DEPARTMENT OF TRANSPORTATION & COMMUNICATIONS
THE FEDERATED STATES OF MICRONESIA

No. 1

BASIC DESIGN STUDY REPORT
ON
PROJECT FOR CONSTRUCTION OF INTER-ISLANDS VESSEL FOR FISHING VILLAGES
IN
THE FEDERATED STATES OF MICRONESIA

FEBRUARY, 1997

JAPAN INTERNATIONAL COOPERATION AGENCY
KYOKUYO CO., LTD.
FISHERIES ENGINEERING 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 Construction of Inter-Islands Vessel for Fishing Villages and entrusted the study to the Japan International Cooperation Agency (JICA).

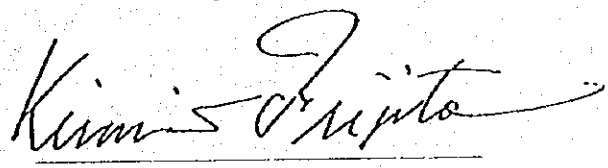
JICA sent to the Federated States of Micronesia (FSM) a study team from 19th August, 1996 to 15th September, 1996.

The Team held discussions with the officials concerned of the Government of the FSM, and conducted a field study at the study area. After the Team returned to Japan, further study were made. Then, a mission was sent to the FSM in order to discuss a draft basic design, 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 team.

February, 1997



Kimio FUJITA
President
Japan International Cooperation Agency

February, 1997

Letter of Transmittal

We are pleased to submit to you the basic design study report on the Project for Construction of Inter-Islands Vessel for Fishing Villages in the Federated States of Micronesia.

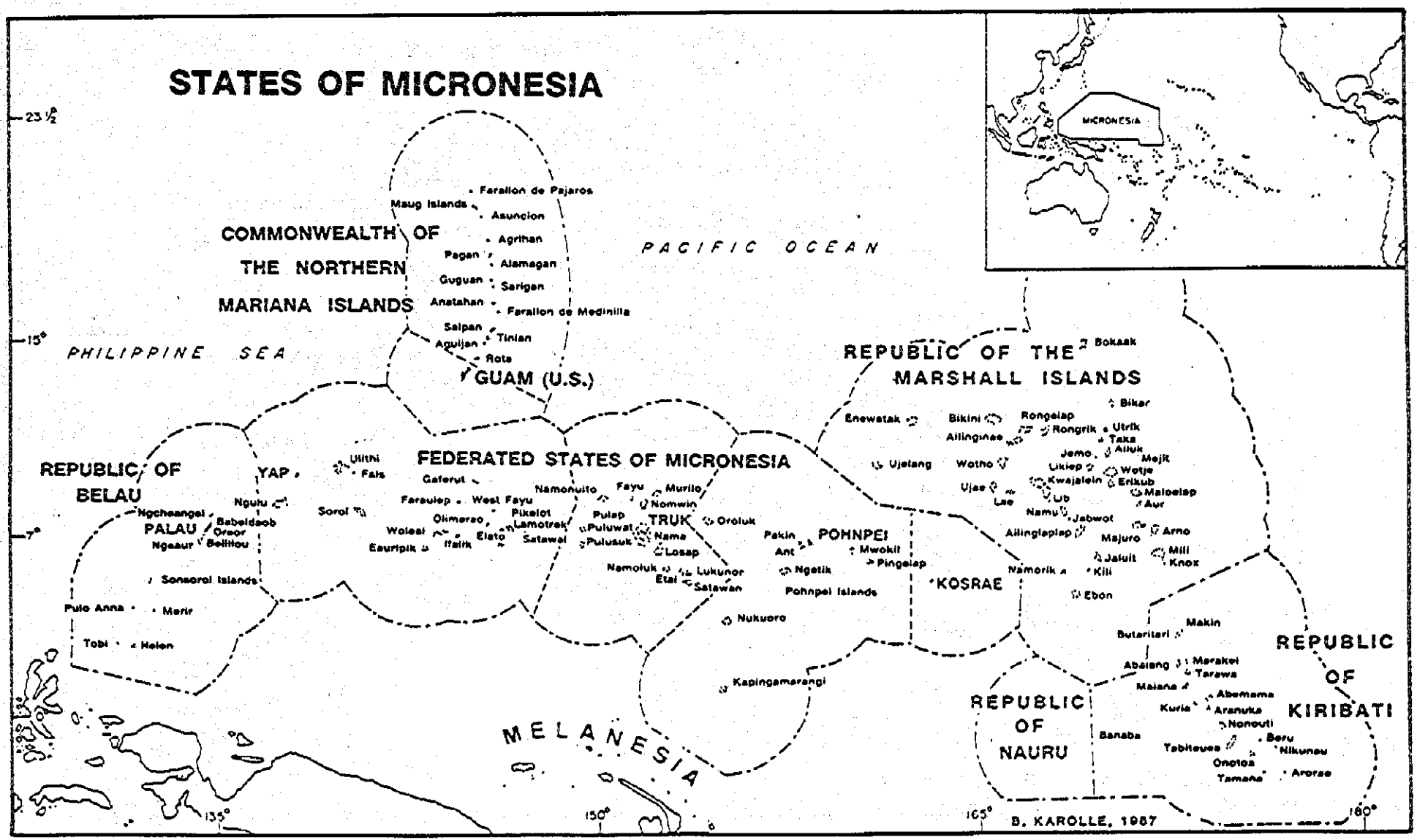
This study was conducted by the Joint Enterprise of KYOKUYO CO., LTD. and FISHERIES ENGINEERING CO., LTD, under a contract to JICA during the period from 31st July, 1996 to 17th February, 1997. In conducting the study, we have examined the feasibility and rational of the project with due consideration to the present situation of the FSM and formulated the most appropriate basic design for the project under Japan's grant aid scheme.

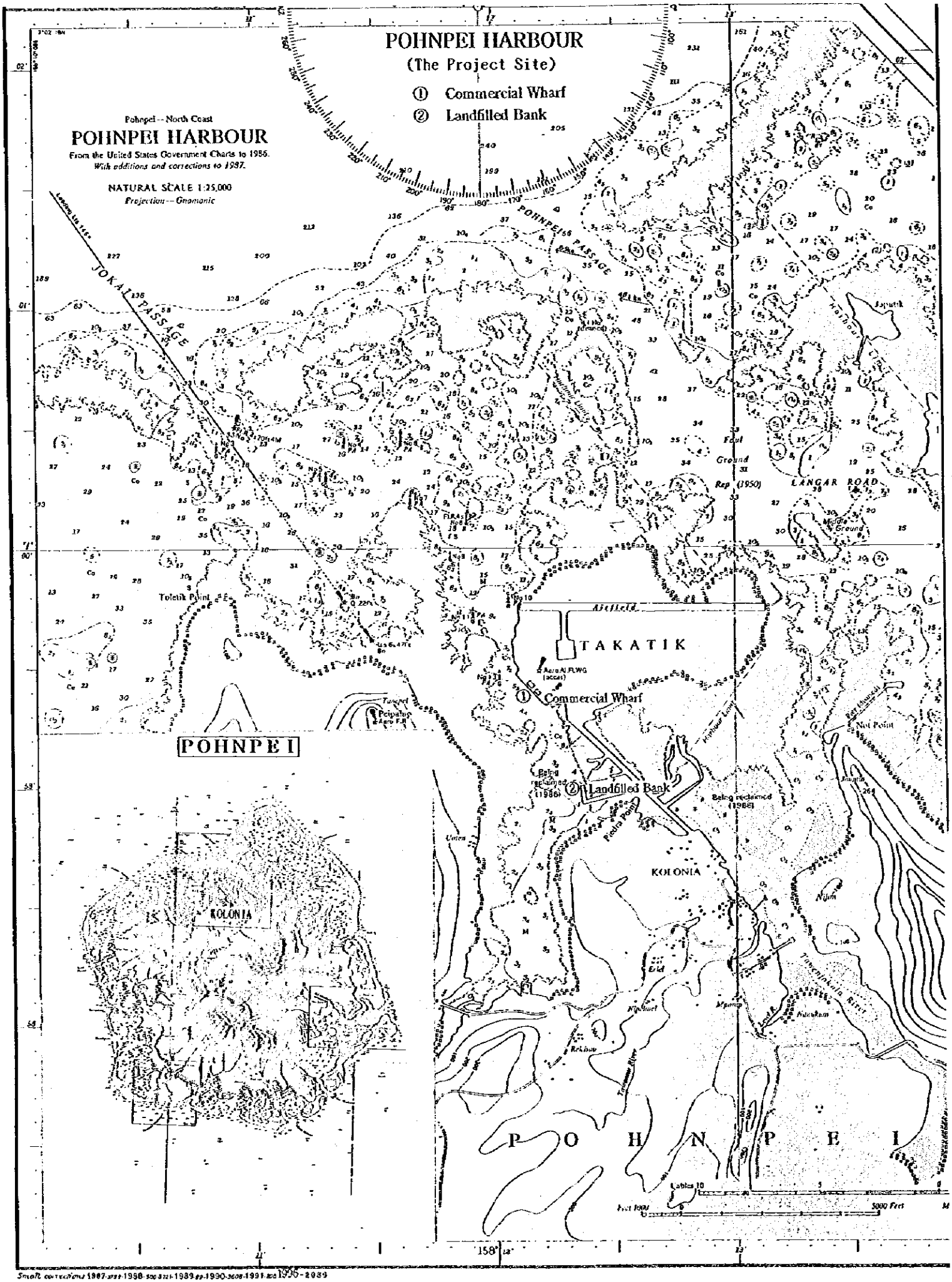
Finally, we hope that this report will contribute to further promotion of the project.

Very truly yours,

豊永三紀雄

Mikio TOYONAGA
Project Manager,
Basic Design Study Team on
Project for Construction of Inter-Islands
Vessel for Fishing Villages in
the Federated States of Micronesia


STATES OF MICRONESIA
MICRONESIA
PACIFIC OCEAN
COMMONWEALTH OF THE NORTHERN MARIANA ISLANDS
Farallon de Pajaros
Maug Islands
Asuncion
Agrihan
Pagan
Alamagan
Guguan
Sarigan
Anatahan
Farallon de Medinilla
Saipan
Aguijan
Tinian
Rota
GUAM (U.S.)
PHILIPPINE SEA
REPUBLIC OF THE MARSHALL ISLANDS
Bokaak
Bikar
Enewetak
Bikini
Rongelap
Rongrik
Utrik
Taka
Allinginae
Ailuk
Jemo
Mejit
Ujelang
Wotho
Likiep
Wotje
Kwajalein
Erikub
Ujae
Lae
Ub
Maloelap
Aur
Namu
Jabwot
Ailinglaplap
Majuro
Arno
Jaluit
Mili
Knox
Kili
Namorik
Ebon
KOSRAE
Makin
Butaritari
Marakei
Tarawa
Abaiang
Maiana
Abemama
Kuria
Aranuka
Nonouti
Beru
Nikunau
Tabiteuea
Onotoa
Tamana
Arorae
REPUBLIC OF KIRIBATI
REPUBLIC OF NAURU
Banaba
REPUBLIC OF BELAU
PALAU
Ngcheangel
Babeldaob
Oreor
Ngeaur
Beliliou
Sonsorol Islands
Pulo Anna
Merir
Tobi
Helen
YAP
Ulithi
Fais
Sorol
FEDERATED STATES OF MICRONESIA
Gaferut
Faraulep
West Fayu
Olimarao
Woleai
Eauripik
Ifalik
Elato
Pikelot
Lamotrek
Satawal
Namonuito
Fayu
Murilo
Nomwin
Pulap
Puluwat
Pulusuk
TRUK
Nama
Losap
Oroluk
Namoluk
Etal
Lukunor
Satawan
Pakin
Ant
Ngetik
Pohnpei Islands
POHNPEI
Mwokil
Pingelap
Nukuoro
Kapingamarangi
MELANESIA
135°
150°
165°
180°
15°
7°
23½
B. KAROLLE, 1987



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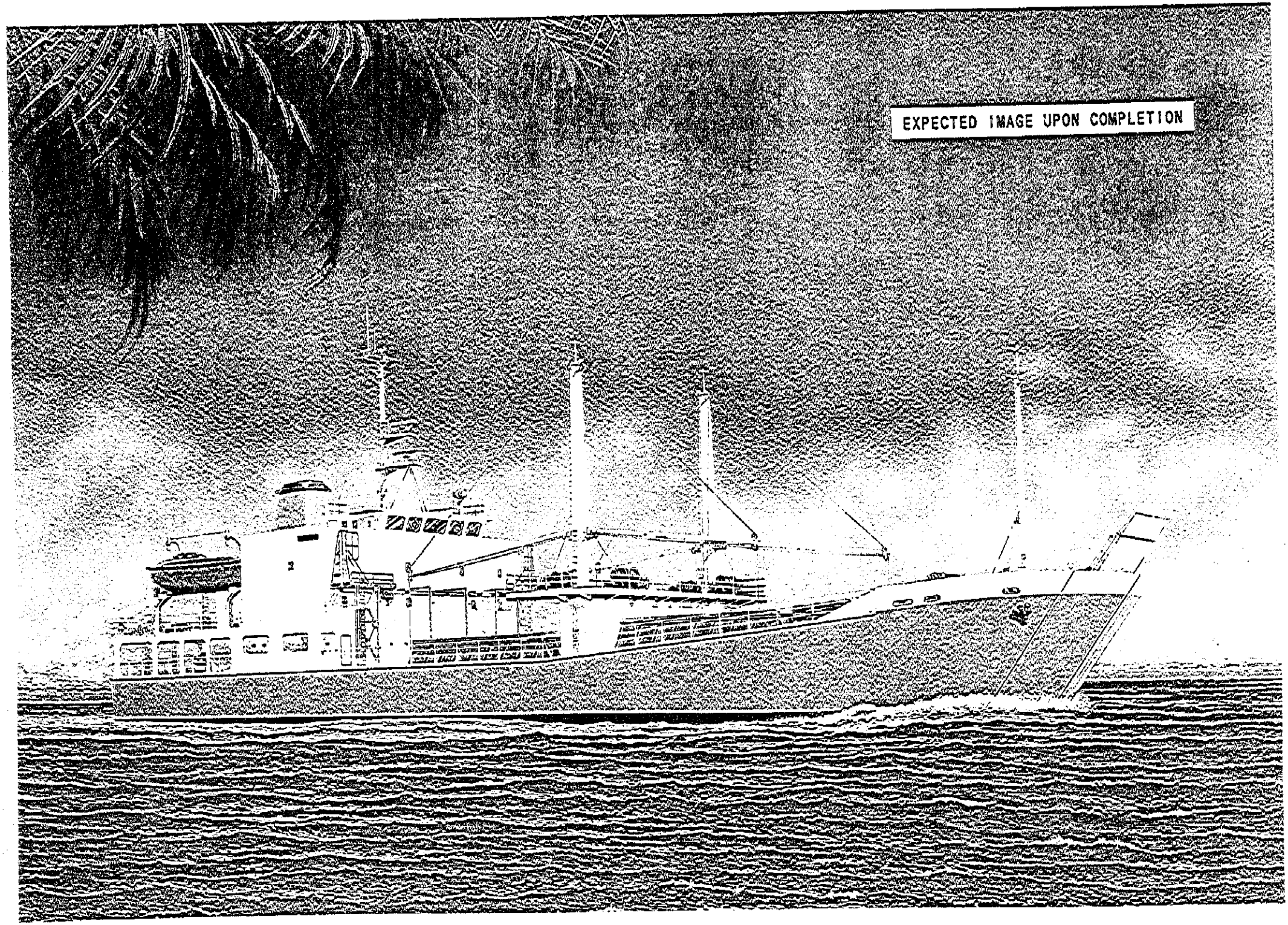
EXPECTED IMAGE UPON COMPLETION

Abbreviations:

FSM : The Federated States of Micronesia
DTC : The Department of Transportation & Communications
DRD : The Department of Resources& Development
CIP : Capital Improvement Project
PSIP: Public Sector Investment Program

CONTENTS

Chapter 1

Background of the Project

Chapter 1 Background of the Project

[Outline of the situation]

1. Land and Natural Environment

The Federated States of Micronesia (FSM) is a vast island country that consists of 607 islands scattered in an f approximately 2,900 thousand Km^2 area of sea extending around in a sphere surrounded by the equator, 14°N, 135°E and 166°E lines. The islands range in size from the largest, a massive volcanic island to small atolls, and have a total land area of approximately 700 Km^2. Approximately 65 islands of the islands are populated with the total population of approx. 104,724 (FSM national census in 1994). The FSM is a federated country composed of the Yap, the Chuuk (the former Truck), the Pohnpei, and the Kosrae, arranged by their locations from the west.

The FSM Capital is Palikir in Pohnpei, and the base port for the Project Vessel is Pohnpei Harbour.

The climate in the FSM is tropical with temperatures of approx. 24°C in the evening and 29°C in the daytime throughout the year, and an average humidity of approx. 80% and high rainfall averaging approx. 3,000mm in the flatlands and more than 10,000mm in the hilly districts. Typhoons or tropical cyclones often occur around Pohnpei and move to the northwest of Chuuk. Huge typhoons strike at a rate of approx. once every 10 years, causing great suffering in the country.

2. National Economy

In 1992, the FSM recorded a GDP of $194.2 million, a GNP per capita of $1,877, an export value of $41.5 million, and an import value of $98.8 million (World Debt Tables 1994).
The FSM industries mainly comprise primary industries such as agriculture and fisheries, which employ approx. 48% of its workforce. The Economy has a dual economic structure with a traditional self-supported economy in the outer islands, and a currency economy around the capitals of each State. There is an extensive disparity in the living standard due to the difference in the cash earnings between the city areas where the currency economy is popular, and the other areas, including the outer islands.

After World War II this area was under UN Trusteeship by the United States, and a Free Association Compact was made with the US in 1986 to inaugurate the independence of the country, with its capital located in Colonia on Pohnpei (shifted to Palikir on the same island in 1989). Since 1986 the FSM has laid down National Development Plans every 5 years aiming at conservation of its traditional culture, modernization of society, and economic self-subsistence. The FSM has been actively pursuing these objectives in order to assure their realization before the termination of the Compact in 2001.

In its National Development Plans, the FSM has made full efforts to promote the copra (the dried coconut flesh) business, a main source of foreign currency, and its tourism and fishery industries. In its Second National Development Plan (1992–1996) the FSM places great importance on the goal of turning to full advantage the rich fishery resources in its own vast exclusive economic zone (the EEZ). The key points of the FSM's development objectives are inherited to the Public Sector Investment Program (the PSIP: 1997 – 2001), which will be equivalent to the Third National Development Plan.

1-1 Present State of the Sector

Marine shipping is playing a critically important role for the personal mobilization, the transportation of living commodities, and the domestic distribution of products in the vast area of the FSM, an island country with many islands interspersed, as well as for export to international markets.

The private sector of the FSM is hardly involved in the country's interstate and the inter-islands sea transportation because of the low profitability due to the interspersed population and small volumes of cargo. For sea transportation, highly oriented towards public service, the Government of FSM operates four (4) field-trip vessels, cargo-passenger ships owned by the government, and one (1) landing craft vessel, the "Caroline Islands" (hereinafter called the "Existing Vessel").

The four (4) field-trip vessels, the ordinary-type vessels, are operated individually by three of the country's states (all but Kosrae), for inter-islands transportation service. The Existing Vessel, the sole landing craft directly operated by the government as an inter-islands vessel, is used to meet numerous purposes in the physical distribution of FSM, a country which depends much upon sea transportation for transportation of living commodities to the outer islands where their port facilities are not yet well arranged, construction machinery, equipment and materials for the various projects such as fisheries projects, disaster relief commodities, and support activities when the field-trip vessels are off-duty for maintenance or repairs.

The economies of the outer islands of the FSM are basically self-sustaining, and the islands are not provided with social infrastructures such as port equipment, educational facilities, hospitals, or airstrips. Further, there are no remarkable industries except the business for copra and a small variety of the fishery products to obtain cash earnings. This copra business, however, has suffered a dull market for the past several years with an less cash earnings, and the disparity in the living standard is increasing between the city areas and the outer islands of the country.

For economic activation of the outer islands, the government is therefore paying attention to the fishery sector, a field capable of development and promotion, and is considering the development and promotion of small-scale fishing in the outer islands with diversified approaches as preferential tasks in its National Development Plan.

In line with those objectives "the Project for Promotion of small-scale fishing in the Yap State" was implemented with Japan's Grant Aid in fiscal year 1995.

In the rural fishing villages in the outer islands of the FSM, the subsistence of the inhabitants is wholly dependent on sea transportation service in order to obtain the fuel oil for fishing

boats, the inhabitants' movement within their places, delivery of the cash-earning products such as copras or fishery products, living necessities such as foods, druggery, and light oil for generators, and means to transport students who are lodging at state centers for educational purposes. Establishment of sea transportation service for the construction machinery, equipment, and materials necessary to provide for the social and fishery infrastructure is also indispensable for development and promotion of the rural fishing villages.

In particular, field-trip vessels of an ordinary-type cannot directly dock and are forced to use other small boats for loading and/or unloading at rural fishing villages where there are no well arranged port facilities. On the contrary, landing craft vessels can touch down at simple bank facilities or beach at low tides at rural fishing villages in order to do load and/or unload through the bow ramp way. The rural fishing villages, therefore, are highly dependent upon the landing craft vessel. With a shallow draft, bow ramp way, and twin engines/twin propellers equipped, a landing craft vessel has an excellent gyration capability in narrow channels, and therefore has a very suitable function for cruising in reef areas. These functions enable a vessel of this type to beach directly on simple bank facilities or beach at the bow, load/unload large machinery, equipment or materials (bulldozers, excavators, dump trucks, generators, ballasts, etc.), clear land or gyrate in narrow wharfing areas, and secure an easy approach to beach even when it is hard for the vessel to come near to a wharf. For these reasons, landing craft vessels make ideal field-trip vessels in rural fishing villages.
The operation results of the Existing Vessel for the past five (5) years are listed in Table 1-1.

Table 1－1 Actual operation results of the Caroline Islands for the past 5 years

	1992		1993		1994		1995		1996		Average / Total			
Actual cruising days (No. of voyage)	220 (8)		123 (7)		210 (11)		183 (10)		114 (9)		170 (9)			
Operation objective	No. Voy.	Cr. day	No. Voy.	Cr. day	No. Voy.	Cr. day	No. Voy.	Cr. day	No. Voy.	Cr. day	No. Voy.	Cr. day	%	Main cargo items transported
C. I. P. Trip	1	20			1	23	2	91			4	134	15.7	Construction-related *2, foods
Copra Run	2	48			1	37	1	50			4	135	15.9	Copra(general cargoes carried in collection voyage)
Field trip			1	59	3	59	2	12			6	130	15.3	General cargoes, Construction-related *3, Copra
Charter trip	1	7	3	14	2	20	2	13	8	77	16	131	15.4	Construction-related *4, Miscellaneous goods, Copra
Disaster Trip	2	105									2	105	12.4	Foods, Oils, Medical goods, Construction-related *5
Election Run							2	12			2	12	1.4	Distribution/collection of ballot papers/boxes, *6
Special trip	1	10			1	2	1	5			3	17	2.0	Construction-related *7, Deployment of channel marks, buoys and FADs, and others *8
Logistic Run			3	50	2	11					5	61	7.2	Construction related *9, FRP boats, Foods
Dry dock	1	30			1	58			1	37	3	125	14.7	Copra in outbound voyage
Sub-total	8	220	7	123	11	210	10	183	9	114	45	850	100.0	
Mooring for repair (days)	8		13		23		36		22		102		6.3	
Berth at port (days)	46		229		132		146		107		660		40.9	
Total	274		365		365		365		244		1,613			
No. voyage at full load	2		3		4		2		2		13		13/45	
1)Construction-related *1	-		3		2		-		1		6		6/45	
2)	1		-		1		1		1		4		4/45	
3)Copra	1		-		1		1		-		3		3/45	
Operation for each States	(220 days)		(123 days)		(210 days)		(183 days)		(114 days)		(850 days)		100.0	
Yap	56 days		- days		36 days		22 days		- days		114 days		13.4	
Chuuk	102		100		48		107		22		379		44.5	
Pohnpei	7		-		18		24		17		66		7.8	
Kosrae	7		23		43		15		30		118		13.9	
National Gov., and etc.	48		-		65		15		45		173		20.4	

Explanation:
1) Working rate is higher in years such as 1992 due to disaster relief activities.
2) Increasing mooring days for repair clearly indicate overage of the vessel.
3) Voyages at full load account for about 1/3 of the voyages for 5 years. In total, 6 two-way voyages were utilized for construction-related purposes. (*1)
4) Chuuk, with many outer islands and many inhabitants, takes up about a half of the total operation days for al states.

Notes: 1) Year is a budget year (10/1 in the preceding year through 9/30 in the relevant year).
2) Budget year of 1992 is January through September. Figures in 1996 indicate the actual results through August.

*1: Construction equipment, machinery, materials, and heavy machinery
*2: Construction equipment, machinery, materials, mobile generators, ballast, cements, and gasoline
*3: Construction equipment, machinery, materials, and oils
*4: Construction equipment, machinery, materials, heavy machinery, generators, vehicles, and oils
*5: Ballasts, construction equipment, machinery,and materials
*6: Construction equipment, machinery, materials, oils, and feed grains
*7: Construction equipment, machinery, and materials for airstrips
*8: Supports for weather observation, and transportation of participants in sports events
*9: Construction equipment, machinery, materials, and heavy machinery

1-2 Problems in the Sector

The public sea transportation services are very important to support the living basis in the rural fishing villages. As a consequence of the overageness in these vessels, all of the four (4) field-trip vessels and the Existing Vessel has less operation efficiency due to the increase of the costs and periods for maintenance. Thus, fewer services are provided to the outer islands and the public services available in the communities of the outer islands are often insufficient. The outline of the four (4) field-trip vessels' specifications and their recent operation results are listed in Table 1-2.

Table 1-2 Main specifications of the Field-trip vessels, and their operations

Name of vessel	Micro Glory	Micro Spirit	Micro Trader	Micro Dawn
Operated by:	Pohnpei	Chuuk	Chuuk	Yap
Constructed in:	1978	June 1978	March 1978	October 1978
Length (overall)	56.40 m	56.40 m	56.40 m	56.40 m
Breadth	10.10 m	10.10 m	10.10 m	10.10 m
Draft	3.61 m	3.61 m	3.61 m	3.61 m
Gross tonnage	798.74 t	798.74 t	804.56 t	798.74 t
Deadweight tonnage	845.00 t	845.00 t	845.00 t	845.00 t
Power	455HP x 2	455HP x 2	455HP x 2	455HP x 2
cruising speed	10.0 kt	10.0 kt	10.0 kt	10.0 kt
No. of crew	24	24	24	24
Passengers(cabin)	12	12	12	12
- do - (deck)	125	125	125	125
Classification	ABS	ABS	ABS	ABS
No. of annual voyages	11	36	36	12
Days per voyage	12	7	7	10
	Actual 1994	Latest average		Actual 1995
Those vessels are a part of seven vessels constructed in Japan in 1978, as the serial vessels, and put in service in Micronesia then under trusteeship Rest of those (Micro Chief, Pilot and Palm) were later transferred to the Republic of Marshall Islands.				

Those four (4) vessels have been used by each State's management for transportation of living commodities and inhabitant passengers. When there are no docking repairs, the annual running operation for each vessel costs each of those vessels approx. $300,000. Due to the vessels' old ages of 18 years or less after construction, regular docking repairs for successive degradation of the high-speed engines made in every 2 years, cost each vessel $400,000 to $700,000. Under these circumstances, the respective average annual operation and maintenance expenses must be estimated at $500,000 to $650,000.

On the other hand, the freight or fare incomes from the operation (to be incorporated into the general account) estimated on the basis of the present freight or fare tariff reach approx. $50,000. Thus, the income is only approx. 10% or less of the operation expenses.

In considering the project for the development and promotion of rural fishing villages, it has

been suggested that a resource survey should be performed in order to conserve the appropriate level of catch and to deploy the fish aggregating devices (FADs) in order to carry out the fishing activities outside of the exterior edges of the reefs fishing within the reefs has a limited developing feasibility due to the adverse effects on the resources because of the reef's small productivity and limited resource volume. There are additional tasks to be considered such as the promotion program for the aquaculture of the mantis shrimp or the trochus shell presently exercised on a small scale in Kosrae and Pohnpei, and the works to distribute those young fries to the rural fishing villages of the respective states.

1-3 Background of the Project

As described above, in the outer islands of the FSM, where no equipment is yet arranged for utilization of ordinary-type vessels, the Existing Vessel is an indispensable carrier. In addition to the public transportation services by the field-trip vessels operated by the state governments, the transportation service by the FSM government, specially, the direct operation of a landing craft inter-islands vessel is so significant to the rural fishing villages that the users, i.e., the states, the outer island' communities, and the private sector, have such a great demand for the vessel that the FSM government must coordinate the shipping priority.

With the hull overage of 20 years old or less and the hull degradation due to long usage in the tropical sea area, however, it is very difficult to prevent deterioration of the Existing Vessel or frequent breakdowns and repairs in spite of the costly maintenance and repairs performed at the regular docking every 2 years. As a consequence, the international classification registry of the vessel was deleted last year.

It is very probable that the budget of the next docking expense for the Existing Vessel will not pass the Congress because of the increase of the maintenance and operation costs, the decrease of the operation efficiency due to the breakdowns and repairs, and a repair-effectiveness that will repay the investment. If the Existing Vessel, the sole inter-islands vessel of a landing craft type directly operated by the FSM government, is forced to terminate its operation, the public transportation services to the outer islands of the FSM will be much disturbed and, furthermore, the termination will give a serious influence to the progress of the National Development Plan. A replacement vessel for the Existing Vessel, therefore, is urgently required.

1-4 Contents of the Project

The FSM has requested one (1) inter-islands vessel for fishing villages with the following specifications:

Length (overall)	Approx. 60.0 m
Breadth	Approx. 12.7 m
Depth	Approx. 7.5 m
Gross tonnage	Approx. 1,300 tons
Deadweight tonnage	Approx. 1,000 tons
Dry cargo hold (bale)	Approx. 1,800 m^3
Frozen cargo hold (bale)	Approx. 20 m^3
Cargo oil tank	Approx. 50 m^3
Main engine	1,500PS x 800/200 RPM x 2 sets = 3,000 PS (4 cycle diesel engine)
Cruising speed	Approx. 12.5 knots
Complement: Crew	23
Passengers	12

1-5 Operation Plan

The Project Vessel will be managed for operation on the basis of the following operation plan:

Table 1-3 Operation plan for the Project Vessel

	Yap		Chuuk		Pohnpei/FSM		Kosrae		Total	
	Voyage	Days	Voyage	Days	Voyage	Days	Voyage	Days	Voyage	Days
C.I.P. Trip	2	16	2	26	1	7			5	49
Logistic Run	2	14	2	12	3	12	2	10	9	48
Field Trip	2	26	1	9	2	10			5	45
Copra Run	2	17	2	18	2	10			6	45
Special Trip	1	7	1	4	1	3			3	14
Election Run					1	4			1	5
Congress FSM Trip										
Charter Trip					1	5			1	5
F.E.M.A. Trip										
Disaster Relief										
Total	9	60	8	69	11	51	2	10	30	210
Berth in the calling ports										30
Dry Dock									1/2	18
Berth in Base Ports (Pohnpei)										107
Grand total										365
Annual operation under this plan										
(1) Cruising	Main/Auxiliary engines running								210 days	
(2) Berth in ports	107 days in Base Port, 30 days in calling ports								137	
	Main engine suspended, Auxiliary engine running									
(3) Dry dock	Main/Auxiliary engines suspended								18	
Total (days)									365	