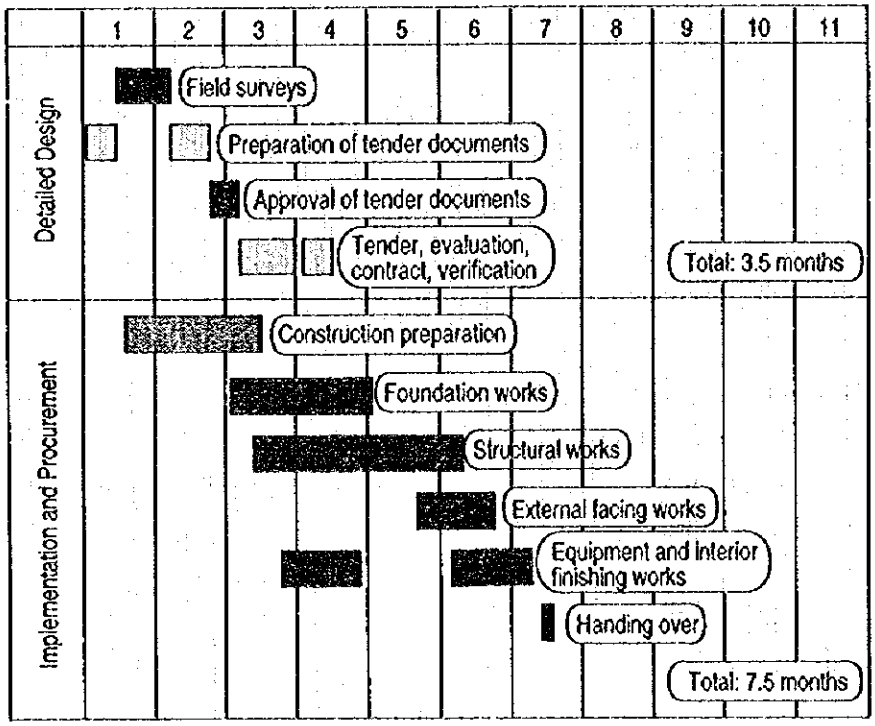
With due consideration of the availability of spare parts and technical support for repairing, the following equipment shall be procured in Japan.

Vehicle	:	90% of imported cars are Japanese products, so spare parts and service are locally available.
Ice making machines	:	The currently used ice making machines are made in Japan, and spare parts and services are locally available.
160 liter heat insulated boxes	:	The currently used boxes are Japanese and widely used among the fishermen.

3-1-6 Implementation Schedule

It is estimated that the Project implementation schedule will comprise 2 months for the detailed design, 1 month for the bidding, 0.5 month for the verification of contract, 0.5 month for starting of work following the signing of the contract with the contractor, 1.5 months for construction preparation, and 5.5 months on the actual construction works. Thus, the implementation period up to the handing over of the facilities will be 11 months after the signing of the E/N. The implementation schedule is indicated below.

Implementation Schedule



3-1-7 Obligations of the Recipient Country

The items to be taken by the Federated States of Micronesia (FSU) side in the implementation of the Project are as follows.

① to remove the existing benches and hut made of nipa palm from the Project site in West Harbor, and to level the site,

② to demolish the old building at the Project site on Falalop Island, and to level the site,

③ to ensure prompt unloading, tax exemption and customs clearance at ports of disembarkation in FSM and internal transportation therein of the products purchased under the Grant Aid,

④ to exempt customs duties, internal taxes and other fiscal levies which may be imposed in FSM with respect to the products procured in the Project

⑤ to provide Japanese nationals permissions ricenses and other authorization necessary for the Project implementation,

⑥ to exempt any inspection fees necessary for construction of the buildings and facilities under the Project,

⑦ to exempt Japanese nationals from customs duties, internal taxes and other fiscal levies which may be imposed in FSM with respect to the supply of the products and services under the verified contracts,

⑧ to accord Japanese nationals whose services may be required in connection with the supply of the products and services under the verified contracts such facilities as may be necessary for their entry into FSM and stay therein for the performance of their work,

⑨ to bear commissions to the Japanese foreign exchange bank for the banking services based upon the Banking Arrangement,

⑩ to bear all the expenses other than those covered by the Grant,

⑪ to ensure that the facilities constructed and products purchased under the Grant be maintained and used properly and effectively for the Project, and

⑫ to ensure the provision of low-cost-fuel-sale service to the artisanal fishing boats at West Harbor, Yap Proper.

3-2 Operation and Maintenance Plan

(1) Operation and Maintenance Plan

The Yap Fishing Authority was established under the Act of Fisheries Corporation of 1979, and it possesses ample experience in operation and management of fisheries support facilities. In addition to a temporary five members board directors, the YFA has 29 employees on land and 45 crews for the YFA owned fishing vessels, so its staffing level is adequate.

Two engineers have operated and maintained the refrigerating facilities and equipment for many years at the Yap Fishing Authority in Colonia. Another engineer is on loan to the Department of Public Works and Transportation on Falalop Island, and is engaged in the operation and maintenance of the small refrigerator owned by the high school in the outer islands. Plate ice making machines differ slightly from block ice making machines in terms of their system, however, plate ice making machines are already in use in Pohnpei and they are capable thorough on the job training provided by manufacturer's engineers during the installation and trial running. Moreover, the engineer currently receiving training in Hawaii is scheduled to return in the spring of 1996, so there should be no problems regarding the numbers of engineers to operate the refrigeration facilities.

The maintenance costs of ice making facilities are not influenced by machine size, and the cost of approximately US$ 2,000 per year each is estimated for the ice making machines at both Yap Fishing Authority and on Falalop Island. The operation of the equipment to be installed at the two artisanal fisheries support stations and the YFA will be covered by a consolidated account and, as an annual profit of approximately US$ 40,750 is anticipated, operation of facilities will not represent a cost burden.

The life span of the ice making machines is expected to be approximately 7-8 years and that of the coolers in ice storages is expected to be around 5-6 years. It is desirable that depreciation in accordance with these actual life span be conducted, and that the local side develop a posture where it is able to replace obsolete machinery through self aid.

The staffing plan for the Project is shown below.

West Harbor, artisanal fisheries support station	Manager: 1 Accountant: 1 Driver: 1	All experienced staff will be dispatched from the YFA in Colonia
Falalop Island, artisanal fisheries support station	Manager: 1 Refrigeration engineer: 1	Dispatched from the YFA in Colonia Refrigeration engineer stationed on Falalop Island
New machines in YFA		Operated and managed by present staff

(2) Financial Plan

West Harbor will generate returns of approximately US$ 2,300 annually. As the operation of the new ice making machines and the selling of ice at Yap Fishing Authority will be performed by the existing staff, there will be no increase in personnel costs and an annual profit of approximately US$ 47,000 can be expected. In the case of the Falalop Island, artisanal fisheries support station, an annual loss of US$ 8,500 will arise, from the relatively high personnel costs. Because all the Project facilities will be run by the same implementing agency, the overall balance will be calculated as a consolidated account, and an annual profit of US$ 40,000 can be anticipated. The income and expenditure balances for each Project site are indicated below.

(US$)

Site	Income	Expenditure	Balance
A annual balance of West Harbor	36,957	34,657	2,300
B annual balance of Colonia	67,200	20,321	46,879
C annual balance of Falalop Island	14,700	23,129	-8,429
Total (consolidated account)	118,857	78,107	40,750

The detailed breakdown of the income and expenditure balance is given in the appendix.

The prices used in the calculations are as follows.

① The division of electricity costs of the ice making machine, water charges, maintenance costs, and revenue from ice sales was conducted a with a 1.2 tons/2.8 tons ice usage ratio between West Harbor and Yap Fishing Authority in Colonia.

② Current rates were applied for the power charges (19 c/kW plus basic charge of US$ 10/month on Yap Proper, and 13 c/kW plus basic charge of US$ 10/month on Falalop Island)

③ The price of the ice was made the same as the current value (8 c/kg).

CHAPTER 4

PROJECT EVALUATION AND RECOMMENDATION

CHAPTER 4 PROJECT EVALUATION AND RECOMMENDATION

4-1 Project Effect

(1) Project Effect

The development strategy for Yap State in the Second National Development Plan is ① to strengthen the economic base and create jobs to respond to the rapidly growing population, and ② to increase food production and attain self sufficiency in response to regional demand. The Project aims to construct fisheries facilities needed for the development of the artisanal fisheries sector, which is the top priority issue in FSM, and it conforms with the development strategy for Yap State. The beneficial effects of the Project will be as follows.

① The Project facilities are not profit seeking but are of a strong public welfare nature in that they will not only benefit the artisanal fishermen and distributors (direct beneficiaries), but also consumers as a whole.

② Implementation of the Project will enable fish, which are a cheap and high quality source of animal protein, to be effectively supplied to the public.

③ Implementation of the Project will contribute to improvement of the food self sufficiency rate and reduction of food imports, which are policies being advanced by the Government of FSM.

④ It will become possible to create more jobs through promotion of the independent economy, and to increase fishermen's incomes. In particular on Ulithi Atoll, in addition to income from copra obtained from the sparse land, new cash income sources will be opened up through implementation of the Project.

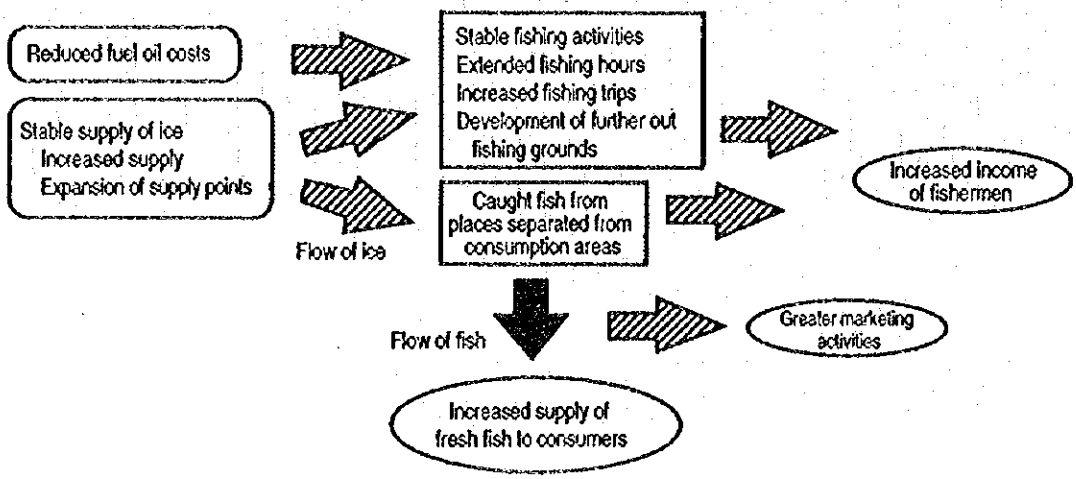
⑤ The implementing agency is the Yap Fishing Authority which possesses sufficient human resources and ample experience in running similar facilities. Moreover, artisanal fisheries support stations in the Project can operate on a self supporting system of accounting and will hardly involve any cost burden at all.

⑥ The facilities designs and operation plans have taken any impact on the surrounding natural environment into full consideration.

Because the above kinds of effects can be anticipated from Project implementation, it is considered that Project implementation through the provision of grant aid is appropriate.

(2) Beneficial Effects

The following figure illustrates the effects of the Project as a flow.



As a result of the stabilized supply of fuel oil and ice brought about by the Project, increased hauls of fish can be anticipated. Moreover, because the conservation of fresh fish will become possible, marketing activities will become more lively and fresh fish will be smoothly supplied to people living in the cities. Stable fishing activities and increased hauls will lead to the improved income of the fishermen, who support the artisanal fisheries sector.

Implementation of the Project will benefit the fishermen and their families (approximately 3,300 people) operating the 233 artisanal fishing vessels, and also the 3,156 people who comprise salary earners and their families, who mainly live in Rull and Weloy.

In the case of Ulithi Atoll, increased supplies of fish will reach the 360 salary earners and their families living on Falalop Island and the 160 students of the high school in the outer islands. Moreover, 350 artisanal fishermen and their families will have an opportunity to earn a cash income. The following table compiles the numbers of people who will benefit from the Project.

233 artisanal fishing boats on Yap Proper	23 vessels × 3 fishermen × 4.73 people/family	Approximately 3,300 people
Salary earners living mainly around Colonia	Approximately 3,100 people	Approximately 3,100 people
Salary earners and students on Falalop Island	360 + 160 people	520 people
Fishermen and their families on Falalop Island and Ulithi Atoll	130 + 350 people	480 people
Total		Approximately 7,400 people

The following effects can be anticipated as a result of Project implementation.

① In the case where a boat leaves Colonia on the eastern coast to go fishing in the waters off Gatmoon on the western coast and trolling for four hours, it is estimated that approximately 12 gal. (45 liters) of fuel oil will be required. Compared to this, in the case where the boat goes directly to the same fishing grounds from West Harbor, two hours will be saved on in the traveling time and approximately 6 gal. (23 liters) of fuel oil can be saved on with each fishing trip.

② Moreover, because independent fuel oil supply facilities will be installed at West Harbor under the Project, the supply of fuel oil under a new system of charges for artisanal fishermen will become possible. As a result, the cost of 6 gal. (23 liters) of fuel oil for one days fishing by vessels based at West Harbor will fall from the present US$ 10 to US$ 6.6, which represents a saving of approximately US$ 3.5 per day. This means that the cost of fuel oil needed for one day of fishing from Colonia (US$ 20) will fall to US$ 6.6 when fishing from West Harbor, which represents approximately one-third of the previous fuel cost. According to the Second National Development Plan (1992-1996), the average weekly income of a family on Yap Proper is approximately US$ 126. Moreover, as the weekly average number of fishing trips made by the part-time fishermen is two times, the weekly fuel cost will be reduced from US$ 40 to approximately US$ 13. As a result of this, it is anticipated that fishing trips and fishing hours will increase, and this will lead to larger hauls of fish.

③ Because of the supply of ice on Falalop Island, it will become possible for the islanders to fish in the waters around the islands of Gielap and Iar (8.5 nautical miles, approximately 16 km away), for which they have the fishing rights to, and this will enable fish hauls to be increased.

④ The new supply of ice will make it easier for forwarding fresh fish from Ulithi Atoll. The budget spent on side dishes consumed by the 160 students of the high school in

outer islands amounts to US$ 15,500 over one quarter, however, it is thought that it will be possible to replace three-quarters of this with locally produced fresh fish. The amount of fish required in this case would be around 1.7 tons per month and, in money terms, this would represent an additional income of approximately US$ 4,000 for the local fishermen. This would provide the 350 fishermen and their families living in Ulithi Atoll with the opportunity to earn a cash income.

The national, average weekly income of families living on outer islands is US$ 32.5 (according to the Second National Development Plan, 1992-1996). As a result of Project implementation, the income earned by fishermen in one operating day is estimated to be approximately US$ 23 according to the model shown below. Thus, an improvement in the incomes of fishermen and their families can be expected.

Conditions : Calculation shall be made for the case where a fishing boat is borrowed. However, the fishing gear, fuel and ice shall be borne by the fishermen. The fish haul shall be 50 kg, and this shall be halved between the boat owner and the fishing crew.

Costs : Fuel cost : 12 gal. (45 liters) of gasoline in one fishing trip, costing US$ 20

Ice : 50 kg of ice, costing US$ 4

Fishing gear : The cost of expended fishing gear required to catch 10 kg of fish has usually been set as approximately US$ 1 in past cases in South Pacific countries, however, US$ 1.5 shall be assumed here. Thus, the fishing gear cost in catching 50 kg of fish will be US$ 7.5.

Balance : Total costs come to US$ 31.5. Assuming the average fish price to be US$ 1 per pound, the fishermen will receive half of the 50 kg catch, which = 25 kg = 55 lb., meaning an income of US$ 55. When the costs of US$ 31.5 are subtracted from this, the fishermen are able to take home US$ 23.5.

Through providing the above-mentioned benefits to the artisanal fishermen, the Project can contribute to the fostering of the said fishermen, the creation of new jobs and the encouragement of employment. As a result of promoting artisanal fisheries and marketing in this way, the Project will lead to increase in supplies of fish and contribute to the advancement of the policies being raised by the Yap State Government.

4-2 Recommendation

Because, in addition to the large effects described earlier, the Project will also contribute widely to improving the standard of living of citizens, it is confirmed that implementation of the Project through the provision of grant aid is appropriate. Moreover, with regard to the operation and management of the Project, too, it is considered that the implementation setup on the FSM side is sufficient in terms of both staff levels and funding. However, if the implementing agency pays attention to the following points when implementing the Project, the implementation process will become even more effective and smooth.

Previously, the Yap Fishing Authority (implementing agency) was an important base for air transportation of fish and ice supply for industrial fishing vessels (mainly foreign vessels) operating in the waters of the West Caroline Islands, and this monopolistic environment gave it a favored position. However, because this Project will require greater services to fishermen, in fish selling and to general consumers, it will be necessary to take the following measures in order to ensure the smooth operation of the Project.

① In enforcing the operating rules and details for utilization of the facilities, hold close exchanges of opinions with the artisanal fishermen in order to achieve mutual understanding. Also, to ensure that the facilities start operating quickly in line with the Project, the operating body should work to publicize and enlighten the fishermen, distributors and consumers about the benefits to be gained from using the facilities.

② Encouragement to base more permanently fishing boats at West Harbor. Various benefits should be offered to the fishermen to encourage them to base their operations here.

③ The operating body of the facilities should strengthen the marketing of marine products in order to expand operations in the future. In order to strengthen the marketing system on Yap Proper, regular ice selling points supplied by carrier vehicle should be established throughout the island to increase the level of convenience for the consumers. With regard to the ice delivery plan, opinions should be closely exchanged with the local fishermen, distributors and residents in order to achieve mutual understanding. The operating body should understand that expanding the consumption of ice will not only lead to expanded fish marketing, it will also contribute to the stronger business standing of the operating body itself.

④ Sales profits made by the facilities should of course be used for facilities operation and maintenance, and they should also be put to use in procuring and installing ice making machines for use at West Harbor.

APPENDIX

APPENDIX 1. MEMBER LIST OF THE STUDY TEAM

Mr.Yasuhiro YOSHIZUKA	Team Leader	Coastal Fisheries Division, Fisheries Promotion Department, Fisheries Agency. Ministry of Agriculture, Forestry and Fisheries.
Mr. Atsushi NAKAGAWA	Coordinator	Second Basic Design Study Div., Grant Aid Study & Design Department. Japan International Cooperation Agency (JICA)
Mr. Kenji OKAMURA	Fishery Development Planner (Chief Consultant)	Overseas Agro-Fisheries Consultants Co., Ltd.
Mr. Jyunichiro MORI	Facility Planner	Ditto
Mr. Wataru IWASAKI	Implementation planing cum Quantity Surveyor	Ditto

APPENDIX 2. SURVEY SCHEDULE

	Date	Day	Schedule
1	November 28	Tu.	Transfer from Narita to Guam
2	November 29	Wed.	Transfer from Guam to Pohnpei
3	November 30	Th.	Courtesy visits to Japanese Embassy and Government of FSM Department of External Affairs and explanation of Inception Report
4	December 1	Fri.	Observation of Pohnpei artisanal fisheries support station
5	December 2	Sat.	Transfer from Pohnpei to Guam
6	December 3	Sun.	Transfer from Guam to Yap
7	December 4	Mon.	Courtesy visit to State Governor; coordinating of schedule and explanation of Inception Report with Yap State Office of Planning and Budget, Office of Resources and Development and Yap Fishing Authority (YFA); observation and study of YFA
8	December 5	Tu.	Data collection at State Government and YFA, study of facilities, study and surveying of West Harbor site
9	December 6	Wed.	Interview of construction conditions at Department of Public Works and Transportation; preparation of West Harbor site surveying; data collection and facilities study at YFA
10	December 7	Th.	Surveying at West Harbor site; data collection and facilities study at YFA; interview of private construction companies
11	December 8	Fri.	Visit and consultations with Environmental Protection Agency; visit and consultations with Sanitation Department; discussion of Project contents with YFA; interview of Mobil Oil, private construction companies and equipment and materials suppliers
12	December 9	Sat.	Transfer to Falalop Island; observation, site surveys, appearance at Meeting of Elders, interview
13	December 10	Sun.	Observation of Falalop Island; site surveys, observation of high school, interview of Public Works Office and Mobil Oil
14	December 11	Mon.	Site survey and surveying of Falalop Island site; transfer to Yap; meeting of Team members
15	December 12	Tu.	Joint meeting of departments, interview of fishermen, collection of survey data, interview of local construction companies
16	December 13	Wed.	Arrival of Mr. Nakagawa (Coordinator), courtesy visits, progress report, site observation, interview of Marine Resources Management Division and local construction companies
17	December 14	Th.	Progress report, joint meeting of departments and questions and answers, visits to Sea Transportation Office and YFA, interview
18	December 15	Fri.	Survey of distribution functions in villages; transfer to Falalop Island of Mr. Nakagawa and Mr. Okamura for observation, site surveys, observation of high school and interview. Mr. Mori and Mr. Iwasaki continued visits and interview of local construction companies and equipment and materials suppliers.
19	December 16	Sat.	Falalop Island observation, site surveys, observation of high school and interview with person concerned; transfer to Yap
20	December 17	Sun.	Arrival of Mr. Yoshizuka (Leader); site and fishing village surveys, progress report and questions and answers, discussion of contents of minutes, transfer of Mr. Iwasaki to Palau

	Date	Day	Schedule
21	December 18	Mon.	Courtesy visit to State Governor by Mr. Yoshizuka, minutes of discussion, report to Ambassador, collection of data
22	December 19	Tu.	Minutes of discussion, data collection, banquet hosted by the State Governor
23	December 20	Wed.	Transfer to Pohnpei via Guam, Interview with Mobil Guam
24	December 21	Th.	Courtesy visit to Department of External Affairs by Mr. Yoshizuka, signing of minutes, observation of Pohnpei support stations and market, data collection
25	December 22	Fri.	Study Team internal meeting
26	December 23	Sat.	Transfer from Pohnpei to Guam
27	December 24	Sun.	Return to Narita from Guam

APPENDIX 3. LIST OF PARTY CONCERNED IN THE FEDERATED STATES OF MICRONESIA

National Government

Mr. John A. Mangefel	Special assistant to the president for state matters Government of FSM
Mr. Lorin Robert	Deputy Assistant Secretary, Department of External Affairs
Mr. Larry Raigetal	Foreign Service Officer, Department of External Affairs
Mr. Reedson F. Edwin	Operation Manager, Marine Division of FSM, Department of Transportation and Communication
Mr. Valentin A. Martin	Division Chief, Division of Maritime Resources (DMR), Department of Conservation and Resources Surveillance
Mr. Masaro Soloman	Assistant Administrator, DMR,
Mr. Benito Ioanis	Chief of support station in Kolonia, Pohnpei

Government of the Yap State

Hon. Vincent Figir	Governor of Yap State
Mr. Matthias Kuor	Lt. Governor of Yap State
Mr. Constantine Yinug,	Chief Justice, The State Court of Yap
Mr. Jesse Raglimar SUBOLMAR	Director of Office of Planning and Budget (OPB)
Mr. John Sohlith	Chief of Office of Planning and Budget (OPB)
Mr. Leo Chiengyen	Statistics Specialist in Office of Planning of Budget (OPB)
Mr. James Gilmar	Director of Resources and Development (R & D)
Mr. Jesse Tamel Gajdusek	Deputy Director of Resources and Development (R & D)
Mr. Andy Tafileichig	Marine Resources Management Division (R & D)
Mr. Peter R. Rebeuluch	General Manager of Yap Fishing Authority (YFA)
Mr. Patrick Peckalibe	Assistant General Manager of Yap Fishing Authority (YFA)
Mr. Francis Faney	Director, Dept. of Public Works and Transportation
Mr. Faustino Yangmog	Subdirector, Dept. of Public Works and Transportation
Mr. James Sarmog,	Chief of Contracts, Dept. of Public works & Transportation
Mr. Amante "PETE" Bonus	Electric engineer Dept. of Public Works and Transportation
Mr. Moses Ngirmekur	State Surveyor, Land resources Dept. of Resources and Development (R & D)
Mr. Marcellino Jibemai	Director of Sea Transportation Office, Public works
Capt. Serphen H. Single	Manager, Sea Transportation Office, Public works
Mr. Jerry O. Fagolimul	Deputy Director, Enviromental Protection Agency

Mr. John Gilmatam	Director of Health Service Dept.
Mr. Galen Joel	Director of weather station

Ulithi Atoll

Mr. John Baptist Rulmal	Governor, representative of Ulithi Atoll
Mr. Philip Yatch	Chief of Falalop Island
Mr. Antonio Taithaw	Chief of Mogmog Island
Mr. Alphonso Lugleol	Chief of Yasor Island
Mr. Moses Yalo	Vice Principal, Outer Islands High School
Mr. Moses Marpa	Officer, Public Works in Falalop
Mr. Alfonso Faipong	Refrigeration engineer, Public Works in Falalop
Mr. Theo Thinnifel	Plant Manager, Yap Fresh Tuna Inc.

Japanese officers and experts in FSM

Hon. Kiyoshi NISHIKAWA	Ambassador , Embasy of Japan in FSM
Mr. Susumu NAKAMURA	First Secretary, Embasy of Japan in FSM
Mr. Hiroaki NAKAMURA	Coordinator of JOCV, Japan International Coperation Agency, and Japan Overseas Cooperaiton Volunteers
Miss Makiko GOTO	Coordinator of JOCV, Japan International Coperation Agency, and Japan Overseas Cooperaiton Volunteers
Mr. Tsutae SATO	Fisheries expert in Micronesian Maritime and Fisheries Academy, Overseas Fishery Cooperation Foundation
Mr. Yukinobu TAKAHASHI	Fisheries expert in Micronesian Maritime and Fisheries Academy , Overseas Fishery Cooperation Foundation
Mr. Tetsushi HARUKAWA	Instructor of Japanese language in Micronesian Maritime and Fisheries Academy, Overseas Fishery Cooperation Foundation
Mr. Seiji KIMURA	Fisheries expert in Yap Fresh Tuna Incorporated, Overseas Fishery Cooperation Foundation
Mr. Ryota NAKAMURA	Fisheries expert in Pohnpei Project Office, Overseas Fishery Cooperation Foundation

APPENDIX 4. MINUTES OF DISCUSSION

MINUTES OF DISCUSSIONS

BASIC DESIGN STUDY
ON
THE PROJECT FOR THE DEVELOPMENT OF ARTISANAL FISHERIES IN YAP OF THE FEDERATED STATES OF MICRONESIA

In response to a request from the Government of The Federated States of Micronesia, the Government of Japan has decided to conduct a Basic Design Study on the Project for the Development of Artisanal Fisheries in Yap of The Federated States of Micronesia (hereinafter referred to as "the Project") and entrusted the study to the Japan International Cooperation Agency (JICA)

JICA has sent to The Federated States of Micronesia a Basic Design Study Team headed by Mr. YOSHIZUKA Yasuhiro, Deputy Director of Coastal Fisheries Div., Fisheries Promotion Dept., Fisheries Agency, and the Team is scheduled to stay in the country from November 29 to December 23, 1995.

The team held a series of discussions with the officials concerned of the Government of The Federated States of Micronesia and conducted a field survey at the study area.

In the course of the discussions and field survey, both parties have confirmed the main items described on the attached sheets. The Team will proceed to further works and prepare the Basic Design Study Report.

Pohnpei, December 21, 1995

吉塚 靖浩

YOSHIZUKA Yasuhiro
Leader
Basic Design Study Team
JICA

Lorin Robert
Deputy Assistant Secretary
Department of External Affairs
Government of FSM

ATTACHMENT

1. Objective

The objective of the project is to promote the artisanal fisheries and the consumption of fresh fish by the improvement and construction of shore-based facilities.

2. Project Sites

1) Colonia and Western Harbor of Yap Island as shown in ANNEX I

2) Falalop Island, Ulithi Atoll as shown in ANNEX II

3. Responsible Organization and Implementing Agency

Responsible Organization : FSM National Government
Department of External Affairs

Implementing Agency : Yap Fishing Authority (YFA) under direction and supervision of the Government of Yap State

4. Items requested by the Government of The Federated States of Micronesia

The items requested by the Government of The Federated States of Micronesia are listed in ANNEX III.

However, the final components of the project will be decided after further studies.

5. Japan's Grant Aid System

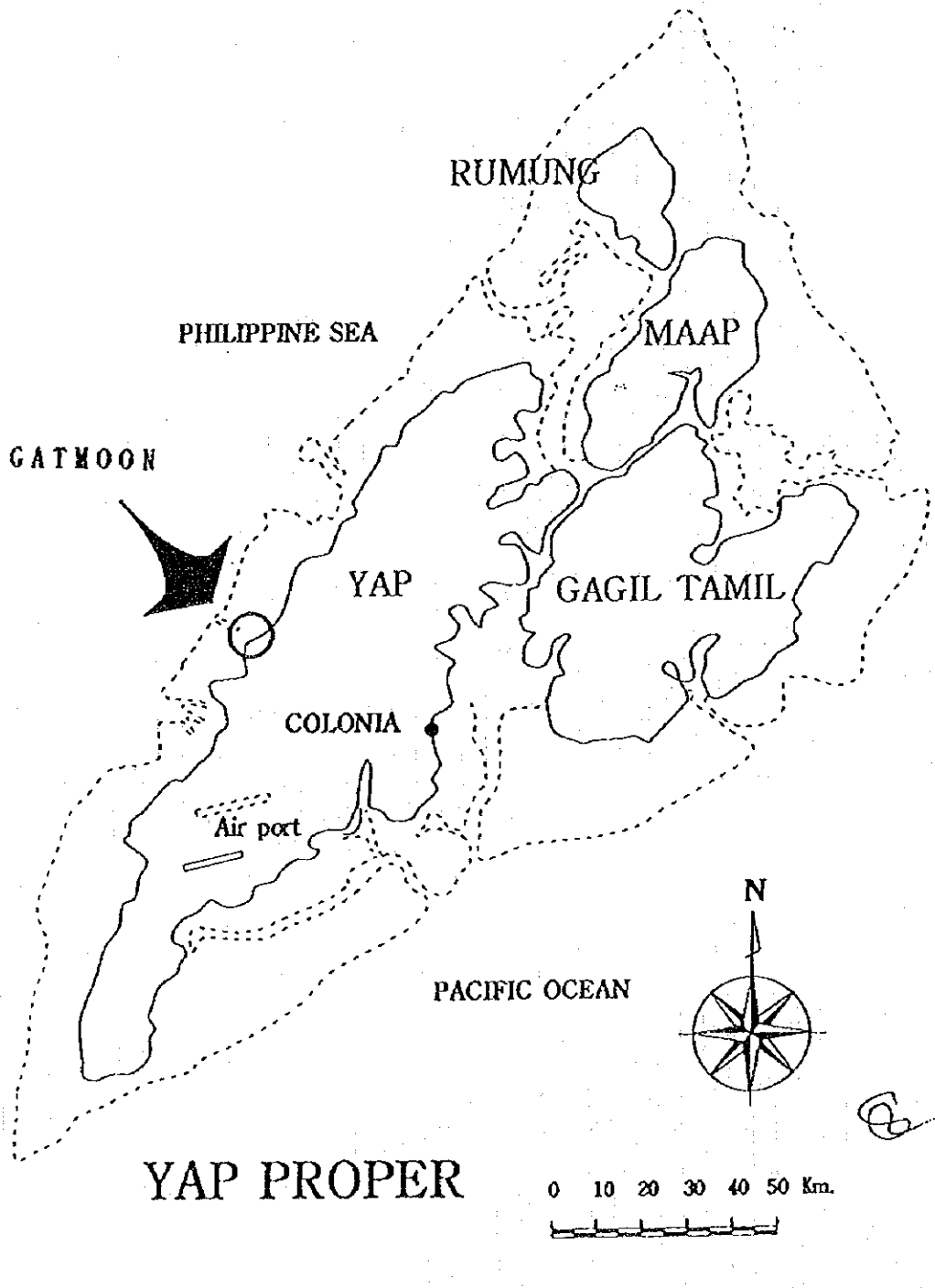
1) The Government of The Federated States of Micronesia has understood the system of the Japan's Grant Aid explained by the Team; the main feature is described in ANNEX IV.
2) The Government of The Federated States of Micronesia will take the necessary measures, described in ANNEX V for the smooth implementation of the Project on condition that the Grant Aid by the Government of Japan is extended to the Project.

6. Further Schedule of the Study

Based on the Minutes of Discussions and technical examination of the study results, JICA will complete the Basic Design Study report and send it to the Government of The Federated States of Micronesia around March, 1996.

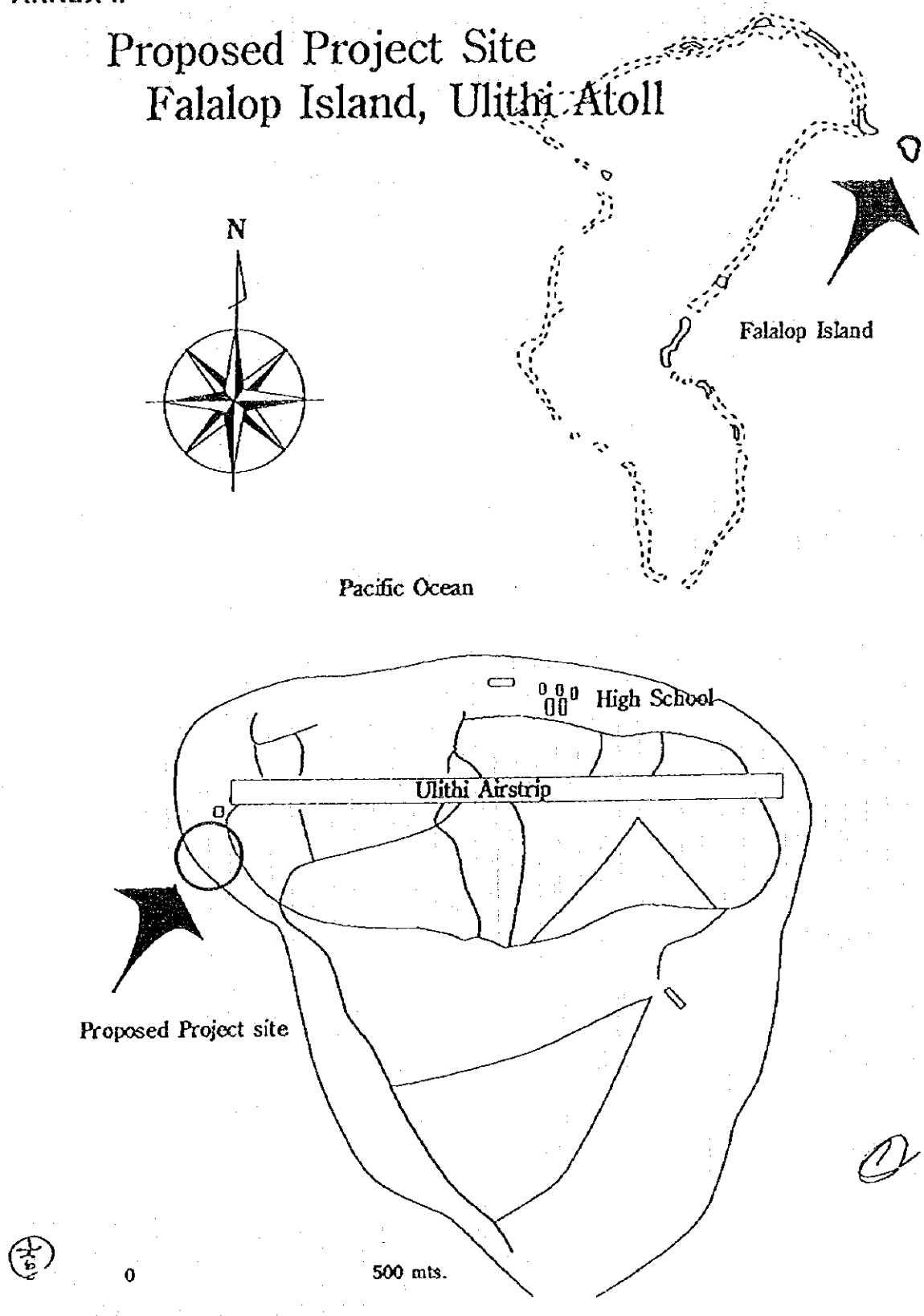
ANNEX I

Proposed Project Site
Yap Proper



ANNEX II

Proposed Project Site
Falalop Island, Ulithi Atoll



ANNEX III: ITEMS REQUESTED BY THE GOVERNMENT OF THE FEDERATED STATES OF MICRONESIA

1. West harbor, Gatmoon, Yap Island

1) Support station building with spaces for ice making facility, storage, office, etc.
2) Ice making machine(s) and pertinent fitting.
3) Water reservoir
4) Fuel oil storage tank(s)
5) Radio telephone(s)
6) Navigation lights
7) Ice and fish handling equipment
8) Ice distribution car

2. YFA building, Colonia, Yap Island

1) Block ice making machine and related machine(s)

3. Falalop Island, Ulithi Atoll

1) Support station building with spaces for ice making facility, storage, office, etc.
2) Ice making machine(s) and pertinent fitting.
3) Rain water reservoir and emergency well with water supply
4) Ice and fish handling equipment
5) Radio Telephone(s)

ANNEX IV: JAPAN'S GRANT AID SCHEME

1. Grant Aid Procedure

1) Japan's Grant Aid Program is executed through the following procedures.

Application	(Request made by a recipient country)
Study	(Basic Design Study conducted by JICA)
Appraisal & Approval	(Appraisal by the Government of Japan & Approval by Cabinet)
Determination of Implementation	(The Notes exchanged between the Governments of Japan and the recipient country)

2) Firstly, the application or request for a Grant Aid project submitted by a recipient country is examined by the Government of Japan (the Ministry of Foreign Affairs) to determine whether or not it is eligible for Grant Aid. If the request is deemed appropriate, the Government of Japan assigns JICA to conduct a study on the request.

Secondly, JICA conducts the study (Basic Design Study), using Japanese consulting firms.

Thirdly, the Government of Japan appraises the project to see whether or not it is suitable for Japan's Grant Aid Program, based on the Basic Design Study report prepared by JICA and the results are then submitted to the Cabinet for approval.

Fourthly, the project, once approved by the Cabinet, becomes official with the Exchange of Notes signed by the Government of Japan and the recipient country.

Finally, for the implementation of the project, JICA assists the recipient country in such matters as preparing tenders, contracts and so on.

2. Basic Design Study

1) Contents of the Study

The aim of the Basic Design Study (hereinafter referred to as "the Study"), conducted by JICA on the requested project (hereinafter referred to as "the Project"), is to provide a basic document necessary for the appraisal of the Project by the Government of Japan. The contents of the Study are as follows:

a) confirmation of the background, objectives and benefits of the requested project and also institutional capacity of agencies concerned of the recipient country necessary for the project's implementation;
b) evaluation of the appropriateness of the project to be implemented under the Grant Aid Scheme from the technical, social and economic points of view;

c) confirmation of items agreed on by both parties concerning the basic concept of the Project;
d) preparation of a basic design of the Project; and
e) estimation of costs of the Project.

The contents of the original request are not necessarily approved in their initial form as the contents of the Grant Aid project. The Basic Design of the Project is confirmed considering the guidelines of Japan's Grant Aid Scheme.

The Government of Japan requests the Government of the recipient country to take whatever measures are necessary to ensure its self-reliance in the implementation of the Project. Such measures must be guaranteed even through they may fall outside of the jurisdiction of the organization in the recipient country actually implementing the Project. Therefore, the implementation of the Project is confirmed by all relevant organizations of the recipient country through the Minutes of Discussions.

2) Selection of Consultants

For the smooth implementation of the Study, JICA uses a consulting firm selected through its own procedure (competitive proposal). The selected firm participate the Study and prepare a report based upon the terms of reference set by JICA.

At the beginning of implementation after the Exchange of Notes, for the services of the Detailed Design and Construction Supervision of the Project, JICA recommends the same consulting firm which participated in the Study to the recipient country, in order to maintain the technical consistency between the Basic Design and Detailed Design as well as to avoid any undue delay caused by the selection of a new consulting firm.

3. Japan's Grant Aid Scheme

1) What is Grant Aid?

The Grant Aid Program provides a recipient country with non-reimbursable funds to procure the facilities, equipment and services (engineering services and transportation of the products, etc.) for economic and social development of the country under principles in accordance with the relevant laws and regulations of Japan. Grant Aid is not supplied through the donation of materials as such.

2) Exchange of Notes (E/N)

Japan's Grant Aid is extended in accordance with the Notes exchanged by the two Governments concerned, in which the objectives of the project, period of execution, conditions and amount of the Grant Aid, etc., are confirmed.

3) "The period of the Grant" means the one fiscal year which the Cabinet approves the

project for. Within the fiscal year, all procedure such as exchanging of the Notes, concluding contracts with consulting firms and contractors and final payment to them must be completed.

However, in case of delays in delivery, installation or construction due to unforeseen factors such as weather, the period of the Grant Aid can be further extended for a maximum of one fiscal year at most by mutual agreement between the two Governments.

4) Under the Grant, in principle, Japanese products and services including transport or those of the recipient country are to be purchased.

When the two Governments deem it necessary, the Grant Aid may be used for the purchase of the products or services of a third country.

However, the prime contractors, namely consulting, contracting and procurement firms, are limited to "Japanese nationals". (The term "Japanese nationals" means persons of Japanese nationality or Japanese corporations controlled by persons of Japanese nationality.)

5) Necessity of "Verification"

The Government of the recipient country or its designated authority will conclude contracts denominated in Japanese yen with Japanese nationals. Those contracts shall be verified by the Government of Japan. This "Verification" is deemed necessary to secure accountability of Japanese taxpayers.

6) Undertakings required to the Government of the recipient country

a) to secure a lot of land necessary for the construction of the Project and to clear the site;
b) to provide facilities for distribution of electricity, water supply, drainage and other incidental facilities outside the site;
c) to ensure prompt unloading, tax exemption and customs clearance at ports of disembarkation in the recipient country and internal transportation therein of the products purchased under the Grant Aid.
d) to exempt Japanese nationals from customs duties, internal taxes and other fiscal levies which may be imposed in the recipient country with respect to the supply of the products and services under the verified contracts.
e) to accord Japanese nationals whose services may be required in connection with the supply of the products and services under the verified contracts such facilities as may be necessary for their entry into the recipient country and stay therein for the performance of their work.
f) to ensure that the facilities constructed and products purchased under the Grant be maintained and used properly and effectively for the Project, and

g) to bear all the expenses other than those covered by the Grant, necessary for the Project.

7) "Proper Use"

The recipient country is required to maintain and use the facilities constructed and equipment purchased under the Grant Aid properly and effectively and to assign the necessary staff for operation and maintenance of them as well as to bear all the expenses other than those covered by the Grant Aid.

8) "Re-export"

The products purchased under the Grant Aid shall not re-exported from the recipient country.

9) Banking Arrangement (B/A)

a) The Government of the recipient country or its designated authority should open an account in the name of the Government of the recipient country in an authorized foreign exchange bank in Japan (hereinafter referred to as "the Bank"). The Government of Japan will execute the Grant Aid by making payments in Japanese yen to cover the obligations incurred by the Government of the recipient country or its designated authority under the verified contracts.

b) The payments will be made when payment requests are presented by the Bank to the Government of Japan under an authorization to pay issued by the Government of recipient country or its designated authority.

ANNEX V: UNDERTAKINGS BY THE GOVERNMENT OF THE FEDERATED STATES OF MICRONESIA

1. To secure a lot of land, in the respective site, necessary for the Project;

2. to clear, level and reclaim the site prior to the commencement of the construction;

3. to provide facilities for distribution of electricity, water supply, drainage and other incidental facilities outside the site;

4. to ensure prompt unloading, tax exemption and customs clearance at ports of disembarkation in The Federated States of Micronesia and internal transportation therein of the products purchased under the Grant;

5. to exempt Japanese nationals from customs duties, internal taxes and other fiscal levies which may be imposed in the The Federated States of Micronesia with respect to the supply of the products and services under the verified contracts.

6. to accord Japanese nationals whose services may be required in connection with the supply of the products and services under the verified contracts such facilities as may be necessary for their entry into The Federated States of Micronesia and stay therein for the performance of their work.

7. to bear commissions to the Japanese foreign exchange bank for the banking services based upon the Banking Arrangement (A/P);

8. to ensure that the facilities and equipment under the Grant be maintained and used properly and effectively for the Project; and

9. to bear all the expenses other than those covered by the Grant, necessary for the project.

10. to ensure for provision of low cost fuel supply to all artisanal fishing boats at West Harbor in Yap Island.

ANNEX VI (1)

PARTICIPANTS IN THE DISCUSSIONS(JAPANESE SIDE)

Name	Position
1.Study Team	
Mr. YOSHIZUKA Yasuhiro	Leader
Mr. NAKAGAWA Atsushi	Coordinator
Mr. OKAMURA Kenji	Consultant
Mr. MORI Jun'ichiro	Consultant
Mr. IWASAKI Wataru	Consultant
2.Observer	
Mr. NISHIKAWA Kiyoshi	Charge d' Affaires Embassy of Japan, FSM

ANNEX VI (2)

PARTICIPANTS IN THE DISCUSSIONS(MICRONESIAN SIDE)

Name	Position
1.Government of FSM	
Mr. John A. Mangefel	Special Assistant to the President for State Matters, Department of External Affairs
Mr. Lorin Robert	Deputy Assistant Secretary, Department of External Affairs
Mr. Larry Raigetal	Foreign Service Officer, Department of External Affairs
2.Government of Yap State	
Hon. Vincent Figir	Governor of Yap State
Hon. Matthias Kuor	Lt. Governor of Yap State
Mr. Constantine Yinug	Chief Justice, The State Court of Yap
Mr. Jesse Raglmar SUBOLMAR	Director of Planning of Budget (OPB)
Mr. John Sohlith	Chief of Planning (OPB)
Mr. Leo Chiengyen	Statistics Specialist in Office of Planning of Budget (OPB)
Mr. Jesse Tamel Gajdusek	Deputy Director of Resources and Development (R & D)
Mr. Moses Ngirmekur	State Surveyor, Land resources, Dept. of Resources and Development (R & D)
Mr. Andy Tafileichig	Marine Resources Management Division (R & D)
Mr. Peter R. Rebeuluch	General Manager of Yap Fishing Authority (YFA)
Mr. Patrick Peckalibe	Assistant General Manager of Yap Fishing Authority (YFA)
Mr. Francis Faney	Director, Dept. of Public Works and Transportation
Mr. Faustino Yangmog	Subdirector, Dept. of Public Works and Transportation
Mr. James Sarmog	Chief of Contracts, Dept. of Public works and Transportation
Capt. Serphen H. Single	Port & Sea Manager, Sea Transportation Office, Public works
Mr. Marcellino Jibemai	Sea Transportation Office, Public works
Mr. Jerry O. Fagolimul	Deputy Director, Envilomental Protection Agency
Mr. John Gilmatam	Director of Health Service Dept.

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