JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)

THE KINGDOM OF TONGA
PORTS ADMINISTRATION DEPARTMENT

BASIC DESIGN STUDY REPORT
ON
THE PROJECT
FOR
PROVISION OF A PORT SERVICE VESSEL
IN
THE KINGDOM OF TONGA

MARCH 1993

OVERSEAS SHIPBUILDING COOPERATION CENTRE

Preface

In response to a request from the Government of the Kingdom of Tonga, the Government of Japan decided to conduct a basic design study on the Project for Provision of a Port Service Vessel and entrusted the study to the Japan International Cooperation Agency (JICA).

JICA sent to Tonga a study team headed by Mr. Naoki Nakanishi, Special assistant to the Director of Industries Division, Maritime Technology and Safety Bureau, Ministry of Transport and constituted by members of Overseas Shipbuilding Cooperation Centre, from November 23 to December 12, 1992.

The team held discussions with the officials concerned of the Government of Tonga and conducted a field study at the study area. After the team returned to Japan, further studies were made. Then, a mission was sent to Tonga in order to discuss a draft report and the present report was prepared.

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 Kingdom of Tonga for their close cooperation extended to the teams.

March 1993

Kensuke Yanagiya

Kensuke Yanagiya
President
Japan International Cooperation Agency

Mr. Kensuke Yanagiya
President
Japan International Cooperation Agency
Tokyo, Japan

Letter of Transmittal

We are pleased to submit to you the basic design study report on the Project for Provision of a Port Service Vessel in the Kingdom of Tonga.

This study has been made by Overseas Shipbuilding Cooperation Centre, based on a contract with JICA, from November 19, 1992 to March 30, 1993.

Throughout the study, we have taken into full consideration of the present situation in the Kingdom of Tonga, and have planned the most appropriate project in the scheme of Japan's grant aid.

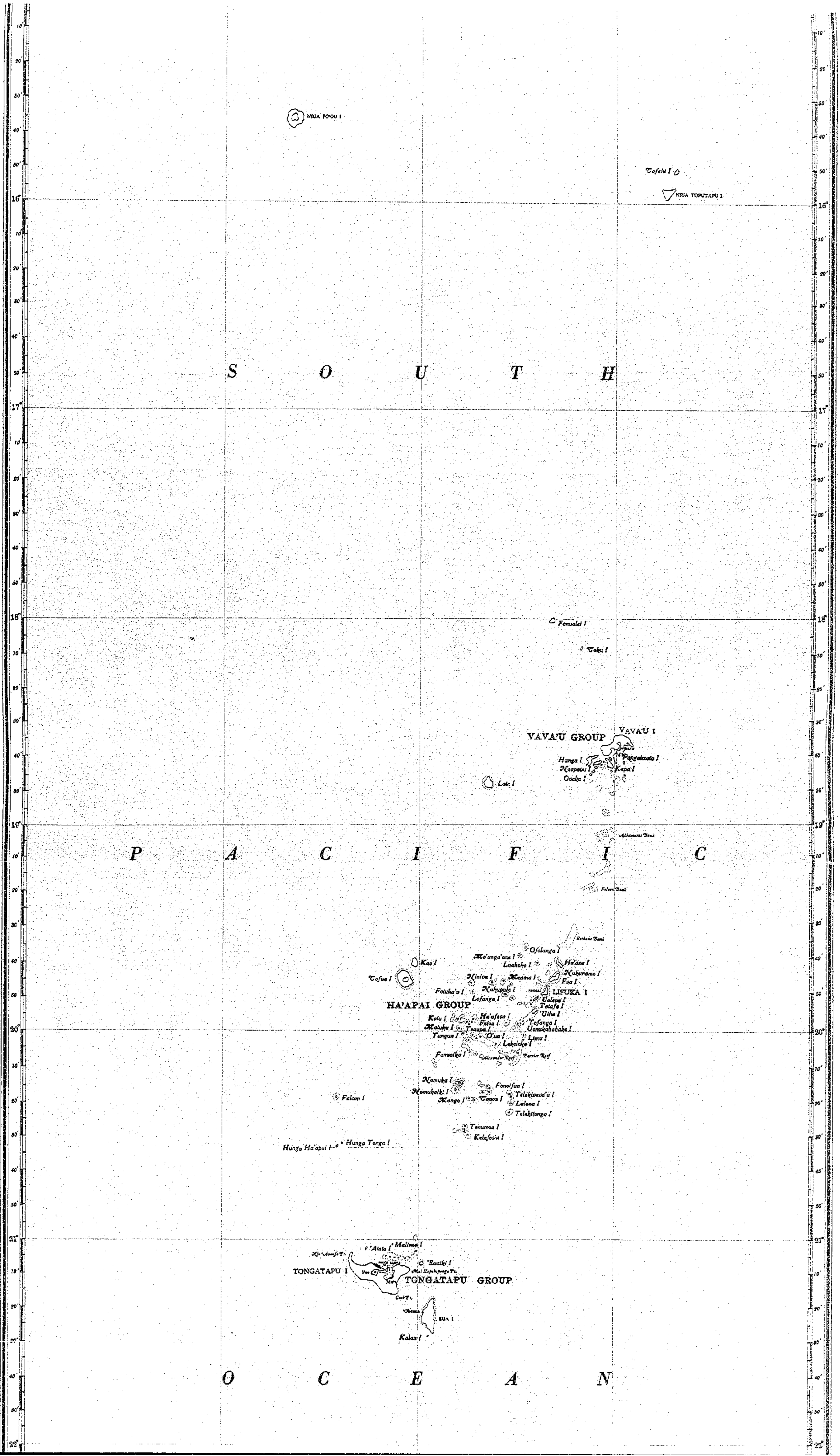
We wish to take this opportunity to express our sincere gratitude to the officials concerned of JICA, the Ministry of Foreign Affairs and the Ministry of Transport. We also wish to express our deep gratitude to the officials concerned of Ports Administration Department of the Government of Tonga, JICA office in Fiji and the Embassy of Japan in Fiji for their close cooperation and assistance during our study.

At last, we hope that this report will be effectively used for the promotion of the project.

Very truly yours,
March 1993

Tatsuo Mogi

Project Manager, Tatsuo Mogi
Basic Design Study Team on
the Project for Provision of
a Port Service Vessel
Overseas Shipbuilding Cooperation Centre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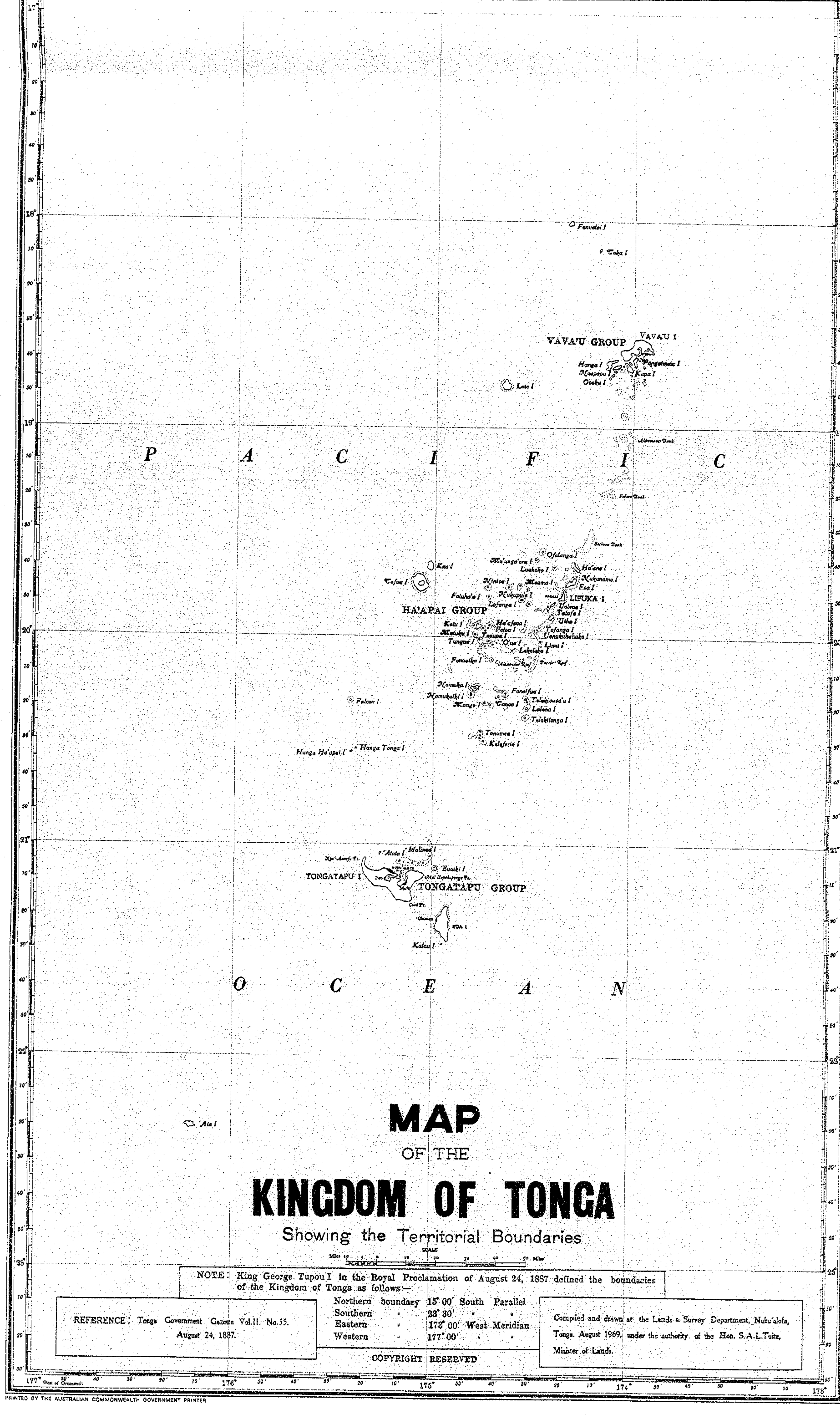
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P A C I F I C
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MAP
OF THE
KINGDOM OF TONGA
Showing the Territorial Boundaries
NOTE: King George Tupou I in the Royal Proclamation of August 24, 1887 defined the boundaries of the Kingdom of Tonga as follows:—
Northern boundary 15° 00' South Parallel
Southern " 23° 30' " "
Eastern " 173° 00' West Meridian
Western " 177° 00' " "
REFERENCE: Tonga Government Gazette Vol.II. No.55. August 24, 1887.
Compiled and drawn at the Lands & Survey Department, Nuku'alofa, Tonga. August 1969, under the authority of the Hon. S.A.L.Tuita, Minister of Lands.
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SUMMARY

SUMMARY

The Kingdom of Tonga, located almost in the middle of the South Pacific Ocean, lies about 700 km southeast of Fiji. The country consists of approximately 170 islands with a land area 697 km² and a total population of about 96,000.

This country, in which shipping transportation makes up an important sector owing to its geographic factor, depends on transportation by the sea for almost all goods including food stuffs, necessary materials for agricultural, and manufacturing and construction industries. The direct taxation on the foreign trade of the country accounted for as much as 48% of the total revenue of the government in 1991. From the aspect of securing government revenues, the shipping sector plays an important role for its economy.

At present, almost all vessels engaged in foreign trade with Tonga berth at the port of Nuku'alofa, the capital of the country, with the number of such vessels reaching 190 a year (Data in 1991). The foreign - going vessels are moored two berths at the Queen Salote Wharf of the port. However, owing to the configuration of the berths, sole berth is acceptable for a large-sized vessel.

For such reasons, the construction and maintenance of facilities necessary for securing safety of vessel traffic in ports has become a major task of top priority for the Government of Tonga to tackle.

Most of such foreign trade vessels are freighters ranging from 3,000 to 9,000 gross tons, and as a result of the increase in the trade volume, both the number and size of such vessels are on the rise. Generally, vessels of such class are berthed or unberthed under the assistance of tug boat.

At the time, however, the Kingdom of Tonga possesses no tug boat to assist vessels in maneuvering in ports, posing problems of safety operation for vessels in ports.

In addition, it is not equipped with facilities to cope with fire in the port, marine pollution or marine accidents, causing a great concern to the country, whose economy is dependent on marine transportation, for fear of

wharves becoming inoperative owing to such disasters and incidents.

Under these circumstances, the Government of Tonga has made a request for the construction, in the form of grant aid cooperation, of a tug boat equipped to assist vessels in berthing and unberthing safely in ports and also to cope with disasters in ports, thereby to secure safer navigation for vessels using ports in Tonga.

The Japanese Government, in response to this request, decided to make a basic design study, and following the decision, the Japan International Cooperation Agency (JICA) dispatched a survey team to the Kingdom of Tonga from November 23 to December 12, 1992.

The survey team held discussions with the administration of the Government of Tonga and related organizations, checking the background, purposses and contents of the request and gathered information and data through field surveys.

After the field survey JICA analyzed the information and data in Japan and prepared a draft of final report on the basis of this work. JICA dispatched a survey team to the Kingdom of Tonga from March 2 to March 14, 1993 and held a conference in order to explain and confirm a draft final report with the government.

Current situations and issues in the Port of Nuku'alofa are summarized as follows;

(1) Of vessels calling in the Kingdom of Tonga for foreign trade, about 80% to 85% come alongside the Queen Salote Wharf in Nuku'alofa, the capital. Container ships account for approximately 70% to 80% of those coming alongside the wharf, with the increase in the ratio and size of the vessel recently.

(2) The wharf has two berths for foreign-going vessels but only one berth is available at the same time for large-sized vessels owing to the positional constraints of the berth arrangement.

(3) Trade winds blow nearly in a constant direction at the wharf. This wind direction presents a severe condition for vessels to berth without tug boat assistance, with container ships suffering more influence because of their larger windage area.

(4) The Kingdom of Tonga has no facilities to cope with ship's fire, marine pollution and other marine accidents in the port.

(5) Current berthing and unberthing operations are carried out under the direction of an experienced Tongan pilot. As the pilot is scheduled to operate the tug boat as master when this project is implemented and the tug boat is commissioned, it can be said that there is no problem in terms of shiphandling.

(6) Although the Kingdom of Tonga has only such small shipbuilding facilities as a 100 ton slipway, it can be said to have sufficient capability to provide ordinary maintenance and repair with the capacity of the maintenance shops for shore machinery, and repair facilities for small sized vessels for home trade. For drydocking the tug boat is to be delivered to Fiji or New Zealand.

Considering above conditions, it seems that berthing under arriving and leaving vessel's own propulsion is close by a limitation in term of safety of vessel traffic in the port by reason of the increase in the number and size of the container vessels and operational restriction of the wharf. In addition, the port is deficient of facilities against an accident in the port.

On the basis of the current situation mentioned above, it can be judged that the necessity for the provision of a tug boat for assistance in the safe operation of vessels in the Port of Nuku'alofa is apparent and that no specific problems will arise in terms of its operation and maintenance in the Kingdom of Tonga.

The specifications of the tug boat on the project are as described below.

(1) Number of vessels: 1

(2) Principal particulars

Gross tonnage:	approximately 177 tons
Principal dimensions:	Length, approximately 26.0 m
	Breadth, approximately 8.0 m
	Depth, approximately 3.3 m
Speed:	approximately 13.0 knots (Max. at sea trial)
Bollard pull:	approximately 30 tons
Main engines:	1200 PS (882.6 kw) x 2 units
Number of crew members:	6 persons

(3) Facilities for marine safety for pollution control, fire fighting at sea and search & rescue.

Fire pump:	Diesel driven x 1 set
Oil fence:	1 km length
Other equipment and materials for oil recovery:	1 set
Rescue boat:	1 set

For the implementation of the scheme, it is expected to take approximately three months for the activities to design the tug boat, approximately 11 months for construction at a ship yard after finalizing a building contract and additional one month for a cruise to deliver the tug boat to Tonga.

After the delivery of the tug boat to Tonga, the Ports Administration Department is the organization to take charge of its operation, maintenance and management and a section in charge will be established under the Harbour Master, the Port of Nuku'alofa.

Most vessels engaged in foreign trade with Tonga call at the Port of Nuku'alofa. From this port, as a starting point, inter-island transportation is carried out by home trade vessels.

The Port of Nuku'alofa, as described above, constitutes the key role of the country in terms of the people's life and national economy. The rendering the wharf unusable or disturbance of vessel traffic in the port due to disasters or accidents, would have an unfathomable impact.

Although fortunately, no serious accidents have not occurred in the port,

there may be more chance of accidents being caused along with the increase both in the number and size of vessels because of the increase in the trade volume.

Further, it is also required that even in rough sea and weather conditions, vessels must be able to enter the port and come alongside a berth efficiently without waiting off wharf.

When such a situation is taken into consideration, the role played by a tug boat to support the safe operation of the Port of Nuku'alofa is extremely important. For the above mentioned reasons, it is quite worthwhile to implement the scheme by cooperation in the form of grant aid.

Proposals have been made regarding the implementation and improvement of the following points for more effective use of the tug boat after the program is put into effect.

1. Expansion and improvement of No.1 berth, Queen Salote Wharf;
2. Development of a storage facility for oil booms;
3. Securing spare parts and consumables necessary for the tug boat;
4. Training and cultivation of engineers for the overhauling, repairing and reassembling of main engines; and
5. Managing system to reserve and secure a slipway for drydocking.

CONTENTS

CHAPTER 1
INTRODUCTION

CHAPTER 1 INTRODUCTION

The Kingdom of Tonga, situated 700 km southeast of Fiji in the middle of the South Pacific Ocean, is an archipelagic country consisting of 170 islands.

Although the main domestic industry of the country is agriculture, it depends on imports for almost all raw materials necessary for agricultural, manufacturing and other major industries except for some food stuffs, and its economy is largely dependent on tax incomes imposed on foreign trade. The foreign trading of such commodities and inter-island transportation are carried out by vessels, and the marine transportation sector constitutes the base of Tonga's economy as well as playing a major role in the development of Tonga.

The center of the marine transportation is the port of Nuku'alofa city, the capital of Tonga, which received about 190 foreign-going vessels and 700 vessels engaged in domestic trade in 1991. All foreign-going vessels which call at the Queen Salote Wharf in the Port of Nuku'alofa. The port, however, is equipped with no tug boat to assist vessels in safe berthing and unberthing operations.

In the event the function of the port is impaired by such incidents as collision of vessels, damage to the wharf, fire in the harbour, and marine pollution, this would have a tremendous impact on the people's life and the economy as a whole. It has become an urgent task which must be addressed with top priority, to improve facilities necessary to secure safety for vessel traffic in the port in order to cope with the increased trade volume and the rise both in the size and number of vessels.

Against such background, the Government of the Kingdom of Tonga has requested the Government of Japan for a grant aid cooperation to provide a tug boat as a port service boat. The Japanese Government decided to make a basic design study in response to this request.

Following this, the Japan International Cooperation Agency (JICA) dispatched to Tonga from November 23 to December 12, 1992 a basic design study team, with Mr. Naoki Nakanishi, Special Assistant to the Director of Industries Division of Maritime Technology and Safety Bureau, Ministry of Transport, as

the leader.

In addition to discussions with relevant government organizations, the survey team made a survey of the Port of Nuku'alofa in terms of such themes as the maritime transportation in the port, berthing and unberthing of arriving and leaving vessels, port and wharf facilities, cultivation of ship's crew members, ship repair facilities, current situation of port administration and development plans.

Furthermore, JICA will sent the draft report explanation team to the Kingdom of Tonga from March 2 to March 14, 1993 to give presentations of a draft final report to the relevant organizations of the Government of Tonga and confirm the contents with them.

CHAPTER 2
BACKGROUND OF THE PROJECT

CHAPTER 2 BACKGROUND OF THE PROJECT

2.1 OUTLINE OF THE KINGDOM OF TONGA

(1) Geographic conditions

The cluster of Tonga islands is located in the South Pacific Ocean approximately 2,000 km north-northeast of New Zealand and 700 km southeast of Fiji, extending over an area 15-00 to 23-30 degree South latitude and 173 to 177 degree West longitude. It consists of about 170 islands with a total land area of 697 m^2, of which 36 islands where people live have an area of about 649 m^2.

(2) Treasury

When the revenues of Tonga (in 1988 to 1989) are taken up, it can be seen that they consist of direct taxes with 12%, indirect taxes 62%, government service revenues 19%, and interest and the rest 7%. Of the indirect taxes, import dues account for 26% and port and service taxes 25%, attesting to the importance of shipping in the entire Tonga Government revenues.

(3) Trend of balance of payments

The conspicuous feature of Tonga's balance of payments is that its constant trade deficit has been compensated for by private remittance from abroad by Tongan emigrants, and loans and grant aid from foreign countries, maintaining an almost balanced long term overall balance of payments. In spite of its large trade deficit, Tonga's international currency reserves are kept in a good condition, totaling approximately T$30 million thanks to the inflow of private remittance and financial assistance from other countries.

(4) Industries

When attention is turned to the labor force of various industries in Tonga, the agricultural and fisheries industry accounts for 49.1%, ranking top, and the manufacturing, construction, and transport and communications sectors, even when combined, account for as little as 15.9%.

As shown here, in this country the primary industry centering around agriculture predominates. Agriculture is the biggest industry in Tonga

comprising about 30% of GDP. The main agricultural produce includes squash, vanilla, water melon, coconut products, banana and root crops.

(5) Trade

Tonga's trade has constantly been in the red, which is compensated for by the remittance by Tongan emigrants from abroad, tourist business incomes and financial aid from foreign countries.

Major exports are agricultural and fishery produce representing 63% of the total export amount and it includes processed agricultural products, such as coconut oil, fishers (e.g., tuna and sea bream), root crops, squash, vanilla and banana. Other exported goods include textile products, wooden goods and general merchandise.

As for imports, food stuffs, beverages, raw materials for industrial use, gasoline, diesel oil, machinery and transport machinery make up the list of top imported goods.

2.2 GENERAL SITUATION OF MARINE TRANSPORTATION AND FOREIGN TRADE

2.2.1 Marine Transportation

The shipping industry is the most important sector for the Kingdom of Tonga, which is isolated from countries of main trading partners and is an archipelagic country made up of 170 islands. The ports for foreign trading of Tonga are the Ports of Nuku'alofa on Tongatapu Island and Neiafu on Vava'u Island.

Tongatapu Island is a main island of the group of Tongan islands and accommodates peoples of 67% of total population of Tonga. The Port of Nuku'alofa, situated in the Nuku'alofa city of the capital of Tonga in the Tongatapu Island, is the largest port for international trade of Tonga.

Although the trade volume at the Port of Neiafu is as little as 3 to 6% of the cargo and container volume handled at the Port of Nuku'alofa, it is located in the center of economy for Vava'u Island and other adjacent islands, and is developing as an international resort base for ocean-going yachts.

Table 2-2-1 Ratio of handled container volume by port (%)

Port/Year	1989		1990		1991	
	Import	Export	Import	Export	Import	Export
Nuku'alofa	97	97	97	97	98	96
Neiafu	3	3	3	3	2	4

Source: Tonga Ports Administration Dept. & Asia Development Bank

Inter-island ferry services of Tonga are provided centering around the Port of Nuku'alofa, supporting vigorous exchanges of local islanders and passengers.

(1) International shipping

Many of the vessels engaged in international trade with Tonga call the Port of Nuku'alofa. The total numbers and tonnages of vessels by type general cargo ship, container ship, oil tanker, gas carrier, passenger ship and

other ships including naval ship (for carriage of soldiers), survey ship and deep-sea fishing boat for years from 1989 to 1992 are shown in Table 2-2-2.

Table 2-2-2 Ships which call at Port of Nuku'alofa (1000 tons)

Year	Cargo		Tanker		Passenger		Others		Total	
	No.	GRT	No.	GRT	No.	GRT	No.	GRT	No.	GRT
1989	101	565	46	89	9	176	10	11	166	841
1990	121	567	29	32	6	98	20	27	176	724
1991	131	606	32	32	8	188	19	11	190	837
1992*	130	-	29	-	4	** -	23	-	186	-

Source: Tonga Ports Administration Department

Note: * The figure for 1992 is not completed.

** The figure includes 69,052 gross tons for the Queen Elizabeth-II, which stayed at anchor off port mainly owing to no tug boat available.

Vessels shown in Table 2-2-2 come alongside Nos.1 and 2 berths, Queen Salote Wharf or moored to the Touliki Tanker mooring buoys. The frequency of entry by foreign vessels is approximately once every 3 days in the case of freighters and once every 10 days in the case of tankers.

Table 2-2-3 The Largest ship which call at Port of Nuku'alofa (Unit: GRT)

Year	Cargo	Oil/Gas Carrier	Passenger
1989	17,787(USA)	8,322(Japan)	37,845(Bahama)
		8,332(Panama)	
1990	17,787(USA)	3,748(NZ)	24,980(USSR)
1991	17,787(USA)	2,602(Vanuatu)	38,047(Bahama)
1992	12,214(Greece)	2,602(Vanuatu)	69,052(England)
			20,606(Bahama)

Source: Record of ships' arrivals and departures by Tonga Ports Administration Department

Note: The ship's nationality is shown in parenthesis.

Large-sized vessels which used Nos.1 and 2 berths in and after 1989 are the freighter California Star of 17,789 gross tons (No.1 Berth) and the freighter Capricornia of 6,373 gross tons (No.2 Berth). A large sized tanker which entered in 1989 came alongside No. 2 berth.

(2) Foreign-going vessels registered in the Kingdom of Tonga.

The foreign-going vessels registered in the Kingdom of Tonga are shown in Table 2-2-4.

Table 2-2-4 Registered fleet of ships in Tonga

Ship's name	Owner / Operator	Year built	GRT	Type
FUA KAVENGA	Tonga/SCP	1979	3,841	Cargo
SAMI-3	Sami Ltd	1972	1,599	Cargo
MOANA-2	Sami Ltd	1964	466	Cargo
TIMO	Sami Ltd	1949	424	Cargo
MAGELLAN	Gaspac Ship	1967	563	LPG Tk
ANDREA COSARI	Gaspac Ship	1969	1,321	LPG Tk
ALBA CORE	Bernard Blocker	1952	253	Cargo
MATAORA	Saturn Ship	1952	298	Cargo
LULU TAHI	Rederi	1973	206	Ferry

When the numbers of calls at the Port of Nuku'alofa by these vessels from 1989 to 1992 are checked using the record book of vessels arrivals and departures of the Ports Administration Department, the Fua' Kavenga and Sami-3 are prominent with 33 times and 30 times respectively.

Table 2-2-5 Decomposition of cargo handling (Unit: Million T$)

Items/Year	1989		1990		1991	
	M. T$	%	M. T$	%	M. T$	%
IMPORT by						
Tongan ship	11.32	16.6	17.19	21.8	17.36	22.6
Non Tongan ship	40.66	59.5	55.86	70.7	53.89	70.2
Air cargo	15.96	23.4	5.69	7.2	5.37	7.0
Post parcel	0.40	0.5	0.25	0.3	0.19	0.2
Total	68.34	100	78.99	100	76.81	100
EXPORT by						
Tongan ship	0.98	8.0	1.50	9.8	1.76	8.2
Non Tongan ship	3.77	31.0	7.89	51.6	14.14	65.9
Air cargo	7.43	61.0	5.91	38.6	5.55	25.9
Post parcel	-	-	-	-	0.01	-
Total	12.18	100	15.30	100	21.46	100

Source: Tonga Statistics Department, Foreign Trading Report

(3) Inter-island marine transportation

The Kingdom of Tonga consists of 170 islands, of which 36 are inhabited by people. Although there is a regular flight service by small aircraft between the islands of Vava'u, Ha'apai and Tongatapu, it is auxiliary as a transportation means from the viewpoint of its loadable weight and fee.

Tonga depends on marine transportation for moving of many of the islanders and most of the commodities for daily life. Here, the current situation of domestic vessels is described on the basis of data derived from the Tonga Coastal Shipping Statistics.

The major ports which vessels engaged in the home trade visit are the following eight, functioning as terminals for inter-island traffic and transportation:

Table 2-2-6 Ports for inter-island transportation service

Island	Ports
Tongatapu Is.	Nuku'alofa
Vava'u Is.	Neiafu
Ha'apai Group	Pangai
"	Ha'afeva
"	Nomuka
'Eua Is.	Nafanua
Niuatoputapu Is.	Falehau
Niuafo'ou Is.	Futu

Source: Tonga Statistics Department,
Coastal Shipping Statistics

The number of domestic trade vessels visiting these ports, sum total of tonnage (net tonnage) of freighters, number of passenger ships, cargo weight are displayed in Table 2-2-7. Each figure shows the sum total of arrivals and departures.

Table 2-2-7 Inter island shipping traffic

Items / Year	1989	1990	1991
Total ships arrival & departure			
Nuku'alofa	1229	1104	1131
Neiafu	158	230	183
Nafanua	580	734	1033
Falehau	24	36	38
Futu	18	16	16
Ha'apai	699	937	889
Total	2708	3057	3290
Total of Net ton.			
Nuku'alofa	53016	63931	51454
Neiafu	33748	43101	37213
Nafanua	9781	11417	11457
Falehau	4842	7436	9758
Futu	3748	3720	4410
Ha'apai	101765	142505	130380
Total	206900	272110	244672
Total of passengers			
Nuku'alofa	44989	37735	35461
Neiafu	13070	10624	9883
Nafanua	15028	19467	31999
Falehau	1170	830	768
Futu	738	207	114
Ha'apai	60794	57742	58786
Total	135789	126605	137011
Total of cargo(ton)			
Nuku'alofa	11531	11103	9479
Neiafu	7891	8144	5256
Nafanua	608	1538	3481
Falehau	714	1986	618
Futu	835	607	70
Ha'apai	34053	35743	28973
Total	55632	59121	47877

Source: Tonga Statistics Dept., Coastal Shipping Statistics

The figures of Ha'apai is the total of three ports of Pangai, Ha'afeva and Nomuka. The details of the three ports of the Ha'apai Group are as shown in Table 2-2-8. The figure here shows only arrivals, and the total of arrivals and departures becomes two times the figure.

Table 2-2-8 Marine transport in Ha'apai group

Port / Year	1989		1990		1991	
	Ships	Tons	Ships	Tons	Ships	Tons
Pangai	182	25492	265	41086	215	31959
Ha'afeva	110	23437	140	27986	173	32210
Nomuka	57	1785	64	2283	57	1254

Notes Ships: Total number of ships in port.
Tons: Total of net ton of ships.

Regarding the eight ports in the group islands of Tonga, Nuku'alofa ranks first, Nafanua comes second followed by Pangai and then Ha'afeva in this order when arranged in the descending order of the number of vessel arrivals and net tonnage.

As Niuatoputapu and Niuafo'ou are located in the northernmost end of the Kingdom of Tonga, the annual numbers of arriving vessels are slightly less than 20 and 8 respectively. Vessels serving this area is of a size of only 400 to 600 gross tons.

Registered home trade vessels engaged on inter-island voyages and those temporarily chartered are 11 in number. Table 2-2-9 shows their ship owners and main service routes.

Table 2-2-9 Trade routes for domestic vessels

Ship's name	Ship's owner	Main trade route
OLOVAHA	SCP	TBU/HPA/VVU
NGALUTA'ANE	"	TBU/EUA
SIUPELIKOULA	Tonga Church	TBU/HPA
FOKOLOLO-'OE-HAU	Pacific Trade	TBU/HPA/VVU
LOTO HA'ANGANA	"	"
PULUPAKI	"	TBU/EUA
VAOMAPA	Tofa Ramsey	TBU/EUA
KAO	SCP	
ALO'OFA	Church	
MU LATE	Defence Services	Chartered ship
PAKO	Ministry of Education	Chartered ship

Route: TBU: Tongatapu, HPA: Ha'apai, EUA: Eua
SCP: Shipping Corporation of Polynesia
Source: Tonga Ports Administration Dept.

Table 2-2-10 Particulars of domestic ships

Ship's name	Length	Draf	GRT	Passen	Carg	Built	Type
	m	m	ton	No.	ton	year	
OLOVAHA	43.8	3.6	707	350	150	1981	S
NGALUTA'ANE	14.6	1.9	28	60	7	-	S
SIUPELIKOULA	16.7	1.7	69	57	8	1981	T
FOKOLOLO-OEHAU	28.5	2.0	253	250	70	1971	S
LOTO HA'ANGANA	32.6	3.1	742	290	40	1976	S
PULUPAKI	20.4	2.0	75	110	30	1991	S
VAOMAPA	16.3	1.7	34	48	8	1963	T
KAO	18.5	1.4	56	-	30	1976	S
ALO'OFA	13.6	1.5	-	32	4.5	-	T
MU LATE	30.0	1.5	-	-	45	-	S
PAKO	14.0	1.0	-	60	1	-	GRP

Source: Ministry of Marine
S: made of steel
T: made of timber
GRP: made of glass reinforced fiber

The Vaomapa, old and decrepit with approximate 30 years of age, is engaged in the short haul Eua route. It seems that a considerable amount of repair work has been done to both hull and engine.

2.2.2 Present situation of trade

The structure of Tonga's trade is observed in terms of its progress by using Tonga's development plans.

(1) Export

The conspicuous change during the period of the Fifth Development Plan from 1985 to 1990 was that the export of coconut products, which first accounted for 57%, dropped to 7% in 1990.

Instead, commodities which have come to make up the top lists of exports are agricultural products including vanilla, root vegetables, squash, fish and industrial products. The export of squash, in particular, to Japan, which started in the 1989/1990 period, drastically grew from T$2 million for 1989/90 to T$4.8 million for 1990/91 and T$ 12 million for 1992, ranking top as an export commodity from Tonga. The ratio, to the total amount of exports, of agricultural products was 80% for 1984/85 but it dropped to 50% for 1989/90, strongly suggesting the structural change in the economy of Tonga.

The export of fishes increased up to 1988/89 and reached as much as T$2 million. It is expected to grow further in the future because of the development of tuna fishing.

Industrial products, centering around knit wear, have increasingly been exported and came to make up 30% of the total amount of export for 1989/1990.

These facts show the shift of the industrial structure from agriculture to fishery and manufacturing industries.

Table 2-2-11 Selected Export Value & Volume (unit: M.T$=Million T$)

Items / Year	1986/87	1987/88	1988/89	1989/90	1990/91
Totals (FOB)	10.36	8.83	12.09	11.55	14.57
Banana (M.T$)	1.734	0.774	0.444	0.145	0.010
" (ton)	4974	1795	971	325	22
Coconut oil(M.T$)	1.869	1.318	0.996	0.676	0.439
" (ton)	4342	2084	1533	1230	1172
Coconut (M.T$)	0.687	0.425	0.328	-	0.002
Fish (M.T$)	1.243	1.275	2.053	1.369	1.183
" (ton)	632	982	387	421	269
Melon,water(M.T$)	0.002	0.016	0.006	0.015	0.118
Melon (ton)	9.0	18.0	9.3	28.6	204.3
Root crops (M.T$)	0.269	0.531	0.860	1.977	0.698
Squash (M.T$)	-	-	0.409	1.983	4.838
" (ton)	-	-	970	3967	6246
Vanilla (M.T$)	1.418	1.191	2.504	0.830	3.320
Manufactured (M.T$)	1.420	1.860	3.060	3.420	2.420
Commodities (M.T$)	1.718	1.440	1.430	1.135	1.542

Source: National Reserve Bank of Tonga

Table 2-2-12 Composition of Exports (%)

Items / Year	1986/87	1987/88	1988/89	1989/90	1990/91
Agriculture, Fish	51.7	47.7	54.6	54.7	69.8
(Squash)	-	-	(3.0)	(17.2)	(33.2)
(Others except squash)	(51.7)	(47.7)	(51.6)	(37.5)	(36.6)
Manufactured	48.3	52.3	45.4	45.3	30.2

Notes: Manufactured goods included coconut oil
Source: National Reserve Bank of Tonga

(2) Import

Table 2-2-13 shows the movement of the amount of imports by Tonga by assuming the figure for 1980, the starting year of the Fourth Development Plan, as 100.

Table 2-2-13 Import Growth (1980 = 100)

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
Index	100	103.3	114.7	108.1	111.8	119.5	103.1	113.6	108.4	102.1

Source: Tonga's 6th Five-Year Development Plan

The average annual increase of 3.6% from 1980 to 1985 almost corresponded to the economic growth of 3.4%. Ever since 1986 imports have moderately progressed despite the dramatic inflation in 1986. The ratio of consumer goods increased until 1986 but on the contrary, capital goods decreased in imports.

In contrast to the increased import of capital goods in 1987 and 1988, production goods decreased in ratio. The increase in the import of consumer goods suggests that the economy could not supply sufficient sources for the investment in production.

Table 2-2-14 Principal Imports Value (Million Pa'anga)

Items / Year	1986/87	1987/88	1988/89	1989/90	1990/91
Total (CIF)	65.57	68.69	68.86	72.71	79.82
Food, Live animals	17.52	20.59	19.62	21.11	20.19
Crude material	2.67	2.50	3.30	3.43	4.13
Fuel, Lubricant	6.84	6.67	7.28	8.52	12.39
Chemicals	5.23	4.92	4.00	4.63	5.05
Manufactured	14.88	12.43	13.27	13.55	13.48
Machinery *	12.89	14.94	14.75	13.74	14.86
Misc. **	5.29	6.33	6.10	7.46	9.06
Commodities	0.24	0.32	0.49	0.26	0.66

Notes: * Machinery and transport equipment
** Miscellaneous manufactured articles

Source: National Reserve Bank of Tonga

(Pa'anga = T$)

(3) Trading partners

Australia and New Zealand always give influence on the whole trade of the Kingdom of Tonga: As to exports, New Zealand has imported almost all bananas, water melons and root vegetables produced in Tonga, and Australia together with the U.S.A. imported a large amount of coconut oil and vanilla. Exports of fish to the U.S.A. have gradually increased. Although in connection with imports, New Zealand and Australia are particularly prominent, Japan is gaining importance.

Table 2-2-15 Direction of Exports (Million Pa'anga)

Year	Total	Australia	Fiji	Japan	N.Z.	USA	Others
1986/87	10.36	2.76	0.06	0.03	4.18	2.53	0.27
1987/88	8.83	2.18	0.30	0.14	3.39	2.37	0.46
1988/89	12.09	2.31	0.35	0.86	3.58	3.50	0.46
1989/90	11.55	2.61	0.28	2.00	4.17	2.46	0.05
1990/91	14.57	2.01	0.30	4.90	2.43	4.37	0.56

N.Z. : New Zealand

Source: National Reserve Bank of Tonga

Table 2-2-16 Direction of Imports (Million Pa'anga)

Year	Total	Australia	Fiji	Japan	Singapo	N.Z.	USA	Others
1986/87	65.57	17.35	4.99	7.18	23.78	1.81	2.58	7.89
1987/88	68.69	18.66	6.59	5.42	23.70	3.45	3.83	7.04
1988/89	68.86	17.73	7.38	5.37	20.39	4.08	7.36	6.55
1989/90	72.71	17.00	9.46	4.98	21.97	3.62	9.04	6.63
1990/91	79.82	17.57	10.05	6.22	25.91	5.51	7.55	7.01

Note: 'U.S.A.' includes Hawaii and American Samoa.

Singapo: Singapore

Source: National Reserve Bank of Tonga

2.3. OUTLINE OF PORT AND WHARF

2.3.1 Port and wharf facilities

The Kingdom of Tonga consists of three groups of its islands and the major ports are located as shown in the Table 2-3-1.

Table 2-3-1 Port in the Tonga

Islands	Name of Port	International	Domestic
Tongatapu Group	Nuku'alofa	o	o
Ha'apai Group	Pangai		o
"	Ha'afeva		o
"	Nomuka		o
Vava'u Group	Neiafu	o	o
Eua Island	Nafanua		o
Niuatoputapu Island	Falehau		o
Niuafo'ou Island	Futu		o

International: Service port for international trade
Domestic : Service port for domestic trade

Among the ports as mentioned above, customs ports open to international trade are Nuku'alofa of Tongatapu Island and Neiafu of Vava'u Island only.

The port of Neiafu, as illustrated in Fig. 2-3-1, has a very narrow channel leading to the wharf with its shallow depths, making it imperative for vessels over 115 m length to anchor at anchorage off port for cargo handling operations.

As the port has a relatively large area up to the anchorage area, it has records of large cruise ships (Queen Elizabeth II) anchoring here. For the port, there is a development plan on the national level to improve the wharf facilities and another to develop it as a resort base for yachts.

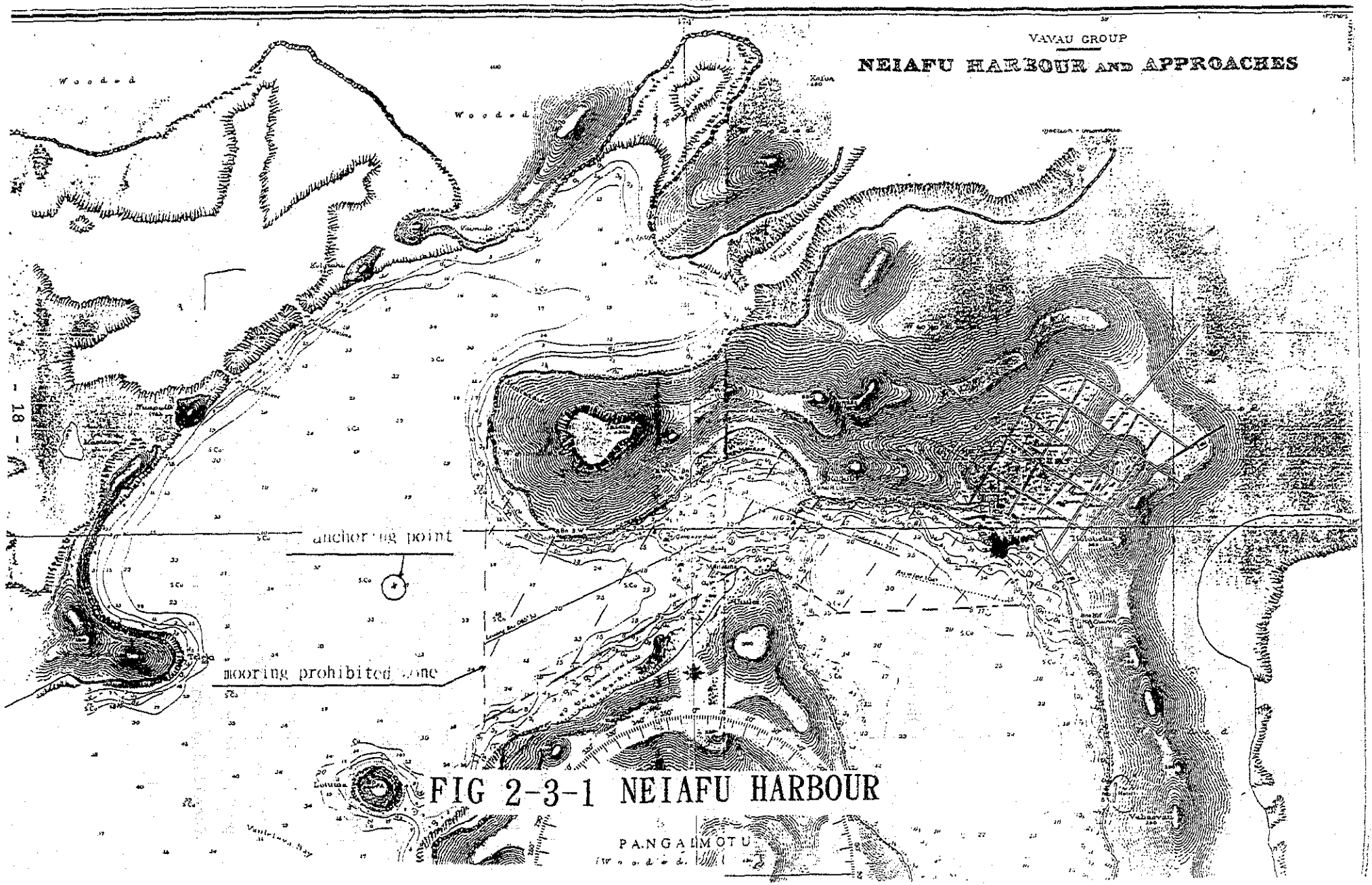


FIG 2-3-1 NEIAFU HARBOUR

(1) Port of Nuku'alofa

It is located in the center of the north coast of the Tonga's main island, Tongatapu, open to due north. Although it faces high seas, it is a port with calm seas as it is surrounded by coral reefs.

It has three approach channels but foreign-going vessels mainly use only Ava Lahi, Its main channel, which was wire dredged up to 12.8 m in depth in 1942. The sub-rout provided west from Ava Lahi is used for day time only. The other two passages (Egeria Channel and Piha Passage) are used by vessels for domestic trade (see Fig. 2-3-2).

Tidal streams flow from west to east along the wharf constantly at approximately 0.3 knots up to an approximate depth of 6 m and circulate through the bay. The normal tidal range between flood tide and ebb tide is 1.2 m at the maximum.

The port is arranged as shown in Fig. 2-3-3 and 2-3-6, and the following facilities are actively used at present:

Queen Salote Wharf equipped with berths for foreign-going vessels and relatively large domestic trade vessels,
Faua Harbour Basin for yachts, small craft and fishing boats, and
Touliki Tanker Bollard as a tanker berth.

In addition, the port has the Vuna Wharf and Yellow Pier but they are not used for ordinary ships.

(a) Queen Salote Wharf (see Fig. 2-3-4)

The Queen Salote Wharf was constructed in 1967 as the sole international trade port in Tonga. The wharf sustained great damage from an earthquake in 1977 and sinkage due to the heavy weight of concrete. It was repaired in 1986 under the assistance of Australia, and have been kept as it is.

The wharf, whose arrangement is shown in Fig. 2-3-4, has four berths, a container yard, bonded warehouse, quarantine office, administration office, workshop for maintaining cargo handling equipment, etc.

Nos.1 and 2 berths are for foreign-going vessels and Nos.3 and 4 for

domestic trade. The office for the Ports Administration Department is located almost in the center of the port.

The port as a whole is incomplete and planned to be improved and developed gradually in the future.

Table 2-3-2 Queen Salote Wharf

Item / Berth	No.1	No.2	No.3	No.4	TANKER BOLLARD
Purpose	Foreign		Domestic		Foreign
Length(m)	93	110	100	50	Anchor
Depth(m)	12.5	10.0	5.5	5.5	10.0
Direction	90	45	147.5	57.5	-
Ship leng.(m)	250*	140	60	40	10,000GRT

Purpose: Foreign = Foreign-going vessel
Domestic = Domestic service vessel
Length : Berth length
Depth : Water depth at berth
Direction : Direction of berth (degree)
Ship leng. : Acceptable max. length of vessel
Anchor : Anchor mooring

Note * : It has a record of accommodating a vessel of 244 m in overall length.

Source : Tonga Ports Administration Dept.

(b) Current situation of Faua Harbour Basin

The original Faua Harbour Basin was constructed by the U.S.A. during World War II, and extended by Australian aid in 1986/87. The outline is summarized as following:

Extended eastern portion

Berth length : 30 m, 260 m, 40 m, 125 m, 30 m
Depth : 3.5 m (narrow entrance limitation: 2.6 m)
Direction : 17 107 17 107 17 degree each
Features : The entrance is 10 m in width and 2.6 m in depth. It is used by many fishing boats and tourist boat for

cruising.
Equipped with 100 ton slipway and 10 ton boat lift, fish market and ice producing factory.

Original western portion

Berth length : 55 m
Depth : 1.5 - 2.0 m
Direction : 17 degree
Features : As it is old, it needs repairs.
Equipped with 15 ton slipway.

(c) Vuna Wharf

Berth length : 65 m
Direction : 90 degree
Features : The pier portion sustained damage owing to a cyclone and earthquake and it is abandoned now.

(d) Yellow Pier

Berth length : 25 m
Water depth : 2.7 m
Direction : 90 degree
Ship length : Acceptable vessel length max. 40 m
Features : The concrete surface was scoured out by a cyclone wave attack and it is abandoned now.
The ramp completely collapsed.

(2) Cargo handling facilities, etc.

Cargo handling operations at wharves are carried out by using cranes and other cargo gear installed on board vessels and special installations are not provided for the port.

(a) Facilities

The port is only equipped with facilities to shift cargo on the shore. Such facilities are as shown in the Table 2-3-3.

Table 2-3-3 Equipments of Nuku'alofa Port

Equipment	Manufacturer	Capacity	Number of set
Forklift	Clark	25 tons	2 units
"	Hyster	7 tons	1 unit
"	"	5 tons	2 units
"	"	3 tons	11 units
Tractor	Ford	65 HP	2 units
Trailer	"	22 tons	3 units
Mobile fire pump	Ford	1,600 l/min	1 unit
Air compressor	Atlas Copco	7 bars	1 unit

In addition, container lifting wire, cargo hooks, shackles, pallet lifting wire, trays, etc. are provided. There is no special fire fighting equipment, and as a fire hydrant for the wharf, water pipes under the control of the municipal office is arranged.

(b) Cargo handling operations

Shipboard cargo handling operations are carried out by three stevedoring companies (Royco, Joes Stevedore, Union Maritime Service) and the administration from the wharf to the port gate is carried out by the Master Porter designated by the government. Approximately 40 longshoremen are registered now. Most of the long shoremen are employed on a daily contract basis, but they are continuously employed by Master Porter.

(3) Port and harbour regulations

(a) Pilot charges

The pilotage is charged separately on arrival and on departure without reference to actual use, with the minimum charge being T$50 and the maximum T$500. The pilot detention charge is T$50 per hour waiting a vessel, regardless of day or night, up to T$500 per day.

(b) Service charges (unit* T$/gross ton)

Table 2-3-4 Harbour, Light & Pilotage Duties

Ship	Harbour dues	Light dues	Pilotage dues
Cruise vessel	0.05	0.025	0.055
International	0.06	0.06	0.055
Local/Yacht	2.75/year or 0.3/month	1.75/year or 0.2/month	-

International: Foreign-going freight & passenger ship

Domestic : Local coasting vessel & yacht

In respect of other vessels, half of the total dues required of cargo and passenger vessels is payable. Vessels calling at a second and subsequent port in Tonga in the course of the same voyage, half the dues otherwise payable is payable.

(c) Mooring and unmooring charges

For each operation of mooring or unmooring when service is rendered, the following charges are applied.

Table 2-3-5 Mooring & Unmooring Charge (Unit:T$)

Vessel	Normal working time	Outside normal working time
Not exceeding 1,000 GRT	30	50
1,000 to 15,000 GRT	90	110
Exceeding 15,000 GRT	110	140

(d) Removal charges

Pilotage removal charge of T$100 apply only if a pilot is used. This charge covers both outward to anchor and return.

Mooring and unmooring : A rate of 25% of the normal mooring and unmooring rates apply to vessels required to move to anchor.

(e) Freshwater charges

Freshwater charges are collected T$3 per 1 m^3 for foreign-going vessels including yachts, and in the case of home trade vessels, labor charges are added to water charges.

(f) Wharf cleaning charges (unit: T$)

Table 2-3-6 Cleaning charge (Unit: T$)

Cruise ships	15/ call
Freighters (without discharging cement)	25/ call
Freighters (discharging cement)	100/call
Coasting vessels less than 100 GRT	3/ call or 200 per calendar year
Coasting vessels more than 100 GRT	8/time or 300 per calendar year

(g) Mooring at Faua Harbour Basin

All vessels using the Faua Harbour Basin are to pay charges for each occasion or for three months.

Table 2-3-7 Mooring Charge in Faua Harbour Basin (Unit:T$/3-month)

Less than 5 m in length	6
5 to 8 m	12
8 to 12 m	24
12 to 15 m	36
15 m or more	45

(h) Regulations for entering vessels

Vessels enter the Port of Nuku'alofa are required to inform the Harbour Master 24 hours in advance of their estimated time of entry into the main channel after passing the Ava Lahi Passage. Vessels shall inform the Harbour master 2 hours before final ETA (Entry Time of Arrival) to pilot station on VHF channel 16 and CH 12, 13, 09, 06 for port operation.

Foreign-going vessels arriving at the Port of Nuku'alofa are strongly

recommended to take a pilot. The Ports Administration Department has two pilots and a berthing master. The pilot boat has a transceiver which is ready to use one hour before vessel's entry to the port.

The pilot boarding stations for entering vessels are as follows:

Ava Lahi Passage: 2.5 miles northeast of Hakau Mama'o lighthouse (21°-00' S, 175°-13' W)
In the vicinity of No.3 light buoy in adverse weather.

Piha Passage : 2-3/4 miles east of the Narrows (21°-07' S, 175°-09' W)

No tug boat is used for assistance to berthing and unberthing of the vessels which call the Port of Nuku'alofa.

2.3.2 Arriving and Leaving Vessels

(1) Berthing and unberthing situations of large-sized vessels.
The study team made a survey, by observation at the Port of Nuku'alofa, into the situation of vessels arriving and leaving, and berthing and unberthing. Vessels entering the port are requested to notify the Harbour Master of the estimated time of passing the Ava Lahi Passage 24 hours in advance and wait for the pilot boat at the pilot boarding station.

Vessels enter the port under the pilotage of a pilot through the fairways as illustrated in Fig. 2-3-2.

(2) Unberthing condition of Socofl Stream (4,000 GRT, overall length of 113m):
The vessel, which entered the port early in the morning on November 30, left the port in the afternoon. How the vessel unberthed is illustrated in Fig. 2-3-5. The vessel's departure time was 15:15 hours and she left the port entering the fairway at 15:35 hours, about 20 minutes later.

(3) Berthing condition of Coral Islander (7,662 GRT, overall length of 155 m)
The vessel entered the port through the fairway as illustrated in Fig. 2-3-6 and came alongside No.1 berth at 11:00 hours on December 30. Despite winds of about 10 to 12 m/sec blowing out of the east and east-north-east

on that day, the vessel quietly came alongside the berth by skillfully going ahead and astern after dropping her anchor about 200 m off the berth (see Fig. 2-3-7). She completed mooring at 12:30 hours, taking about 1.5 hours for entering port.

(4) Cargo transfer operations by tankers

Tankers which enter the Port of Nuku'alofa are mainly small-sized foreign-going tankers loaded with LPG, gasoline or light oil.

Cargo handling operations are carried out in the procedure as illustrated in Fig. 2-3-8. a flexible hose, fixed to the unloading buoy leading to an oil transfer pipe, is connected to the vessel and transferred to the shore tank with ship's pumps. The capacity of the oil transfer pipe is 1,000 kiloliters per hour.

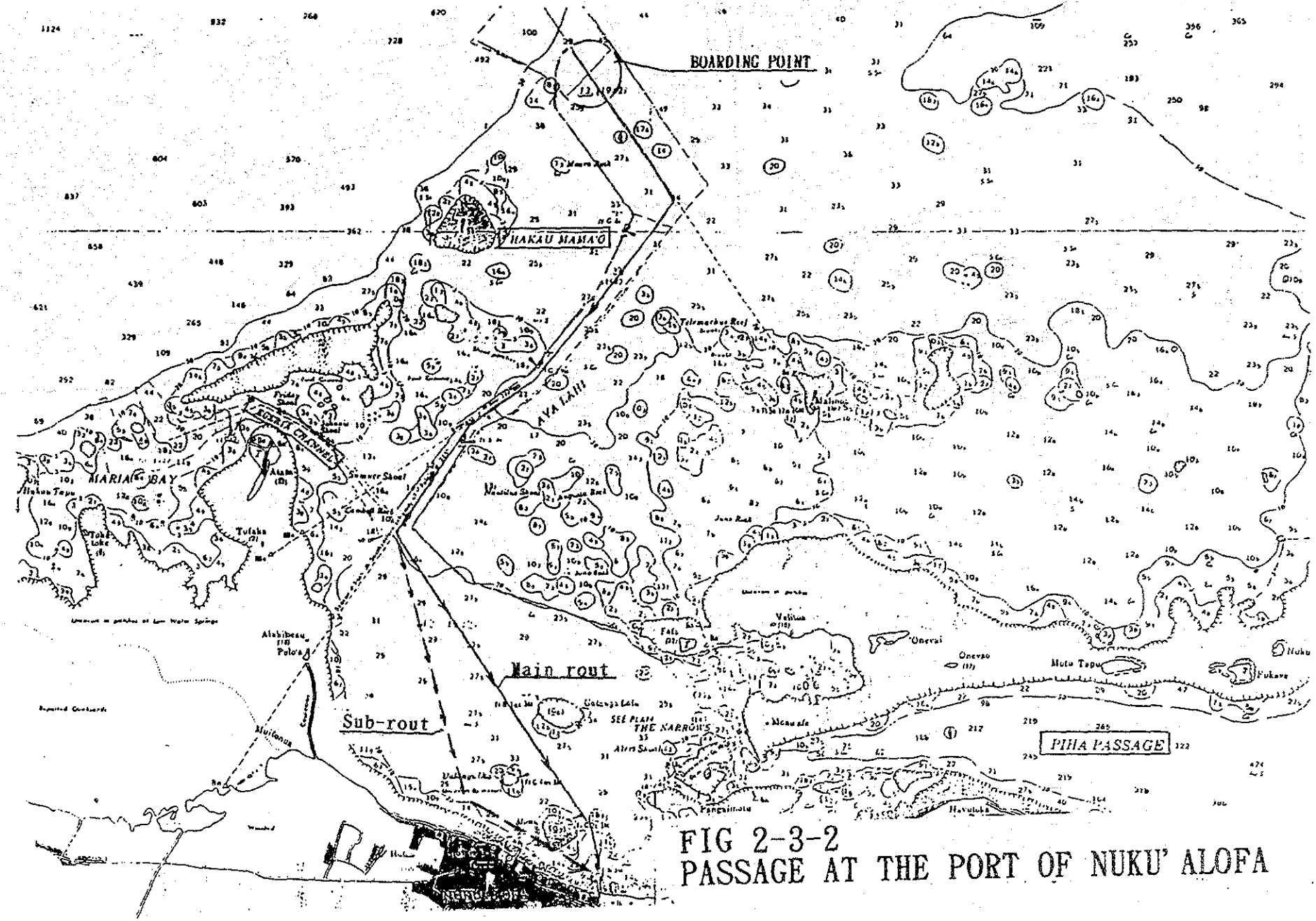


FIG 2-3-2
PASSAGE AT THE PORT OF NUKU' ALOFA

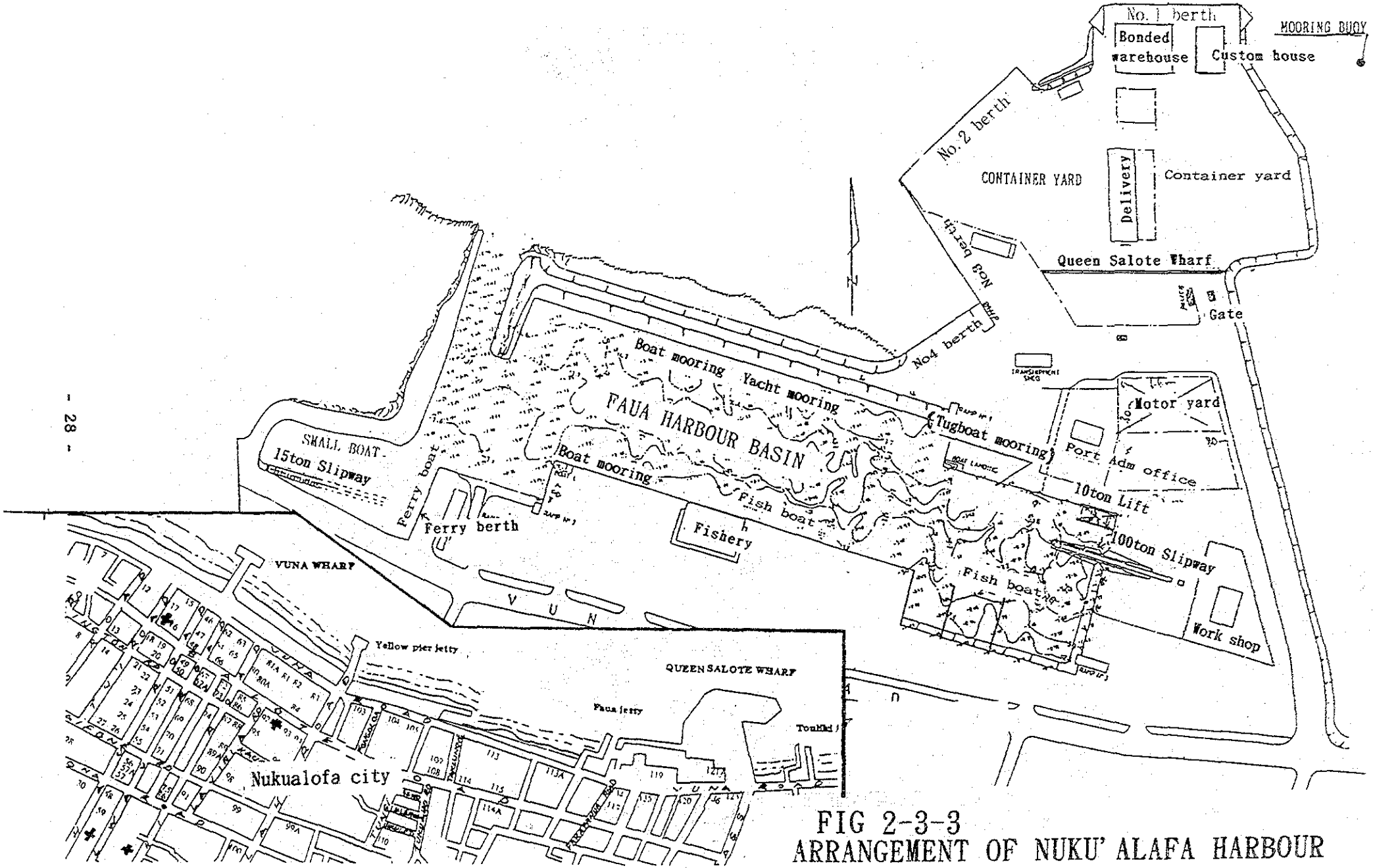


FIG 2-3-3
ARRANGEMENT OF NUKU' ALAFA HARBOUR

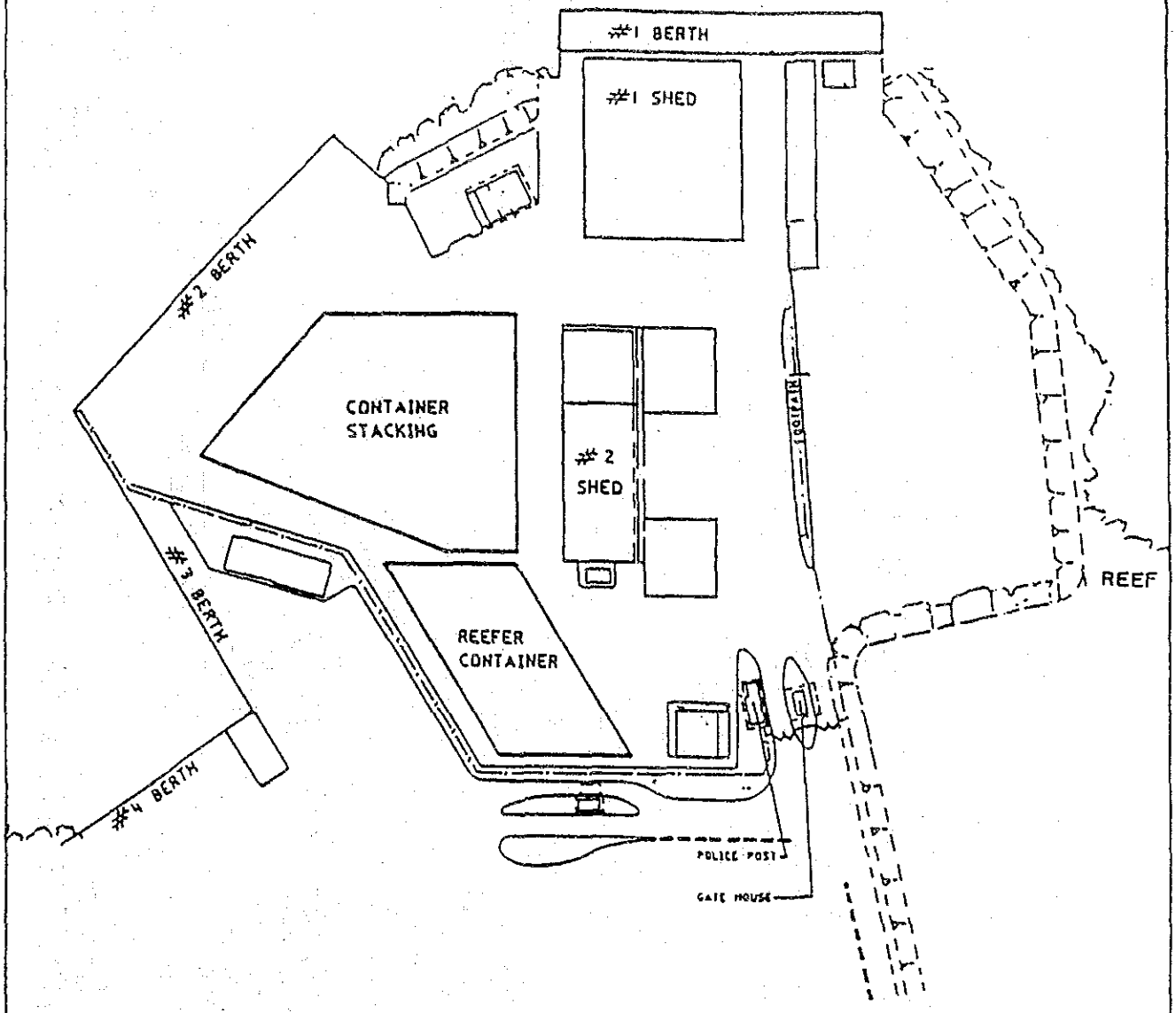


FIG 2-3-4
ARRANGEMENT OF QUEEN SALOTE WHARF

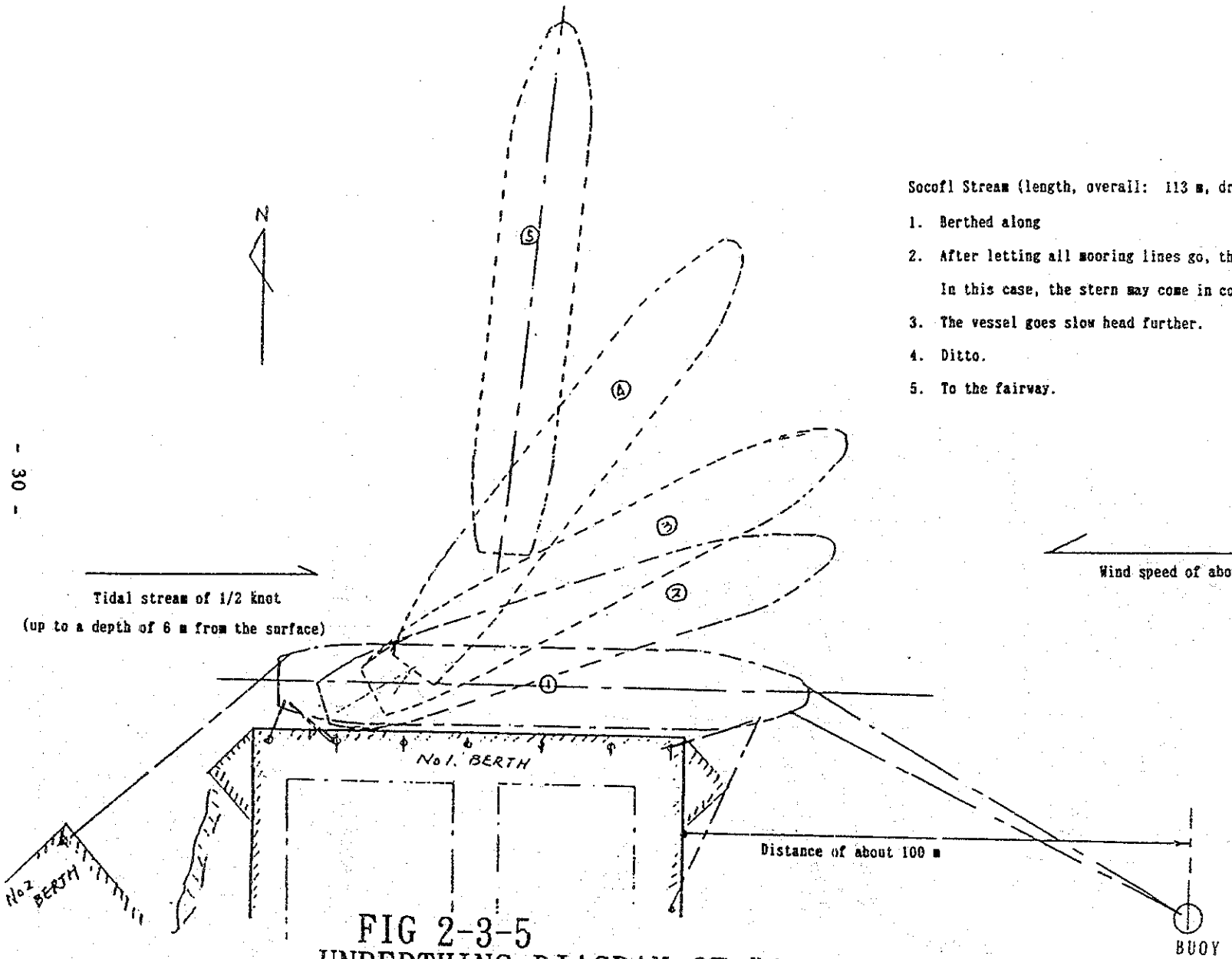


FIG 2-3-5
UNBERTHING DIAGRAM OF "SOCOFL STREAM"

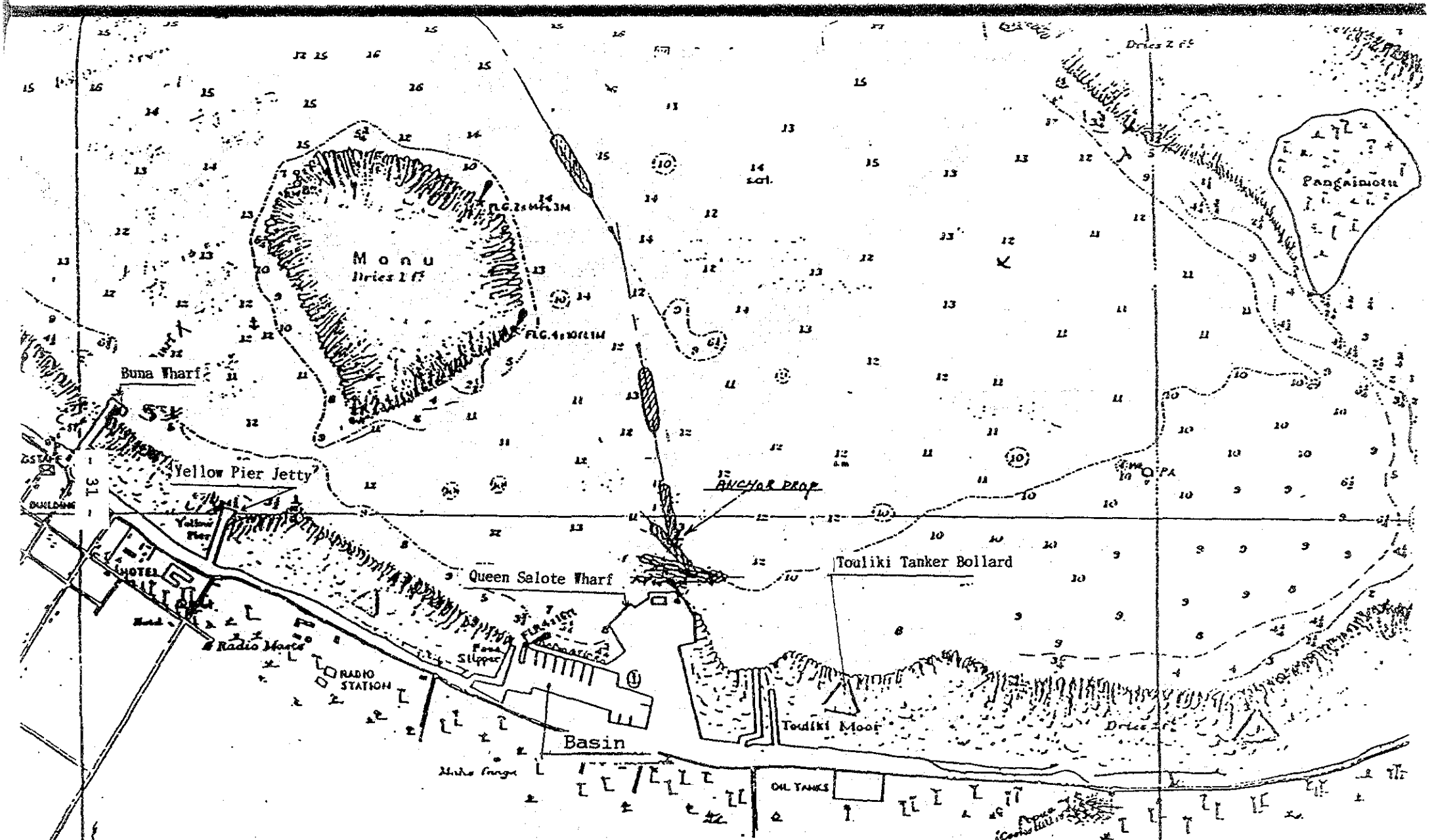
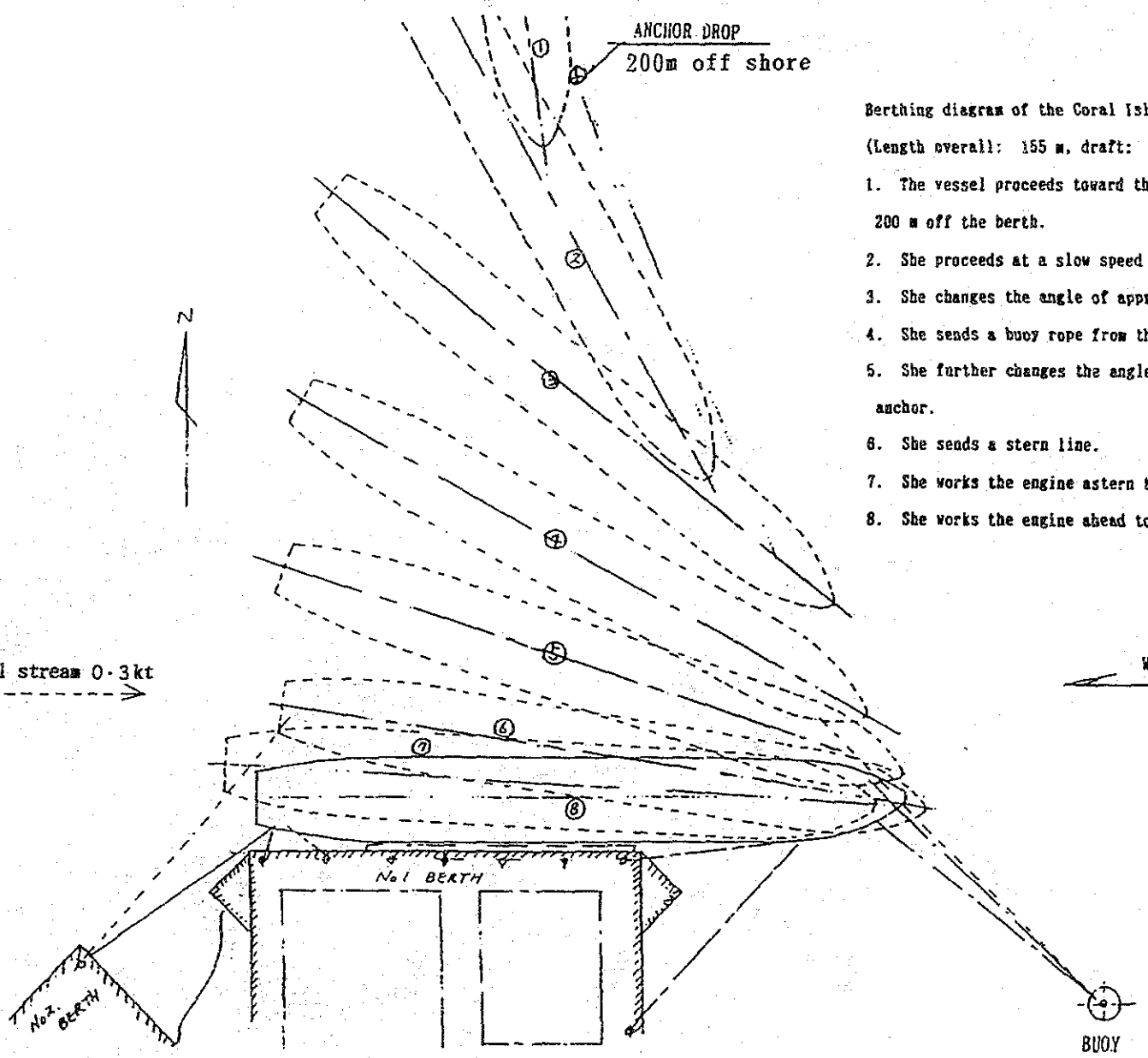


FIG 2-3-6
ROUTE OF "CORAL ISLANDER" IN PORT



Berthing diagram of the Coral Islander

(Length overall: 155 m, draft: 6 m)

1. The vessel proceeds toward the tip of No. 1 berth and drops her anchor about 200 m off the berth.
2. She proceeds at a slow speed by gradually letting go her anchor cable.
3. She changes the angle of approach to the berth face by utilizing her anchor.
4. She sends a buoy rope from the bow about 60 to 70 m off berth.
5. She further changes the angle of approach to the berth face by utilizing her anchor.
6. She sends a stern line.
7. She works the engine astern to put the hull back.
8. She works the engine ahead to moor her in position.

FIG 2-3-7
BERTHING DIAGRAM OF "CORAL ISLANDER"

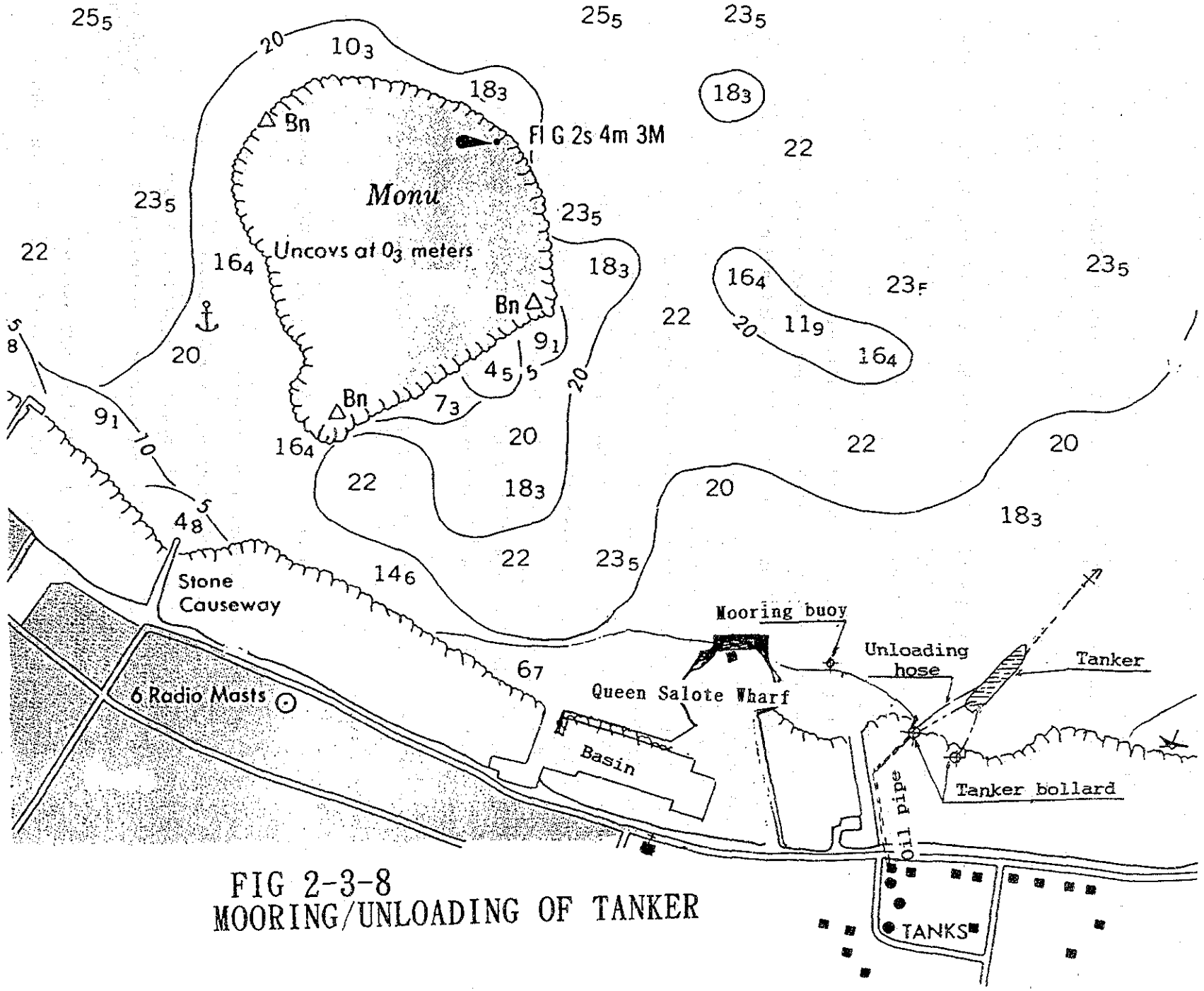


FIG 2-3-8
MOORING/UNLOADING OF TANKER

2.3.3 Managing Organization

(1) Administrative organization

The shipping industry and port and wharf administration are under the jurisdiction of the Ministry of Marine and the Ports Administration Department.

At present, the Prime Minister also serves as the Minister of Marine, the day to day business is entrusted with the Director of Marine. Items under the jurisdiction of the Ministry of Marine are:

Shipping policy (domestic and international shipping);
International conventions and standards concerning shipping;
Establishment of national regulations concerning shipping;
Employment and education of seafarers;
Marine administration and safety;
Carriage of passengers and cargo by the sea;
Registration of ships;
Inspection of ships;
Registration of seafarers;
Certification of seafarers;
Prevention of marine pollution;
Investigation of marine accidents

Ports Administration Committee deals with policy issues and Harbour Master does the day to day business.

Items under the jurisdiction of the Ports Administration Department are:

Planning of port and harbour development;
Budget control for the management of ports and wharves;
Allocation of berths for use and security of ports and wharves;
Operation and maintenance of ports, wharf installations and cargo handling facilities;
Control and supervision of cargo handling operations;
Statistical business concerning the operation of ports and wharves;

The Customs business is under the jurisdiction of the Ministry of Finance.

(2) Port and harbour control in Tonga

The international trade ports in Tonga are Nuku'alofa (Tongatapu Island) and Neiafu (Vava'u Island). Other major ports include Pangai, Ha'afeva, Nomuka (Ha'apai Island), Nafanua (Eua Island), Falehau (Niuatoputapu Island) and Futu (Niuafo'ou Island). These ports and harbours are all under the jurisdiction of the Harbour Master.

(3) Organization of Ports Administration Department

The Ports Administration Department was established in 1986 and administers functions concerning ports and harbours, and wharves. The responsible person is the Harbour Master, who is in charge of the operation of ports and harbours in Tonga.

The department is under the supervision of the Ports Administration Committee. This committee consists of the Prime Minister, Minister of Finance, Minister of Land, Survey and Natural Resources, Directors of Ministries of Marine, Works and Agriculture and the representatives of shipping companies and the Chamber of Commerce with Harbour Master Secretary. The Ports Administration Department has its office in the port area of Nuku'alofa and its organization is as shown in Figure 2-3-9. The figure in the parentheses shows the number of staff members.

The Tug boat Service Section (provisional name), which is in charge of the operation and management of the tug boat, is to be established under the Harbour Master.

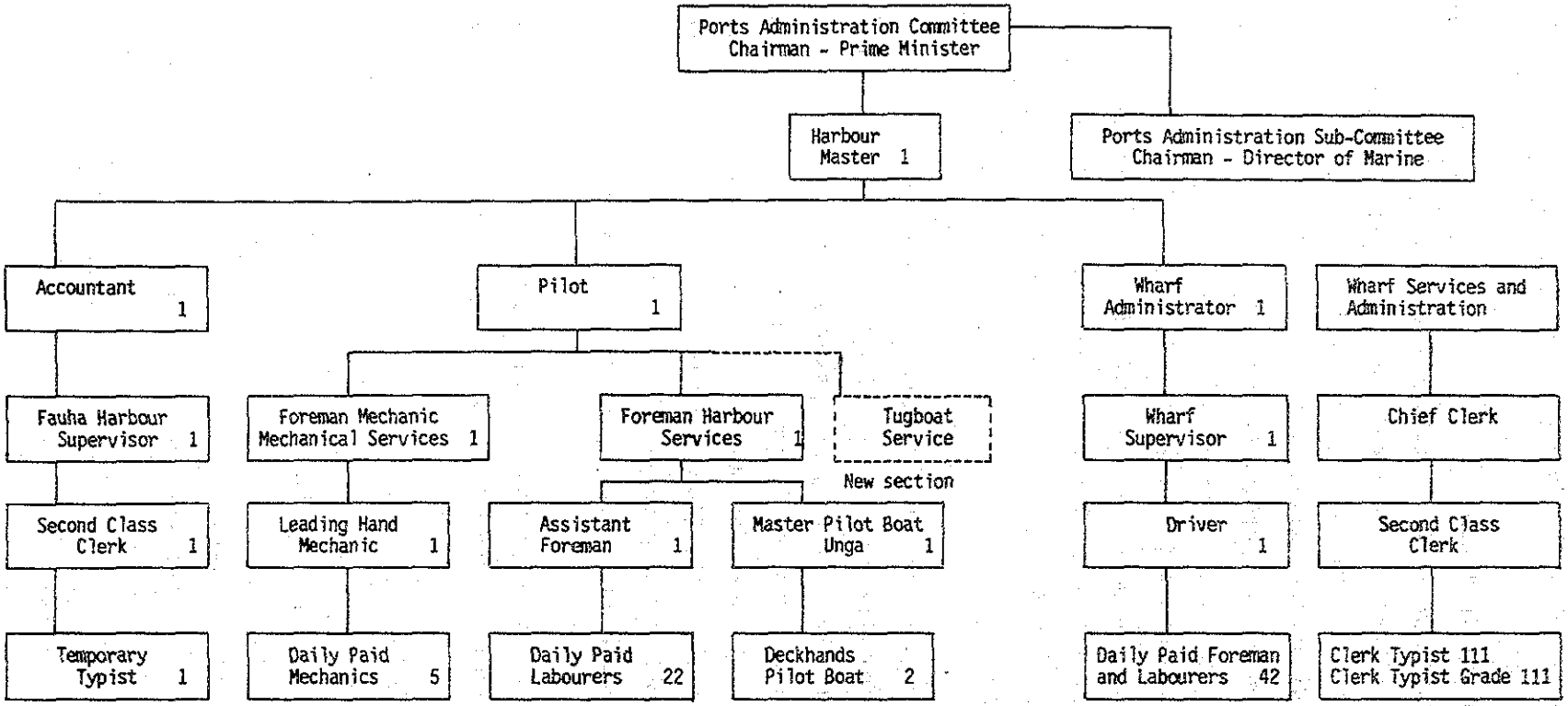


Figure 2-3-9 Organization of Ports Administration Department

(4) System to handle maritime safety measures

The division of administrative functions under the governmental jurisdictions concerning countermeasures against accidents such as fires in ports and harbours, shipboard fires, and marine pollution by oil and rescue operations from marine accidents:

On-shore activities to prevent and fight fire: Ministry of Police,
- Fire Services Department -

Activities to prevent and fight fire	
In wharf	: Ministry of Police
In harbour sea areas	: Ports Administration Dept.
Activities to prevent marine pollution	
Outside bays and land areas	: Ministry of Land
Inside bays and sea areas	: Ports Administration Dept.
Marine rescue activities	
Inside and outside Nuku'alofa and coastal areas	: Ministry of Police in cooperation with Ministry of Marine

(Ministry of Police: Ministry of Police, Prisons and Fire Services)
(Ministry of Land : Ministry of Land, Survey and Natural Resources)

The staff members engaged in the rescue operations are under the joint jurisdiction of the Ministries of Police and Marine and are conducting activities jointly. The expenses for these activities are funded by the budget of the Ministry of Police. The Ministry of Police owns ships as to patrol and carry out other activities for maritime safety; the Takuo (22 gross tons) and a boat (about 4 m in length). The Takuo is operated by the Ministry of Police.

Three patrol boats (approximate speed of 18 knots) are owned by the Ministry of Foreign Affairs and Defense and they are deployed for maritime rescue operations in rough weather upon the request of the Ministry of Police.

Other government department ships may be called upon to assist when required, example a plot boat and fishery boats.

2.4 GENERAL SITUATION OF SEAFARERS

2.4.1 Technical Level of Seafarers

(1) Qualifications of Seafarers in Tonga

By the 'Subsidiary Legislation (Shipping), 1988 Edition' of the Tonga Ministry of Marine, the qualifications of seafarers as crew members of ships are divided into the following kinds according to the navigational area and examinations to check skills are held for each qualification.

1. Sheltered water	Only in the Ports of Nuku'alofa and Vava'u
2. Master unlimited	Qualification as master of a vessel engaged on international and home trades
3. Mate unlimited	Qualification as chief mate of a vessel engaged on international and home trades
4. Master home trade	Qualification as master of a vessel engaged on home trade
5. Mate home trade	Qualification as chief mate of a vessel engaged in home trade or inter-island trade (excluding Ata, Niaufo'ou and Keppels)
6. Master restricted	Qualification as master of a vessel engaged in inter-island navigation (excluding Ata, Niuafo'ou and Keppels)
7. Engineer	There are qualifications in accordance with the above-mentioned divisions 1 to 6.

Seafarers are required to pass an examination corresponding to the navigation area of the vessel.

(2) Grade of seafarers

To gain qualifications as maritime officers for Tonga ships, following, shipboard experience is required in accordance with the current 1988 Shipping Legislation of Tongan government.

Class of officers	Sea service requirement
a) Able Bodied Seaman (AB)	: 3 years in which a 6 months course in the Tonga Maritime Polytechnic Institute is included.
b) Master Restricted (Minimum age 20)	: 4 years of which one year shall have been in the capacity of AB in a Foreign Trade vessel or 18 months in a similar capacity in Home Trade vessel.
c) Mate Home Trade (Minimum age 21)	: 5 years of which one year shall have been in the capacity not lower than 3rd Mate Home Trade of Master Restricted of a local trade vessel while holding a Master Restricted's qualification.
d) Mate Home Trade	: 6 years of which one year shall have been in the capacity not lower than First Mate of a vessel employed in the Home Trade or Third Mate of a vessel employed in the Foreign Trade while holding a Mate Home Trade Certificate.

Tonga's maritime qualifications are not yet graded like the STCW. (STCW: Standards of Training, Certification and Watchkeeping for Seafarers) Unlimited Master of Mate means that it is a foreign going qualification from New Zealand, Australia, Japan, U.S.A. etc. but is to be approved and endorsed by Tongan government.

Examples of the qualifications equivalent to STCW and shipboard experience of seafarers on board ships engaged on home trade are shown in Table 2-4-1. Ocean going ships as the Fua Kavenga owned by the Government of Tonga and the Columbus Canada owned by Tonga Ocean Ltd. are also manned with Tongan seafarers.

Table 2-4-1 Examples of grade of crew members on board

Ship's name / Position	STCW grade (equivalent)	Shipboard Experience/persons		
		less 5 years	6-10 years	more 10 years
OLOVAHA				
Master	4th class		1	
Chief Eng.	3rd			1
Officer	4th	1		
Engineer	4th	1		
FOKOLOLO OEHAU				
Master	4th class		1	
Chief Eng.	3rd			1
Officer	4th	1		
Engineer	4th	1		
LOTO HA'ANGANA				
Master	4th class			1
Chief Eng.	3rd		1	
Officer	4th	1		
Engineer	4th	1		

Source: Tonga Ministry of Marine

Notes: STCW Standards of Training, Certification and Watchkeeping for seafarers

(3) Pilot

The Ports Administration Department owns a pilot boat, which is engaged in the pilotage of arriving/leaving vessels. The number of pilots is two and one of them is served by Harbour Master. The pilot is required to have experience of 10 years or more as chief mate, or of 5 years or more as master, on board vessels engaged in international trade, and in addition to have passed a qualification examination.

The present pilots have experience as pilot of 7 years or more in the Port of Nuku'alofa and are familiar with the topographic and hydrographic features, and weather and sea conditions. In addition, a survey of shiphandling operations on site also attests to their skill and dexterity.

2.4.2 Education and Training

The cultivation of seafarers in the Kingdom of Tonga is carried out in Tonga Maritime Polytechnic Institute. This institute, which belongs to the Ministry of Education, accommodates graduates from high schools to provide education and training for boatswain level seafarers. The school was completed in 1985 under the aid of West Germany and has three courses of deck operating, engineering and catering.

At present one class is composed of about 20 students and is capable of accommodating 100 in total. Since its establishment, 400 to 500 students entered the school, and those who graduated are approximately two thirds of them.

The basic education program is a three-year course, in which the first 6 months are spent for lectures at school, the next 27 months for shipboard training and the last 3 months for finishing education. On top of this course, an advanced course is established to educate students chosen from excellent graduates of the basic course.

All the students with ages of 16 to 25 have lived in the dormitory before, but most live at their homes now. Graduates are recruited by Pacific Forum Line, Columbus Line, Warner Pacific Line, Gaspac Shipping, Sofrana Line Shipping Corporation of Polynesia which have trade routes to Tonga.

The school was first managed under the aid of West Germany, with its subsidy 100% in 1985 being reduced by 25% every year. It realized 100% self-administration and management by the Ministry of Education, the Government of Tonga in 1991. There is a plan to upgrade it to a polytechnic college in 1993 by improving three courses of automobile, electric and mechanical engineerings.

The present instructors are twelve:nine Tongans, one British, one German and one Japanese (a member of Japan Overseas Cooperation Volunteers). Two Tongan instructors in the mechanical course underwent a 6-month course in Germany and became instructors.

The school is located in the city of Nuku'alofa and has a wide campus

facing the sea, where training by using cutters is frequently provided. It owns a life boat davit in the area of school and training ship of 12 m in length. In addition, it also has 3-week courses for training in firefighting with carbon dioxide gas, foam and water.

2.5 OUTLINE OF SHIP REPAIR CAPACITY

2.5.1 Repair Facilities

(1) Shipbuilding facilities

The shipbuilding industry in the Kingdom of Tonga, with its mere records of building small FRP boats and steel ships of up to 20 m in length, has yet to be developed in terms of facilities and related industries. Table 2-5-1 shows ships built in Tonga.

Table 2-5-1

Ship's name	Owners
Government	
LATE	Defense service
TAULOTO 2	Ministry of works
TAULOTO BARGE	do.
'UNGA	Ports Administration Dept.
EKIAKI	Fisheries Department
ALBACORE	do.
NGUTULEI	do.
VAHOI	Ministry of Police
TAKUO	do.
LEA'AETOHI	do.
PAKO	Ministry of Education
RAMARAMA	do.
FUNGANIU'UI	Ministry of Health
Private Sector	
VAOMAPA	Ramsay Shipping
TAUFALE	do.
SIUPELIKOULA	Church of Tonga
LANGIFO'OU	do.
KAO	Shipping of Polynesia
NGALUTA'ANE	do.
'ALO'OFA	Tokai Koro
TATA	Tourist
SHAREE	Maritime Project
LINE	Mosese Fakatou
VAIKOLOFIA	Manase Fakapulia
'UTUMALAMA	Asipelic Niupalau
FETU'UMOANA	Chatholic Church
HAKULA	Stuart Bollam
KEPASH	Mr. Colin Yynch
KURTI	Fafa is. Resort

Shipbuilding facilities at present are a 100 ton slipway, a 15 ton slipway and a 10 ton lifting gear for landing, all of which are installed in the

Faua Harbour Basin, the Port of Nuku'alofa.

If these facilities can not handle inspections and repair work because of their size, vessels cruise to neighbor countries equipped with dry-docks and/or slipways, where they are drydocked or grounded on slipways for repair work.

(a) The 100 ton slipway is an inclined plane to haul ships on a cradle capable of supporting a load of 100 tons, equipped with an electric winch of a capacity of 55 kW.

(b) The 15 ton slipway is an inclined plane with a cradle to haul ships with a hand-operated 3-stage winch, and is used exclusively for inspection and repair of small fishing boats and yachts.

(c) A wheeled gantry crane fitted with 4 manual hoists, lifts a boat of up to 10 tons in weight from the sea and shifts it to a desirable place on the shore.

Their capacity for reparations is to repair, paint and convert vessels on these slipways. According to data obtained from the Ports Administration Department, the recent operational situation of these slipways is as follows:

Table 2-5-2

Slipway	1989	1991
100 ton slipway	45	32
15 ton slipway	17	13
Total	62	45

Source: Tonga Ports Administration Dept.

(2) Repair facilities in neighbor countries

Slipways in the neighbor countries are shown in the following table.

Table 2-5-3

State name	Location	Capacity
American Samoa	Pago Pago	1 to 800 tons
		1 to 3000 tons
Fiji	Suva	1 to 1000 tons
		1 to 500 tons
		1 to 200 tons
New Zealand	Tauranga	1 to 600 tons
New Zealand	Whangarei	1 to 2000 tons
New Zealand	Auckland	1 to 1000 tons
		1 to 500 tons
New Zealand	Gisborne	1 to 400 tons
New Zealand	Lyttelton	1 to 230 tons

Source: Tonga Ports Administration Department

(3) Machine shops

In Tonga the shipbuilding industry has not developed and there are no large factories which are specializing in the production and repair work of machinery for marine service. However, there are work shops which are engaged in the repair work of land machinery, including heavy duty trucks and bulldozers, and equipment and instruments for fishing ships.

The city of Nuku'alofa has several work shops, state and privately owned. Table 2-5-4 shows work shops revealed by an on-site survey by the survey team, a telephone inquiry and by questioning the Ports Administration Department.

Table 2-5-4

Work shop	Type of services offered
Mechanical service shop of Ministry of Works	Machining, overhaul, fitting work, machining of shaft
Mechanical Work Shop of Ministry of Agriculture	Engine repair work
Boat Yard of Ministry of Fishery	Repair of refrigerating facilities, construction of wooden fishing boats
Flemming Electric Co., Ltd.	Repair work of motors, compressors and refrigerating facilities
KW International (Tonga) Ltd.	Construction of FRP ships
Somi Industrial Engineers	Repair work of motors and refrigerating equipment
Weco Tonga Limited	Construction of ships, repair work of machinery and hydraulic system, and painting
Silapelu Electrical Industries	Repair of electric system of boats
Machine Shop of SCP	Repair work of pumps and compressors, machining
Work Shop of Slipway	Machining, welding
Utupoto Diesel Ltd.	Repair work of engines
Mosese Marine Service	Marine engine repair and maintenance
Asia Paints (Tonga) Ltd.	Marine Paints and bottom point

SCP: Shipping Corporation of Polynesia

Source: Tonga Ports Administration Department

Mechanical Work Shop of 100 ton Slipway:

It is located in the area of a slipway and equipped with basic machine tools and welding machines.

New ships are constructed on the slipway.

Mechanical Work Shop of Shipping Corporation of Polynesia:

SCP has an exclusive mechanical repair work shop and parts storehouse in a building near the Queen Salote Wharf.

It is equipped with such machines as lathe, drilling machine, milling machine, welding machine, etc.

The parts storehouse always has a supply of packing, bolts and nuts,

pipes and paints.

Parts which are not stocked here are delivered from New Zealand on every occasion when necessary.

Mechanical Service Shop of Ministry of Works:

It is a repair factory of the Ministry of Works, engaged in the repair work of bulldozers and other heavy duty construction vehicles.

It is most improved works in Tonga both in terms of facilities and employees.

It is systematically operated with a large parts storehouse.

The work shop is equipped with various instruments such as vertical and horizontal lathes, milling machines, drilling machines and welding machines.

The long horizontal lathe of 12 m in length is capable of machining propeller shafts.

It has accomplished repair work of engines of 700 HP for a fishing boat.

Flemming Electric Co., Ltd.

It is located in the Small Industries Center and undertakes repairs of motors, compressors and refrigerators, etc. It owns such equipment as lathes, drilling machines, welders, and dryers for motor coils re-wiring. It is a factory with 4 engineers - 2 Danes, a New Zealander and a Fijian, in addition to three local staff members who are always on hire.

It has business records of replacing 150 kVA generator coils, 245 HP generator shaft bearings and repairs of winch motors for the OLOVAHA, a domestic trade passenger ship, with a capacity of 350 passengers.

Somi Industrial Engineers

It repairs motors, refrigerating equipment, air conditioners, etc. The works manager has a career of working for an electric motor factory of a Japanese company for two years.

The workshop facilities give the impression that it is capable of repairing small motors for auxiliary machinery of the tug boat in question.

2.5.2 Repairing Skills

(1) Maintenance and services of tug boat

The Mechanical Service Shop of the Ministry of Works is highly rated in the level of repairing skills. The team members held technical discussions with the chief engineer and the superintendent of mechanics on the engine and reduction gear on board the tug boat.

They say that at their present level they are not capable of overhauling and inspecting 1,000 to 1,500 HP-class diesel engines but that they may be able to cultivate capable engineers to handle such engines if they undergo special technical training for about 6 months in Japan. The Mechanical Shop can handle as much as machining propeller shaft by using its facilities at its technical level.

As to electric instruments and appliances, Flemming Electric Co., Ltd. can handle repairs of motors.

The vessels registered in Tonga - with 11 vessels including the OLOVAHA, for domestic trade, 9 for foreign trade, and 3 patrol boats for the Naval Force - are provided with all usual maintenance and repairs, except drydocking, in Tonga. Although vessels for domestic trade, with their old ages, seem to have a high frequency of failures, they are operated by local people of Tonga without noteworthy accidents.

The Tongatapu Island power plant owned by Tonga Electric Power Board has 2 sets of 1,700 HP and 2 sets of 2,400 HP diesel generators, which are all operated by Tongan people. However, the periodical overhauls and inspections are carried out by engineers invited from Australia.

The overhauls and inspections of engines for the heavy duty forklifts used in the Queen Salote Wharf are made by local staff on site.

(2) Parts for repairs

The city of Nuku'alofa in Tonga has direct services air flight and sea routes with Australia and New Zealand. Between Nuku'alofa and Auckland there are four direct air flight services a week and between Nuku'alofa and

Sydney one direct weekly service. There is a liner service from Auckland once every 3 weeks. When Auckland has a supply in stock, parts may be obtained in three days after placing an order, in the most favorable cases. Bolts and nuts, parts for piping, and paint are easily available in the city of Nuku'alofa.

Although it cannot be said that all packings are always readily procurable owing to their diversified types and sizes, no problem should arise, as they are to be supplied as spare parts for common use of the tug boat, on condition that these parts are kept under proper custody and control.

As parts of electronic appliances such as communication instruments may be replaced, it will be necessary to secure a service route from Japan.

As for parts and materials required for drydocking, it is necessary to arrange beforehand and procure them in time for docking. It is important on the side of Tonga to establish a working system to keep parts, including those supplied together with the tug boat, under proper custody and control.

A certain Japanese engine maker has established a storehouse in Singapore and uses it as a service terminal for the entire South East Asia.

2.6 OUTLINE OF THE RELEVANT SECTOR

2.6.1 National Development Plans

The Kingdom of Tonga has planned and executed the Five-Year National Development Plan since 1966, and the Sixth Development Plan was started from 1991. Projected government development budget during the 5th period of the Sixth Plan is shown in Table 2-6-1.

Table 2-6-1 Projected Tonga Government Development Budget during the 6th DP (Million T$)

Items / Year	1990/91	1991/92	1992/93	1993/94	1994/95
Grants	24.6	29.9	30.6	29.7	32.1
Loans	2.0	14.6	19.7	32.9	38.0
Local revenue	2.6	0.3	2.7	4.0	5.2
Domestic borrow.	4.0	5.0	4.0	3.0	2.5
Tonga trust fund	2.6	6.0	6.0	6.0	6.0
Anticipated development expenditure					
Onshore	11.8	19.4	22.9	30.5	36.2
Offshore	14.8	25.1	27.4	32.0	33.9
Total	26.6	44.5	50.3	62.5	70.1
Fund balance available for other development	9.2	11.3	12.7	13.1	13.7
Total potential development expenditure	35.8	55.8	63.0	75.6	83.8

Notes) Onshore: Funds spent through government accounting system
Offshore: Funds spent directly by funding sources

Source: Tonga 6th 5-Year Development Plan

The Kingdom of Tonga depends, for a great part of the budget for development projects, on aid in the form of grant aid and financial assistance from foreign countries.

Of the development budget for 1992/1993 (T$59.4 million), approximately 36% was given in the form of grant aid and the rest as loans. The country which

aids Tonga most is Australia. In addition, bilateral assistance is given by New Zealand, EC, Japan, U.S.A., Germany, France, etc.

According to a 1989 record of bilateral official development assistance (ODA), Australia accounts for 42.7%, Japan 27.2%, New Zealand 13.7% and IDA-World Bank 12.0% (data from Association for Promotion of Overseas Cooperation). Japan's record of donation to Tonga is as shown in Table 2-6-2.

Table 2-6-2 Japan's ODA to Tonga (Unit: US Million $)

Aid / Year	1986	1987	1988	1989	1990
Grant Aid	2.23	3.72	2.09	3.42	8.41
Technical Asst	1.34	1.42	1.45	1.95	1.69
Total	3.57	5.14	3.54	5.36	10.10

Source: Association for Promotion of Overseas Cooperation

Projects concerning the shipping sector in the Sixth Development Plan are as follows (the donor countries are not decided and the aid here includes loans):

1) Program-1

To acquisition of a tug boat to the Port of Nuku'alofa as soon as possible (Possible source of funds: Japan);

Improvement of the Queen Salote Wharf including the followings (Possible source of funds: Australia);
Extension of the wharf,
Improvement of storage facilities for cargo and agricultural products,
Improvement of cargo handling equipments.

2) Program-2

Restoration works of Vuna Wharf and Yellow Pier
(Possible source of funds: Asian Development Bank and Australian co-financing);

Improvement of the Port of Neiafu and cargo handling facilities
(Possible source of funds: EEC and Asian Development Bank);