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VOLUME 1 SUMMARY

No. 1

**THE STUDY
ON
THE DEVELOPMENT OF THE PORTS
IN
WESTERN SAMOA**

FINAL REPORT

SEPTEMBER 1987

JAPAN INTERNATIONAL COOPERATION AGENCY

SDF



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PREFACE

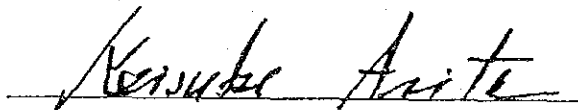
In response to the request of the Government of Western Samoa, the Japanese Government has decided to conduct a feasibility study on the Project for Developing Ports and entrusted the study to the Japan International Cooperation Agency (JICA). JICA sent to Western Samoa a study team headed by Mr. Katsuhiro Suzunai, The Overseas Coastal Area Development Institute Japan (OCDI) and comprising experts from OCDI and Nippon Totorapod Co., Ltd. from January to March, 1987.

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

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

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

September, 1987

A handwritten signature in cursive script, reading "Keisuke Arita", is written over a horizontal line.

Keisuke Arita

President

Japan International Cooperation Agency

LETTER OF TRANSMITTAL

September 1987

Mr. Keisuke Arita
President
Japan International Cooperation Agency

Dear Mr. Arita:

It is my great pleasure to submit herewith the Report for the Study on the Development of the Ports in Western Samoa.

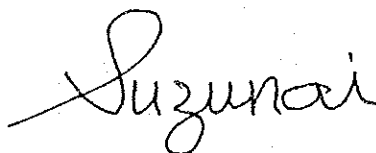
This report is the result of studies carried out by the Overseas Coastal Area Development Institute of Japan and Nippon Tetrapod Co., Ltd. at the request of the Japan International Cooperation Agency. Regarding this project, our study team conducted two series of field surveys, one of which took place for 67 days from January 18, 1987, to collect a variety of data including data concerning natural conditions.

The findings of these surveys were discussed to prepare a Master Plan and a First Stage Plan for the ports in Western Samoa, and were then compiled into this report. The study shows that the First Stage Plan is extremely important, so I hope the First Stage Plan will be executed promptly.

On behalf of the study team let me express my heartfelt thanks to the Ministry of Transport and to the other related agencies of the Government of Western Samoa for the generous cooperation and assistance and the warm hospitality which were extended to the study team during their stay in Western Samoa.

Our thanks are also due to the Japan International Cooperation Agency, the Ministry of Transport, the Ministry of Foreign Affairs and the Japanese Embassy in New Zealand for their valuable advice and support during the field surveys and the preparation of this report.

Your Faithfully,



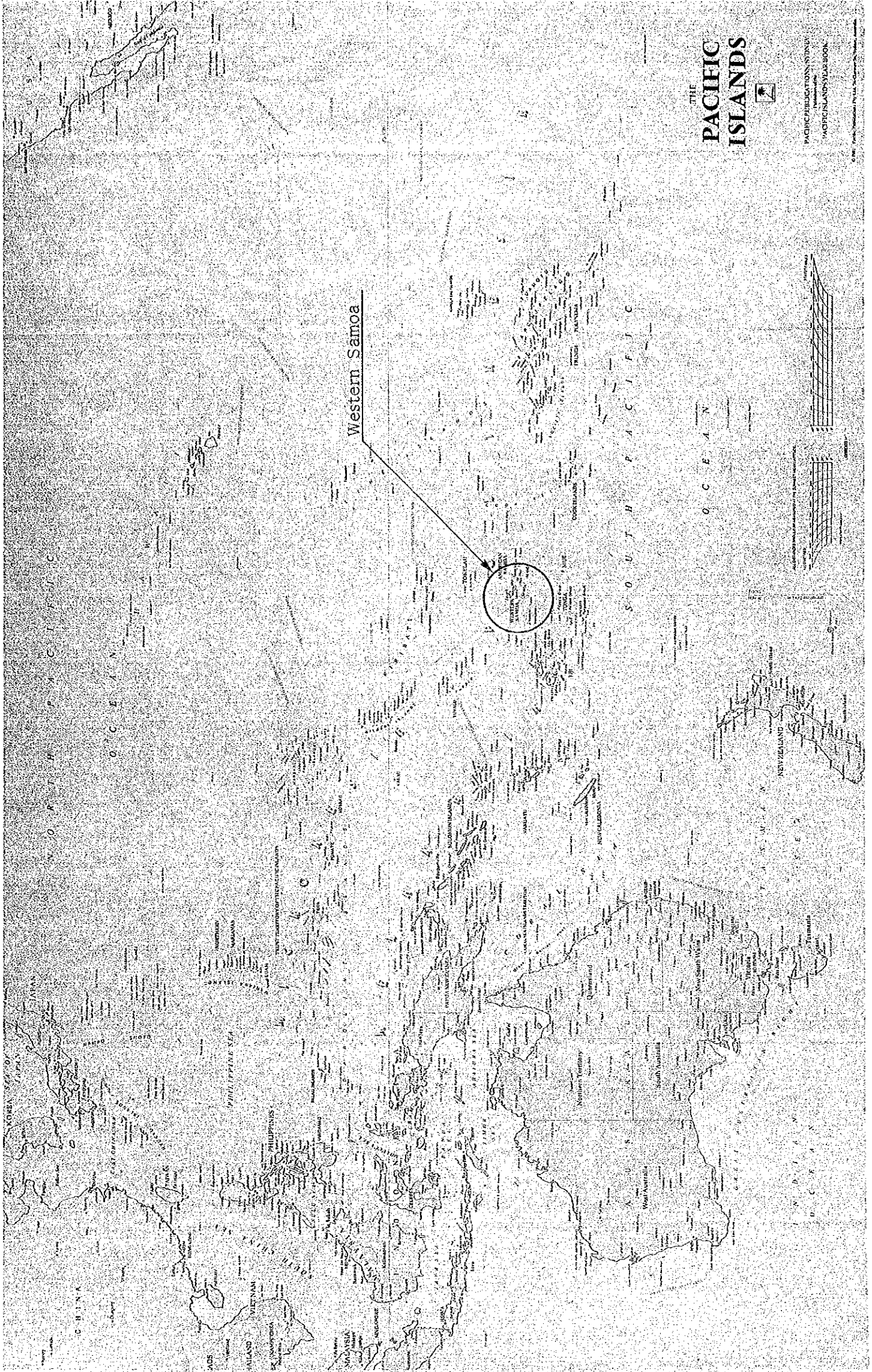
Katuhiro Suzunai
Head
Japanese Study Team for the Study on
the Development of the Ports in
Western Samoa
(Adviser, the Overseas Coastal Area
Development Institute of Japan)

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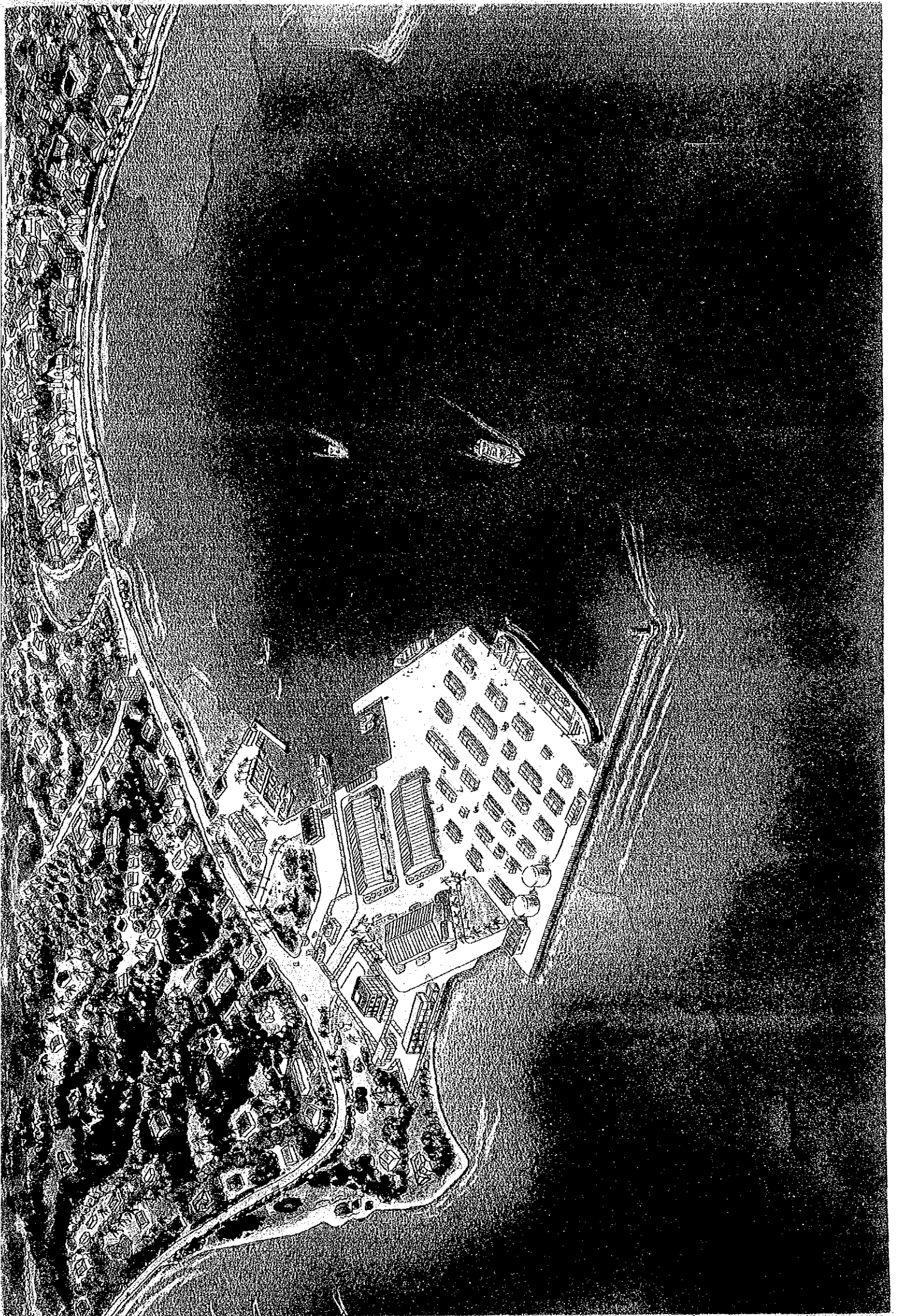


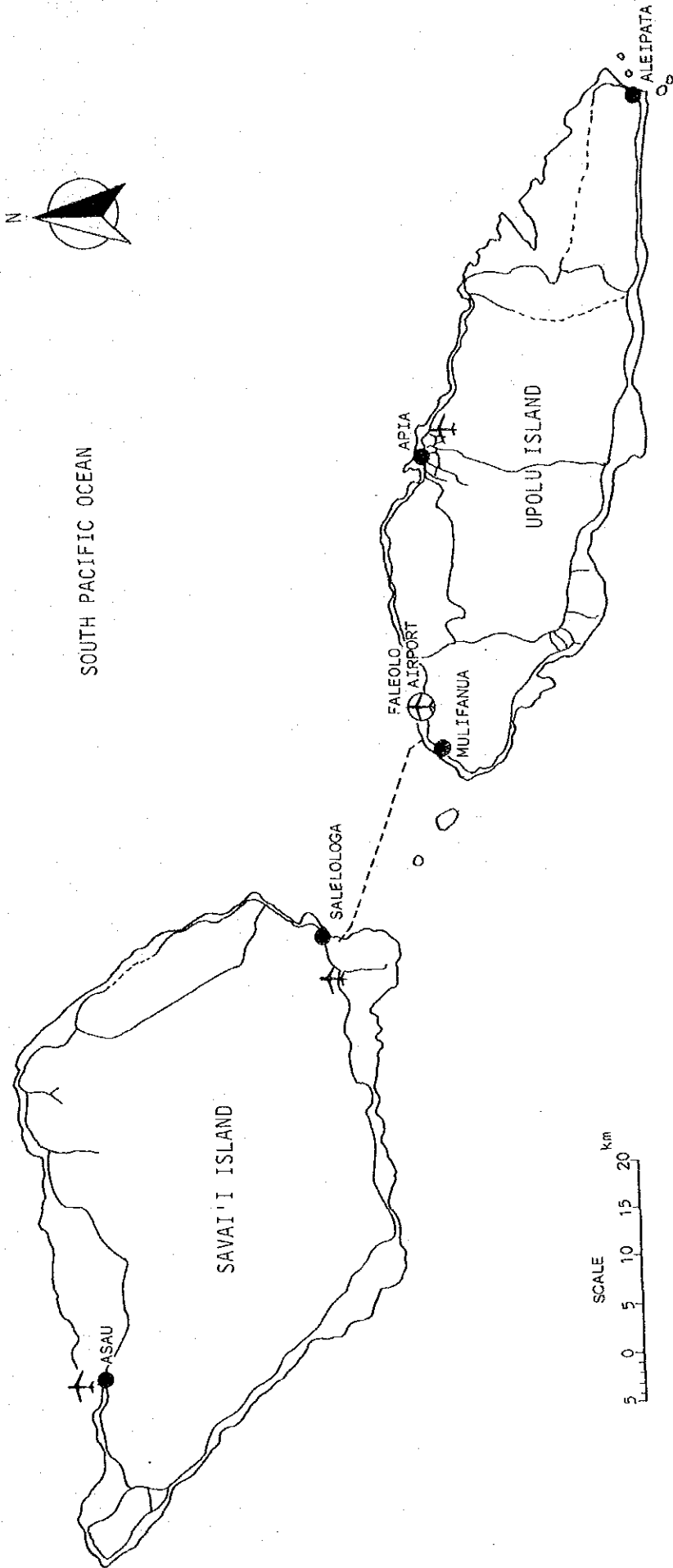
Western Samoa

S O U T H P A C I F I C

O C E A N







Foreign Exchange Rate

US\$ 1 = W\$ 2.08 = ¥ 152

(As of March, 1987)

Abbreviations

bd ft	board feet
BP	Burns Philip
CD	Customs Department
CFS	Container Freight Station
CIF	Cost, Insurance and Freight
DED	Department of Economic Development
EIRR	Economic Internal Rate of Return
FCL	Full Container Load
FIRR	Financial Internal Rate of Return
FOB	Free on Board
GDP	Gross Domestic Product
GRT	Gross Registered Tonnage
JIS	Japanese Industrial Standard
LCL	Less than Full Container Load
LOA	Length Over All
MH	Morris Hedstrom
MOT	Ministry of Transport
MS	Maintenance Shop
NZ	New Zealand
PFL	Pacific Forum Line
PWD	Public Works Department
Ro/Ro	Roll on/Roll off
SMB	Sverdrup, Munk, Bretschneider
SSS	Samoa Shipping Services
TEU	Twenty Foot Equivalent Unit
US\$	United States Dollar
WESTEC	Western Samoa Trust Estates Corporation
WSSC	Western Samoa Shipping Corporation
WS\$	Western Samoa Dollar (or Tala)
Y	Yen

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CONCLUSION AND RECOMMENDATIONS

CONCLUSION

Western Samoa has an area of about 2,800 sq km which comprises two main islands, Upolu, the seat of the Government, and Savaii which is located northwest of Upolu. The total population of the country is 159 thousand in 1986, of which 72% live on Upolu. As the economic activities and livelihood of the people depend on port activities because of the geographical situation of the country, port development is considered essential for the economic and social development of the country.

Of the four ports in Western Samoa, Apia Port, which is located in the northeast part of the capital, is the most important and almost all international trade cargoes are handled there. Asau Port promotes the development of reforestation of Savaii. Salelologa and Mulifanua Ports connect the two main islands as ferry terminals.

Though some studies on ports in Western Samoa have been carried out since 1970s, no comprehensive, long-term development plan has been prepared. The main objective of the projects under the Master Plan is to provide necessary port facilities to cope with the present problems and the future demands, and thus to contribute to the economic and social development of Western Samoa.

The proposed Master Plans include the following components: i) a commercial port, a ferry terminal, port management infrastructure and tourism development with a marina at Apia Port, ii) a commercial port at Asau Port and (iii) ferry terminals at Salelologa and Mulifanua Ports.

The First Stage Plan concentrates on Apia Port. The main objectives of the first stage projects (hereafter the Project) are to resolve the present bottlenecks, to meet the present demand, to provide economic benefit to Western Samoa and to upgrade the safety of the port.

The Project, therefore, includes the following components: i) constructing a 100 meter long breakwater which will improve the calmness in the basin in the rainy season; ii) Extending the life of the existing main wharf through anti-corrosion measures to the H-shaped steel piles; iii) replacing the existing superannuated ferry terminal; iv) expanding the yard behind the main wharf; v) purchasing a tugboat and vi) providing lighting on the tanker buoys.

The cost of the Project is estimated at 23 million WS\$ of which 16 million WS\$ will be the foreign currency portion (excluding interest) and 7 million WS\$ the local currency portion.

The Project will result in significant economic benefits. The improvement of Apia Port will reduce the staying cost of ships, the cargo handling cost and the waiting time of consignees.

The economic internal rate of return for the Project is estimated at 13.4 percent, and therefore the Project is viable from the economic point of view. But, since the financial internal rate of return for the Project is estimated at -2.7 percent, it is difficult to execute the Project using a loan.

To resolve the present port management problems it would be desirable to establish a Port Authority after a detailed study on its financial aspects, human resources and business plan.

RECOMMENDATIONS

The following items are recommended to resolve the present bottlenecks in the port activities.

1. Urgent Implementation of the Project

The repair of the main wharf, which has become superannuated, and the expansion of yard behind the main wharf will greatly contribute to the effective usage of the existing facilities and greatly improve the cargo handling efficiency.

The construction of a breakwater will also greatly improve the calmness in the basin in the rainy season, which has been pointed out as critical in past studies including the study "Report on Apia Harbour Study" June 1975 by A.J.Raudkivi.

The replacement of the ferry terminal will resolve the congestion of cargoes and passengers and improve the safety of the port by separating the cargo handling and the passenger flow in the port area.

The purchase of a tugboat and the lighting of the buoys will also improve the safety of the port, facilitating safe maneuvering and mooring in the limited water area.

2. Establishment of a Port Authority

We propose the establishment of a Port Authority as a port management body, which would have control of all aspects of port activities except for the cargo handling which should continue to be executed by the private sector as at present, after a detailed study on its financial aspects, human resources and business plan.

3. Staff Training

Since human resources concerning port planning, construction, maintenance and management are not sufficiently developed in Western Samoa, it is necessary for the proposed Port Authority to make every effort to develop its own human resources for the smooth implementation of the port

activities. But for a while it may be necessary to retain foreign experts to serve advisers to the Port Authority.

4. Improvement of the Road Network in the Hinterland

Although the development of roads is outside the scope of the port development plan, roads are closely related with port activities. The present roads between the port and downtown Apia, and between the port and Vaitele are not sufficient for the passage of heavy vehicles.

It will be necessary to upgrade the pavement on these roads to accomodate heavy traffic. Traffic control should also be improved.

INTRODUCTION

INTRODUCTION

1. Objectives of the Study

The objectives of the study are to formulate a Master Plan for the development of the ports in Western Samoa for the period up to the year 2005 and to prepare a First Stage Plan within the framework of the Master Plan.

2. Background

The Government of Western Samoa requested the Government of Japan to carry out a study on the development of the ports in Western Samoa.

In response to the request, the Government of Japan dispatched the Japanese Preliminary Study Team headed by Mr. Mineo Tokuda to Western Samoa in June 1986. The team held a series of discussions about the study with the Government of Western Samoa. The Scope of Work for the study was agreed upon on 5 August 1986 by Mr. Mineo Tokuda, leader of the Japanese Preliminary Study Team, and Hon. Toeolesulusulu Siueva Toalepaialii, the Minister of Transport of Western Samoa.

Based on the Scope of Work, JICA organized a study team headed by Mr. Katsuhiko Suzunai, Adviser, OCIDI. The study team then executed the study, including two field surveys, from January to September of 1987.

3. Contents of the Study

The contents of the Study are as follows.

- 1) Analysis of the present situation
- 2) Formulating a Master Plan
(the target year is 2005)
- 3) Preparing a First Stage Plan
- 4) Economic and financial analysis

- 5) Investigation of the port management

4. Study Schedule

The study was conducted as follows.

- 1) Preparation in Japan : January, 1987
- 2) First Field Survey : January - March, 1987
 - ① Presentation of the Inception Report
 - ② Field Survey
 - ③ Submission of the Progress Report
- 3) First Analysis in Japan : April - June, 1987
- 4) Second Field Survey : June - July, 1987
Submission of the Draft Final Report
- 5) Second Analysis in Japan : August - September, 1987
Preparation of the Final Report

5. Organization of the Study Team

The Japanese study team was comprised of six specialists from OCIDI and Nippon Tetrapod, and a JICA representative. Their names, duties and present positions are as follows.

	Name	Present Position
1) Project Manager, Port Management & Administration	Katsuhiko Suzunai	Adviser, OCIDI
2) Port Planning and Cargo Forecast	Yutaka Sunohara	OCIDI
3) Economic Appraisal and Financial Analysis	Tomoo Amano	OCIDI

4)	Structures Planning	Tetsuji Hashimoto	OCDI
5)	Design of Structures, Construction Planning & Cost Estimation	Koichi Igari	Tetrapod
6)	Natural Conditions	Shigeki Ishikawa	Tetrapod
7)	Coordinator	Masaru Suzuki	JICA

6. List of Counterparts

The counterpart personnel from the Government of Western Samoa are listed below.

1)	Hon. Toeolesulusulu Siueva Toalepaialii	Minister of Transport
2)	Mr. Nofo Vaaelua	Acting Secretary Ministry of Transport
3)	Mr. Feturi Elisaia	Deputy Secretary Ministry of Foreign Affairs
4)	Mr. Epa Tuioti	Deputy Financial Secretary Treasury Department
5)	Ms. Lusie Sefo	Senior Planning Officer Department of Economic Development
6)	Mr. Noel Hawkins	Chief Civil Engineer Public Works Department
7)	Mr. Ray Bancroft	General Manager Western Samoa Shipping Corporation

SUMMARY

Chapter 1 Evaluation of the Present Situation

1-1 Socio-economic Situation of Western Samoa

1) Geographical Position

1. Western Samoa is situated between south latitude 13° and 15° and west longitude 171° and 173°. The country is located about 8,000 kilometers from Japan and 3,000 kilometers from New Zealand.

2. The land area of 2,800 square kilometers comprises two main island, Upolu, the seat of the Government, with 1,100 square kilometers and Savaii, which is located northwest of Upolu, with 1,700 square kilometers.

2) Climate

3. The climate of the country is tropical and oceanic. The dry season is from May to August and the rainy season is from December to March.

4. The monthly average temperature at Apia ranges from 25°C to 28°C. The maximum temperature ranges from 29°C to 31°C and the minimum ranges from 23°C to 24°C.

5. The south and southeast regions receive from 5,000mm to 7,000mm of rain annually. The leeward side of the country receives from 2,500mm to 3,000mm. The average rainfall at Apia is 3,000mm a year.

3) Population

6. According to the 1986 census the population of Western Samoa is 159 thousand of which 72% live on Upolu Island.

7. The population growth rate between 1976 and 1986 is about 0.45% per year, but it recorded only 0.33% during 1981 - 1986. This small increase in the population is attributable to the high rate of emigration to New Zealand and other countries (Table 1.1).

8. About 45% of the population are fourteen years of age or under. The economically active population is about 40 thousand in 1981, of which about 60% work in agriculture, forestry and fishery.

4) Land

9. About 81% of the total land is customary land which is administered by the matai for the benefit of their groups. The other land includes government land (11%), Western Samoa Trust Estate land (4.5%), etc.

5) Gross Domestic Product (GDP)

10. In 1985 the GDP recorded 98.6 million WS\$ in 1980 prices, and per capita GDP was 622 WS\$. The annual growth rate of real GDP from 1981 to 1985 was 1.6%. Only the manufacturing and electricity sectors expanded (Table 1.2).

6) International Trade

11. In the international trade of Western Samoa, the import value usually exceeds the export value. In 1985, the international trade of Western Samoa totaled about 150 million WS\$, of which about 75% were imports.

12. Samoa's principal export markets are the United States, West Germany, Australia, New Zealand and Japan. Import sources are Australia, New Zealand, the United States, Japan and Singapore. Private remittances have been important in offsetting the trade deficit.

Table 1.1 Record of the Population, Western Samoa 1966, 1971, 1976, 1981 and 1986

Year	Total Population	Upolu	Savaii
1966	131,377	-	-
1971	146,627	106,046	40,581
1976	151,983	109,765	42,218
1981	156,349	113,119	43,510
1986	158,940	114,815	44,125

Source: Report of the Census of Population and Housing 1981 and Data of the Department of Statistics.

Table 1.2 Real Gross Domestic Product and Per Capita GDP from 1981 to 1985

	1981	1982	1983	1984	1985
Real GDP (1980 prices, million WS\$)	92.7	93.2	95.2	97.1	98.6
GDP (market prices, million WS\$)	130.4	154.4	183.5	n/a	n/a
Population ('000)	156.3	156.8	157.3	157.8	158.4
Per Capita GDP (1980 prices)	593WS\$	594WS\$	605WS\$	615WS\$	622WS\$

Source: Western Samoa Socio-economic Situation Development Strategy and Assistance Needs; Data from Treasury Department

1-2 Present Situation of Ports and Problems

1) Present Situation of Ports

13. The country has four active ports, Apia and Mulifanua on Upolu Island, and Asua and Salelologa on Savaii Island. The foreign trade cargoes are handled at Apia and Asau Ports. Mulifanua and Salelologa Ports are used as bases for the ferry services between the two main islands.

14. Besides the four ports there is one partially-constructed port, Aleipata, which is situated at the southeastern tip of Upolu Island. Construction works at Aleipata stopped about ten years ago.

(1) Apia Port

(i) Port Facilities

15. The port area was reclaimed in 1962, and the present main wharf was completed in 1966. The structure of the wharf is a detached pier type using steel piles encased in concrete sleeves. The pier is 184.7m long, 13.1m wide and 10m deep, but it was 11m deep when it was constructed.

16. The other facilities are an 80m long wharf for small vessels, behind the main wharf, a ferry terminal to the southeast and mooring buoys for petroleum tankers on the west side of the bay.

17. The land area is 3 hectares and there are four main sheds (Fig. 1.1, Table 1.3).

18. As for cargo handling, the derrick or gantry cranes of the vessels are used between the vessels and the wharf. On the land area folktilts owned by the stevedoring companies are used.

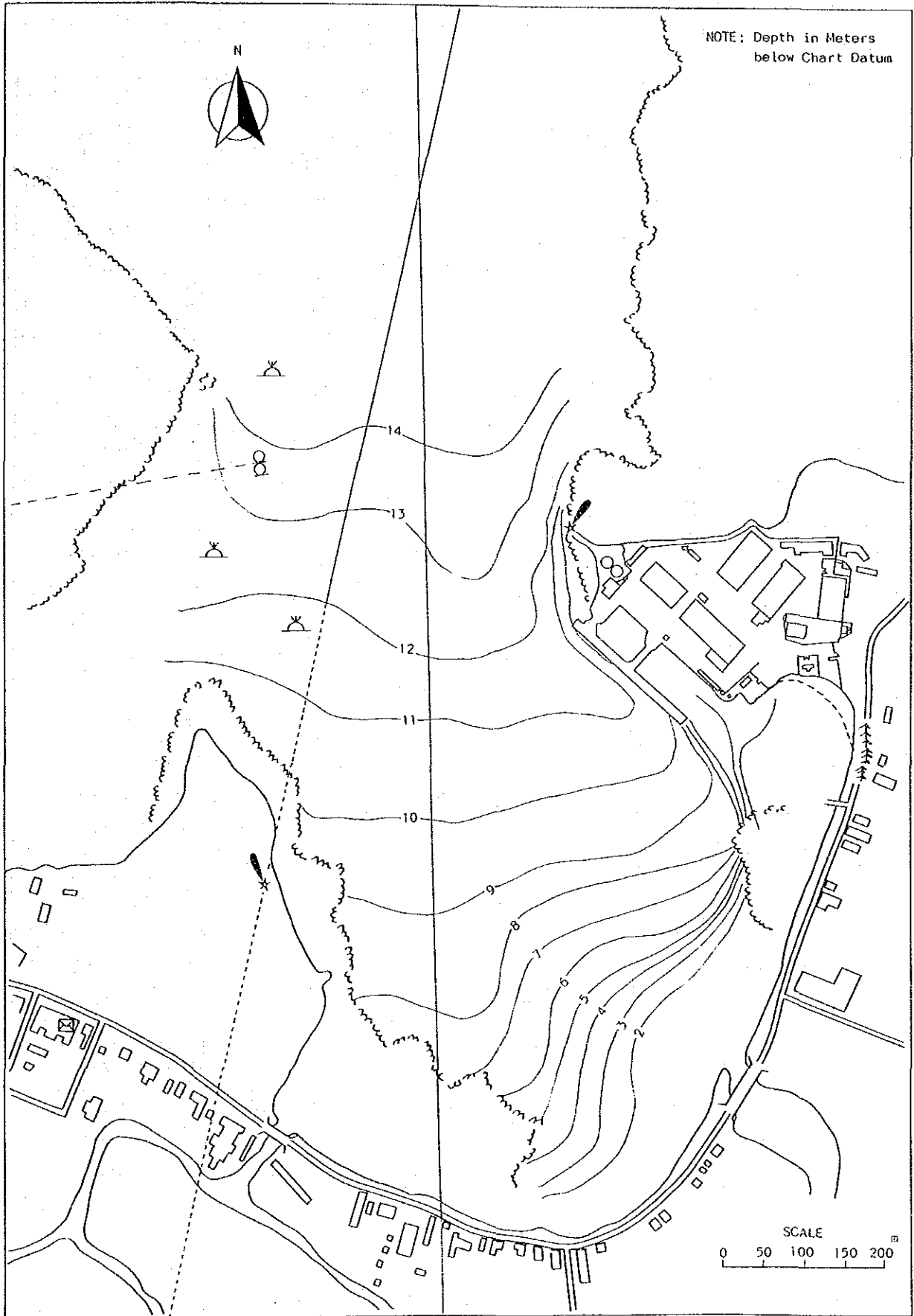


Fig. 1:1 Location of Apia Port

Table 1.3 Existing Port Facilities and Equipment (Apia)

Facilities/Equipment	Number/Capacity	Construction Year	Owner
Wharf	•main berth (length 184.7m) (width 13.1m) (depth -10.0m) •small ship berth (length 80.0m)	1966	M.O.T.
Mooring Buoy	3 buoys	1960's	Private
Turning Basin	depth -11.0m	1967	M.O.T.
Ferry Berth	depth - 3.4m		M.O.T.
Shed No.1	3,645m ²		M.O.T.
Shed No.2	1,792m ²		M.O.T. (damaged by fire)
Shed No.3	2,541m ²		M.O.T.
Shed No.4	2,486m ²		Copra Board
Coconut tanks	1,500t x 2 (one is under construction)		Samoa Coconut Products
Storage Shed (Copra Meal)	1,500t (about 300m ²)		Samoa Coconut Products
Chemical Shed	about 100m ²		Agriculture Department
Cool Storage	about 800m ²		Produce Market- ing Dept.
Leading Light			M.O.T.
Beacon			M.O.T.
Tugboats	"Pualele" 425 bhp "Savaii" 175 bhp	1972 1964	M.O.T.
Pilot-boat	120 bhp	1960's	M.O.T.

(ii) Natural Conditions

(a) Resonance in Apia Harbour

19. Apia Harbour is open northward and during the southeastern trade wind season, from April to October, it is well protected from waves. However, it is reported that during the rainy season from December to March heavy surges occur along with the northeast waves. A wave observation using ultrasonic wave recorders and an analysis on the recorded data were carried out and the results are summarized as follows.

- ① The dominant wave period of component waves is about 10 sec. at the mouth and the inner part of the Harbour.
- ② The resonance phenomenon of amplification of long period components can occur in the Harbour.
- ③ The dominant periods of resonance are about 60 sec. in the east-west direction and 600 sec. in the north-south direction.
- ④ The magnitude of the amplification of the long period component in the Harbour is 1.5 to 3 times the situation offshore.
- ⑤ The energy density of the amplified component in the Harbour is small, about 1 percent of the dominant wave component offshore.

(b) Ordinary Waves

20. Wave hindcasting based on the wind data recorded at Apia and an analysis on the swell data recorded by U.S. Navy offshore were carried out. The occurrence probability of the offshore waves which can reach to Apia Harbour is estimated as follows; 1 meter and more: 32 days/year, 2 meters and more: 16 days/year, 3 meters and more: 8 days/year

(c) Anomalous Waves

21. The dimensions of the maximum wave which could occur offshore Apia Harbour are $H_{1/3} = 7\text{m}$ and $T_{1/3} = 10\text{ sec}$, which were estimated using hurricane record.

(d) Calmness in the Harbour

22. An analysis on the calmness in Apia Harbour was carried out. The characteristics of the wave are 10 sec. in period and N10°E in direction. Under the present conditions, the wave height in front of the existing wharf is 28 per cent of that of the offshore waves. But after the construction of a 100m long breakwater at the northern part of the existing wharf, the wave height in front of the wharf will be reduced to less than 45% of the present condition, which is required from the viewpoint of cargo handling.

(e) Siltation in Apia Harbour

23. There is regular siltation in Apia Harbour. The main source of the sediment is the Vaisigano River. A comparison of the sounding chart of this study and that of 1981 shows that the siltation volume is 9,500 m³/year, i.e. 7.5 cm/year in the 400m diameter turning basin in front of the wharf and the maximum siltation rate is 12 cm/year at the center of the turning basin. The water depth of the siltation area is less than 13 meters. No tendency of siltation is observed in the approach channel.

(f) Geotechnical Conditions

24. A boring survey of two bore holes was conducted at the main wharf. The strata underneath the wharf are divided as follows:

L.W.L. -9m to -16m : Soft sandy silt layer with an N-value of less than 1,

L.W.L. -16m to -33m: Silty sand layer with an N-value of 1 to 40. The lower part of the layer consists of a coral layer with a thickness of 1 to 3 meters.

L.W.L. -33m and Lower: Hard volcanic rock layer with a compressive strength of 300kg/cm² or more.

(iii) Port Activities

(a) Shipping Service Network

25. Apia Port is mainly connected with foreign ports in South Pacific nations such as New Zealand and Australia, Far East ports, the United States and Europe by liner services. Full container ships, semicontainer ships and Ro/Ro ships are in service on these routes (Table 1.4).

26. In the South Pacific region, Pacific Forum Line (PFL), which was established to provide regional liner services in 1977 by the nations of South Pacific Forum, is the main line, and provides two container ships to Apia Port. As for Apia Port, PFL has also a stevedoring section and handles about 75% of the general cargo as a shipping line and a stevedoring company.

27. The main trampers are general cargo vessels and tankers and cruising vessels call on sometime.

28. Apia is connected with Pago Pago, American Samoa, by a twice weekly ferry service, operated by the Western Samoa Shipping Corporation.

(b) Vessel Calls

29. There are two annual statistics concerning vessel calls at Apia: the "Economic Statistics of Shipping" by the Department of Statistics and the "Return of the Trade, Commerce and Shipping of Western Samoa" by the Customs Department.

30. The former statistics do not include the calls of ferries between Apia and Pago Pago, yachts and some other vessels which do not handle cargo at the port. According to this data there are 190-200 vessel calls per year (Table 1.5). But the customs data records 470-480 vessel calls including yachts, ferries and all other vessels. The record of the ministry of Transport is almost the same as the Department of Statistics data.

31. Vessels which call at Apia Port are relatively small: 20% of them are

Table 1.4 Calling Ships at Apia

No.	Name of Line	Calling Ship	Calling Frequency (Times per Year)	Destination	Agent	Stevedore	Import		Export	
							Container (TEU) (loaded)	Container (TEU) (empty)	Container (TEU) (loaded)	Container (TEU) (empty)
1.	Bali Hai Service	"Pacific Islander" "South Islander"	6 6	Japan Japan	BP (SS)	BP (SS)	240	0	30	210
2.	Toyofuji Kaiun	"Toyofuji"	12	Japan						
3.	Pacific Fourm Line	"Fourm Samoa" "Fua Kavenga"	17 14	N.Z Australia	PFL	PFL	3,630	240	1,170	2,720
4.	Polynesia Lines Ltd.	"Polynesia"	12	U.S.A.						
5.	Columbus Line	"Tausala Samoa" "Moray Bank"	12	Europe						
6.	Bank Line	"Cycle Bank" "Tamaitai Samoa"			Union Maritime	Union Maritime	240	0	30	170
7.	Polynesia Triangle Line	"Capricornia"	21	N.Z. Hawaii						
8.	Kyowa Line	"Kyowa Hibiscus" "Asian Lily"	12	Japan	MH	Triangle Cargo	240	0	0	240
9.	Warner Pacific Line	"Coral Chief" "Rex Star"	12 12	Australia N.Z.	Warner Pacific	"	540	0	120	400
						Total	4,890	240	1,390	3,740
							5,130			5,130

smaller than 1,000 GRT, and 50% of them are 1,000 - 5,000 GRT. Only less than 10% of them are larger than 10,000 GRT (Fig. 1.2).

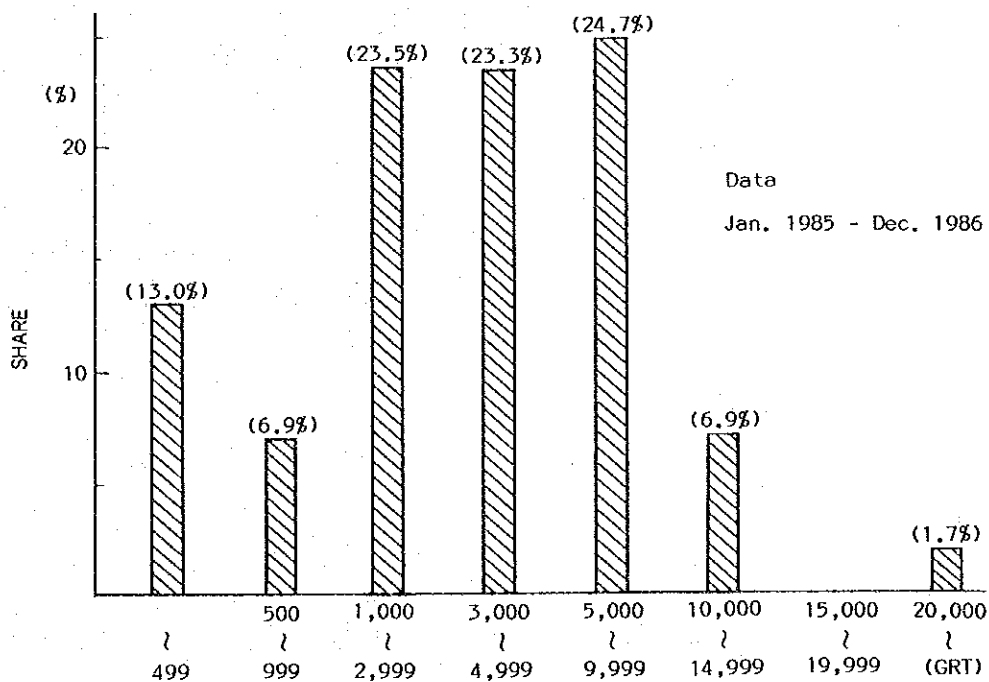
32. The berth occupancy is 50-60%, because it includes mooring time for resting.

Table 1.5 Number of Calls by Type of Vessel

	1980	1981	1982	1983	1984	1985	1986
General Cargo	112	95	94	88	95	87	84
Container	16	15	30	46	46	34	42
Semi-Container	3	5	6	4	5	4	3
Roll-on/Roll-off	30	48	53	44	46	45	35
Passenger Cruise	9	9	9	4	7	7	-
Others (mainly Tankers)	22	18	21	29	24	19	21
Total	192	190	213	215	223	196	185

Source: Dept. of Statistics "Economic Statistics of Shipping"

Note : Excludes ferries and yachts



Source: Ministry of Transport

Fig. 1.2 Vessels Using the Main Wharf by Vessel Size

(c) Cargo Volume

33. The cargo volume at Apia Port increased from 133 thousand tons in 1981 to 181 thousand tons in 1986. In this period the imports increased from 100 thousand tons to 129 thousand tons, and the exports increased from 33 thousand tons to 52 thousand tons (Table 1.6).

34. The main commodities imported are oil products, foods such as cereals, sugar, salt and meat, cement, steel and vehicles. The main export commodities are mainly agricultural products such as coconut oil, coprameal and taro.

35. The origins of imports are mainly New Zealand (40%), and Australia. New Zealand, Europe and North America are the major export market for Western Samoa.

36. As for container cargo, 10,200 TEU were handled at the port in 1986. 5,100 TEU for imports and the same for exports. The percentage of empty containers in 1986 was 5% for imports and 73% for exports within 5,100 TEU.

37. The daily container stack within the port fluctuated from 263 to 355 TEU during the field survey. The average dwell time of a container is assumed to be 19 days.

(d) Passengers

38. Every year 30 to 40 thousand passengers use the ferry services between Apia and Pago Pago. But there is no data about passengers on cruising vessels.

Table 1.6 Total Cargo Volume at Apia Port

		1981	1982	1983	1984	1985	1986	Annual incr. (1981-1986)
Imports	General Cargo	70,607	89,483	91,516	80,396	102,164	105,694	1.084
	Oil Products	29,125*1	14,392*1	20,985	*2	23,960	23,074	0.954
	Total	99,732	103,875	112,501	-	126,124	128,768	1.052
Exports	General Cargo	33,117	40,148	35,260	45,816	43,970	38,070	1.028
	Coconut Oil	-	8,027	12,188	10,537	12,099	13,801	1.145
	Total	33,117	48,175	47,448	56,353	56,069	51,871	1.094
Total	General Cargo	103,724	129,631	126,776	126,212	146,134	143,764	1.067
	Oil	29,125	22,419	33,173	-	36,059	36,875	1.048
	Total	132,849	152,050	159,949	-	182,193	180,639	1.063
Annual Increase Rate		-	1.14	1.05	-	1.07	0.99	-

*1: Estimated From Total Volume of Oil Products

*2: Unknown

Source: General Cargo: "Economic Statistics of Shipping" Dept. of Statistics

Oil Products: Western Samoa Shipping Corporation

Coconut Oil: Customs Dept.

Coconut Oil: Samoa Coconut Products

(2) Asau Port

39. Asau Port, which is located on the northwest coast of Savaii, was opened by dredging a channel through the broad coral reef to the open sea (Fig. 1.3).

40. The channel is 850m long and its width is 54m at a depth of 5.9m, or 38m at a depth of 6.9m below M.L.W.S.

(i) Port Facilities

41. The existing port facilities are as follows:

A wharf (detached pier type): Length = 120m, Width = 13m:

A mooring buoy for tankers:

A shed.

(ii) Natural Conditions

(a) Waves

42. Asau Harbour is located in a lagoon, and it is well protected from offshore waves. However, in the rainy season it is reported that navigation in the northern part of the entrance channel is dangerous because of the dominant northeast waves which attack the side of vessels.

(b) Water Depth

43. The minimum water depth along the faceline of the wharf is 8.2m below chart datum. Two shallow banks are located about 100m southward and 300m southwestward from the wharf. The minimum water depth in these areas is 8.0m and 5.3m below chart datum respectively.

(c) Bed Material

44. The soil characteristics at the wharf is gray white silt containing fragments of shell and coral and the west bank of the entrance channel is gray coral sand.

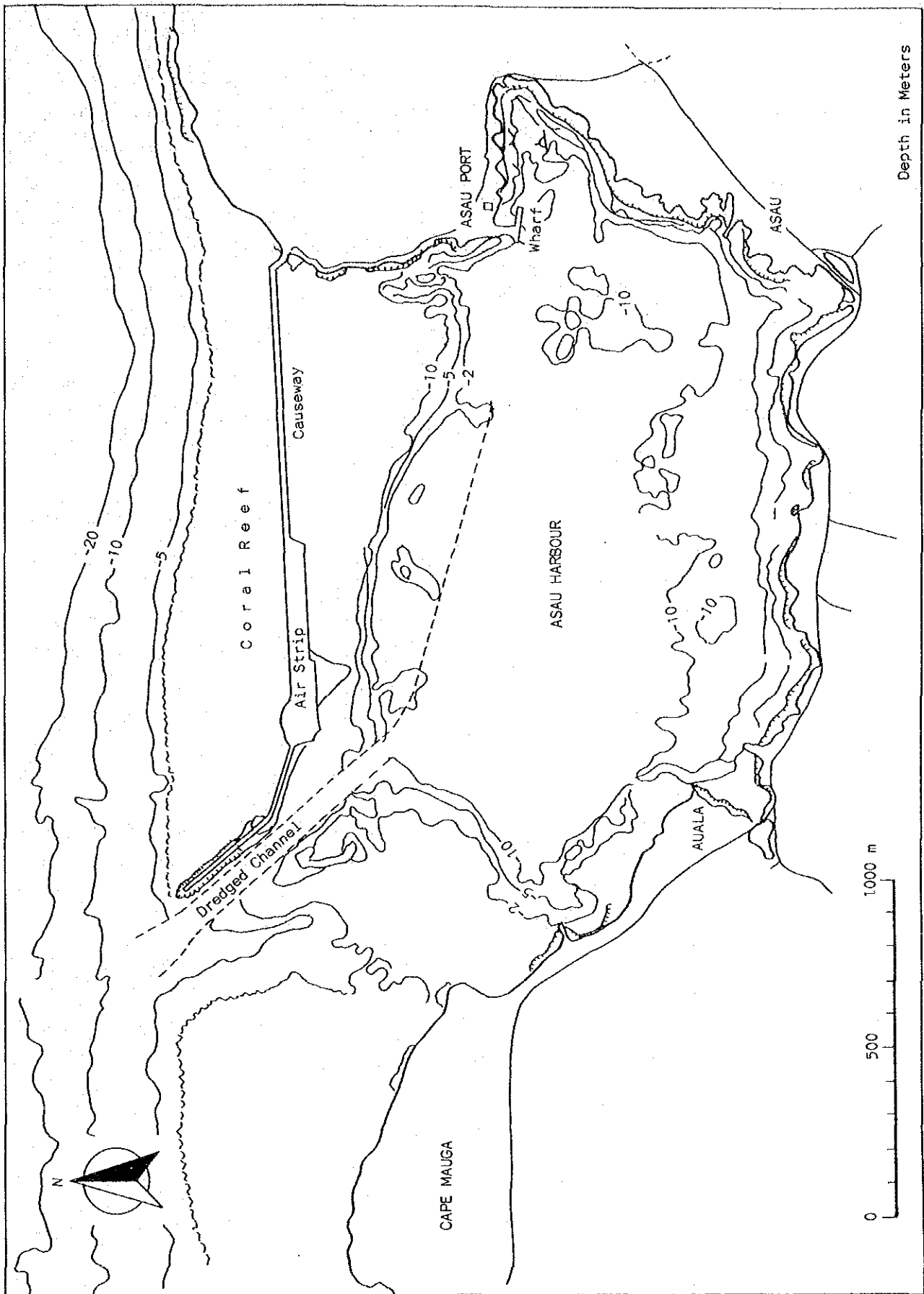


Fig. 1.3 Location of Asau Port

(iii) Port Activities

45. Annual vessel calls fluctuated from 10 to 20. The vessels are mainly tankers for the import of oil products and general cargo vessels for timber export.

46. The cargo volume handled per year is about 5.5 thousand tons, 2.5 thousand tons of oil products and 3 thousand tons of timber.

(3) Salelologa and Mulifanua Ports

47. These ports are ferry terminals linking Upolu and Savaii, and their main port facilities were upgraded with Japanese aid in 1984 - 1985 (Exchange of Note dated Feb. 28th 1985, Fig. 1.4, 1.5).

48. There are four trips per day from Monday to Friday, three trips on Saturdays and two trips on Sundays.

49. The number of passengers using the ferry services have increased. From 25 March to 31 December 1986, 244 thousand passengers were transported. In the same period 12 thousand vehicles were transported.

(4) Aleipata Port

50. Construction of Aleipata Port was started for the purpose of connecting the southeast part of Upolu Island with Pago Pago (American Samoa) by a passenger/vehicle ferry and generating trade from this area. But the construction works stopped about ten years ago.

51. The existing port facilities are only a wharf, 46m long, 8m wide and 1.3m deep, and a connecting road to the land area. Other facilities such as the entrance channel have not been developed.

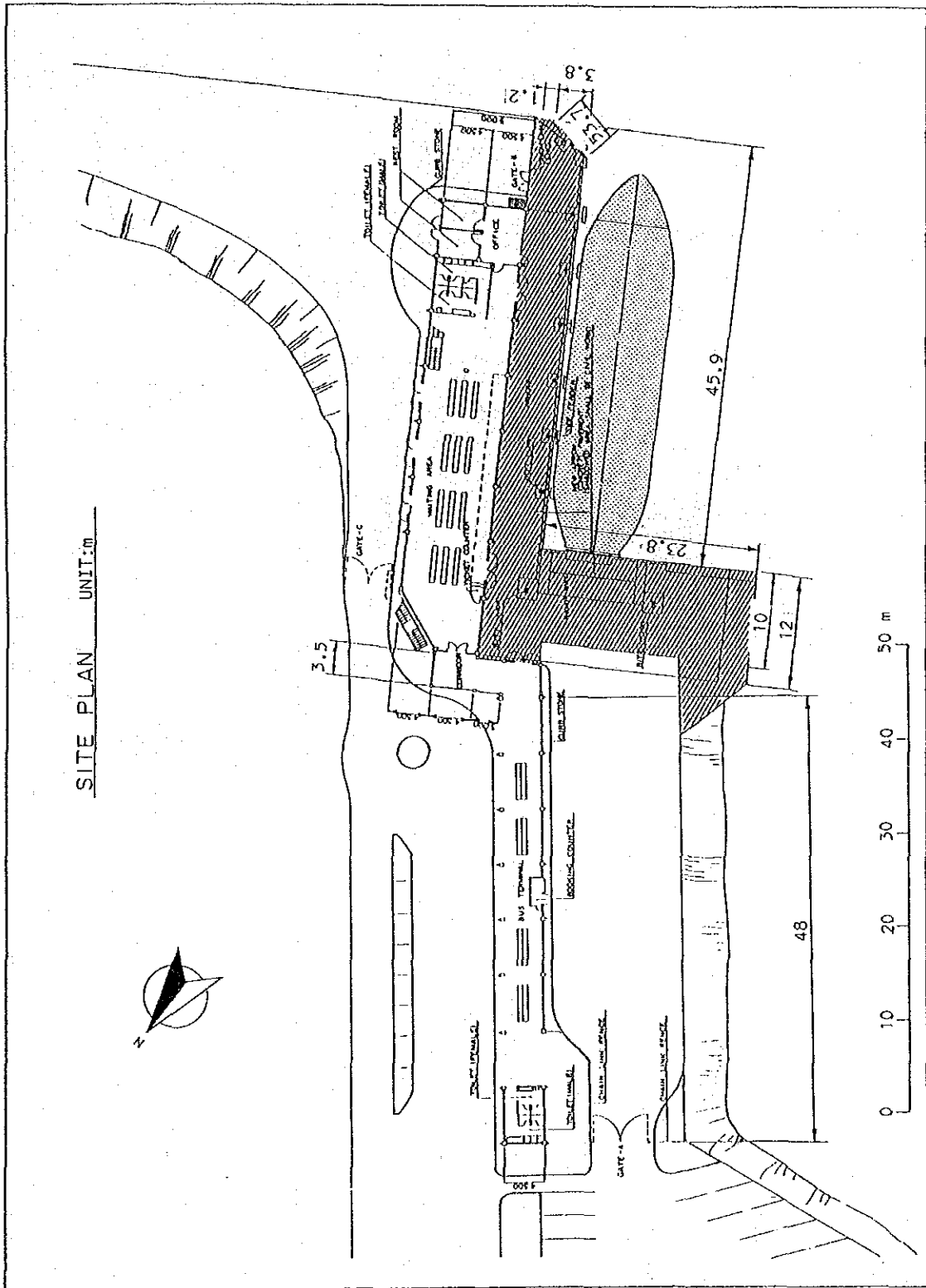


Fig. 1.4 Salelologa Ferry Terminal

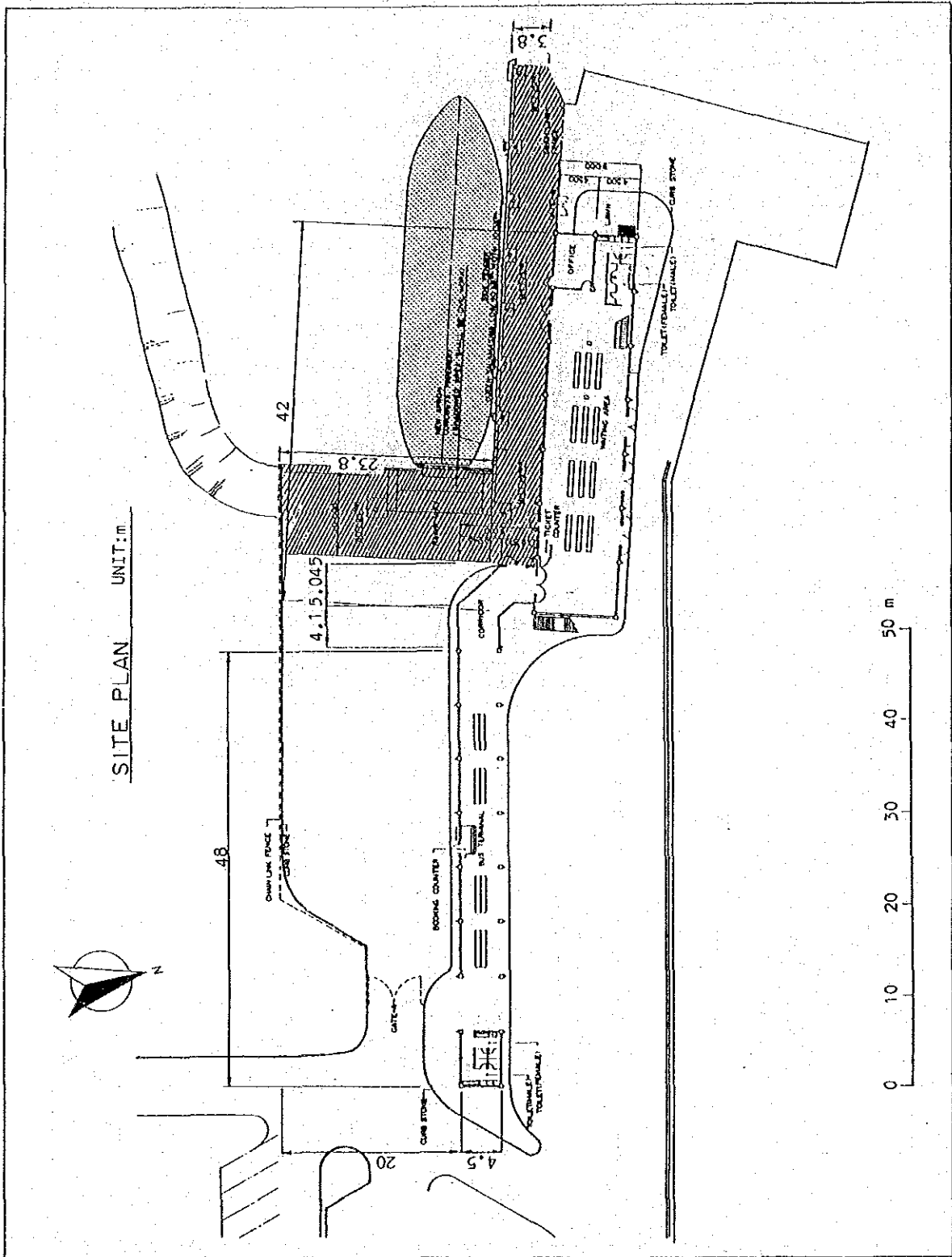


Fig. 1.5 Mulifanua Ferry Terminal

2) Present Problems

The present problems of each port are as follows.

(1) Apia Port

(i) Port Facilities

- ① As the existing main wharf was constructed about 20 years ago, it has become superannuated and the steel members are beginning to show signs of corrosion.
- ② The container yard is narrow, and the pavement and the drainage are insufficient.
- ③ Shed No.2 was destroyed by fire in 1982. Shed No.4, the copra shed, does not have to be located within the port area, because copra should be transported to the coconut oil factory directly.
- ④ Bollards for the ferry have broken down, making the mooring unstable.
- ⑤ Two low-horsepower tugboats are presently out of service due to mechanical difficulties.

(ii) Calmness of the Water

53. Based on the natural conditions survey, the main period of the waves in the rainy season is about 10 seconds, which makes the basin in front of the wharf rough.

(iii) Siltation in the Basin

54. There is a siltation problem in the basin, and the volume of sediment is approximately ten thousand cubic meters per year. So in the future it will become necessary to dredge and maintain the basin.

(iv) Cargo Handling

55. The narrowness of the apron and the wharf load limits reduce handling efficiency.

(v) Safety

- ① As the passenger area and the cargo handling area are not separated, cargoes are sometimes stolen and containers damaged by passengers.
- ② The maneuvering of the vessels in the basin is difficult because of its smallness, the lack of tugboats and the location of buoys for tanker mooring.
- ③ The identification of the leading lights is difficult.

(2) Asau Port

(i) Entrance Channel

56. The width and the depth of the channel are not sufficient for the safe passage of vessels. And the sea conditions at the entrance of the channel are very rough.

(ii) Leading Markers

57. The present leading markers are different from the direction of the channel.

(3) Salelologa Port and Mulifanua Port

- ① These ports require improved parking lots.
- ② The beacons are not sufficient for safe navigation.
- ③ At Salelologa Port there is a shallow reef in front of the berth that may impede safe berthing in case of north wind.

(4) Aleipata Port

58. Judging from its hinterland, the connecting road to Apia, cargo flow and the wave conditions, it is premature to construct Aleipata Port as a ferry terminal.