MINISTRY OF TRANSPORT
THE INDEPENDENT STATE OF SAMOA

BASIC DESIGN STUDY REPORT
ON
THE PROJECT
FOR
THE SECOND DEVELOPMENT FOR APIA PORT
IN
THE INDEPENDENT STATE OF SAMOA

AUGUST 2000

JAPAN INTERNATIONAL COOPERATION AGENCY
ECOH CORPORATION

PREFACE

In response to a request from the Government of the Independent State of Samoa, the Government of Japan decided to conduct a basic design study on the Project for the Second Development for Apia Port and entrusted the study to the Japan International Cooperation Agency (JICA).

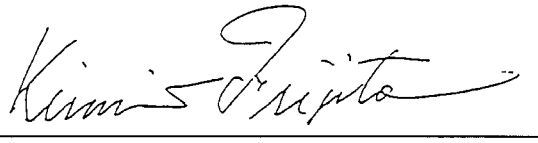
JICA sent to Samoa a study team from March 28 to April 18, 2000.

The team held discussions with the officials concerned of the Government of Samoa, 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 Samoa in order to discuss a draft basic design, and as this result, the present report was finalized.

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

I wish to express my sincere appreciation to the officials concerned of the Government of the Independent State of Samoa for their close cooperation extended to the teams.

August, 2000



Kimio Fujita
President
Japan International Cooperation Agency

August, 2000

Letter of Transmittal

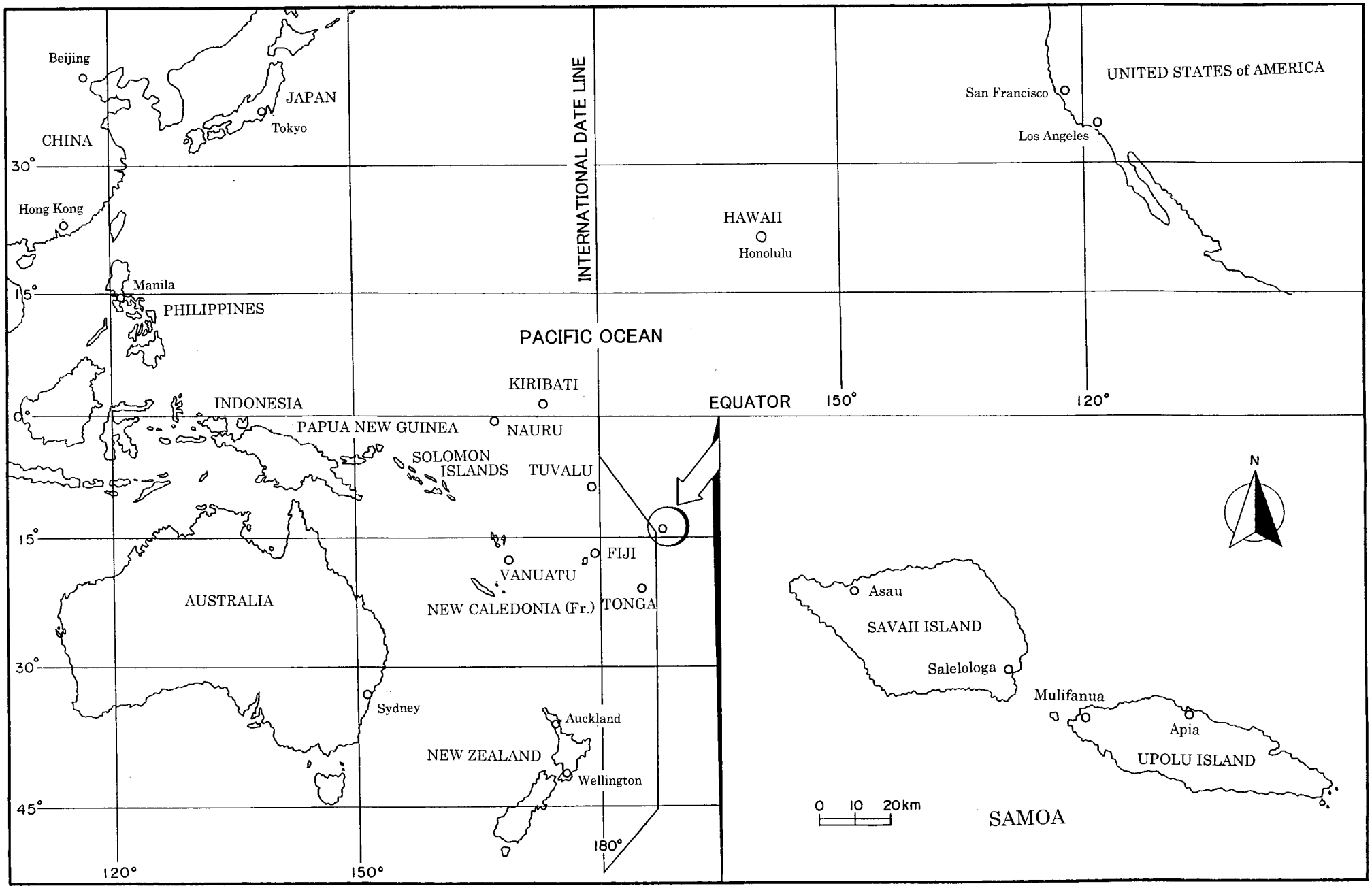
We are pleased to submit to you the basic design study report on the Project for the Second Development for Apia Port in the Independent State of Samoa.

This study was conducted by ECOH CORPORATION, under a contract to JICA, during the period from February 23 to August 31, 2000. In conducting the study, we have examined the feasibility and rationale of the project with due consideration to the present situation of Samoa and formulated the most appropriate basic design for the project under Japan's grant aid scheme.

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

Very truly yours,

Hisanori Kato
Project Manager
Basic Design Study Team on
the Project for the Second Development
for Apia Port
ECOH CORPORATION



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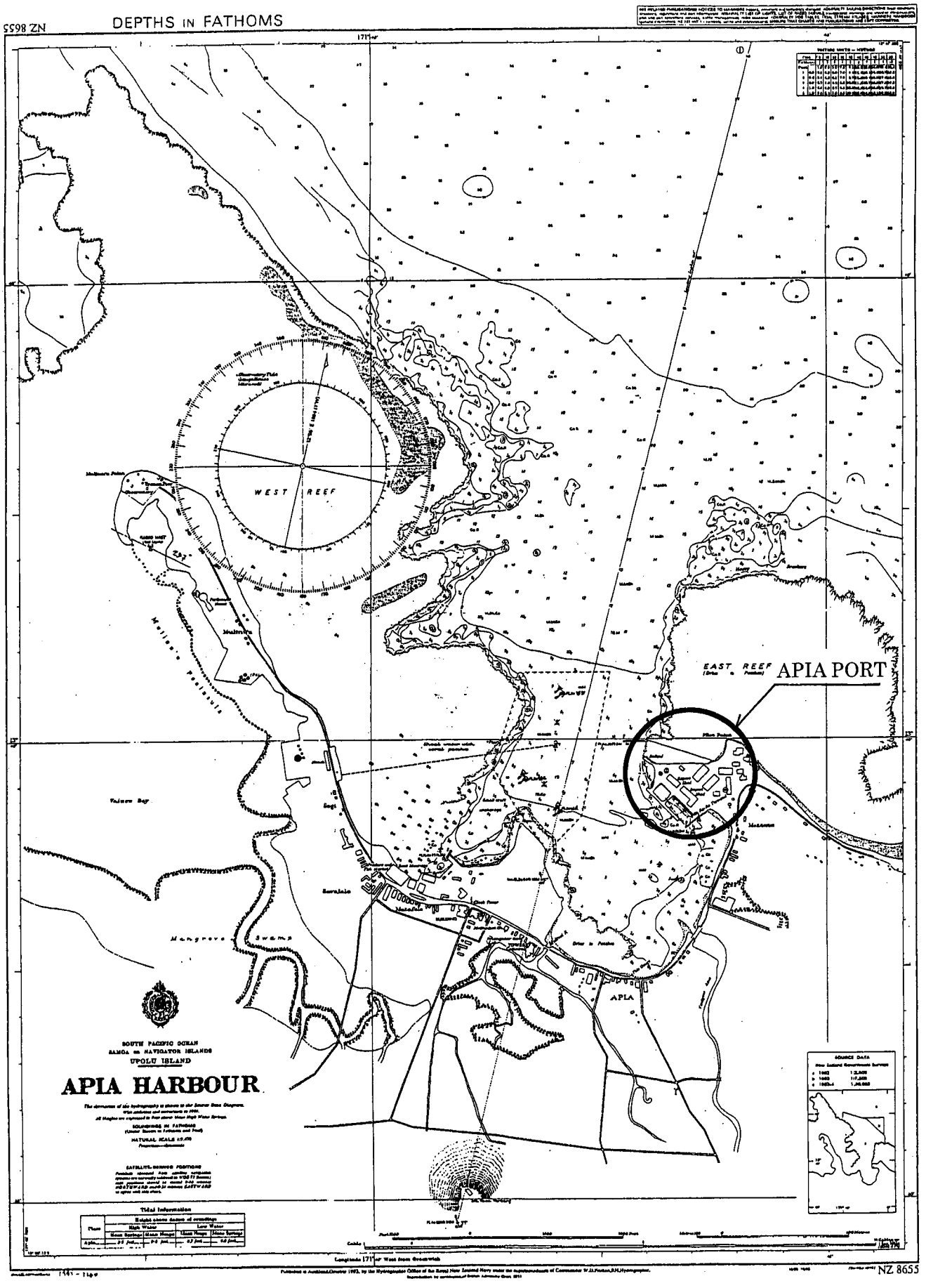
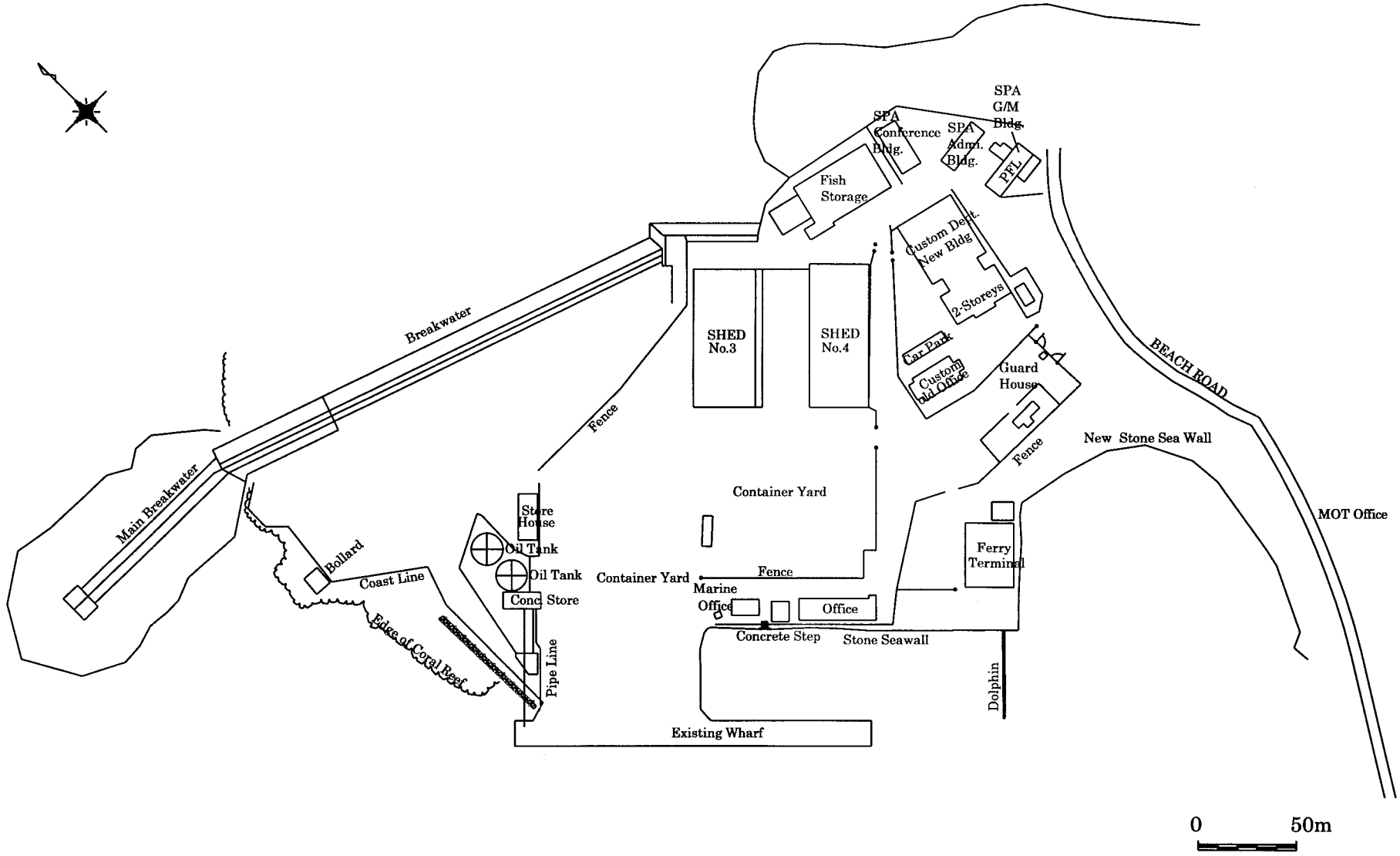
Location of Samoa



Location of Apia Port



Existing Facilities in Apia Port

Abbreviations

BBE	Betham Brothers Enterprises Limited
DL	Datum Level
DLSE	Department of Lands, Surveys and Environment
EIA	Environmental Impact Assessment
EIAR	Environmental Impact Assessment Regulations
E/N	Exchange of Notes
GDP	Gross Domestic Product
GNP	Gross National Product
GRT	Gross Registered Tonnage
HP	Horse Power
HWL	High Water Level
IEE	Initial Environmental Examination
JICA	Japan International Cooperation Agency
JOCV	Japan Overseas Cooperation Volunteers
LOA	Length Overall
LWL	Low Water Level
MH	Morris Hedstrom Samoa Limited
MOT	Ministry of Transport
MSL	Mean Sea Level
NRT	Net Registered Tonnage
ODA	Official Development Assistance
PEAR	Preliminary Environment Assessment Report
PFL	Pacific Forum Line Limited
Ro/Ro	Roll on / Roll off
SPA	Samoa Ports Authority
SPREP	South Pacific Regional Environment Program
SSC	Samoa Shipping Corporation
SSS	Samoa Shipping Service Limited
TEU	Twenty Feet Equivalent Unit
TTS	Telegraphic Transfer Selling Rate
US$	United States Dollar

CONTENTS

[APPENDICES]

List of Tables

[CHAPTER 2] **page**

[CHAPTER 3] **page**

List of Figures

[CHAPTER 2] **page**

[CHAPTER 3] **page**

CHAPTER 1

BACKGROUND OF THE PROJECT

CHAPTER 1 BACKGROUND OF THE PROJECT

Samoa is an insular country located in the central South Pacific with a national land area of 2,936 km^2 and a population of about 160,000. Given its geographical condition, Samoa's national life and economic activities largely depend on maritime transportation, making ports crucial components of basic social infrastructure.

Apia is a sole commercial port, handling almost of all foreign trade cargos (approximately 280,000 tons in 1999) for the country. Apia port is connected with 10 international shipping lines from Australia, New Zealand, Japan, USA, Europe and so on rendering regular shipping services. The existing wharf of Apia Port was constructed in 1966 for conventional cargo handling purposes with the provision of the major facility of 11m deep and 185m long berth. However, more than 35 years have passed since initial construction and number of functional problems have arisen in the port facilities.

The Government of Japan conducted a study titled "The Study on the Development of the Ports in Western Samoa" in 1987. As a results of this study, a master plan targeting the year 2005 was worked out and a first stage plan was prepared to provide the expansion of container yard, the anti-corrosion protection of piles for the existing wharf and the construction of breakwater and so on. Japan's Grant Aid Project "The Project for the Development of Apia Port" consisting of components proposed in the first stage plan was implemented in 1988-1989. Since then, two Japan's Grant Aid Projects on the port facilities for rehabilitation of cyclone-damaged ports have been implemented.

The structure of the existing wharf had been originally designed for conventional cargos and such a quick change of trend as the recent containerization of sea cargo had not been expected in the initial planning. The existing wharf which have been badly deteriorated is imposed with load limitation. On the other hand, the recent increase of cargos has caused a serious damage to the country's economy through sharp rise of sea freight.

Under the above background, the Government of Samoa requested the Government of Japan to conduct the study titled "The Study on Improvement of Apia Port" and this particular project as Japan's Grant Aid Project. The Study was conducted to formulate a new master plan targeting the year 2015 reviewing the previous master plan and a feasibility study for the phased improvement plan for Apia Port in May to December, 1998. The following components have been proposed in the phased improvement plan; repair of the existing wharf,

construction of a new wharf, improvement of breakwater, pavement of staging area, construction of administration office, construction of a tug boat and minor repair works (ferry wharf and ferry dolphin).

The preliminary study on the request for Japan's Grant Aid Project was conducted to confirm the background, the objectives, the present situation of the project site, implementing organization of the project, the facility and equipment plan and the situation of foreign aids in September, 1999. The Basic Design Study on the construction of the tug boat in the phased improvement plan has been conducted since January, 1999. Following the tug boat project, this project intends to improve such port facilities as a new wharf, etc.

CHAPTER 2

CONTENTS OF THE PROJECT

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2.1 Objectives of the Project

Economy and people's lives of Samoa depend heavily on sea transportation due to the country's peculiar geographical condition of remoteness from major trade partners and industrial structure of high dependence of industrial products and foods on import. On this background, the Government of Samoa has taken up the development of port facilities as the most important issue in the national development plan.

Apia Port, located in Apia the capital of Samoa, is the most important gate for international trades handling almost all of foreign cargoes. Apia Port, being provided with only one berth which can accommodated large sized ships, faces the problem of recent port congestion caused by increasing cargoes and calling ships together with deterioration of the existing wharf.

Number of ship's calls and cargo volume handled in Apia Port increased from 218 ships and 240,000 tons in 1994 to 265 ships and 280,000 tons in 1999. Since Apia Port is provided with no more than one berth, there occurs waiting for berth when more than two ships call the port at a time. Though shipping schedule is adjusted in order to avoid this situation, it inevitably occurs due to increase of calling ships and absolute shortage of berth. Number of occurrence of waiting for berth sharply increased from 10 in 1997 to 39 in 1999 causing serious port congestion with maximum waiting time of about 10 days in recent years.

The existing main wharf, 185m long and 11m deep, was constructed under New Zealand aid in 1966 with the structural type of a concrete deck supported by H shaped steel piles.

The H shaped steel piles have heavily corroded during its service period of 35 years after construction losing the original design strength and now limitation of load onto the wharf deck is imposed. This limitation of load gives rise to interruption of handling operation of heavy container cargoes by heavy equipment resulting in a further port congestion. Further structural deterioration of the wharf due to continuing corrosion of H shaped steel piles could lead to partial collapse which would seriously affect function of the port.

Port congestion is to affect economy of Samoa in a way of increase import price and loss of international competitiveness through increased sea freight. The Government of Samoa has well recognized absolute necessity of provision of efficient and reliable port facilities supporting sound growth of national economy

and put the highest priority to development of the port facilities among other basic social infrastructures.

The objectives of this Project are to secure safe and efficient port operation by reducing port congestion through improvement of port facilities especially the deteriorated existing wharf.

2.2 Basic Concept of the Project

2.2.1 Basic Direction of Development Plan

Basic direction of this Project is set as follows;

1) Cargo handling capacity of Apia Port becomes insufficient to meet the traffic demand of increasing cargoes and calling ships coupled with deterioration of the existing wharf. To secure safe and efficient container cargo handling operation, the port facilities shall be urgently improved.

2) Establishment of Samoa Ports Authority (SPA) has drastically improved administration and management aspects of Apia Port. Improvement of the port facilities, which is considered to be well within the capacity of SPA, shall not be included in this Project.

3) The development plan shall be worked out to be appropriate for Japan's Grant Aid Program through due consideration of the present situation, urgency, priority and expected benefits of all the facilities to be planned.

2.2.2 Examination of Requested Facilities

The port facilities, agreed as the items requested by the Government of Samoa after discussions during the field study and listed in Minutes of Discussions (see appendix 4), are in priority order as follows;

1) Construction of New Wharf
2) Improvement of Breakwater
3) Pavement of Staging Area
4) Repair Works of Ferry Dolphin
5) Repair Work of Existing Wharf

- Replacement of Damaged Fenders
- Dredging in front of Existing Wharf
- Corrosion Protection of Piles

6) Construction of Administration Office

The above facilities are examined according to the above-mentioned basic direction of the development project as below;

1) Construction of New Wharf

Construction of the new wharf has been evaluated as necessary and feasible by means of economic analysis in "The Study on Improvement of Apia Port" done in 1998 by giving thorough consideration to such various factors as ship waiting cost generated by increasing cargoes and ships, construction cost, deterioration of the existing wharf, etc. The feasibility of construction of the new wharf has been reconfirmed in the present study by collating the actual cargo and ship records in 1998 and 1999 with the values forecast for the same years in the said study as follows;

Volume of cargoes handled in Apia Port increase steadily with values in 1998 slightly lower than the forecast and in 1999 total of 275,000 tons (export 35,000 tons and import 240,000 tons) exceeding the forecast. While, a number of ship's call is in a trend of steady increase from 240 in 1997, 245 in 1998 to 265 in 1999 exceeding the forecast of 233 in 1999. Important port planning indices of cargo volume and ship's call forecast in "The Study on Improvement of Apia Port" in 1998 coincide to the actual records for the following two years and the evaluation on construction of the new wharf is considered as appropriate.

Congestion in Apia Port has become serious due to increasing cargoes and calling ships in recent years. In 1999, berth occupancy reached 62% and waiting for berth occurred 39 times clearly showing saturation of the port and it is judged necessary that this Project shall be urgently implemented.

In the present study, the design and cost estimation of "The Study on Improvement of Apia Port" in 1998 have been reviewed based on the results of new soil investigation revealing wider distribution of hard coral layer. While the length of the new wharf has been extended 10 m to 165 m securing full length of design ship for safety of ship and efficiency of cargo handling operation.

2) Improvement of Breakwater

The new wharf is more exposed to waves penetrating from outer sea than the

existing wharf due to its location. An appropriate work shall be planned to secure calmness in front of the new wharf. Computer analysis on calmness has been done based on the annual characteristics of wave occurrence and wave deformation at the new wharf site. Number of non-operable days is calculated at 16 in a year (more than 95% operable) for the existing wharf on the assumption of the maximum critical wave height of 0.5 m for cargo handling operation. While the same calculation gives almost two times of 34 days for the new wharf without any countermeasure to secure required calmness. The extension of the breakwater interferes with turning and navigation of large tankers and other ships and can not adopted as a countermeasure to secure required calmness. In this Project, placing of crown concrete on top of the rubble mound of the existing breakwater is planned to reduce transmitting waves to secure more than 95 % of annual operable days.

3) Pavement of Staging Area

A staging area for container handling is planned along the back of the new wharf to improve efficiency of cargo handling operation. All the export containers are to be stacked in the staging area before ship's berthing to allow loading operation immediately after ship's berthing. While, all the import containers are to be stacked in the staging area and after ship's departure transported to the container yard away from the wharf to shorten the port time by minimizing waiting time of a ship. The average number of containers handled per ship in Apia Port is about 100 TEUs (export 50 TEUs, import 50 TEUs) with maximum of about 200 TEUs. The staging area with stacking capacity of 200 TEUs is planned at the back of the new wharf.

4) Repair Works of Ferry Dolphin

The mooring dolphin for a ferryboat at Ferry Terminal has been damaged by an impact of a ship moored at the time of cyclone. The supporting steel piles of the dolphin are tilted and in a dangerous condition requiring repair work to ensure safe mooring of a ferryboat. The existing gangway is not used for passenger traffic, but it is for mooring and maintenance work of a ferryboat. As the width of 115cm of the exiting gangway is narrow, there has been an accident that two mooring laborers fell down to the sea due to rolling of a ferryboat caused by swell in the past. Therefore, the new gangway replacing the existing one is expanded in order to ensure safe mooring of a ferryboat.

5) Repair Work of Existing Wharf

The existing wharf is planned to be used for ships of medium or smaller sizes after completion of the new wharf under the same limitation of load to the wharf deck. The Government of Samoa expressed desires to repair the damaged rubber fenders and to dredge the silted water area in front of the existing wharf.

- Replacement of Damaged Fenders

The rubber fenders of the existing wharf have been installed under Japan's Grant Aid of "The Project for Rehabilitation and Improvement Cyclone-damaged Ports and Foreshore Protection" in 1992.

12 units of rubber fenders out of 40 have been seriously damaged over the service period of seven years losing their required functions (see Appendix 6.1). One of the major reasons of this damage is harbor agitation caused by swell occurring in the period from November to February. The swell penetrates into Apia Bay and reflects on the reclaimed land on the opposite side of the port giving considerable agitation in the water area of the bay. The ship berthing along the existing wharf gives large impact by the movement caused by agitation. In addition to this, a ship with a steel belt gives a large force by her movement when she rolls in handling container with her crane. The steel belt iteratively pushes fenders down by rolling and swell agitation causing eventual breakage of the fenders.

Inclusion of the repair work to the damaged fenders in this Project is judged inappropriate due to following reasons.

Fenders installed on a wharf are consumable and to be repaired and maintained with an annual recurrent budget. Wearing rate of fenders in Apia Port is high due to the above-mentioned reasons and it is recommended that SPA shall allocate a budget to repair and maintain damaged fenders. Since the existing wharf will not serve for large cargo ships and cruisers after completion of the new wharf, the wearing rate will reduce. In order to minimize maintenance and repair costs, it is recommended that SPA undertake a periodical inspection, repair works to damaged fenders, reuse of damaged fenders in different section, instruction of proper berthing to port users, etc.

- Dredging in front of Existing Wharf

The water area in front of the existing wharf has become shallow to the extent that ship's bottom and propeller touch sea bed and the Government of Samoa requested inclusion of the dredging work of this area in this Project. According

to the results of sounding survey conducted, water depth along the front of the existing wharf is –8 to –9 m and –9 to –11 m 50 m off the existing wharf (see Appendix 6.2). Dredging work is required in front of the existing wharf to secure safety of berthing operation of large sized ships. The existing wharf will be used by smaller ships other than container carriers and cruisers after completion of the new wharf. Large sized cruisers give a berthing impact too strong to the deteriorated existing wharf and will be accommodated at the new wharf. Therefore, the dredging work in front of the existing wharf will become a waste of investment, though deeper water depth is required until completion of the new wharf. Dredging work of silted soil should principally be implemented as a part of repair and maintenance works to port facilities and is excluded in this Project. It is recommended that SPA notify to port users to adjust the draft of ships calling Apia Port until completion of the new wharf.

- Corrosion Protection of Piles

The existing wharf has deteriorated due to serious corrosion of supporting H shaped steel piles and the load limitation imposed to the concrete deck lowers efficiency of cargo handling operation. Anti-corrosion works can extend the service life of the existing wharf by reducing corrosion rate but continuation of load limitation is necessary. Most part of the anti-corrosion works are to be done underwater and the cost is very high close to construction of a new wharf. Therefore, this particular Project has been planned to focus on construction of a new wharf and the anti-corrosion works to the H shaped steel piles are excluded.

6) Construction of Administration Office

Newly established SPA have completed construction of SPA Office and an entrance gate house and maintenance of Marine Office. Buildings formerly used by an agriculture department have been remodeled to SPA office in a satisfactory condition. SPA have enough budget and engineering staff required for these works and the construction of SPA office has been excluded from the scope of this Project.

The concrete slope of the ferry wharf supporting a steel ramp of a ferryboat had been dug about 30 cm by abrasion of the ramp. The slope is repaired before introducing a new ferryboat by Samoa Shipping Corporation (SSC) in 1999, and is excluded from the project scope.

2.3 Basic Design

2.3.1 Design Concept

(1) Design Standards

Local design standards on port facilities have not been established in Samoa and the Japanese design standards such as “Technical Standards for Port and Harbour Facilities in Japan” are applied.

(2) Design Policies of Port Structure

Port facilities to be planned in this Project include a new wharf, improvement of the breakwater, a container staging area and repair of a ferry dolphin. Following factors will be taken into account in planning and designing of port facilities.

① The structure of port facility is designed for easy maintenance by taking into account the natural and social conditions at site.
② A construction plan is made so that construction works have minimum effects on the port activities.
③ Labors and materials from Samoa are procured as much as possible to stimulate the local economy and the construction plan is made by taking into account the technical limitation at site so that the cost and period of works are minimize.
④ Construction works are implemented under the law and regulation relating to the environment stipulated by the Government of Samoa.

2.3.2 Basic Design

(1) New Wharf

1) Design Ship

The dimension of ships which called at Apia Port is shown in Table 2.3.1. As the number of container ships regularly called at Apia Port is limited to ten ships every month and nine ships every other month, the maximum size of ship is applied as the design ship. The dimension of ships by ship type is shown in Table 2.3.2. The new wharf is planned to accommodate container ships and the

maximum size of container ship is applied as the design ship.

At the present, the maximum size of container ships which regularly call at Apia Port is Polynesia. However, in “The Study on Improvement of Apia Port” in 1998, the maximum size of container ships for the past five years was selected as Kassiakos which does not call now. Since the same size of container ship as Kassiakos is expected to call at Apia Port in the future, Kassiakos is applied as the design ship. The dimension of Kassiakos is as follows;

Loa: 165m Draft: 10.5m Beam:26m

Table 2.3.1 Dimension of Ship Called at Apia Port

Name of Vessel	Type	Loa (m)	Beam (m)	Draft (m)	GRT (ton)	NRT (ton)	No. of Crane	With Bow Thruster
Crystal Symphony	Cruise Ship	238.01	30.20	8.50	51,044	20,201		1
Sky Princess	ditto	240.40	29.80	8.17	46,087	21,617		1
SS Rotterdam	ditto	228.17	28.69	8.40	39,674	17,692		1
Royal Viking Sun	ditto	204.00	27.53	7.31	37,845	14,054		1
Arkona	ditto	164.00	22.40	6.20	18,591	6,719		
Seabourn Pride	ditto	133.40	19.00	5.60	9,975	3,025		1
Seabourn Legend	ditto	134.00	19.00	5.60	9,961	3,019		1
Daphne(r2)	ditto	162.00	21.36	8.60	9,436	4,381		
Sea Dancer	ditto	100.95	14.60	5.22	3,745	1,123		
Bosei Maru	Reseach	87.98	12.80	5.60	2,174	726		1
Fua Kavenga	RoRo/LoLo	118.83	19.20	6.60	6,861	2,586	1	1
Forum Samoa	ditto	118.83	19.20	6.60	6,861	2,586	1	1
*Kassiakos	Container	165.00	26.00	10.47	16,872	8,705	5	1
Coral Islander	ditto	155.52	25.00	7.31	14,294	5,512	3	
Pacific Islander	ditto	155.52	20.20	7.80	14,146	6,190	2	
Tausala Samoa	ditto	148.58	23.10	—	12,004	6,750	2	1
Tui Pacific	ditto	156.70	31.49	8.62	11,998	5,701	3	1
Forth Bank	ditto	161.62	22.60	9.60	11,956	7,131	4	
Polynesia	ditto	162.10	22.40	9.60	10,774	6,134	2	1
Micronesia Nation	ditto	129.10	24.20	8.20	9,048	4,643	1	1
Capt. Tasman	ditto	113.12	18.90	—	8,030	3,602	2	
Kyowa Cattleya	ditto	117.52	20.20	6.40	7,945	2,842	2	1
Kyowa Hibiscus	ditto	117.52	20.00	6.40	7,945	2,847	2	1
Forum Tonga	ditto	129.75	22.00	8.35	7,908	—	2	1
Southern Cross Ⅱ	ditto	99.97	18.50	6.10	4,410	2,240	2	1
Makarov	ditto	97.80	17.30	5.60	3,936	1,612	2	1
Southern Cross	ditto	93.00	15.00	6.28	3,186	1,372	2	1
Nepline Teratai	ditto	92.57	13.80	6.80	2,961	1,117	2	1
Princess Cathrin	ditto	83.32	14.81	8.80	2,887	1,588	2	
Southern Moana	ditto	79.45	13.25	5.19	1,808	1,115	2	
Forum Tokelau	General	59.00	10.00	4.20	808	371	1	
Transpacific	Car Carrier	156.00	24.40	7.78	18,337	5,501		1
Pacific Gas	Gas Carrier	84.30	13.60	7.20	2,602	780	2	1
Captain Martine	Tanker	176.00	—	10.87	25,060	11,128		
Saccon	ditto	173.80	32.00	11.20	11,748	8,550		
Petro Discoverer	ditto	88.00	13.60	6.50	1,970	959		
Pacific Mariner	ditto	75.00	12.60	5.62	1,384	696		

*Maximum size of container ships which regularly called at Apia Port

Table 2.3.2 Dimension of Ships by Ship Type

Ship Type	Name of Vessel	GRT (t)	LOA (m)	Draft(m)
Container Ship	Polynesia	10,774	162	9.60
	Kassiakos	16,872	165	10.47
Tanker	Captain Martin	25,060	176	10.87
Cruise Ship	Crystal Symphony	51,044	238	8.50

2) Wharf Structure

Two structural types as shown in Figure 2.3.1 and 2.3.2 are examined for a new wharf.

Steel Sheet Pipe Pile Bulk Head Type (Type A) : Figure 2.3.1
Open Type Piers with Vertical Piles (Type B) : Figure 2.3.2

Based on the results of comparison of structural design as shown in Table 2.3.3, steel sheet pipe pile bulk head type is adopted.

Table 2.3.3 Comparison of Wharf Structure

Comparison Items	Steel Sheet Pipe Pile Bulk Head Type (Type A)	Open Type Piers with Vertical Piles (Type B)
Construction cost ratio to type A	1.0	1.2
Easiness of construction work	*Steel sheet pipe piles are driven to hard coral by a water jet cutter with a vibratory pile driver on a floating crane. *Anchoring wall works are done on land. *As coping work and pavement of apron are done on land after backfilling work behind steel sheet pipe piles, construction works of type A are easier than those of Type B. *The volume of sand for backfilling is large.	*Steel pipe piles are driven to hard coral by a water jet cutter with a vibratory pile driver and are finally driven by hammer in order to confirm their bearing capacity. *Steel sheet piles is required behind the piers. *As a concrete deck work is constructed on the sea, careful construction works are required. It is difficult to control quality of concrete used in many kinds of works such as scaffold, support and shuttering etc. *Though volume of sand for backfilling is small, type B needs retaining wall and rubble slope.
Construction Period	*As most of construction works are executed on land, the construction period is short at about 18 months.	*As concrete deck work is executed on the sea, the construction period is long at about 20 months.
Total Evaluation	1 (selected)	2

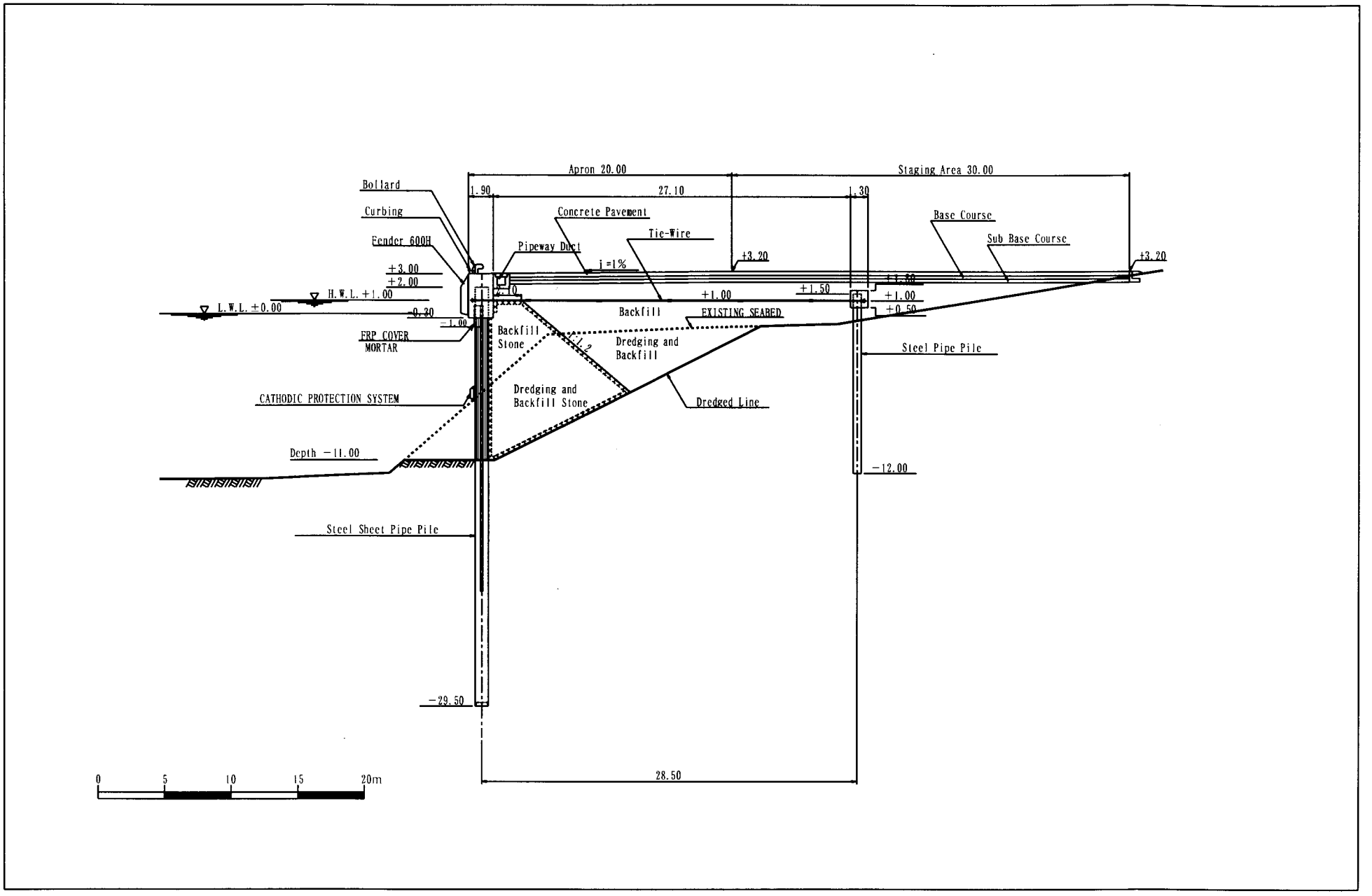


Figure 2.3.1 Steel Sheet Pipe Pile Bulk Head Type for New Wharf (Type A)

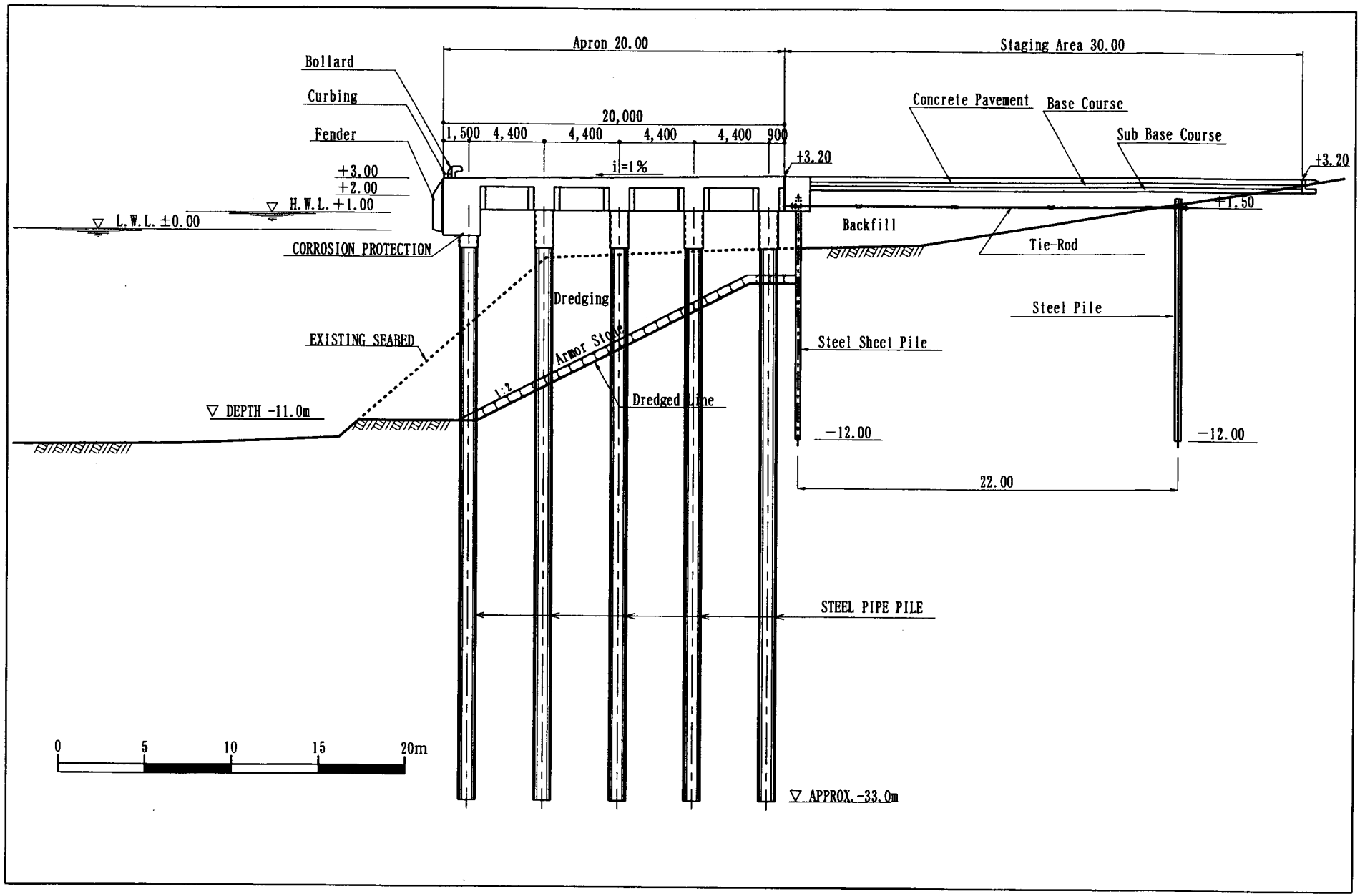


Figure 2.3.2 Open Type Piers with Vertical Piles for New Wharf (Type B)

3) Layout Plan

The construction site of the new wharf is planned from the existing wharf to the end of the breakwater as proposed in “The Study on the Development of the Ports in Western Samoa” in 1987. According to the results of boring survey done in “The Study on Improvement of Apia Port” in 1998 and the present study, the face line of the new wharf crosses reef flat area including a part of hard coral layer, and the face line is adjusted and determined through consideration of easiness of construction work, calmness of berthing area and construction cost.

The three alternative face lines as shown in Figure 2.3.3 are examined from the view points of total volume of dredging and backfilling, calmness of berthing area, easiness of construction work, construction period and construction cost.

The comparison of alternative face lines is shown in Table 2.3.4 and Line B is selected as the best alignment. Figure 2.3.4 shows the plan of the new wharf.

4) Length, Depth and Crown Height

(a) Length

The length of the new wharf is determined to be 165m, which is overall length of the design ship, Kassiakos.

(b) Depth

The design depth(h) is determined by adding a depth allowance(h2) to full load draft(h1) of the design ship. The depth of the new wharf is set at 11m below C.D.L. by adding a depth allowance of 0.5m to the full load draft of the design ship of 10.5m.

$h = h1 + h2 = 10.5 + 0.5 = 11.0m$

(c) Crown Height

The crown height of the new wharf is set at +3.00m as the same as that of the existing wharf.

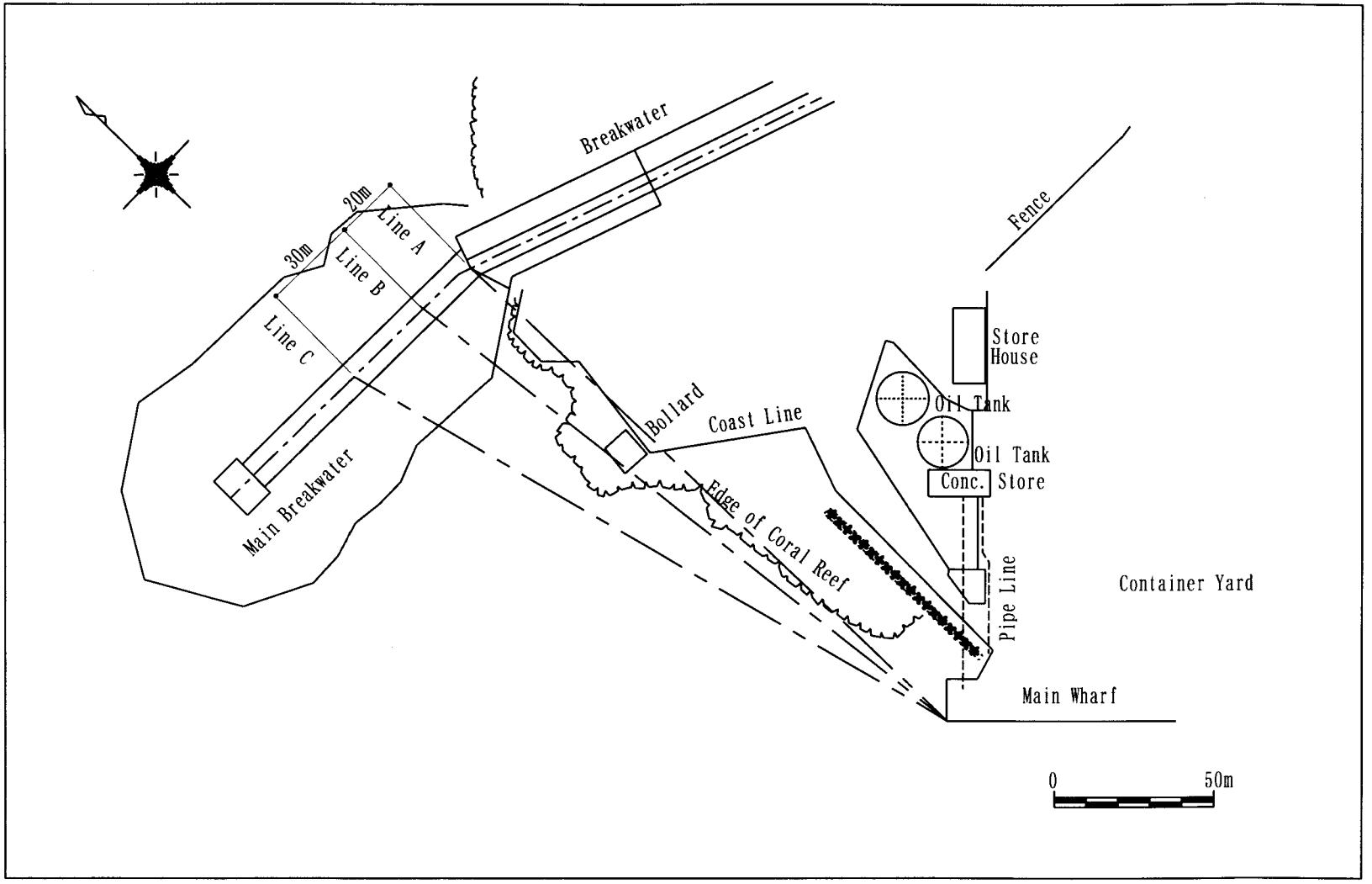


Figure 2.3.3 Face Line of New Wharf

Table 2.3.4 Comparison of Alternative Face Line

Comparison Item	Line A (Line A is shifted 20m inshore from Line B)	Line B	Line C (Line C is shifted 30m offshore from Line B)
Volume of dredging (hard soil) (normal soil)	19,000m^3 28,000m^3	7,300m^3 17,100m^3	0m^3 5,600m^3
Volume of backfilling	30,000m^3	30,800m^3	50,000m^3
Total volume	77,000m^3	55,200m^3	55,600m^3
Calmness of berthing area	*Calmness of berthing area is secured by improving the breakwater impermeable. There is not a marked difference between Line A and Line B on calmness of water area. As Line A is shifted 20m inshore from Line B, calmness in berthing area of Line A is a little better than that of Line B. (Wave height ratio 0.33)	*Calmness of berthing area is secured by improving the breakwater impermeable. There is not a marked difference between Line A and Line B on calmness of water area. As Line B is shifted 20m offshore from Line A, calmness of berthing area of Line B is a little worse than that of Line A. (Wave height ratio 0.34)	*As water area in front of the new wharf is less sheltered from waves than other lines, wave height ratio in berthing area of Line C is 12% higher than other lines. The countermeasure against wave overtopping from the breakwater is necessary in cyclone season. (Wave height ratio 0.38)
Easiness of construction work	*As the face line crosses hard coral area in vicinity of the existing bollard, steel sheet pipe piles are driven to hard coral by a water jet cutter with a vibratory pile driver. *As the seawall is constructed in landside of coral drop-off, the volume of hard coral excavation is large.	*As the face line crosses hard coral area in vicinity of the existing bollard, steel sheet pipe piles are driven to hard coral by a water jet cutter with a vibratory pile driver. *As the seawall is constructed by placing rubble and concrete blocks in front of coral drop-off, construction works are easy.	*As Line C avoids hard coral area, steel sheet pipe piles are driven easily. *Large volume of backfilling are required to secure reclamation material. *As the subsoil is composed of soft silty layer, the surface of backfilling is expected to be subject to differential settlement. *The countermeasure against wave overtopping such as widening or elevating crown height of the breakwater is necessary.
Construction period	*Large volume of coral dredging, long period for driving of steel sheet pipe piles to hard coral layer and large volume of dredging and backfilling cause long construction period.	*Though the dredging of hard coral and long period for driving of steel sheet pipe piles to hard coral layer are necessary, construction period of Line B is shorter than that of other lines due to small volume of dredging and backfilling.	*A period for stability against settlement of the surface in reclamation area causes the longest construction period.
Construction cost ratio to Line B	1.48	1.00	1.02
Total Evaluation	3	1 (selected)	2

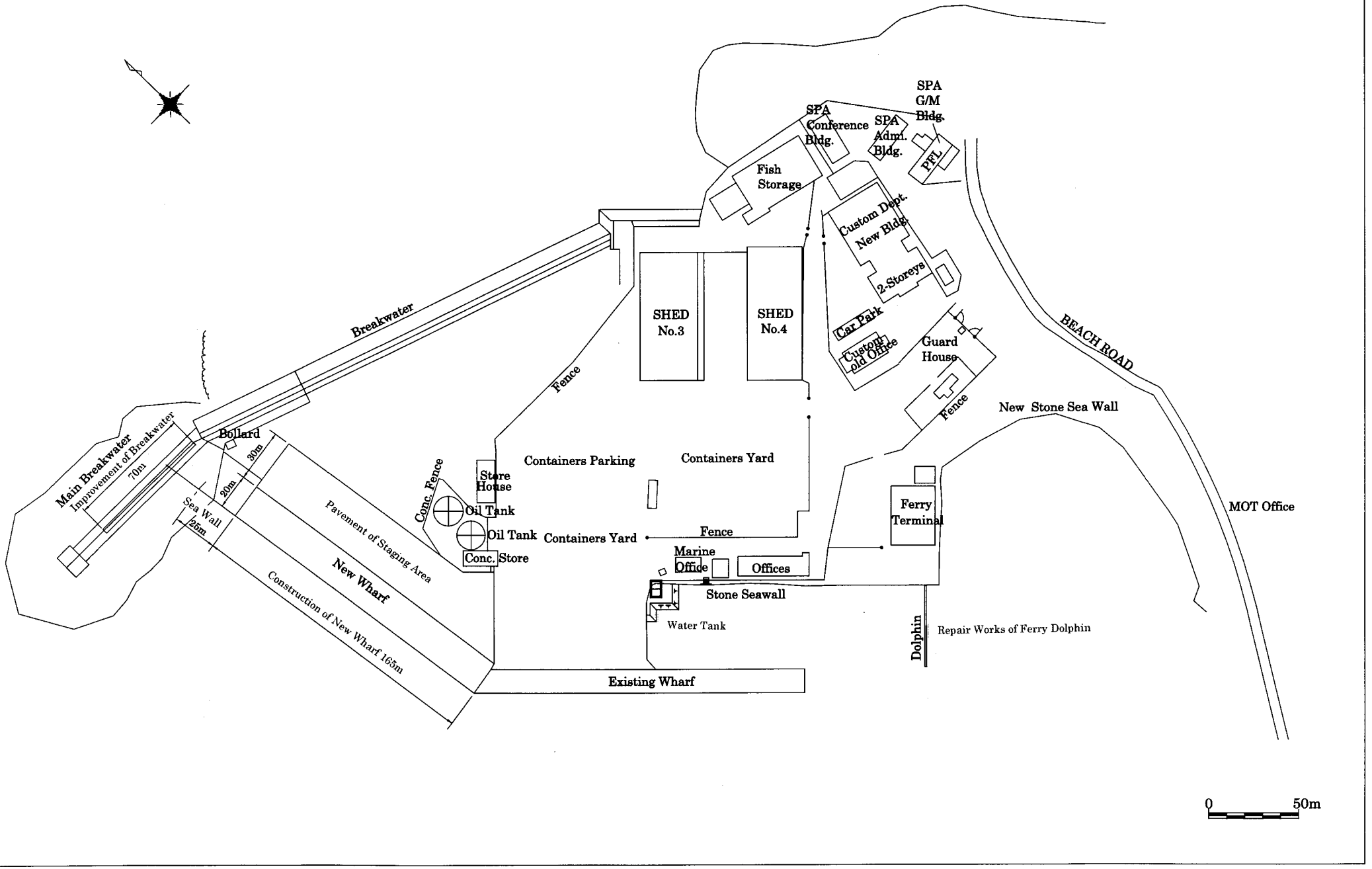


Figure 2.3.4 Layout Plan of New Wharf

5) Wharf Structure

(a) Soil Conditions

Figure 2.3.5 shows soil profiles according to results of boring surveys in "The Study on Improvement of Apia Port" in 1998 (BH-1 to BH-8) and the field survey (BH-D1 to BH-D7) in this study. The results of soil investigation are summarized as follows.

a) Section ①—① (on the face line of new wharf)

＜Reef flat area (length of 55m , depth of +0.5m), BH-D1, BH-D2, BH-D3＞

Coral layer lies from surface to -10m at both edges of reef flat (BH-D1 and BH-D3) and also lies from surface to -20m at central part of reef flat (BH-D2). These coral layers include very hard coral rock with a thickness of about 3 m (N value more than 100). Under these layers, fine sand (N value 3 to 13) underlies and a weathered rock is observed at -30m. At BH-1, very hard coral layer (N value more than 100) is observed from -22m to -30m.

According to the result of soil investigation conducted in the present study, the subsoil is composed of very complicated soil layers and lacks horizontal and vertical continuity. The compressive strength of hard coral rock is approximately 120 kgf/cm^2.

＜Offshore area from reef flat, BH-8, BH-D4, BH-2, BH-D5＞

The strata from seabed to -30m consists of coarse sand layer, silty sand layer or coral sand layer (N value 3 to 20). The depth and thickness of each layer are various.

b) Section ②—②

At BH-D7 which is 20m land side from the face line of the new wharf, the surface layer from +0.8m to -0.5m consists of reclaimed sand. Under this layer, coral layer with a thickness of 0.5m to 2.5m, coral sand layer and fine sand layer with a thickness of 1.5m to 3m are alternately observed.

At BH-D3 on the face line of the new wharf, coral layer and fine sand layer from surface to -21m are alternately observed. Under these layers, fine sand layer is observed down to -30m to reach the weathered rock.

At BH-1 just under coral drop-off, hard coral layer (N value more than 100) from -11m to -21m is observed.

At BH-7 and BH-3 which are at the foot of coral reef slope, coarse sand layer from seabed to -22m is observed and from -22m to -30m silty sand layer observed to reach the weathered rock.

c) Section ③—③

At BH-D6 which is 20m land side from the face line of the new wharf, the surface layer from +0.8m to -0.5m consists of reclaimed sand like in BH-D7. Under this layer, coral layer, coral sand layer and fine sand layer are alternately observed.

At BH-D2 on the face line of the new wharf, coral sand layer from -2.5m to -4m and coral layer from -4m to -18.5m are observed. Under these layers, fine sand layer is observed down to -32m to reach the weathered rock.

At BH-6 which is at the bottom of coral reef flat, silty sand layer and coarse sand layer from seabed to -33m are alternately observed and down to reach the weathered rock.

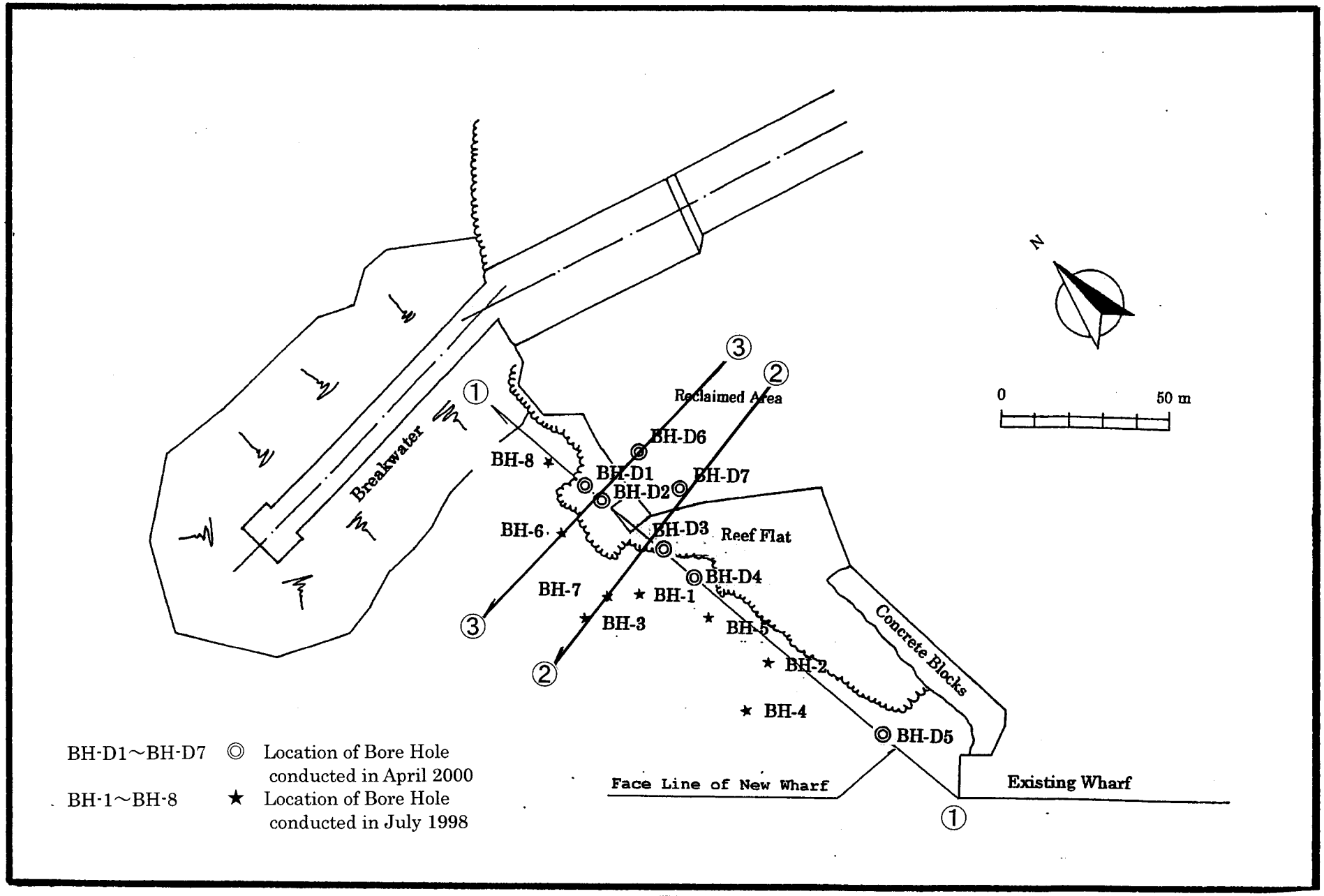


Figure 2.3.5(1) Location of Boring Survey

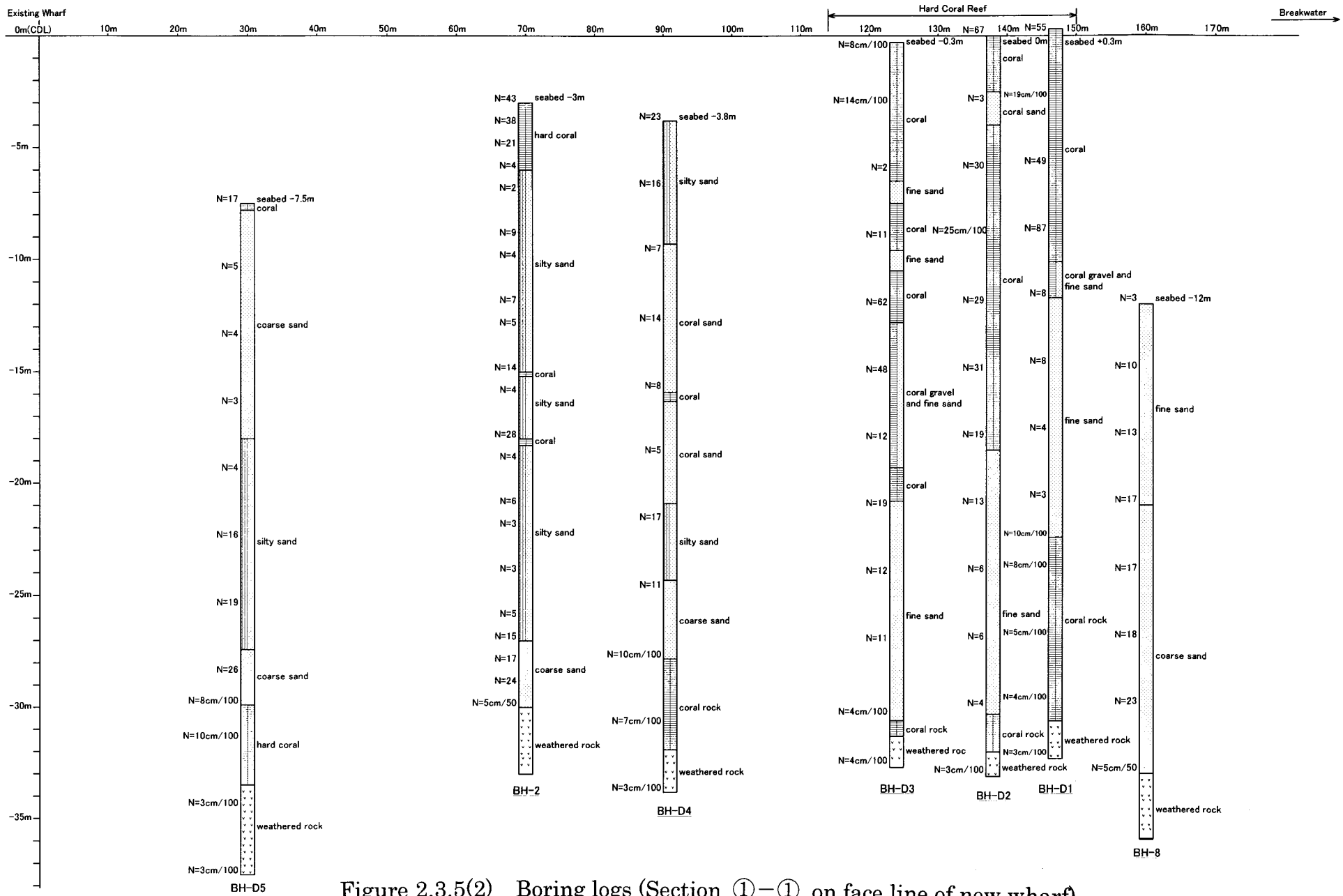


Figure 2.3.5(2) Boring logs (Section ①－①, on face line of new wharf)

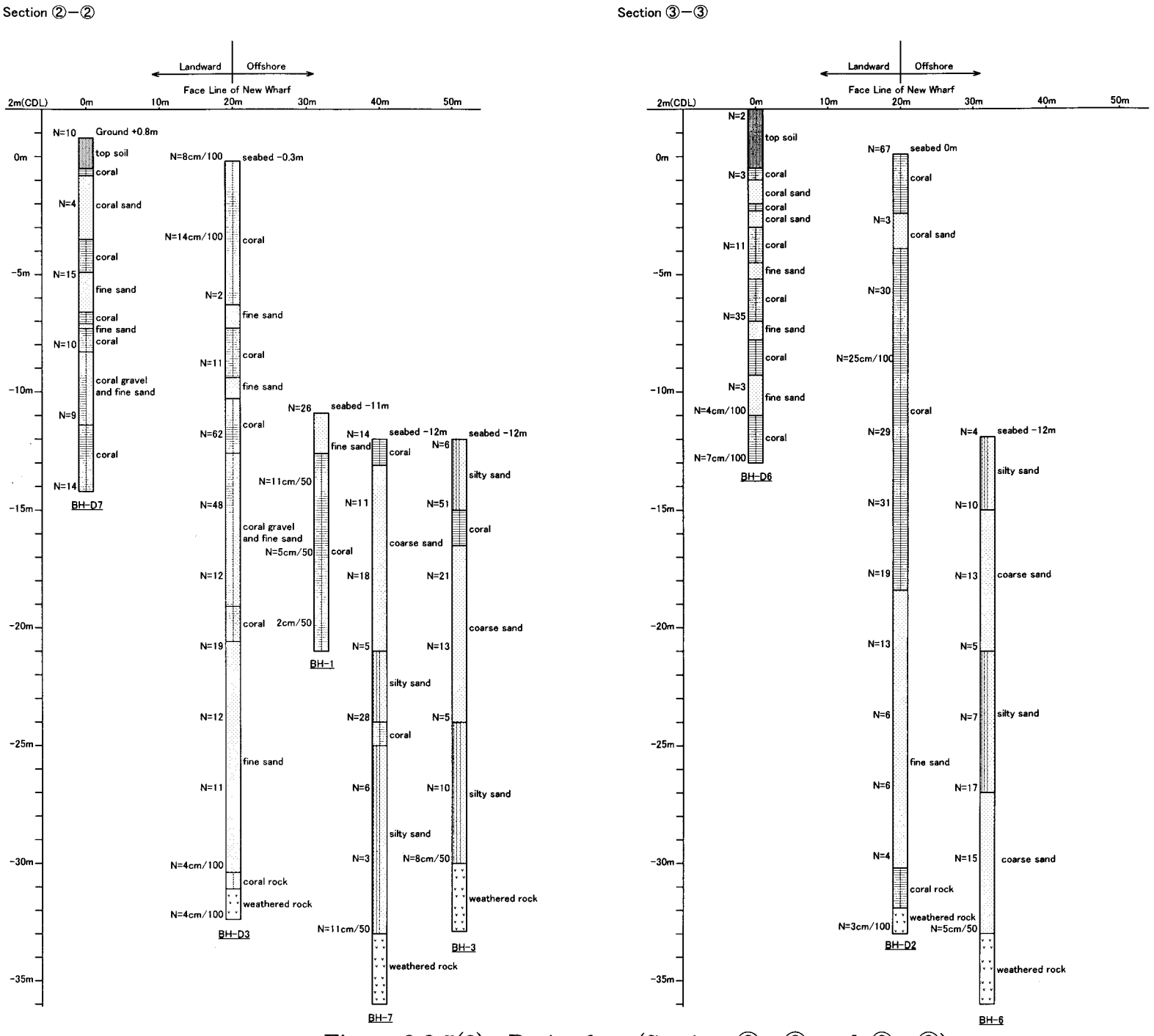


Figure 2.3.5(3) Boring logs (Section ②−② and ③−③)

(b) Design Conditions

Design conditions are listed as follows.

a) New Wharf

Crown height:	+3.00m
Depth:	D.L.-11m

b) External Force

Design ship:	Kassiakos (16,872 GRT)
Tractive force:	Bollard 100t
	Mooring bitt 70t
Berthing velocity of ship:	0.1 m/sec (by Tug boat)
Surcharge:	4.0 t/m^2 (at ordinary time)
	2.0 t/m^2 (at earthquake)

c) Natural Conditions

Tidal level:	H.W.L. +1.00m
	L.W.L. +0.00m
Design seismic coefficient:	0.15 (in the air)
	0.30 (underwater)
Specific density:	1.03 t/m^3 (seawater)
Soil condition:	as shown in boring survey results

d) Anti-corrosion Method for Piles

Underwater:	Cathodic protection (30 years)
Splash zone:	Mortar lining

(c) Typical Cross Section of New Wharf

Though the subsoil along the face line of the new wharf is composed of very complicated soil layers, the same cross section as shown in Figure 2.3.1 is adopted for the entire length of the wharf. Since coral layer is observed from surface to -18m at BH-D2 in coral reef flat area with length of 55m, steel sheet pipe piles are driven by a water jet cutter with a vibratory pile driver after dredging of hard coral from surface to -11m. The water jet cutter with the vibratory pile driver works with the high pressure water discharged through the nozzle at the tip of the pile. The force of water jet is then combined with a vertical vibration of the vibratory pile driver to drive the piles.

The cross section of the new wharf is shown in Figure 2.3.6.

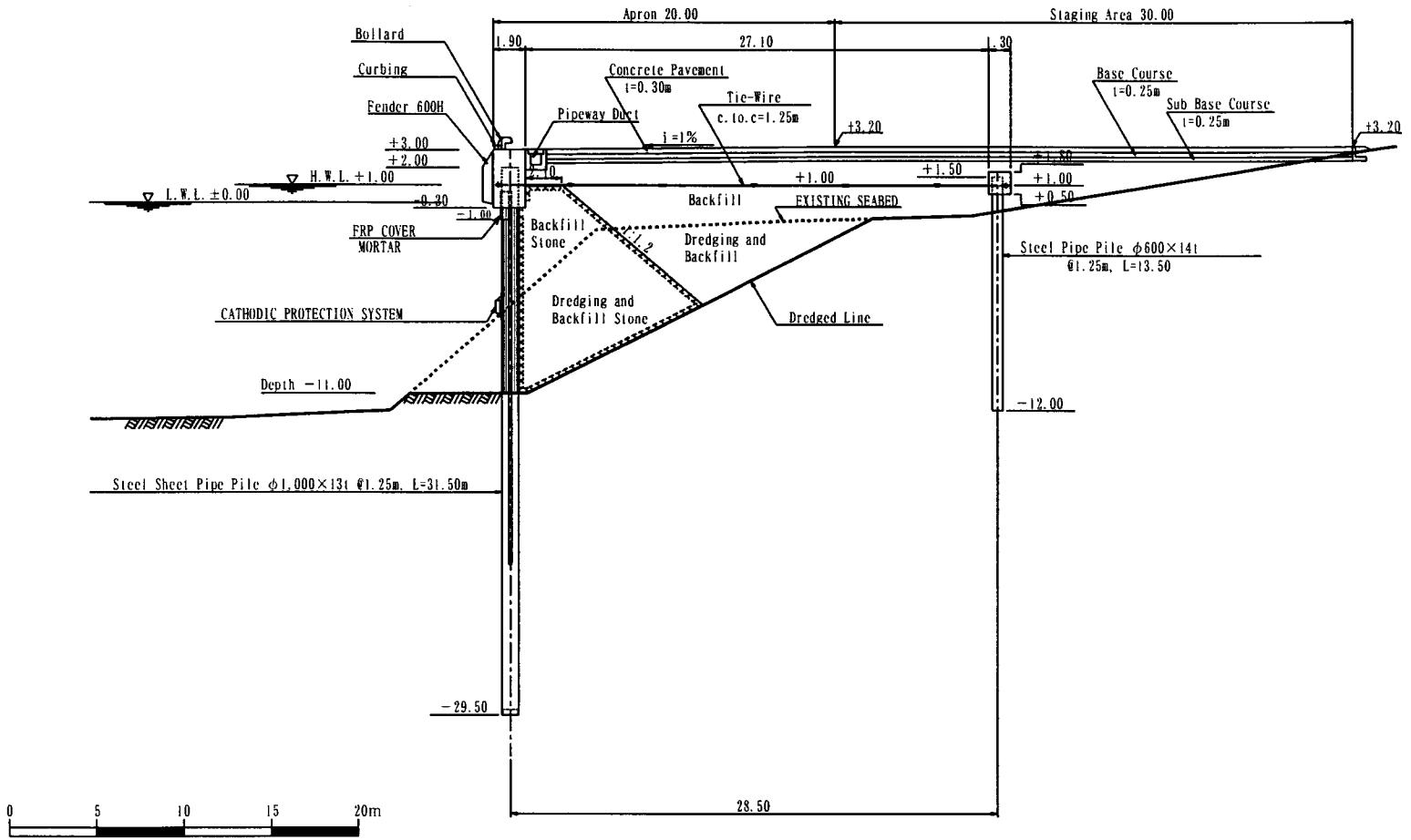


Figure 2.3.6 Cross Section of New Wharf

6) Supplementary Facilities

(a) Apron

The wharf apron 20m wide is paved with concrete. The structure of apron is designed as follows.

Reinforced concrete pavement:	30cm thick
Base course:	25cm thick
Sub-base course:	25cm thick

(b) Fenders

Since the new wharf accommodates large container ships, fenders are installed at the interval of 10m twice that of the existing wharf. Fenders of the existing wharf are damaged by movement of ship during swell and a ship's steel belt fender, which are peculiar conditions of Apia Port. Therefore, a rubber fender (600H) with an inclining upper part without a steel pad is adopted so that the fender may allow the ship's steel belt to slide.

A stainless steel ring for a hanging rubber tire between two fenders is installed on the coping concrete in order to berthing of small ships.

(c) Bollard

A bollard (100 tons) is constructed on land at the end of the breakwater.

(d) Curbings and Mooring Bitt

Curbings (0.4m wide and 0.3m high) are of as the same concrete structure as that of the existing wharf. Mooring bitts (70 tons) are installed at the interval of 20m. Curbings and bollards are not installed in 20m section for a ramp area of Ro-Ro ship.

(e) Water Supply Facilities

City water is supplied to the existing wharf through a 4 inches water pipe. Since water pressure is low, water is supplied to ships by a water lorry of PFL. However, water supply service takes a time consuming for filling operation due to small tank capacity (5 tons) of the water lorry, many ships, though requiring water, decide to depart without waiting for this service in order not to stay in the port any longer after finishing cargo handling. This is the case particularly for container and cruise ships. The port charges have been raised for financial soundness of SPA and the raising

of port tariff has led the port users to demand improved port services like water supply.

Therefore, water supply facility is included in this project taking into account discussions with the Samoan government and the above-mentioned situation on the existing water supply service.

The volume of water supplied to cargo ships by a water lorry of PFL is approximately 100 tons per ship at maximum. A 100 tons water tank of concrete structure is installed near the marine office and water is supplied at the center of the new wharf.

(f) Concrete Duct for Water and Oil Supply

Since SPA intends to supply water to ships at the new wharf, concrete duct for plumbing and water outlet are installed behind curbings. The existing diesel and coconut oil tanks are located behind the planned new wharf and oil pipes have been plumbed to the existing wharf. As two oil pipes cross the container staging area, concrete duct for laying water and oil pipes are installed underground from oil tanks to the center of the new wharf. Concrete duct and the plumbing work for water pipe are included in this Project. The plumbing work for diesel and coconut oil pipes are born by the Government of Samoa.

(g) Lighting Facilities

The standard intensity of illumination on a wharf apron and a container staging area is set at 50 lx and the following lighting facilities are planned. Two light poles with four lamps 1000W each are installed behind staging area. The existing light pole is relocated and two lamps 1000W each are added on the top of the pole. The height of light poles are 18m and high-pressure sodium lamps are adopted

(h) Navigation Markers

A wharf marker with lantern is installed on the top of seawall in order to confirm the boundary between the new wharf and seawall from the bridge of the ship where berthing.

A breakwater marker with lantern (buoy type) is installed at the toe of slope in the middle of the breakwater in order to prevent collision between the ship and the breakwater.

Since two existing anchor markers for large tankers are demolished to

construct the new wharf, new non-lighted markers are installed on the top of the breakwater and behind the existing wharf on the bearing line respectively.

Figure 2.3.7 shows the location of anchor markers for tankers and the specification of lantern of makers are as follows.

①Wharf marker

Luminous range: 2 nautical miles
Light color: Yellow
Light character: Fl. 4 sec

②Breakwater marker (buoy type)

Luminous range: 2 nautical miles
Light color: Yellow
Light character: Fl. 4 sec

(i) Junction of New Wharf

a) Existing wharf side

Since the toe of batter piles of the existing wharf are located 5m outside of the concrete deck at the junction between the existing wharf and the new wharf, steel sheet pipe piles for the new wharf are not able to be driven along the edge of the existing wharf and the access bridge. Therefore, the return wall is constructed to avoid batter piles of the existing wharf. The steel sheet pipe pile bulk head type is adopted for 9m length of 23m return wall and steel sheet pile type is adopted for the remaining 14m. The open type pier with vertical piles is adopted for the area surrounded by the return wall and the existing wharf. L-type concrete blocks are installed behind the open type pier as the retaining wall.

b) Seawall side

The steel sheet pipe pile bulk head type is adopted for 9m length of a 30m return wall and a steel sheet pile type is adopted for the remaining 21m.

(j) Seawall

The rubble mound type covered with 4 tons concrete blocks is adopted. The rubble stones and 4 tons blocks placed in the seawall to the north of the

existing wharf is reused. The cross section of seawall is shown in Figure 2.3.8.

7) Ship Maneuvering and Mooring to New Wharf

The mooring method of the design ship to the new wharf is shown in Figure 2.3.9. The new wharf is able to accommodate the design ship without any trouble as shown in Figure 2.3.9. Figures 2.3.10 and 2.3.11 show the ship maneuvering to the new wharf.

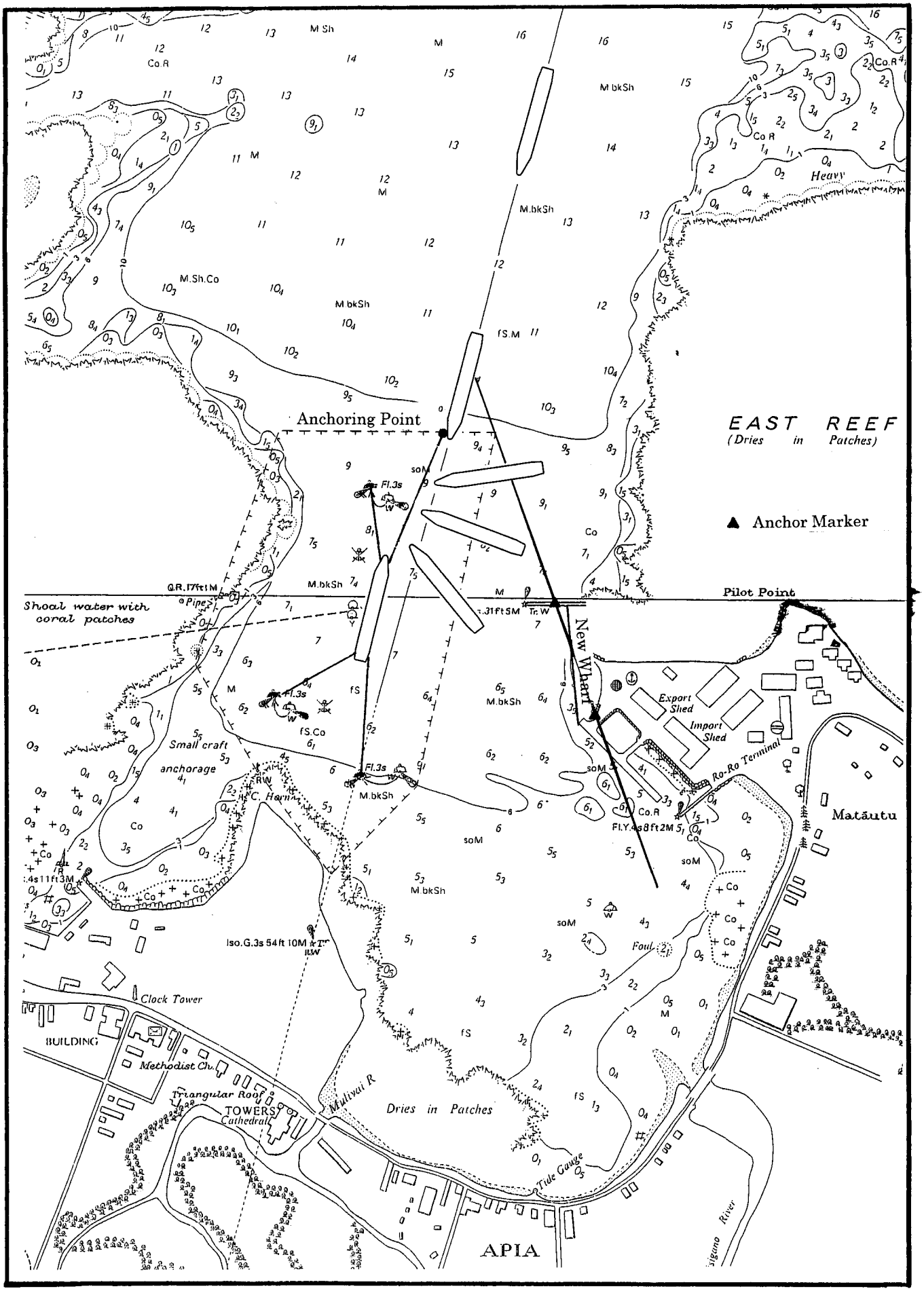


Figure 2.3.7 Location of Anchor Marker for Tankers

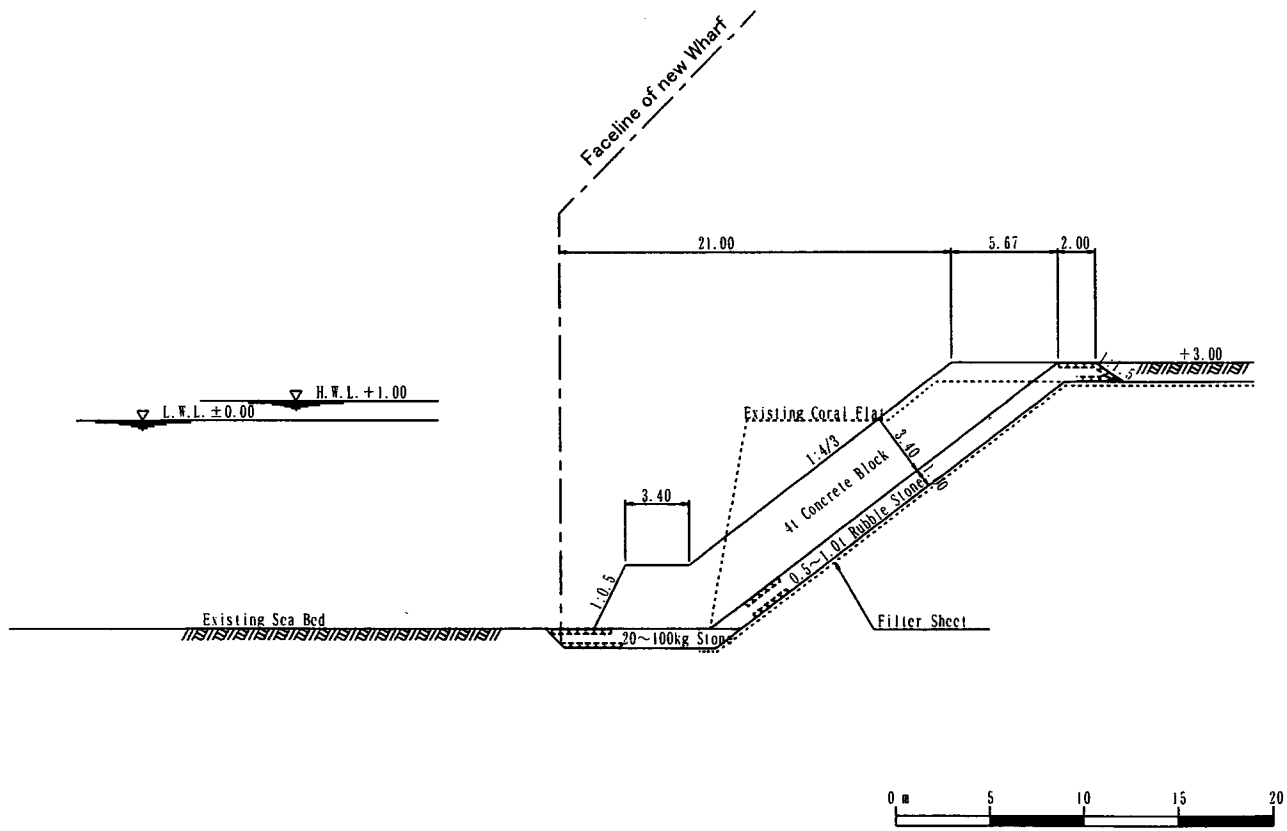


Figure 2.3.8 Cross Section of Seawall

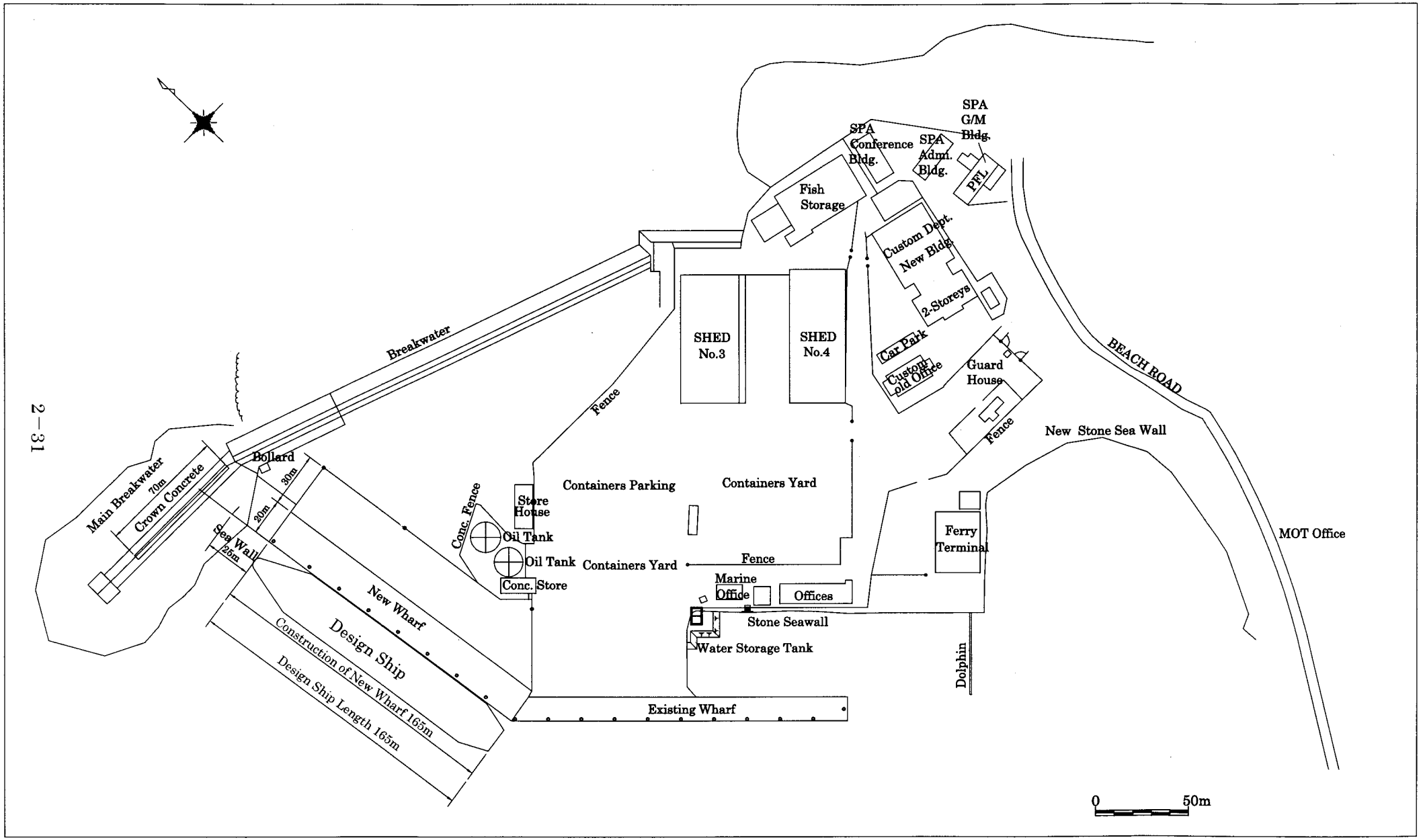


Figure 2.3.9 Mooring Method of Design Ship to New Wharf

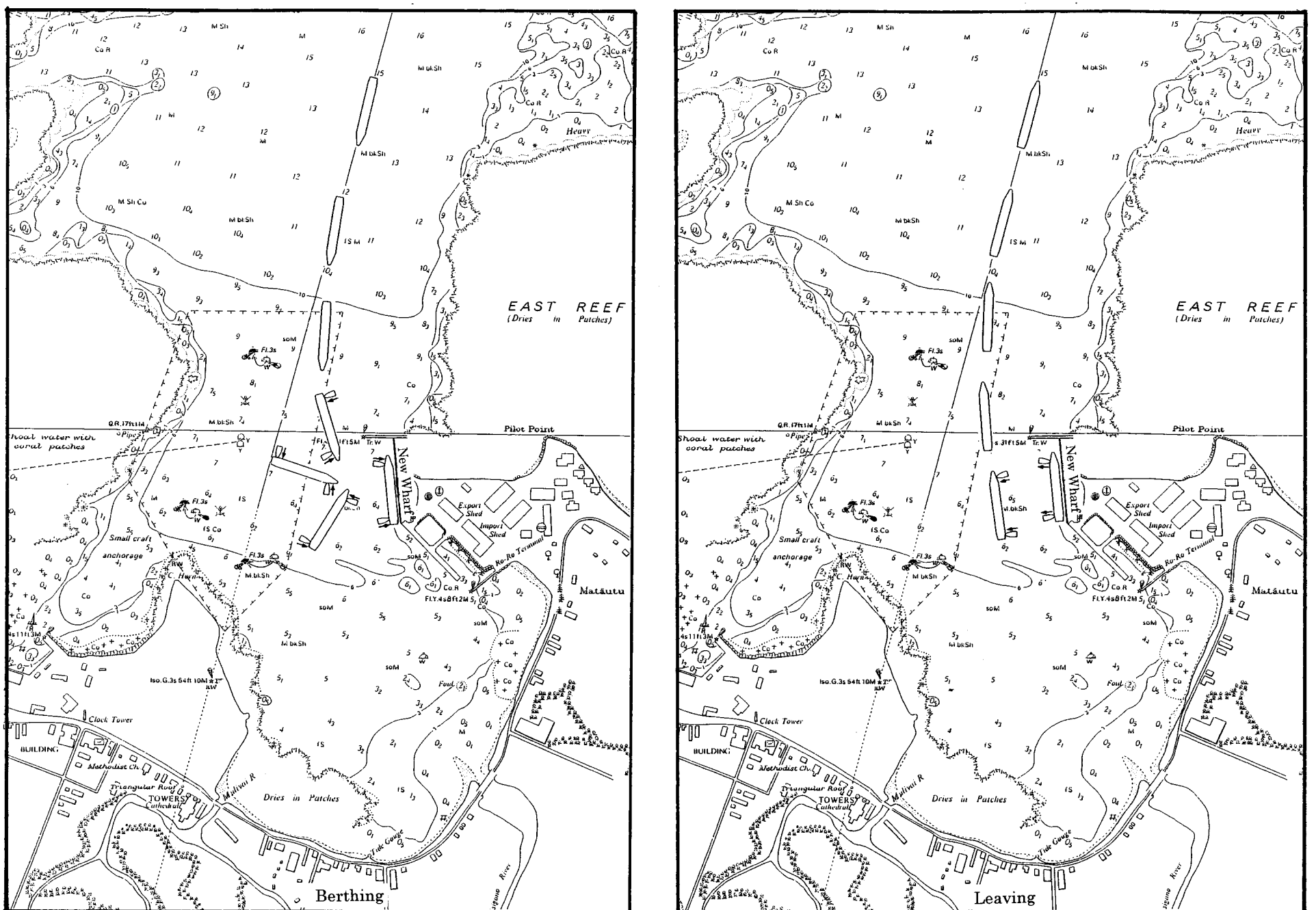
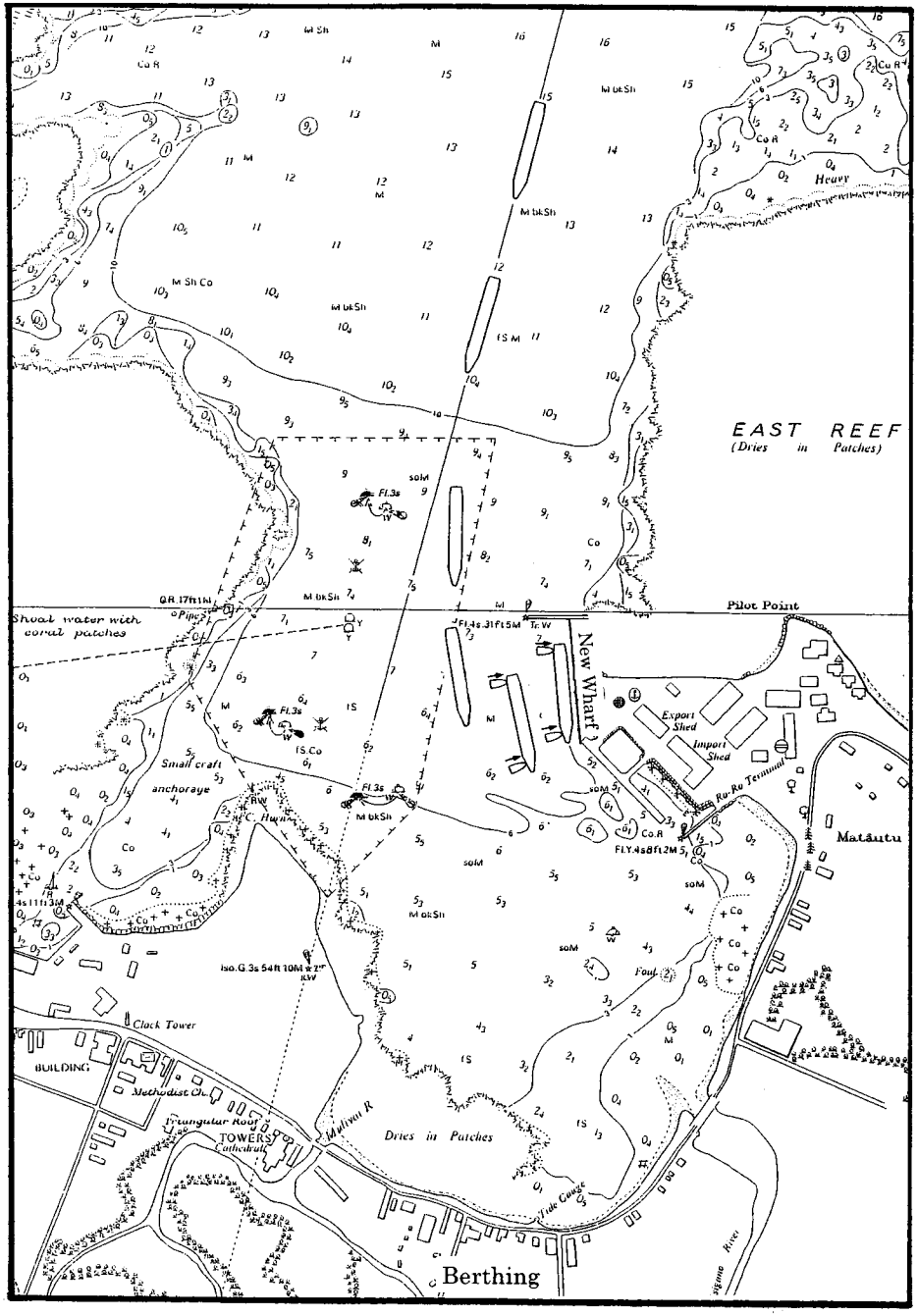


Figure 2.3.10 Ship Maneuvering to New Wharf (mooring head down)



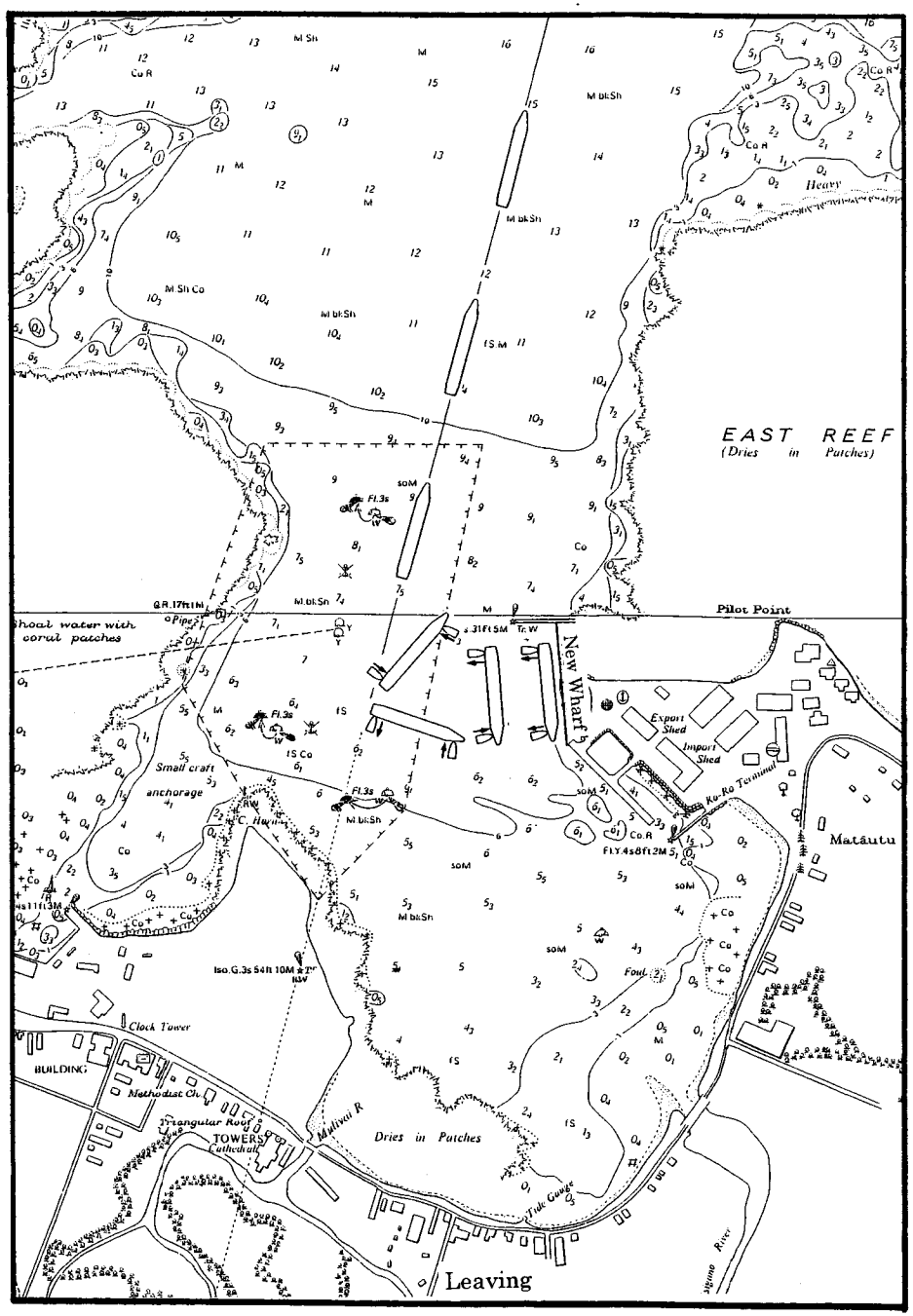


Figure 2.3.11 Ship Maneuvering to New Wharf (mooring head in)

(2) Improvement of Breakwater

The new wharf is planned to be constructed just behind the breakwater. The new wharf is exposed to waves transmitting through the breakwater to the extent that a ship berthing alongside can not work about 34 days (number of the day that wave height is more than 50cm) a year according to the results of the calculation of calmness in water area in front of the new wharf. The non-workable day for handling at the new wharf increases twice the day (16 days) at the existing wharf and the rate of effective working days for cargo handling reduces from 96% to 91%. Therefore, the improvement of the breakwater with the length of 70m is planned to reduce transmitting waves and is able to secure 95% of rate of effective working day. The results of the calculation of calmness in front of new wharf and rate of effective working days are presented in Appendix 7.1.

The extension of the breakwater is considered to secure the calmness in front of the new wharf. However, the extension of the breakwater interferes with turning and navigation of large tankers and other ships along the channel. Therefore, the extension of the breakwater is not proposed in this Project, and instead installing of crown concrete on the top of rubble mound of the breakwater is planned to reduce transmitting waves. The cross section of the improvement of the breakwater is shown in Figure 2.3.12.

As the crown concrete is cast in site, the stability of the crown concrete against cyclone waves is examined. The waves in front of the breakwater crown are transmits through 10m thick concrete block layer above H.W.L. Assuming that the waves reduced by concrete blocks directly act on the crown concrete, the stability of the crown concrete against wave pressure is calculated. The crown concrete of a trapezium shape is adopted to increase the stability of the structure by wave pressure acting in a downward direction. The height of the crown concrete is determined by taking into account securing the thickness of concrete blocks on top and effects of reducing waves. The results of the stability calculation of the crown concrete is presented in Appendix 7.2.

The concrete blocks replaced by the crown concrete are placed in the base of the breakwater in order to increasing the effects of reducing waves.

(3) Container Staging Area

The average number of containers per container ship calling Apia Port is 100 TEUs (loaded 50 and discharged 50) and a maximum of 200 TEUs (loaded 100 and

discharged 100). Therefore, 10 bays (one bay consisting of 20TEUs (5 slots×2 rows×2 tiers=20 TEUs, total 200 TEUs) are arranged in the staging area as shown in Figure 2.3.13. The interval of each bay is 10m so that a folk lift caring a container may pass through. The staging area is planned to be approximately 4,700m^2.

40 feet containers are allocated at the end of the area taking into account working condition of forklifts. SPA plans to gravel pave the area behind staging area for storage of containers.

With the construction of staging area, it is necessary that supplementary facilities such as oil protection wall and oil separator are relocated by taking into account capacity of oil tanks. The supplementary facilities such as oil protection wall and oil separator are relocated by the Government of Samoa.

The staging area is planned to be paved with concrete as the same as the apron of the new wharf. The drainage is planned in the staging area and this area is paved at slope of approximately 1%.

(4) Repair of Ferry Dolphin

Since the size of a damaged dolphin supported by two steel piles is small, this dolphin is not demolished. Four new steel piles are driven around the damaged dolphin and the damaged one is covered with new coping concrete as the same size as that of the existing large dolphin (four steel piles and coping concrete). Rubber fenders are installed on the restored dolphin.

Two damaged gangways are replaced with new ones. These gangways are expanded from 115cm to 145cm. Expanded checker plates are also placed on the surface of two undamaged existing gangways on the offshore side.
Figure 2.3.14 shows the repair of ferry dolphin.

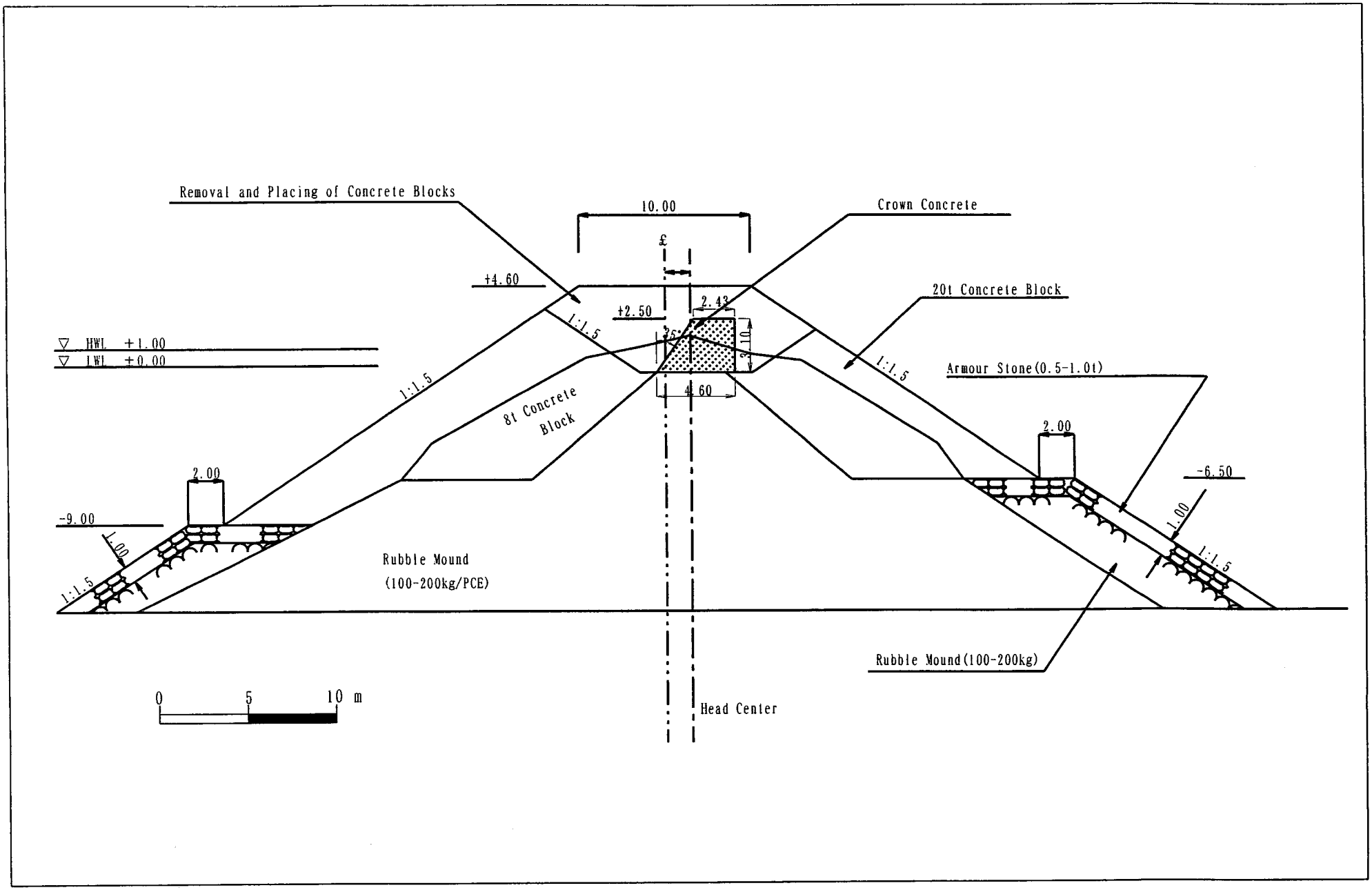


Figure 2.3.12 Cross Section of Improvement of Breakwater

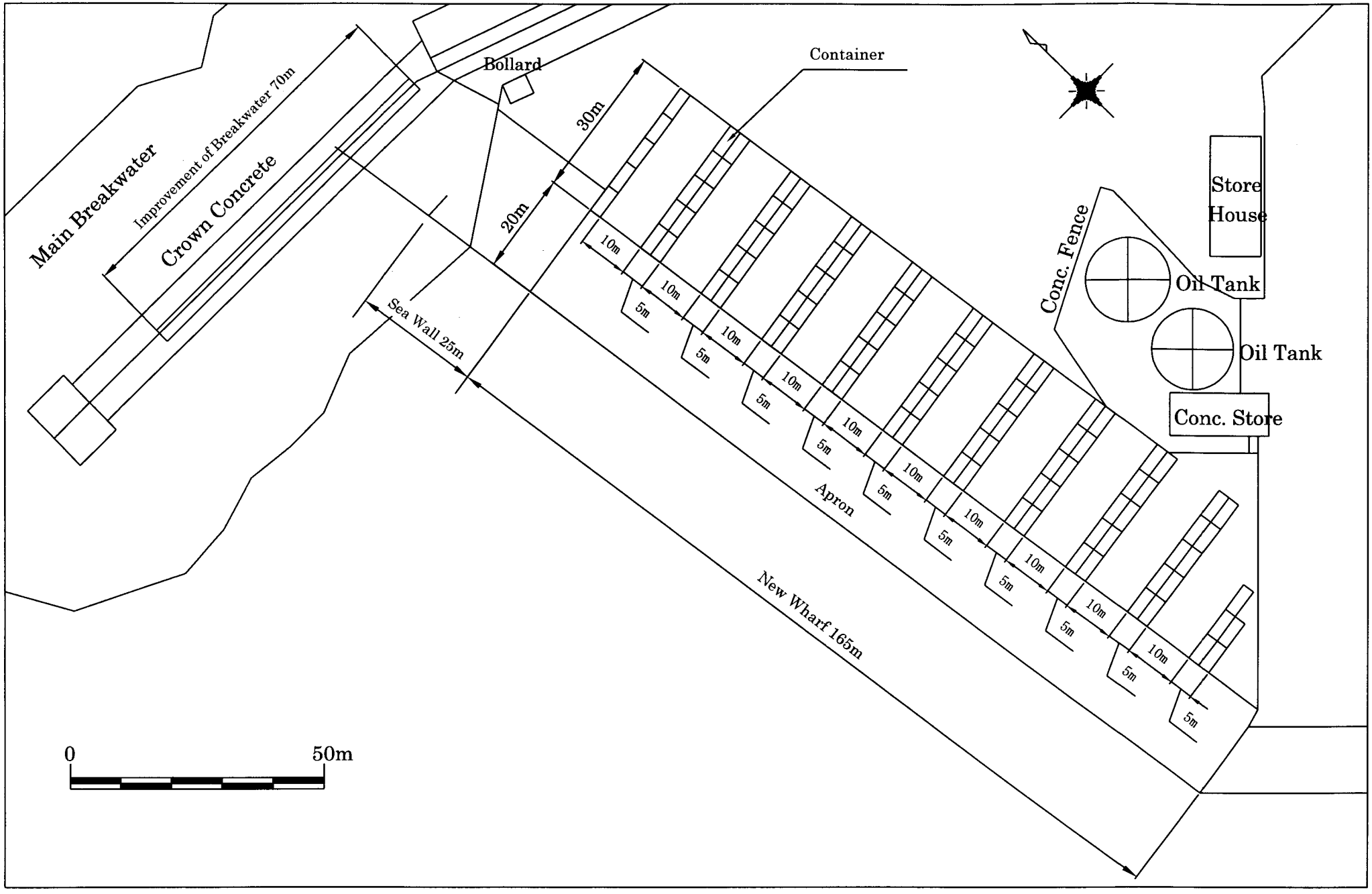


Figure 2.3.13 Arrangement of Container in Staging Area

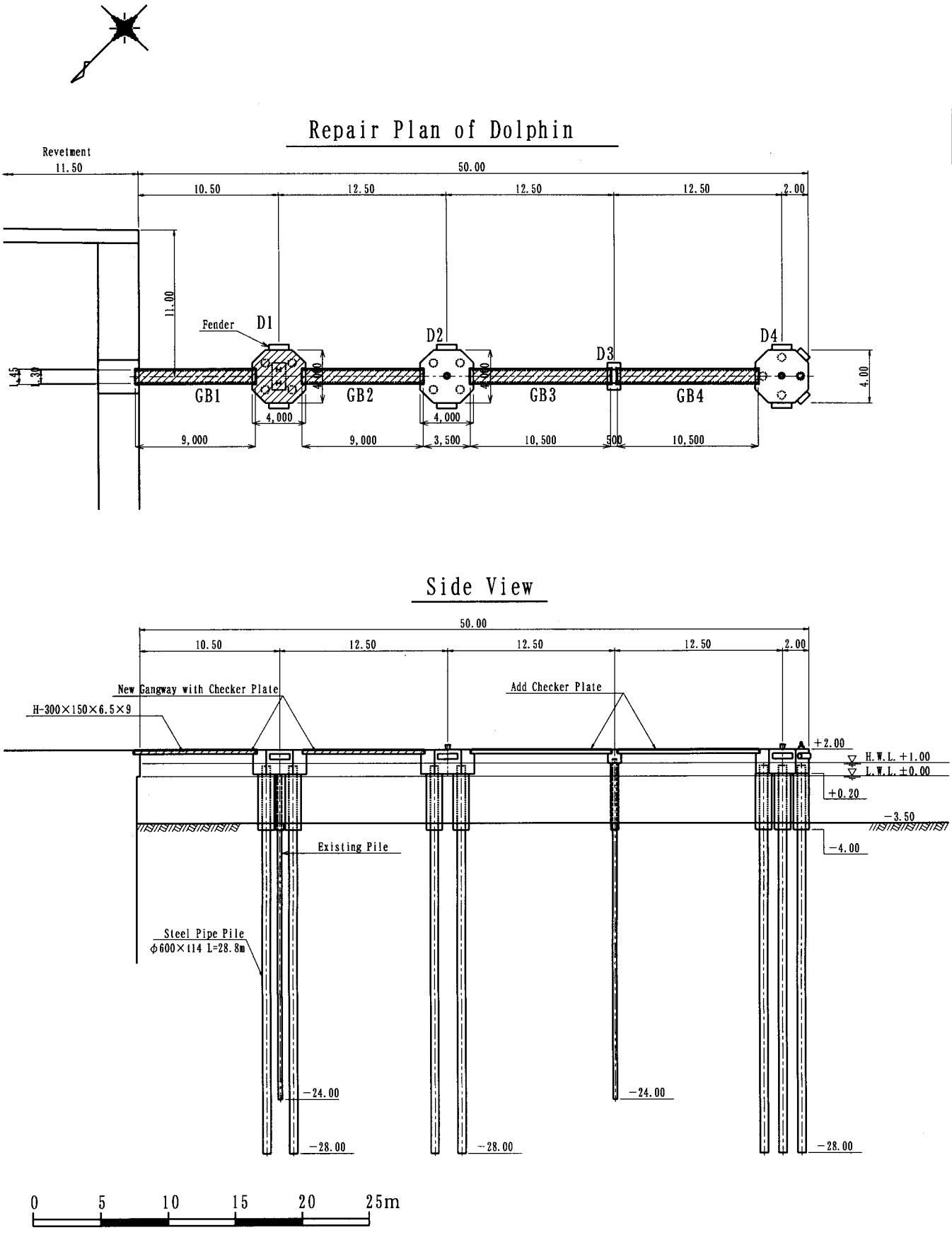


Figure 2.3.14 Repair of Ferry Dolphin

2.3.3 Basic Design Drawing

(1) Outline of Facilities Planned

Outline of facilities planned in this Project is shown in Table 2.3.5.

Table 2.3.5 Outline of Facilities Planned

Facility	Type	Content
1.New Wharf		
1)New wharf	Steel sheet pipe pile bulk head type (partly open type piers with vertical piles 13m)	Wharf length:165m Depth –11m, Crown height +3.0m Dredging approx. 19,600m^3
2)Seawall	Rubble mound covered with concrete blocks	length: 25m, Crown height +3.0m
3)Water and oil supply	made of Concrete	Water tank 100ton
4)Lighting facilities	High-pressure sodium lamps	2 light poles (new) 1 light pole (relocated)
5)Markers	Lighted Lighted Non-lighted	1 wharf marker with lantern 1 breakwater marker with lantern 2 anchor markers for tankers without lantern
2. Improvement of Breakwater	In-situ concrete	Crown Concrete 70m
3. Staging Area	Reinforced concrete pavement	approx. 4,700m^2
4. Repair of ferry dolphin	Vertical piles type Steel checker plate	1 dolphin 2 gangway (replacement)

(2) Design Drawings

Design drawing are listed as follows.

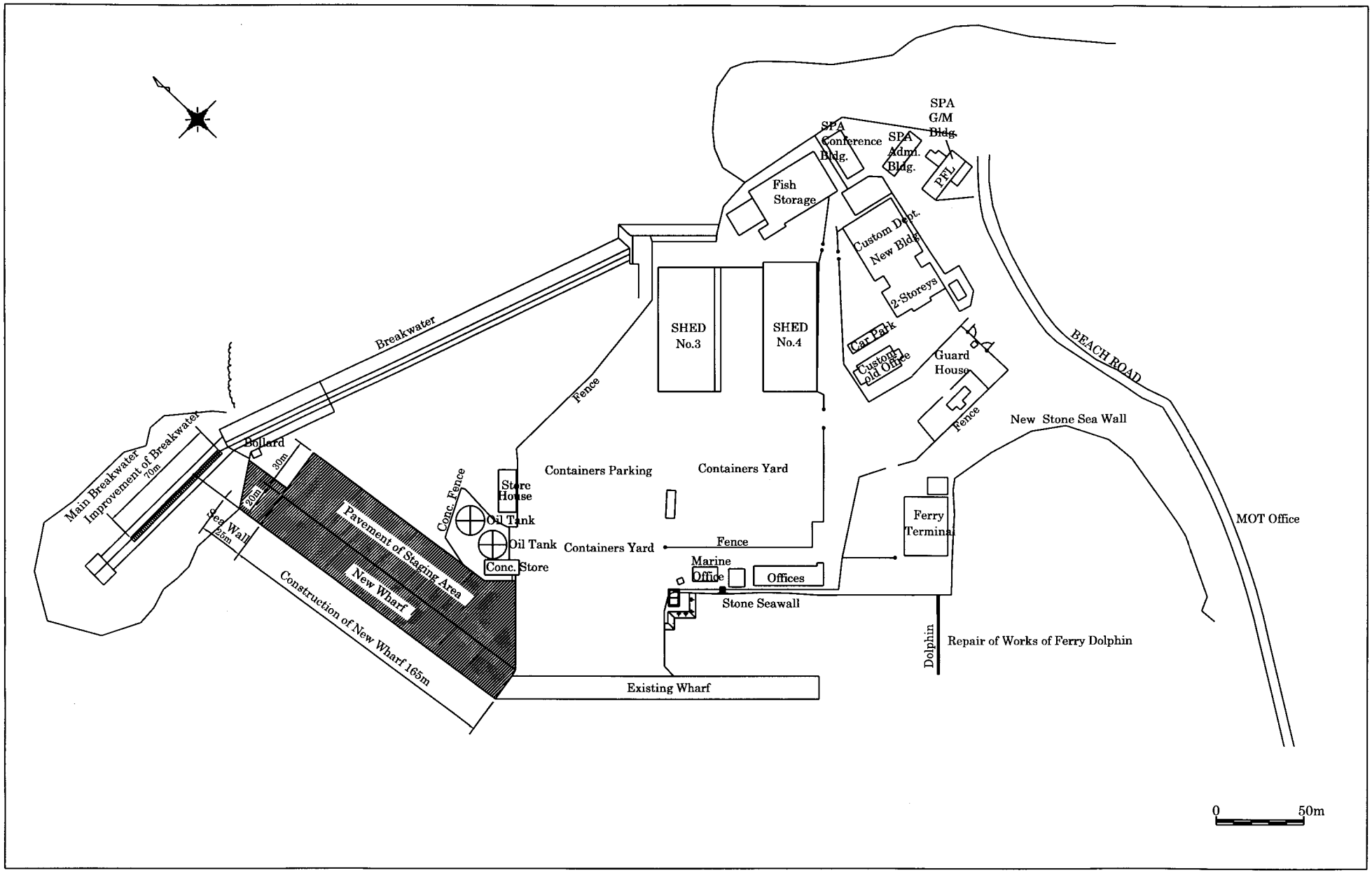


Figure 2.3.15 Project Layout Plan

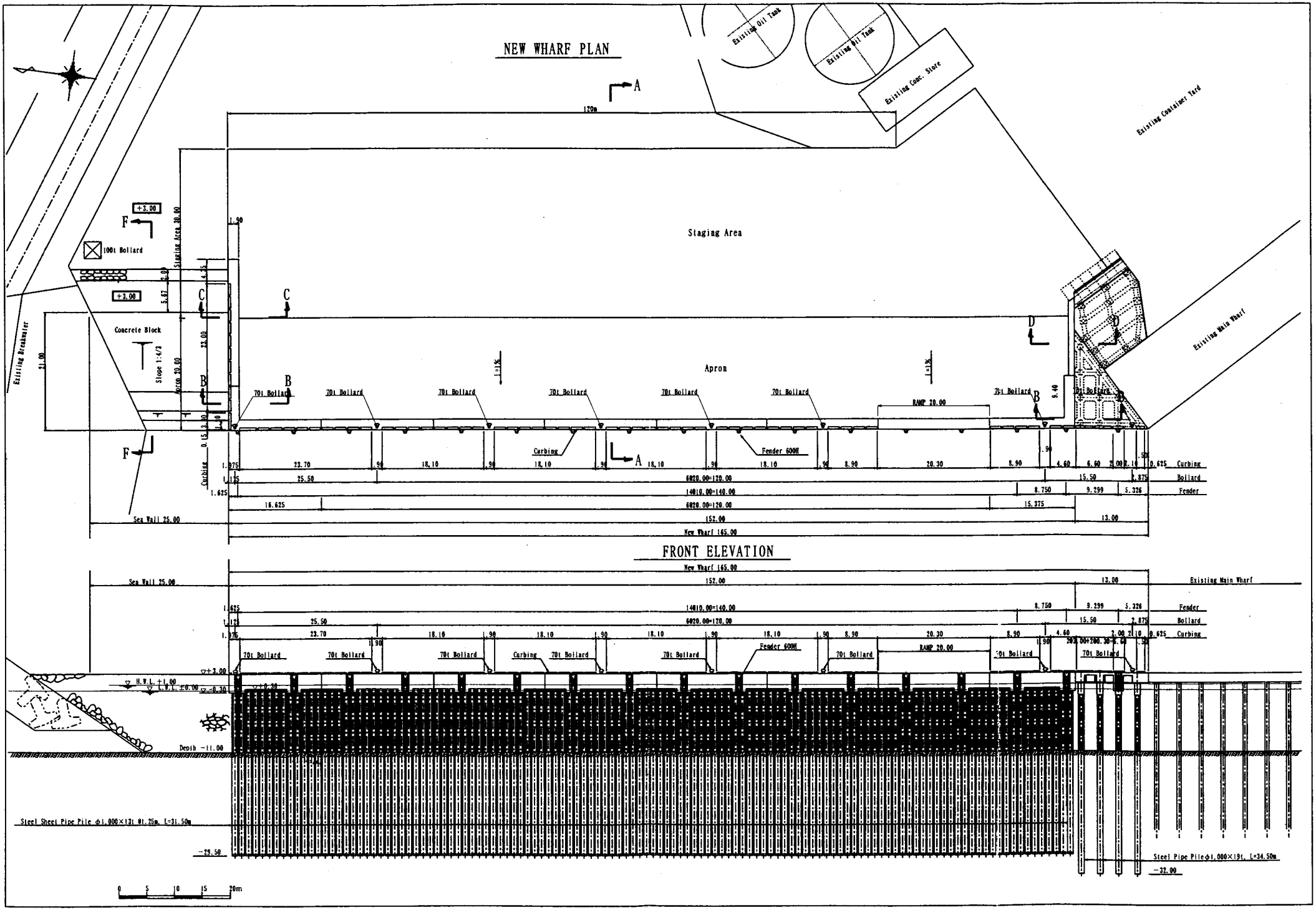


Figure 2.3.16 Pan and Front Elevation of New Wharf

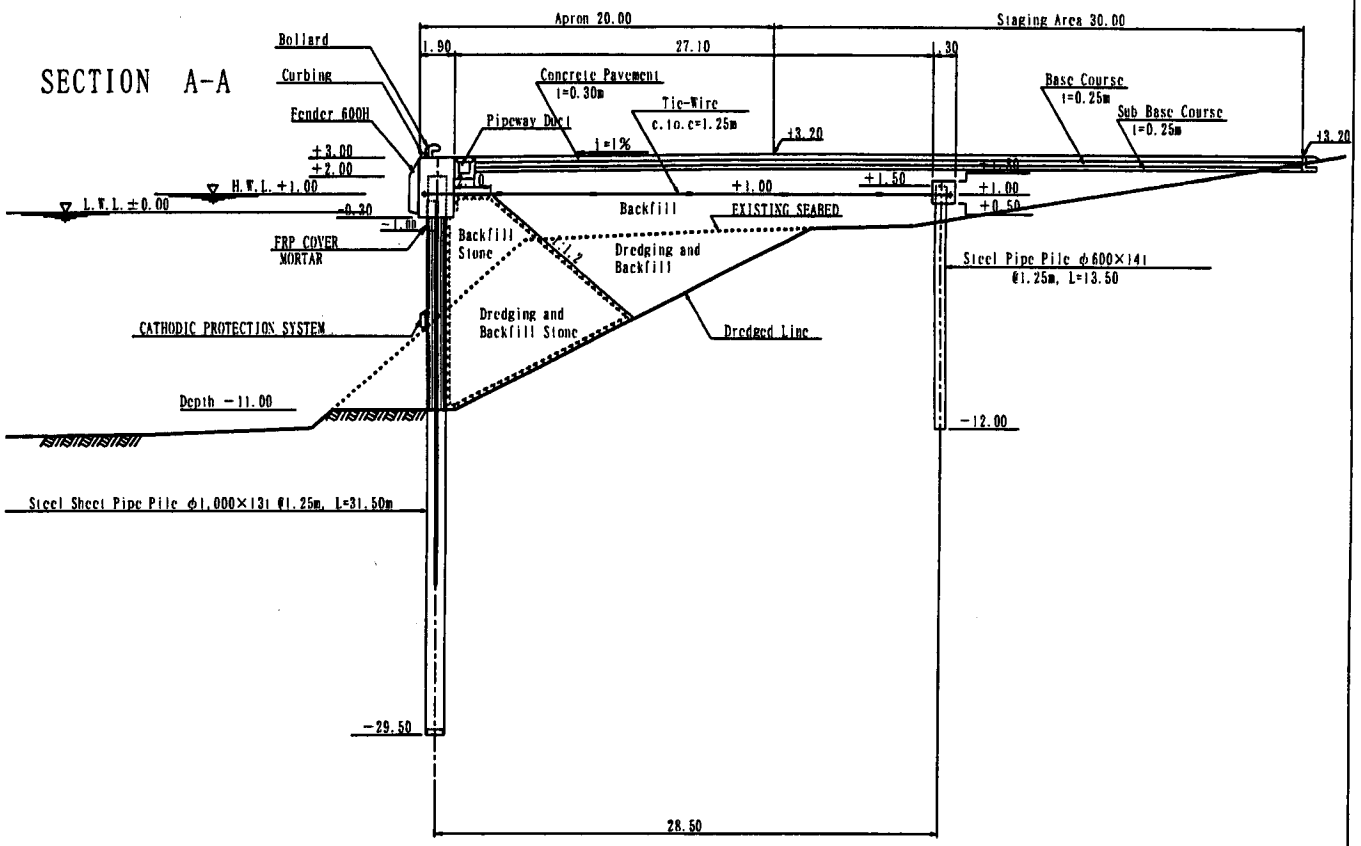


Figure 2.3.17 Cross Section of New Wharf

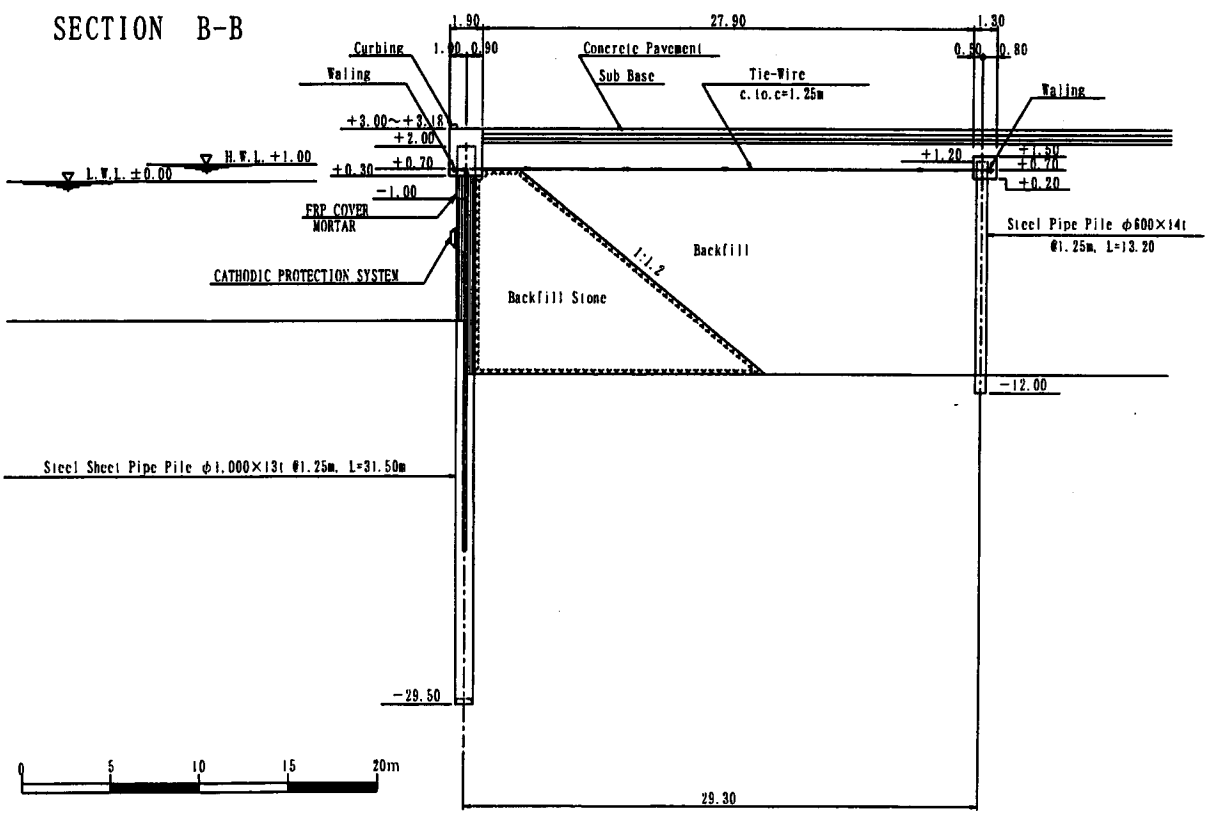


Figure 2.3.18 Cross Section of Junction B-B for New Wharf

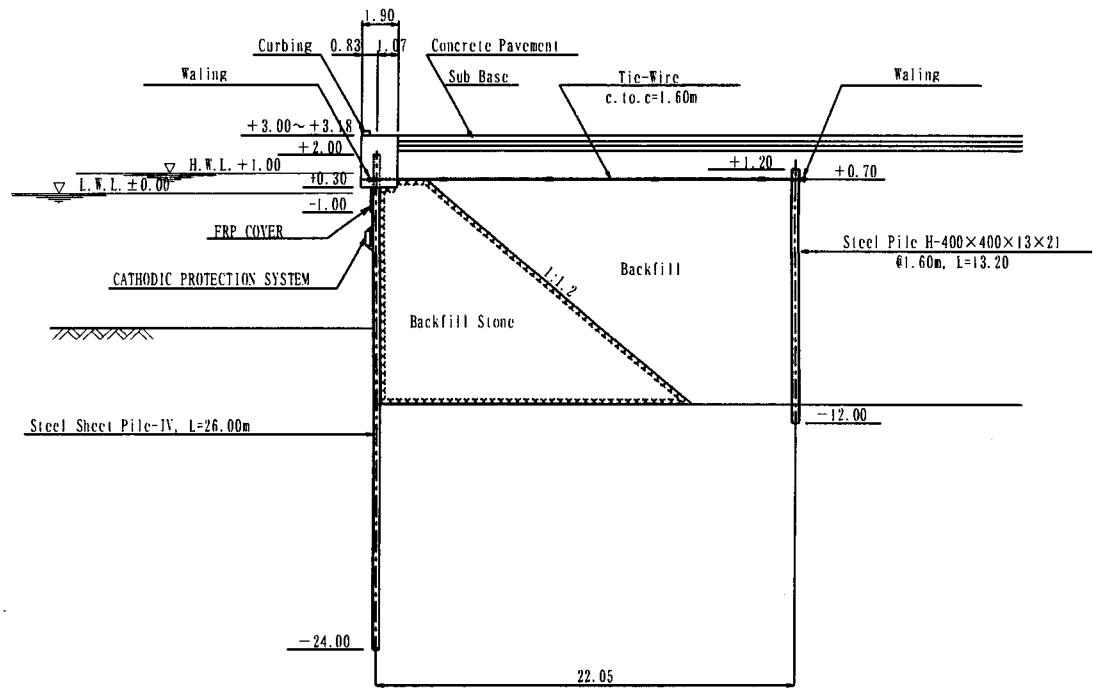


Figure 2.3.19 Cross Section of Junction C-C for New Wharf

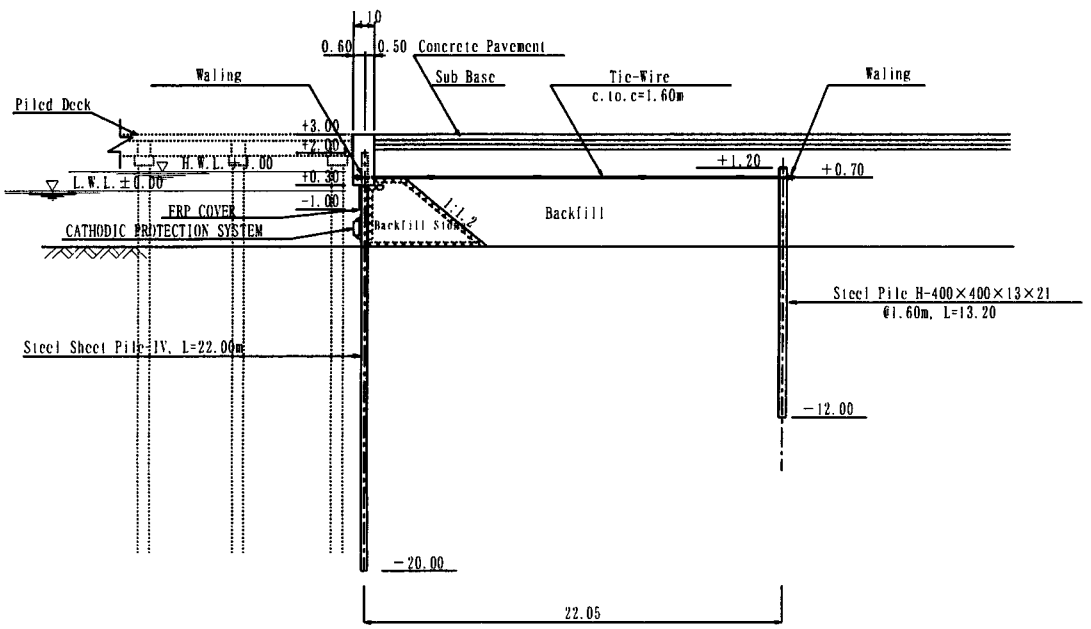
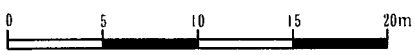


Figure 2.3.20 Cross Section of Junction D-D for New Wharf



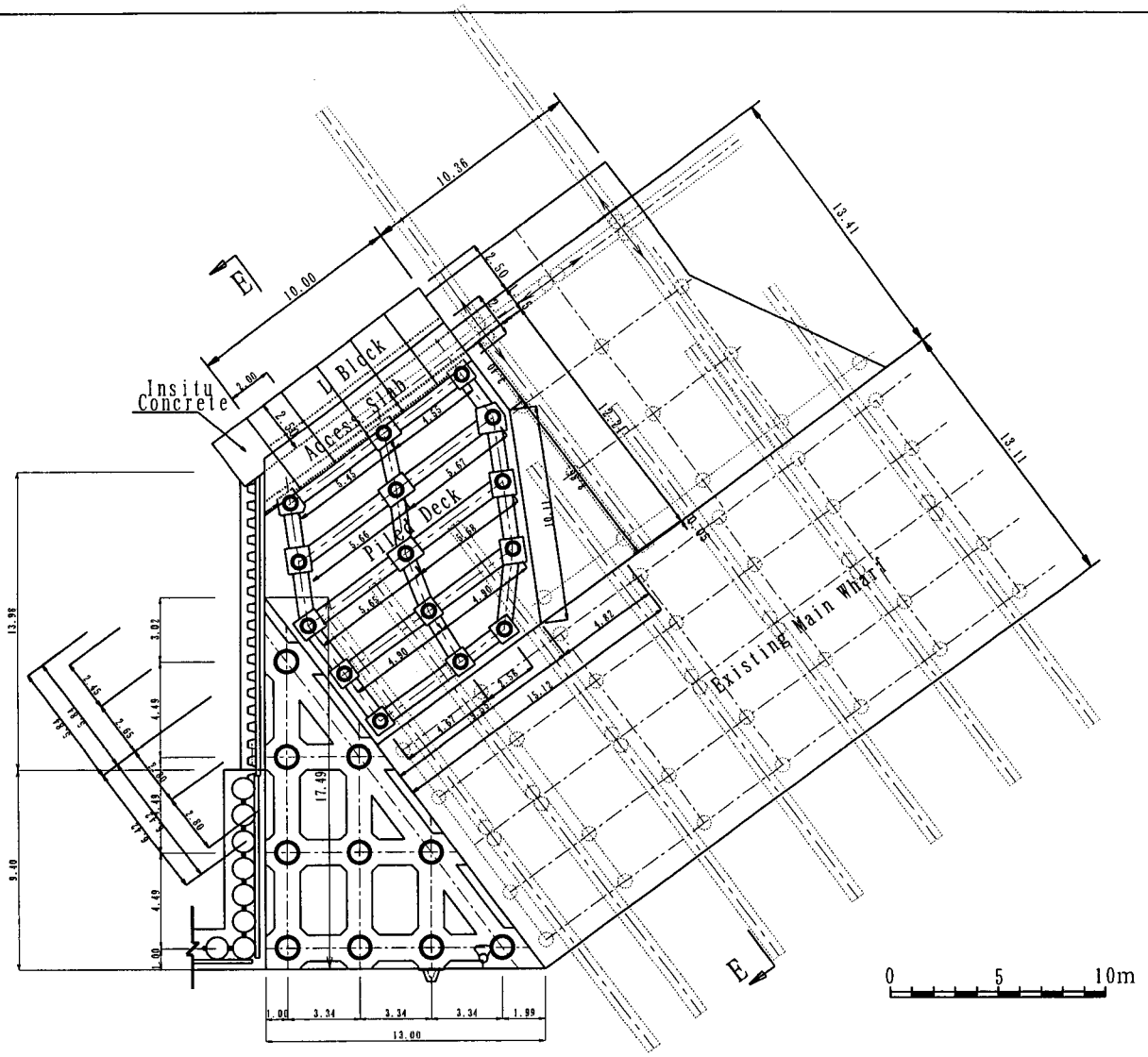


Figure 2.3.21 Plan of Open Type Piers for Junction

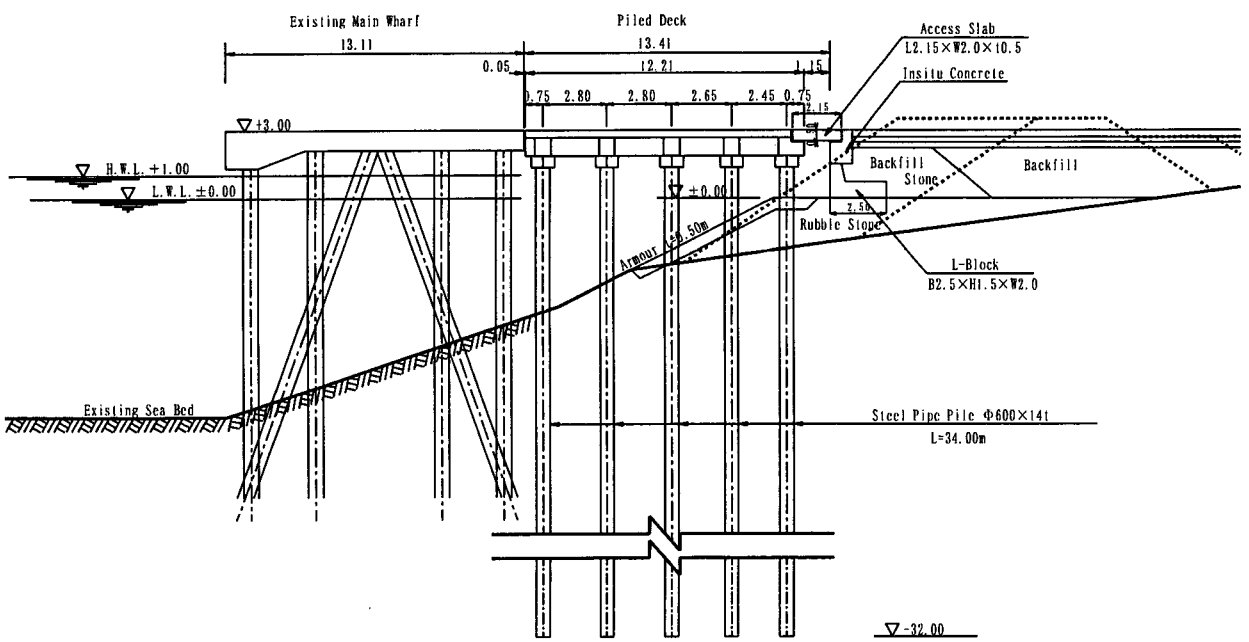


Figure 2.3.22 Cross Section of Junction E－E

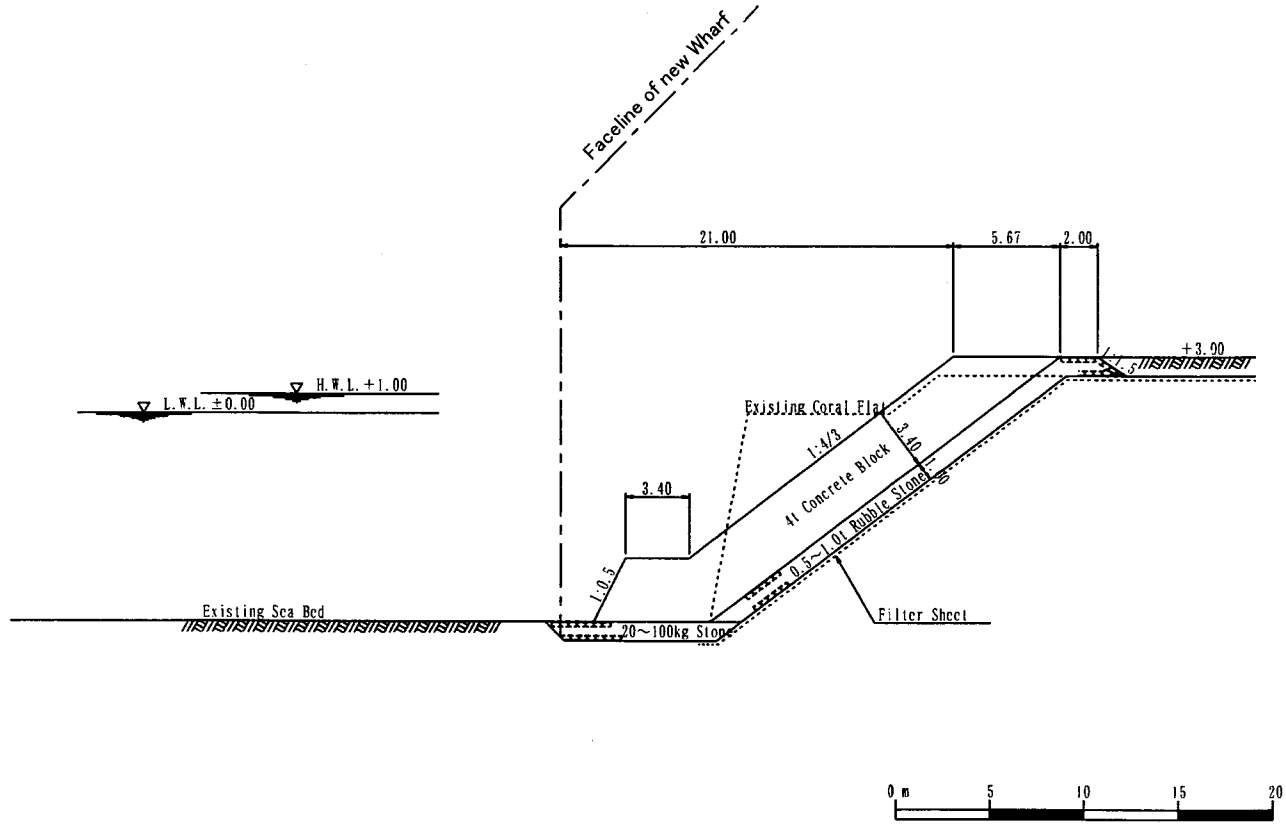
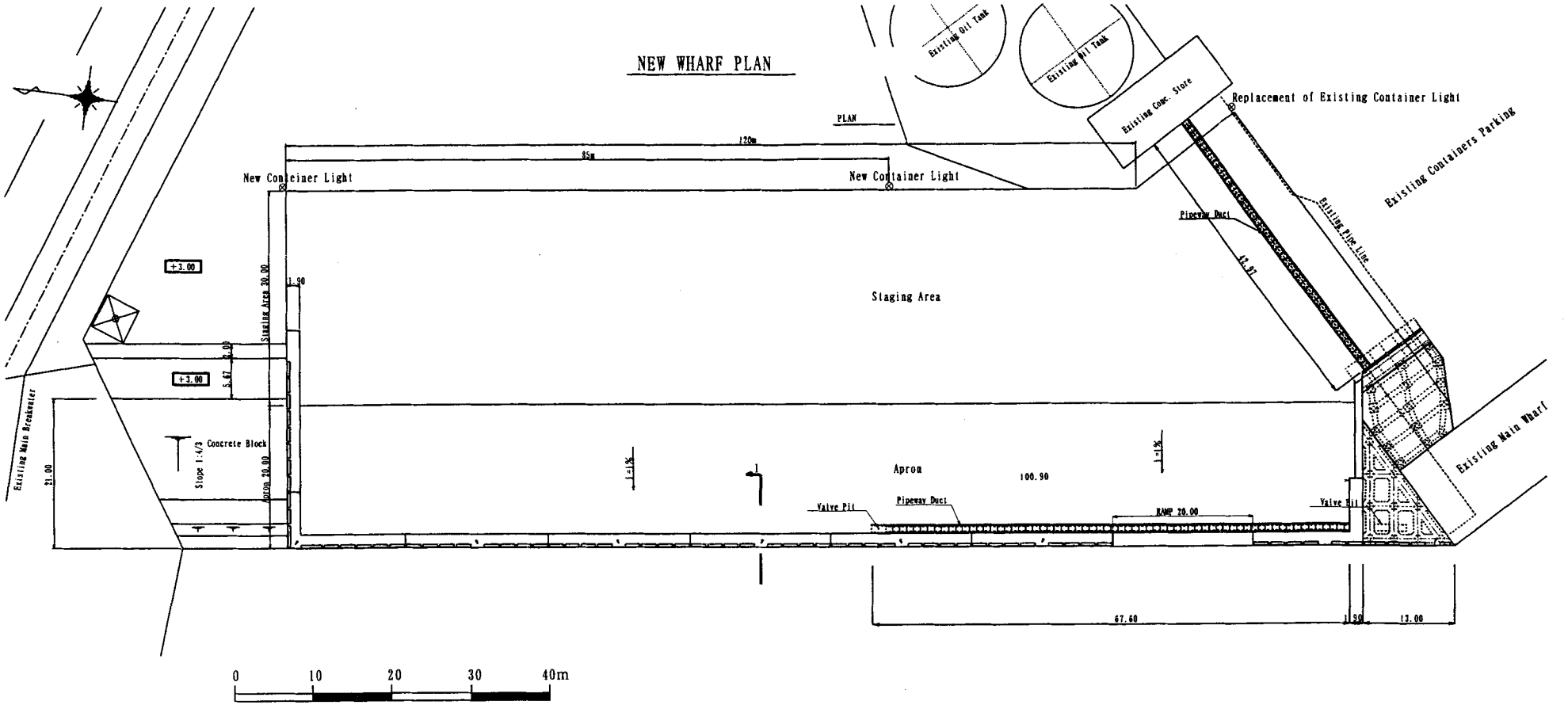


Figure 2.3.23 Cross Section of Seawall (F－F)



SECTION 1-1

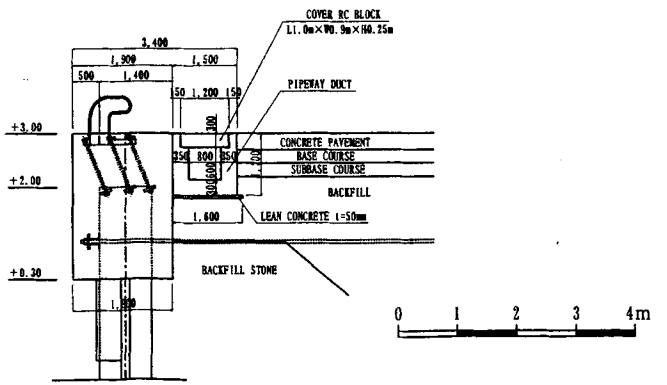
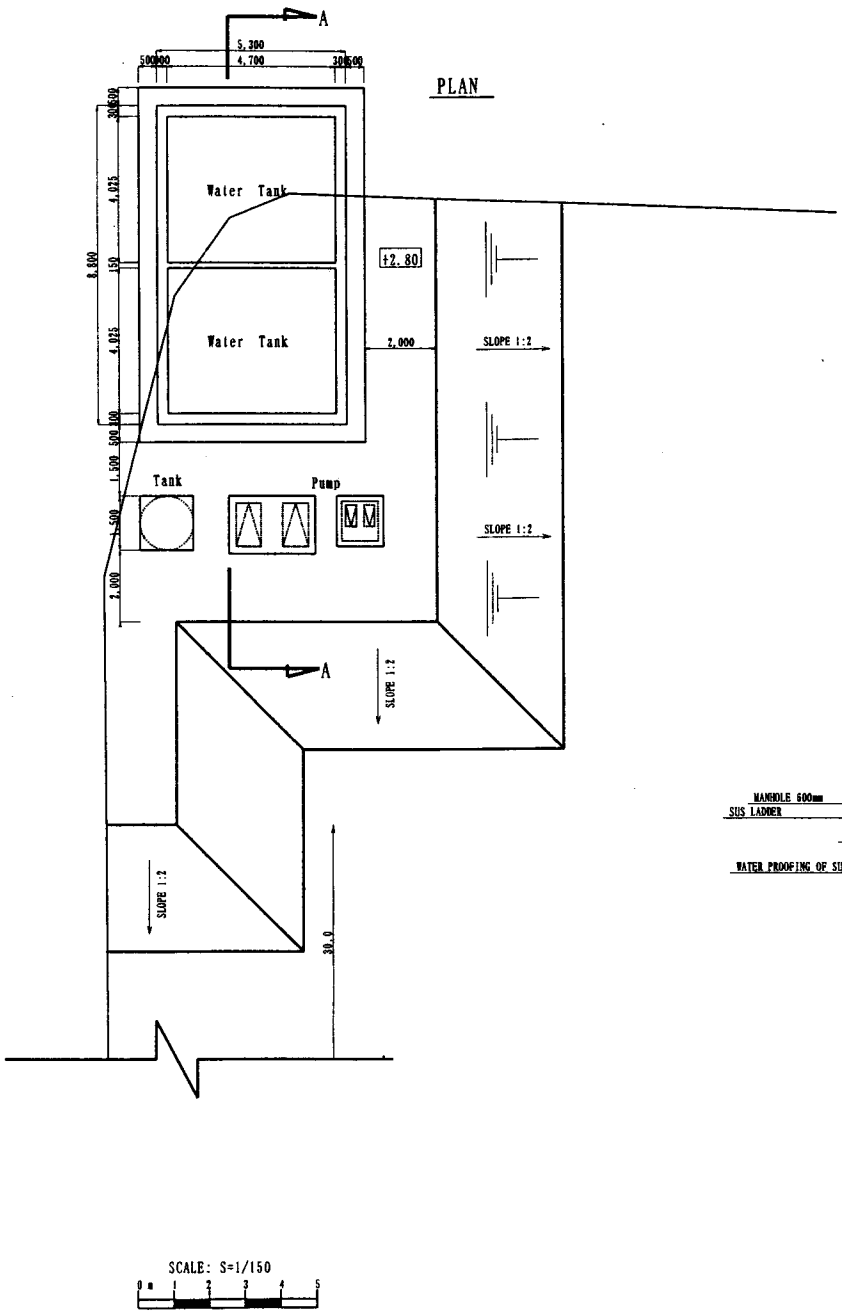
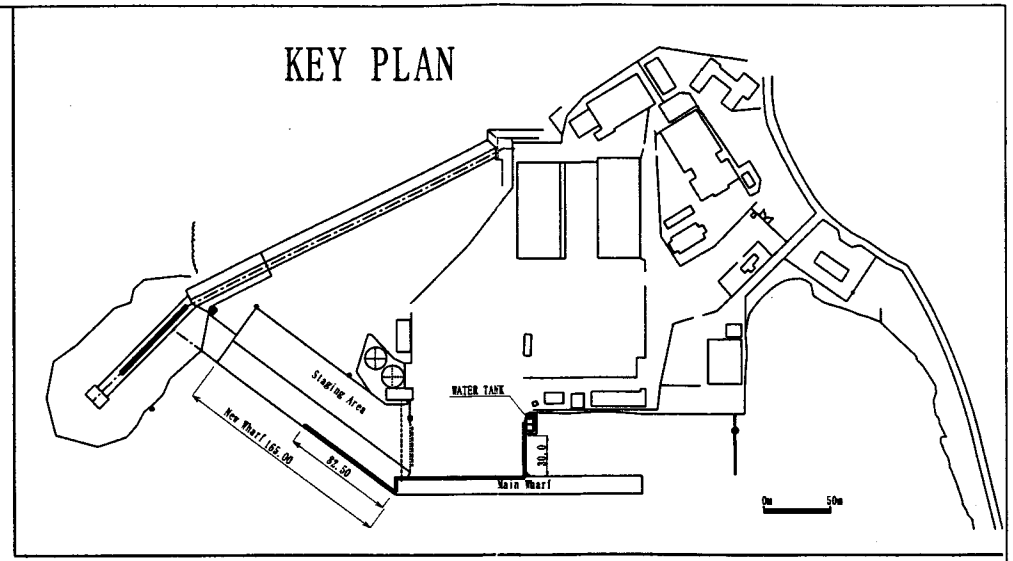


Figure 2.3.24 Oil Supply and Lighting Facilities





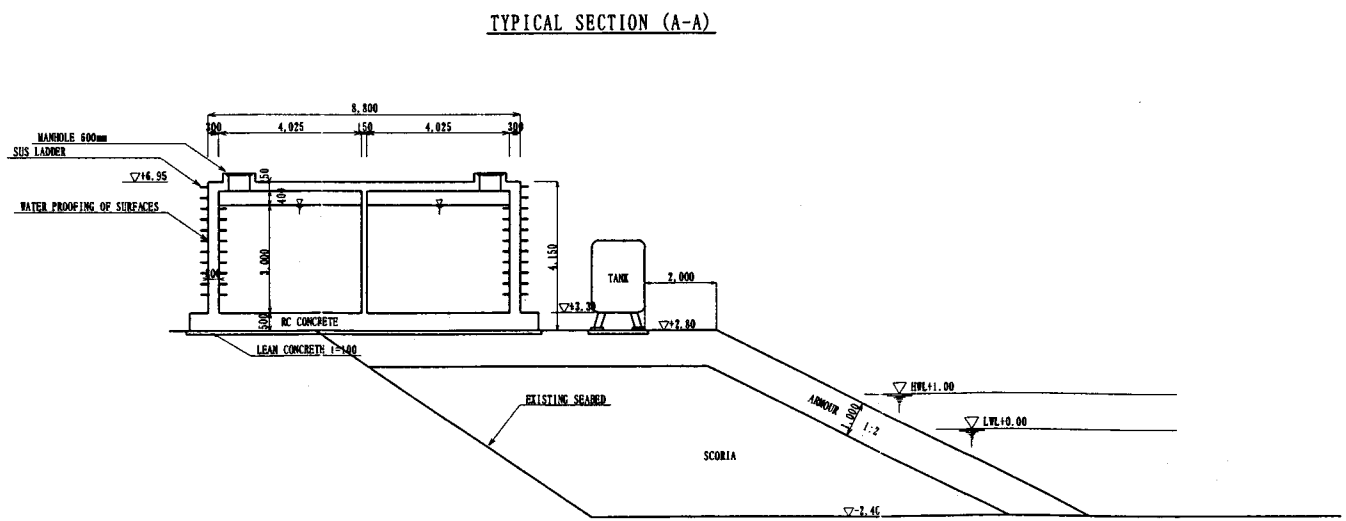


Figure 2.3.25 Water Supply Tank

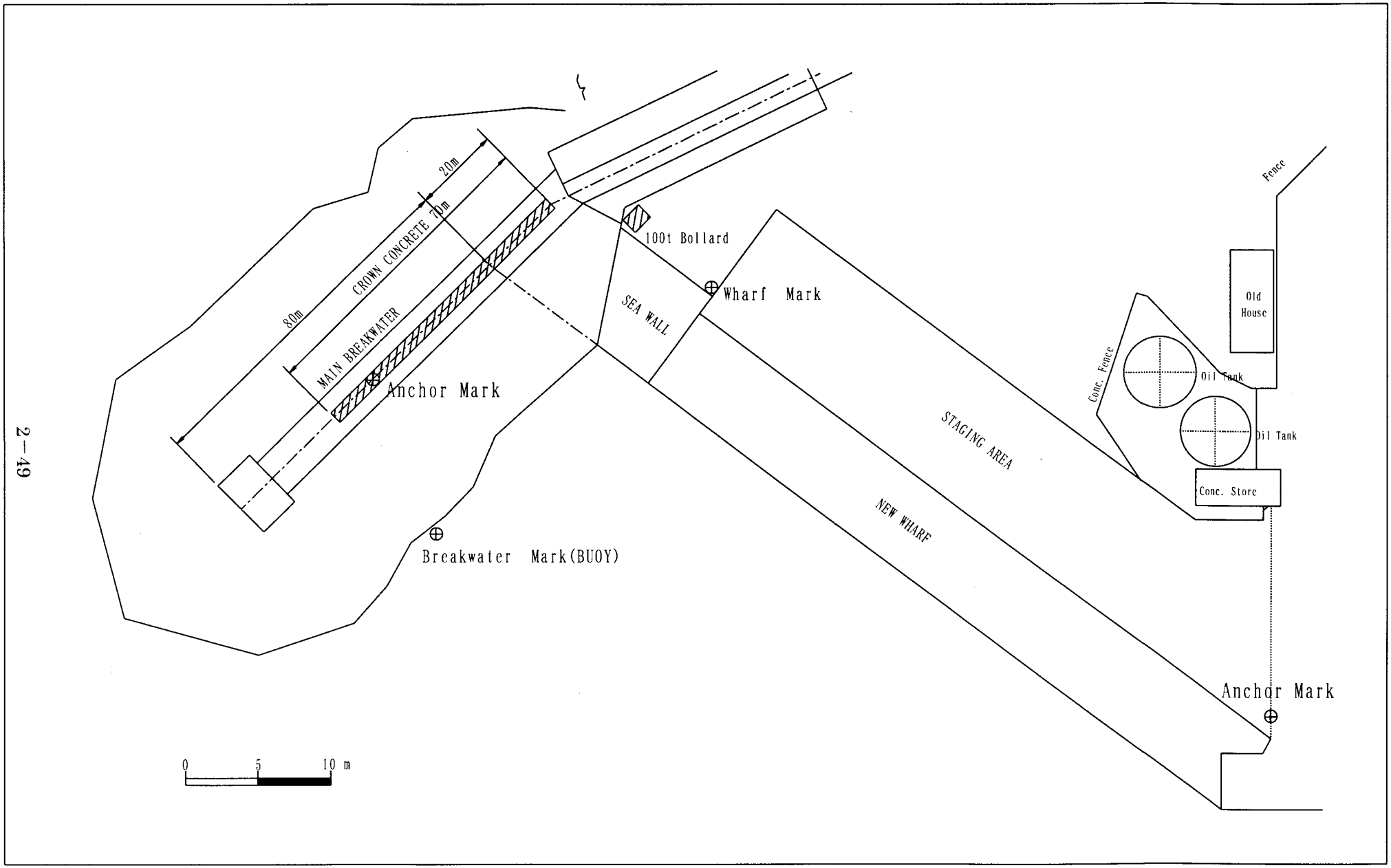


Figure 2.3.26 Plan of Markers

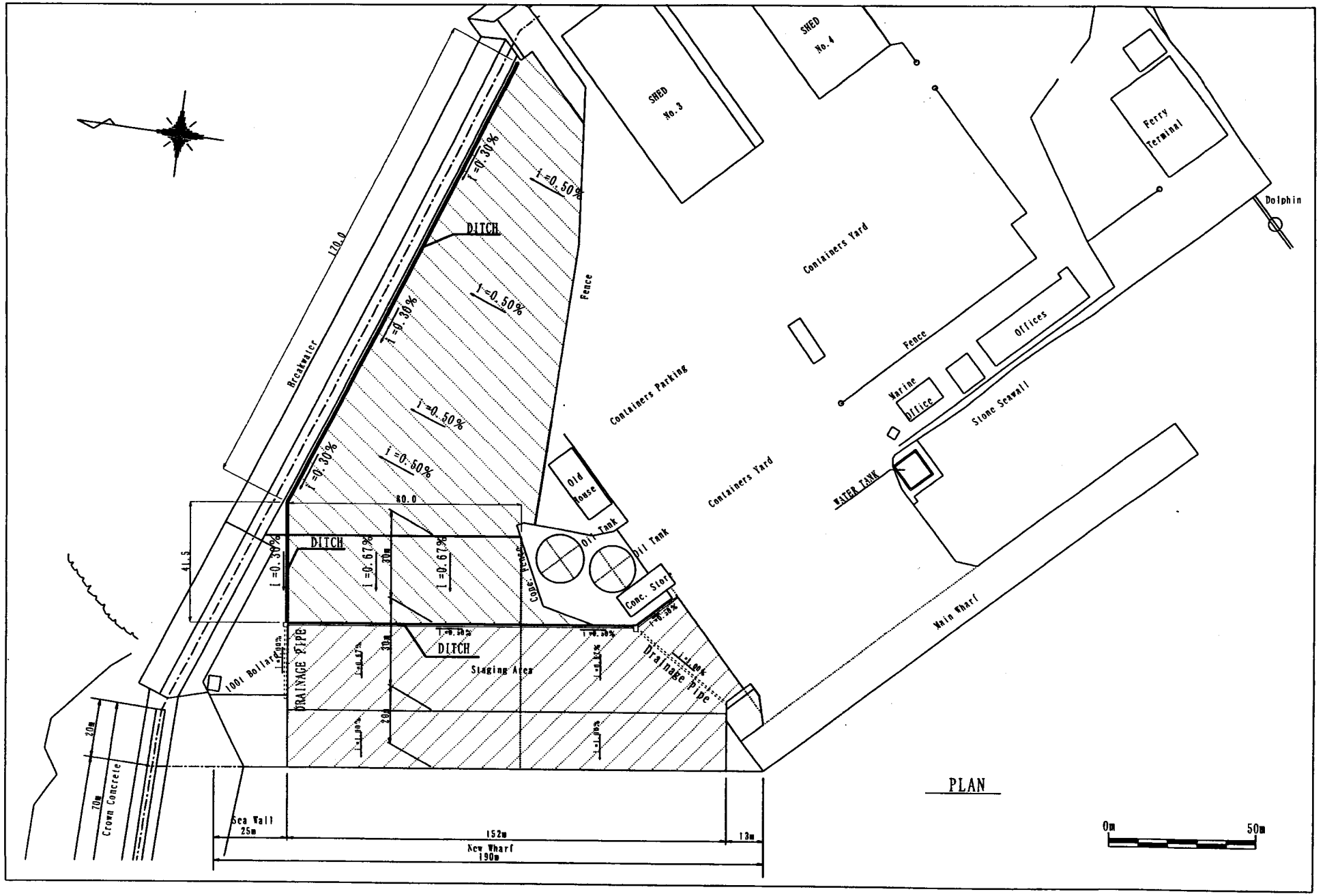


Figure 2.3.27 Plan of Drainage

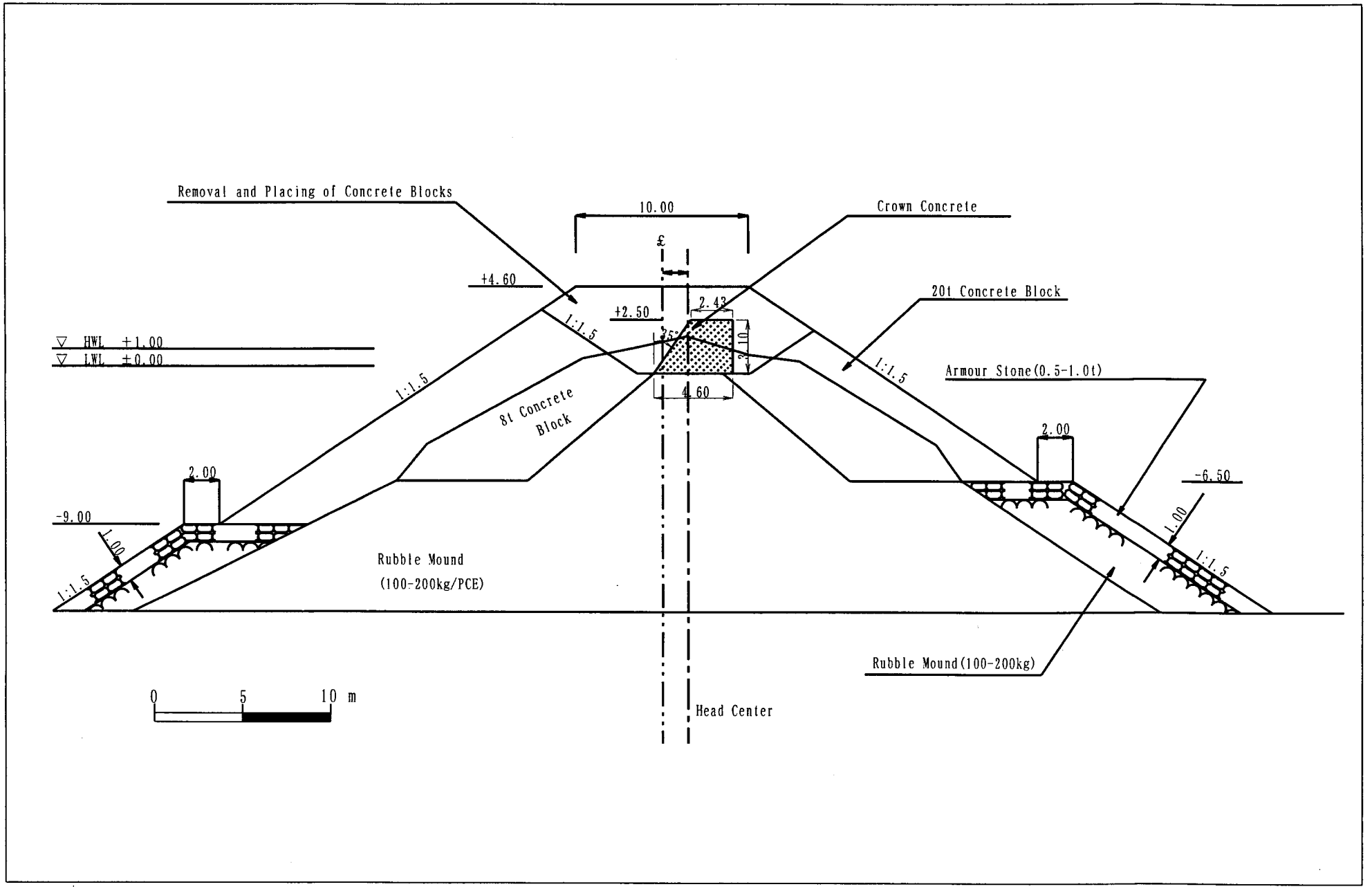


Figure 2.3.28 Cross Section of Improvement of Breakwater

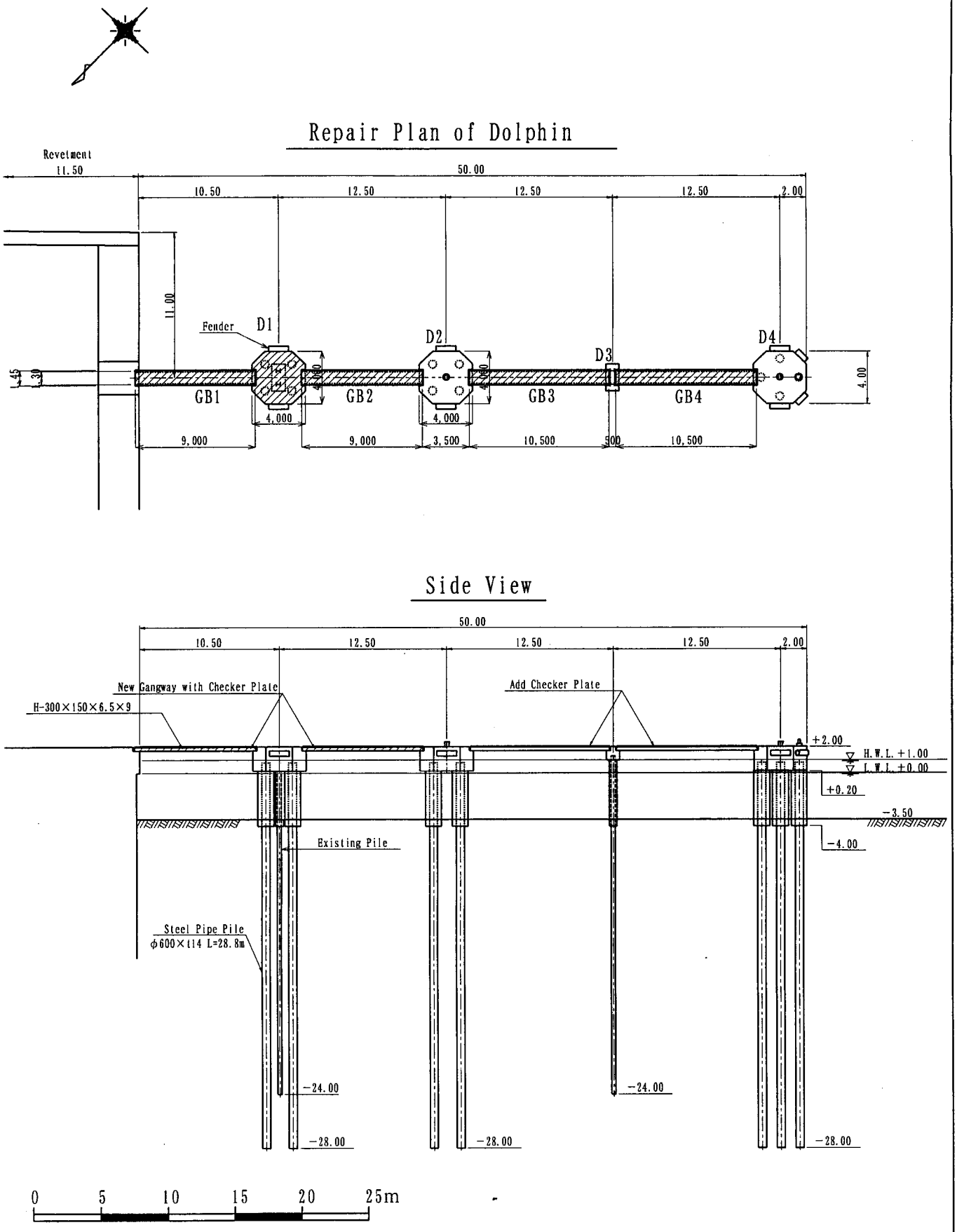


Figure 2.3.29 Repair of Ferry Dolphin

2.4 Environmental Aspect

(1) Environmental Impact Assessment Regulations (EIAR1998)

Environmental Impact Assessment Regulations 1998 (EIAR1998) for Samoa is now under the necessary procedures through the Department of Lands, Surveys and Environment (DLSE). EIAR1998 will be scheduled to come to force before July, 2001 after the Cabinet approval. The Samoan Government has promoted this Project and DLSE will examine and approve the application from the Ministry of Transport (MOT). The procedures of EIAR1998 for the development project are shown in Figure 2.4.1.

In this Project, MOT has submitted the Preliminary Environment Assessment Report (PEAR) to DLSE after the Draft Report Explanation in July, 2000.

(2) Environmental Impact

Initial Environmental Examination (IEE) and Environmental Impact Assessment (EIA) were conducted in "The Study on Improvement of Apia Port" in 1998 and the results of IEE and EIA are described as follows.

The possible environmental impact is expected to be diffusion of turbidity during dredging work. As a countermeasure to this environmental impact, periodical monitoring shall be carried out during construction period and a silt-curtain shall be installed enclosing the dredging site to minimize leakage and dispersion of muddy water. When dredged soil is used for reclamation, soil shall be kept for drying. The harbor ordinance restricts dumping bilge oil in the port. Bilge oil from work boats shall be collected and kept in a bilge oil tank. Waste water treatment facilities have to be provided in the port area. Through environmental examination discussed above, it is concluded that the construction work of the Project will not generate any significant impact to the environment if necessary countermeasures are taken.

On the other hand, since the turbidity is caused by natural phenomenon, like flooding of rivers and stirring up sediment on the sea bottom by propeller in water area in front of the existing wharf, the monitoring sites of turbidity shall cover the whole area of Apia harbor.

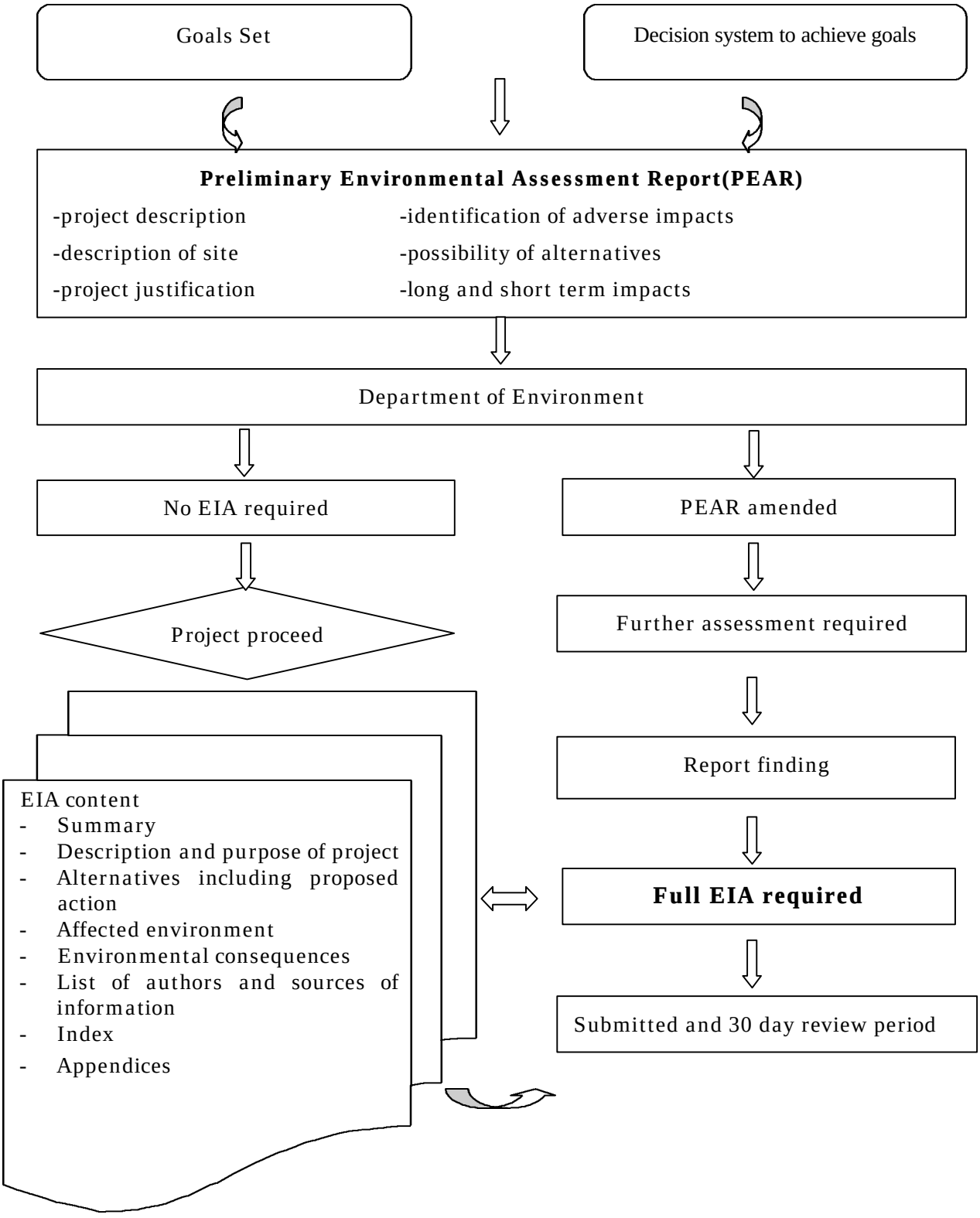


Figure 2.4.1 Procedure of EIAR1998

CHAPTER 3

IMPLEMENTATION PLAN

CHAPTER 3 IMPLEMENTATION PLAN

3.1 Implementation Plan

3.1.1 Implementation Concept

(1) Basic Concept

1) Upon the implementation of this Project, after the Exchange of Notes (E/N) between the Government of Japan and the Government of Samoa, a contract on consulting services will be concluded between the Government of Samoa and a Japanese consultant.

2) The consultant will prepare all the tender documents such as drawings, technical specifications, cost estimation, conditions of contact and so on necessary for the tender and the construction contract. After the approval of those documents by the Government of Samoa, the contractor for this Project will be selected among Japanese construction companies through the procedure of the prequalification and the tender.

3) The construction works will be performed by the selected contractor in accordance with the construction contract concluded between the Government of Samoa and the contractor.

4) The construction period is expected to be 24 months taking into consideration the scale of the project and the site conditions.

(2) Implementation Concept

1) This Project is of a large-scale port construction type. The construction works mostly consist of construction of a new wharf, improvement of a breakwater, pavement of staging area and repair works of a ferry dolphin. A new wharf, breakwater and a ferry dolphin can be constructed on land and on sea, which will contribute to reduction of the construction cost and the shortening of construction period.

2) There are no construction companies in Samoa having sufficient

experiences in various construction fields. Labors and small-size construction equipment belonging to local construction companies may be applied by Japanese construction company for this Project.

3) There are few construction consultant companies in Samoa, and experience of the investigation field is simple land survey. Japanese consultant employs a local engineer by the direct management and carry out the water quality survey such as environment monitoring (turbidity) during the dredging work.

4) Most construction equipment (except small-size construction equipment), goods and materials (except stone, sand, aggregates and importation cement) will be procured from Japan.

(3) Executing Agency in the Government of Samoa

Executing agencies of the project on the part of the Government of Samoa will be as follows.

1) Responsible Agency for Tender
Ministry of Transport (MOT)

2) Executing Agency
Ministry of Transport (MOT)

3) Implementation Agency
Ministry of Transport (MOT)

4) Agency for Management after Completion
Samoa Ports Authority (SPA)

3.1.2 Implementation Conditions

(1) Construction Conditions

1) Construction Company

There are not large construction companies in Samoa. Local construction companies may be assigned sub-contract under the supervision of the Japanese construction company.

2) Construction Equipment

Land and marine construction equipment except small-size construction equipment can not be procured in Samoa. Construction equipment including heavy equipment such as a large scale floating crane, a grab type dredger and so on will be required for the construction for a long period and they will be procured from Japan.

3) Labors

Skilled labors can not be procured locally in Samoa. As for all kinds of construction works, it is necessary for the Japanese skilled experts to instruct local labors. Common skilled labor and unskilled labor will be managed locally.

4) Goods and Materials to be imported

Major construction materials (stones, sand, aggregates, and importation cement) will be procured from Samoa with consideration of the quality and the stable supply.

Other construction materials (include steel sheet pipe piles etc.) will be procured from Japan.

5) Safety Control

As the new wharf is planned to be located from north side of existing wharf to the breakwater, utmost care should be taken for the safety of container ships, fishing boats and passenger boats navigating in the nearby area by installing marker buoys during construction of the new wharf and so on. In land construction works, the access road to bring in the construction materials should be clearly signed in order not to cause the traffic accidents.

(2) Care for Construction

1) Appropriate construction plan should be prepared considering the natural conditions at site, especially the marine conditions.

2) Dispatch of the Japanese staffs and technical experts should be planned carefully considering the appropriate number of persons, timing and duration in accordance with the progress of works.

3) Local equipment and materials should be used as much as possible, minimizing the procurement from Japan.

4) As there will be involved long terms marine works, special attention should be paid to the container ships, fishing boats and passenger boats navigating in the nearby area.

5) As a countermeasure to minimize this environmental impact, periodical monitoring should be carried out during construction period and a silt-curtain should be installed enclosing the dredging site to minimize leakage and dispersion of muddy water.

3.1.3 Scope of Works

The scope of works of the Project to be undertaken by the Japanese and Samoan governments are divided as follows:

(1) Scope of Works to be undertaken by Japanese Government

Port Facilities
- Construction of New Wharf,
- Improvement of Breakwater,
- Pavement of Staging Area, and
- Repair Works of Ferry Dolphin.

(2) Scope of Works to be undertaken by the Government of Samoa

- Plumbing the oil supply line in the concrete duct, and
- Removal and reconstruction of the oil retaining wall and the oil separator

3.1.4 Consultant Supervision

The policy of Japan's Grant Aid Projects requires that the project proceed consistently throughout the period from the detailed design stage to the construction stage with assistance of the consultant who fully understands the objectives of the basic design. The consultant is required to supervise the construction work by stationing capable resident engineers at the site for

management and communication as well as by dispatching special engineer for a short term for inspections and instructions in accordance with the progress of works.

(1) Supervisory Policies

1) Control of the work progress in accordance with the construction schedule, with maintaining close contact and communication between the responsible organizations in both countries,

2) Provision of prompt and adequate instructions and advice to the contractor so that they can complete the construction of the facilities in conformity with the design plans,

3) Provision of instructions for maximum adoption of local materials and sub-contractors,

4) Promotion of technology transfer in construction and engineering to make the most of grant aid project,

5) Provision of adequate instructions and advice on maintenance of the delivered facilities to help smooth operations thereof.

(2) Supervisory Works

1) Assistance on Contracting

Providing assistance on selection of contractor, determining the type of contract, drafting contract documents, evaluating the bill of quantities and witnessing contract awarding.

2) Evaluation and Approval of Shop Drawings, etc.

Evaluating and approving shop drawings as well as materials and equipment proposed and submitted by the contractor.

3) Instruction to Construction Works

Reviewing construction plans and schedule, etc., providing instructions to contractor and reporting the progress of works to the client.

4) Assistance in Procedure of Payment

Evaluating and approving the bills on payment to the contractor for the work in progress and upon the completion of the project.

5) Inspection and Witness

The consultant inspect where necessary the work in progress and gives instructions to the contractor. The consultant, upon the confirmation of completion of the works and fulfillment of requirements of the contract, witness the delivery of the objects of the contract and confirm the client's acceptance thereof to complete his obligations.

The consultant also provides reports to the Government of Japan in relation to the progress of works, payment procedures and delivery of completed facilities.

3.1.5 Procurement Plan

In procuring necessary materials and equipment for the project, special attentions are required as follows:

(1) Procurement Policy

Priority should be given to the use of materials and equipment locally available or third foreign countries, if the quality or supply capacities meet the requirements. Procurement of materials from Japan will be minimized from the viewpoint of cost.

1) Procurement from Japan

A detailed procurement and transport schedule will be prepared well in advance for the materials and equipment to be made available in Japan, because the process of placing an order, manufacturing, packing and shipment of goods normally takes a long period. The project will procure many materials and equipment from Japan such as steel sheet pipe piles, steel sheet piles, rubber fenders and large scale floating crane, grab type dredger etc.

2) Local Procurement

The materials locally available would be only stones, sand, aggregates and importation cement.

Small-size equipment can be procured locally. However, heavy equipment such

as a large scale floating crane, a grab type dredger and so on will be required for the construction for a long period and they will be procured from Japan.

3) Cost

The cost is an important factor to be taken into account in the selection of materials from local resources, third foreign countries and Japan. It should be borne in mind that the price of procurement from Japan includes the charges for packing, transportation and insurance, while port charges and taxes are to be exempted. On the bases of the above principles and rules, the following plans will be established for the procurement of construction materials and equipment.

(2) Procurement of Materials and Equipment

The main materials and equipment to be procured for the project will be as follows.

1) Materials

- Local:

stones, aggregates, sand, cement and concrete

- Japan:

steel sheet pipe piles, steel pipes, steel sheet piles, steel materials, fenders, bollards, electricity supply materials

- Third Foreign Country:

none

2) Equipment

- Local:

track crane, dump track, excavator (0.6m^3), bulldozer, welder, compressor, motor grader, vibratory roller, road roller, pneumatic tire roller, vibratory plate compactor, water sprinkler

- Japan:

large scale floating crane, anchor boat, barge, tag boat, grab type dredger, crawler crane, excavator (2.0m^3), concrete bucket (3.0m^3), vibratory pile hammer, water jet cutter, generator, testing instruments (plate bearing testing instrument, concrete compression testing machinery)

- Third Foreign Country:

none

3.1.6 Implementation Schedule

Implementation of the project under the Japan's Grant Aid Program will be proceeded in the following manners:

After the Exchange of Notes (E/N) regarding the preparation of detailed design documents concluded between the two countries, the Japanese consulting firm will be appointed by the Government of Samoa and the consulting contract will be concluded between the said government and consultant firm. And the project will be completed in two stages of the execution of tender and construction contract and the execution of construction works.

(1) Preparation of Detailed Design Documents

After the consulting contract concluded between the executing organization of the project in Samoa and the Japanese consultant firm, the contract will be verified by the Government of Japan and the consultant will start the detailed design. In the detailed design stage, the tender documents consisting of detailed design drawings, technical specifications, instructions to tenderers, etc. will be prepared based on the present basic design report. Meantime, the consultation with the Government of Samoa regarding the details of the facilities will be held and the approval of all the tender documents will be obtained from the Government of Samoa.

The detailed design requires 3 months.

(2) Execution of Tender and Constr uction Contract

The contractor (Japanese construction company) for the construction of project facilities will be decided by the tender. All the procedures regarding the tender will be performed in such order as the notification, the acceptance of the offer for the tender, the prequalification, the distribution of the tender documents, the evaluation of the tender results, the designation of the contractor, and the construction contract. The whole procedure will take 2 months.

(3) Execution of Constr uction Works

Construction will be started after the conclusion of the construction contract and the verification by the Government of Japan. The construction period is expected to be 24 months considering the scale and contents of facilities, the local construction conditions and the lower marine work efficiency.

Figure 3.1.1 shows the implementation schedule covering from the Exchange of Notes to the completion of the project.

3.1.7 Obligations of Recipient Country

The obligations of the Government of Samoa were confirmed by Minutes of Discussions during the Basic Design Study as follows.

1) To secure the land necessary for the execution of the Project, such as the land for facilities, temporary offices, working areas, storage yards and others;

2) To make all passable roads leading to the Project sites before the commencement of inland transportation of materials and equipment;

3) To undertake the incidental works, such as gardening, fencing, lightning and other incidental facilities in and around the Project sites, if necessary;

4) To ensure prompt unloading and customs clearance at ports of disembarkation in Samoa and internal transportation therein of the products purchased under the Grant Aid Program;

5) To exempt Japanese nationals from customs duties, internal taxes and other fiscal levies which may be imposed in Samoa with respect to the supply of the products and services under the Verified Contracts;

6) To accord Japanese nationals whose services may be required in connection with the supply of the products and services under the Verified Contracts such facilities as may be necessary for their entry into Samoa and stay therein for the performance of their work;

7) To maintain and use facilities constructed under the Grant Aid Program properly and effectively for the Project;

8) To bear commissions to the Japanese bank for its banking services based upon the Banking Arrangement, namely the advising commission of the "Authorization to Pay" and Payment Commissions;

9) To bear all the expenses, other than those covered by the Grant Aid Program, necessary for the Project;

10) To coordinate and solve any issues related to the Project which may be raised from third parties or inhabitants in the Project area during implementation of the Project;

11) Plumbing work of the oil pipes in the concrete duct; and

12) Removal and reconstruction of the oil retaining wall and the oil separator.

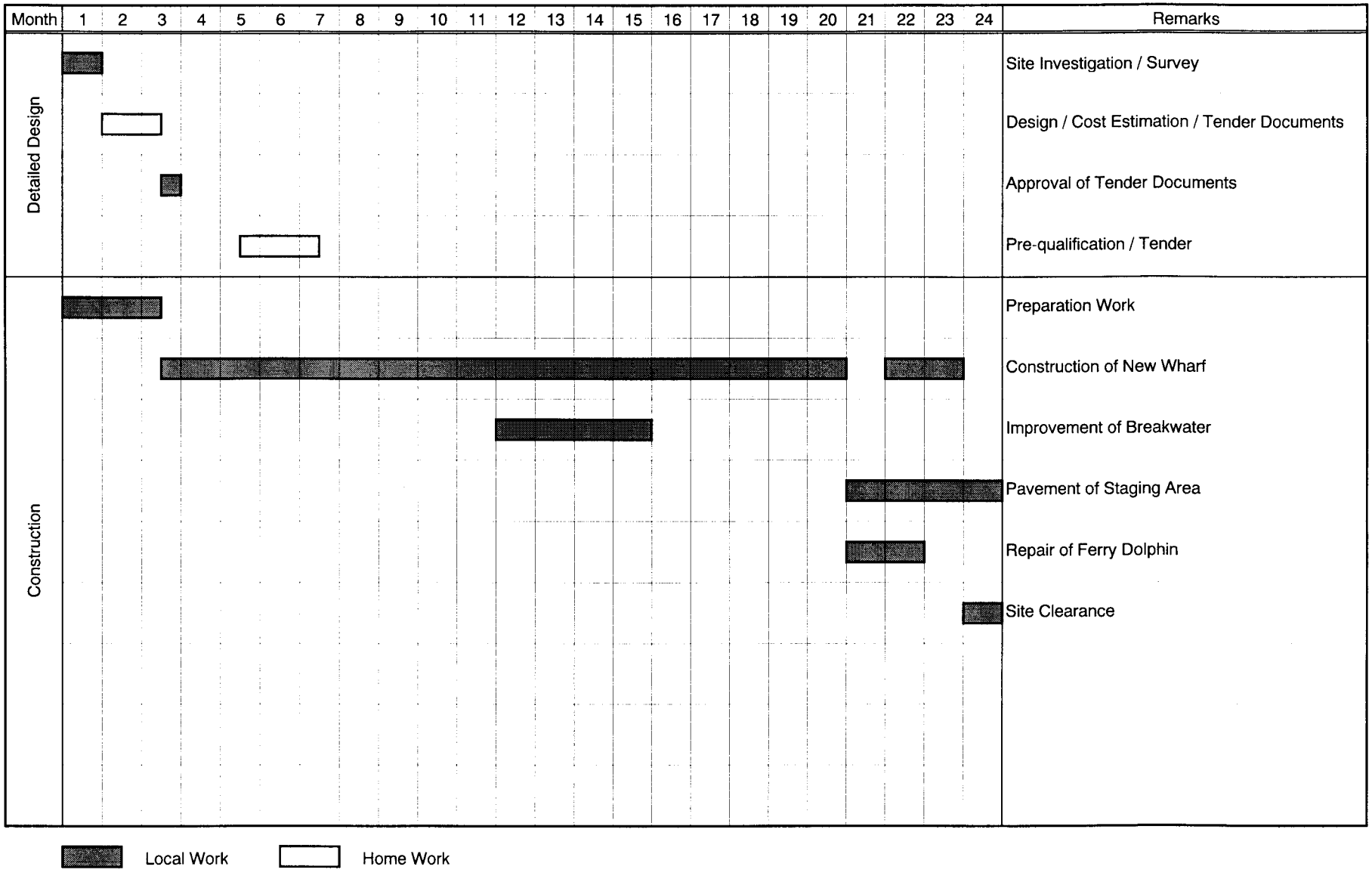


Figure 3.1.1 Implementation Schedule

3.2 Operation and Maintenance Plan

On the basis of the results of analysis on revenues and expenditures of SPA in 1999/2000, financial situation in 2003/2004 has been estimated for the years after this Project will be completed in 2003.

(1) Port Charges

SPA has inherited the office building, ships and various equipment from the Ministry of Transport and is a financially autonomous entity. It is, therefore, important to establish an appropriate level of port charges, being the major source of revenues, to make SPA financially viable. "The Study on Improvement of Apia Port" done in 1998 pointed out that the port charges of Apia Port were lower than those of the neighboring ports and thus recommended to revise them. In response to this recommendation, SPA revised the port charges as shown in Table 3.2.1.

Table 3.2.1 Port Charges

Ship (Unit：Tala)

Particulars	Unit	Ship's Type		
		Tankers and Passenger Cruise	Overseas Vessel	Home-trade Vessel
Light Dues	Time	100	40	200 (per annum)
Pilotage	GRT	0.18	0.1	0.1
Port Dues	GRT	0.07	0.05	5 (per annum)
Dockage	GRT	0.05	0.05	200 (per annum)
Berthage	GRT	0.41 (Stand by)		
Staff	Hour	60		
	Day		40(<1500GRT)	40(<1500GRT)
	〃		60(>1500GRT)	60(>1500GRT)
Staff	Hour	60	60	60
Tag Boat <200HP	Hour	100	100	100
〃 <400HP	〃	200	200	200
〃 <600HP	〃	300	300	300
〃 <800HP	〃	400	400	400
〃 <1000HP	〃	700	700	700
Cleaning	Time	50	200(tallow, cement) 50(others)	200(tallow, cement) 50(others)
Water Supply	Gallon	0.1	0.1	0.1
Telephone	Units	100	100	100
Liquid and Dangerous Goods	Hour	30	30	30
Cargo Dues	Ton	0.1	0.1	0.1

Cargo (Unit：Tala)

Particulars	Unit	Charge
Wharfage	Ton	5 (Import) 2 (Export) 2.5 (Transshipment) 1 (Oil)
Cargo Dues Cargo, LCL	Ton	10 (Import) 1 (Export)
Container	Container	200 (20ft Import) 350 (40ft Import) 30 (20ft Export) 60 (40ft Export)
Storage Cargo	Ton	nil (1st-4th day, Overseas) nil (1st-4th day、Home) 6 (after 4th day, Overseas) 4 (after 4th day、Home)
Container	Container	5 (20ft empty)* 10 (40ft empty)* 75 (20ft full or partly)** 120 (40ft full or partly)** 50 (20ft Export)** 100 (40ft Export)**

* charge not apply until 21days
** charge not apply until 4 days

(2) Revenues and Expenditures

The financial situation after this Project will be completed has been estimated for the fiscal year 2003/2004. The estimation has been carried out based on the actual revenues and expenditures in 1999/2000 taking into account improvement of port function by new port facilities developed in this Project and introduction of a tug boat.

Table 3.2.2 shows that the annual revenues for the fiscal year 2003/2004 are estimated as 5,701 thousand Tala as compared with the expenditures of 5,561 thousand Tala resulting in the gross profit of 140 thousand Tala.

The details of revenues and expenditures are shown in Table 3.2.3. As for the revenues, an increased income has been considered for port charges (1,182 thousand Tala) generated by increasing cargo volume (340,000 tons) in 2003 which has been predicted in "The Study on Improvement of Apia Port" in 1998 and charge of work/tug boats (112 thousand Tala) generated by introduction of a new tug boat.

As for the expenditures, the depreciation costs (1,539 thousand Tala) of port facilities developed in this Project and a new tug boat are added to the actual depreciation costs (1,422 thousand Tala) in 1999/2000. The service life of new facilities and a new tug boat are set as 50 years and 20 years respectively. Concerning the maintenance and repair costs (R&M expense), 10% of the depreciation costs of new facilities and a new tug boat is added to the actual cost in 1999/2000. For personnel costs (Salaries staff), cost of new 6 staffs who will be employed in the future is added to the actual cost.

As the depreciation costs of the existing facilities have been appropriated in the first year expenditures 1999/2000 when SPA was established, the renewal costs of the existing port facilities will not be saved enough by the time they will require renewal. Therefore, the shortage of renewal costs for the existing port facilities is required to be allocated by the budget of the Government of Samoa.

Table 3.2.2 Revenues and Expenditures of SPA

(Unit：Tala)

Fiscal year	Revenues	Expenditures	Gross Profit
2003/2004	5,701,049	5,561,117	139,932

Table 3.2.3　Revenues and Expenditures of SPA in 2003/2004

(Unit：Tala)

Fiscal Year 2003/2004		Amount	Ratio (%)
Revenues			
	Port Charges	4,237,813	74.3
	Electricity Recoveries	421,740	7.4
	Work/Tug Boats	319,376	5.6
	Overtime Recovered	195,858	3.5
	Storage of Container	77,147	1.4
	Clearing Fee	7,805	0.2
	Levy Land/Canteen	96,133	1.7
	Inward/Outward Passengers	52,263	0.9
	Levy Buildings/Warehouses	183,115	3.2
	Other Income	109,799	1.9
Total Revenues		5,701,049	100.0
Expenditures			
	Salaries:staff	780,996	14.0
	Overtime(staff & casual)	253,943	4.6
	Depreciation	2,800,546	53.2
	Fuel & Oil (boats)	75,788	1.4
	R & M Expense	701,410	12.6
	Office Expense	81,814	1.5
	Travel Cost	129,099	2.3
	Utilities Expense(water, electricity)	180,465	3.2
	Insurance	47,769	0.9
	Other Expense	348,938	6.3
Total Expenditures		5,561,117	100.0
Gross Profit		139,932	

CHAPTER 4

PROJECT EVALUATION

AND

RECOMMENDATION

CHAPTER 4 PROJECT EVALUATION AND RECOMMENDATION

4.1 Project Effect

Economy and people's lives of Samoa depend heavily on sea transportation due to the country's peculiar geographical condition of remoteness from major trade partners and industrial structure of high dependence of industrial products and foods on import. Apia Port is the most important gate for international trade handling almost all of foreign cargoes. Number of ship's calls and cargo volume handled in Apia Port increased from 218 ships and 240,000 tons in 1994 to 265 ships and 280,000 tons in 1999. The existing main wharf, 185m long and 11m deep, was constructed under New Zealand aid in 1966 with the structural type of a concrete deck supported by H shaped steel piles. This wharf is the only one berth that can accommodate large sized ships in Apia Port.

On the above-mentioned background, Apia Port, which is an important basic social infrastructure supporting the country's economic activities, faces the following serious problems of deterioration of efficiency and safety of cargo handling operation caused by recent port congestion arising from increasing cargoes and calling ships coupled with deterioration of the existing wharf.

1) Number of ship's call and cargo volume handled in Apia Port have been increasing after recovery from cyclone damages. Since Apia Port is provided with no more than one berth, there occurs waiting for berth when more than two ships arrive at the port at a time. Though shipping schedule is adjusted in order to avoid this situation, ship's waiting inevitably occurs due to increase of calling ships and absolute shortage of berth. Number of occurrence of waiting for berth sharply increased from 10 in 1997 to 39 in 1999 causing serious port congestion with maximum waiting time reaching about 10 days in recent years.

2) The limitation of load to the existing wharf gives rise to interruption of handling operation of heavy container cargoes by heavy equipment resulting in a further port congestion. Further structural deterioration of the wharf due to continuing corrosion of H shaped steel piles could lead to considerable deterioration of safety of cargo handling operation and serious loss of port function.

3) In consequence, the port congestion is to affect economy of Samoa in a way of increased import price and loss of international competitiveness through increased sea freight.

On this background, the Government of Samoa, having recognized absolute necessity of improvement of port facilities in Apia Port to support sound growth of national economy, has given the highest priority to this Project among other development plans of basic social infrastructures in the national development plan.

This Project is expected to contribute to secure safe and efficient port operation by reducing recent serious port congestion as follows;

1) Number of ship's call and cargo volume handled in Apia Port have been increasing in recent years, which gives rise to critical condition of ship's waiting. Increasing port congestion has become a growing problem to be urgently solved. After completion of the project, since a berthing facility that is the most important among port facilities will increase to 2 berths, safety and efficiency of cargo handling operation will be remarkably improved for increasing cargoes and ships.

2) Also, since such large ships as container carriers, etc. will no longer berth along the existing wharf, safety of the existing wharf will be improved.

3) Construction of the staging area at the back of the new wharf will improve cargo handling efficiency. While the existing container yard will be relieved from congestion.

4) Safety of mooring operation of a ferryboat will be improved by repair work to the dolphin at the ferry terminal.

The above effects will give direct benefits to the port users and indirect benefits to Samoan nationals of 160,000 people through reduction of sea freight rate.

Through the above consideration, development of Apia Port under this Project is evaluated as appropriate and beneficial as a grant aid assistance.

4.2 Recommendation

After completion of the Project, it is recommended that, in order to contribute to realization of the targets set out in the national development plan through efficient utilization of the port facilities such as wharf, container yard, etc., SPA shall manage and operate the port paying special attention to the following;

1) Since establishment in July in 1999, SPA has been achieving remarkable improvement on management as well as maintenance of the port facilities. After completion of the project, berthing facility that is the most important among port facilities will increase to 2 berths. It is recommended that SPA further reinforce management and maintenance aspects of the port and maximize efficiency of port utilization.

2) Periodical inspection and maintenance are imperative for safety and function of port facilities and longer service lives. Corrosion protection to steel piles, maintenance dredging and repair work to fenders are classified into the works to be done as maintenance and repair, and it is recommended that SPA shall, strengthening the structure, conduct proper maintenance works. To acquire necessary knowledge of maintenance, repair and reconstruction, overseas training of SPA staff and expatriate technical assistance are effective.

3) Repair work of existing wharf

The existing wharf is planned to serve ships of medium and smaller sizes after completion of the new wharf. Therefore, the load acting to the wharf will decrease, however, as the piles will be further corroded, the wharf will deteriorate showing inclination, settlement, cracks, etc. It is recommended that SPA shall continue the load limitation to the existing wharf and implement adequate maintenance and repair works based on periodical inspection on deformation and displacement of the existing wharf.

The damages of the existing fenders are caused under special conditions of harbor agitation by swell and a steel belt installed on a ship's hull. It is recommended that SPA undertake a periodical inspection, adequate repair works, instruction of proper berthing manner to ship operators, etc. for proper maintenance of the port facilities.

The water area in front of the existing wharf has become shallow and SPA shall update the information of maximum navigable draft through periodical sounding survey over the port water area. It is recommended that SPA notify to the port users to adjust the draft of ships calling Apia Port until completion of the new wharf in order to avoid such marine accidents as touching seabed, etc.

APPENDICES

Appendix 1 Member List of the Study Team

Field Study

Name	Assignment	Organization
Official Member		
Mr. Hidetoshi TAKAMA	Leader	Resident Representative Samoa Office Japan International Cooperation Agency (JICA)
Mr. Yasunori MAKITA	Technical Advisor	Chief Construction Division Ports and Harbors Bureau Ministry of Transport
Consultant Member		
Mr. Hisanori KATO	Chief Consultant / Port Facilities Planner / Operation and Management Planner	ECOH CORPORATION
Mr. Kazumasa MITA	Architectural Planner	ECOH CORPORATION
Mr. Hitoshi TAKEMOTO	Construction Planner/ Cost Estimator	ECOH CORPORATION
Mr. Masanori IKEDA	Port Statistics Analyst	ECOH CORPORATION
Mr. Shuji SAKAI	Natural Conditions Surveyor	ECOH CORPORATION

Explanation of Draft Basic Design

Name	Assignment	Organization
Official Member		
Mr. Tsutomu MORIYA	Leader	Resident Representative Samoa Office Japan International Cooperation Agency (JICA)
Mr. Michiyuki WATANABE	Technical Advisor	Staff, International Affaires Office, Construction Division Ports and Harbors Bureau Ministry of Transport
Consultant Member		
Mr. Hisanori KATO	Chief Consultant / Operation and Maintenance Planner	ECOH CORPORATION
Mr. Hitoshi TAKEMOTO	Construction Planner/ Cost Estimator	ECOH CORPORATION

Appendix 2 Survey Schedule

Field Study

Date			Hidetoshi TAKAMA	Yasunori MAKITA	Hisanori KATO	Hitoshi TAKEMOTO	Kazumasa MITA	Masanori IKEDA	Shuji SAKAI
			Leader	Technical Adviser	Chief Consultant Port Facilities Planner Port Management Planner	Construction Planner Cost Estimator	Architectural Planner	Port Statistics Analyst	Natural Conditions Surveyor
3	16	Thu							Tokyo 19:00(FJ303)→
	17	Fri							→06:25 Nadi Investigation of procurement from third country
	18	Sat							Nadi20:00(FJ561)→ 22:50-1Samoa Discussion with Surveyor
	19	Sun							Contract of Surveys
	20	Mon							Courtesy Call to JICA,MOT Preparation of Boring Investigation
	21	Tue							Investigation of procurement
	22	Wed							Discussion with SPA
	23	Thu							Boring Survey(Land Area)
	24	Fri							ditto
	25	Sat							ditto
	26	Sun							Data Analysis
	27	Mon		Tokyo20:55(JL090)→13:35+1 Auckland	Tokyo21:15(JL771)→07:45+1Sydney				Boring Survey(Land Area)
	28	Tue	Courtesy Call to MOT, SPA ,MOF	Auckland00:15+1(QF323)→ 05:15Samoa Courtesy Call to MOT, SPA ,MOF, JICA	Sydney16:30(PH836)→05:15Samoa Courtesy Call to MOT, SPA ,MOF, JICA, Schedule Arrangement				ditto
	29	Wed	Presentation and Discussion of Inception Report with MOT and SPA Investigation of Apia Port						ditto
	30	Thu	Discussion on the Minutes					Tokyo19:00(FJ303)→	ditto
	31	Fri	Signing of the Minutes					→06:25Nadi	ditto
4	1	Sat		Samoa01:05(NZ061)→	Investigation of Ship's Call and Cargo Handling	Site Investigation of Fender		Nadi20:00(FJ561) →22:50-1Samoa Team Meeting、Preparation	ditto
	2	Sun		→04:05Auckland10:55 (NZ033)→19:00Tokyo	Data Analysis	sounding survey	Tokyo20:55(JL090)→ 10:40+1Auckland18:15(NZ056)→23:00-1Samoa	Data Analysis	sounding survey
	3	Mon			Investigation of Present Situation of Apia Port		Investigation of Site Infrastructure Investigation of supplies (Construction Machinery and Material)	Investigation of Apia Port	Boring Survey(Marine Area)
	4	Tue			ditto	Investigation of Construction Site, SPREP, SSC	Investigation of Marine Office	Investigation of Apia Port (Ship's Call, Cargo Volume, etc.)	ditto
	5	Wed			ditto	Investigation of Present Situation of Apia Port	Investigation of Site Infrastructure	ditto	ditto
	6	Thu			Discussion with MOT (Port Plan of Apia Port)	Site Investigating of Fender	Discussion with SPA Investigation of Marine Office	ditto	ditto
	7	Fri			ditto	Lands, Survey and Environment Department	Investigation of supplies (Machinery and Material)	ditto	ditto
	8	Sat			Investigation of Apia Port	Site Investigating of New Wharf	Data Analysis		ditto
	9	Sun			Data Analysis	Site Investigation of Breakwater and Ferry Dolphin	ditto		Site Investigation of Breakwater and Ferry Dolphin
	10	Mon			Discussion with SPA (Management of Apia Port)	Discussion with SPA (Architectural Plan)	Investigation of SPA	Economic Evaluation of the Project	Boring Survey(Marine Area)
	11	Tue			ditto	Investigation of procurement	ditto	Economic Evaluation of the Project	ditto
	12	Wed			Investigation of Port Management (budget)	Investigation of procurement	Investigation of Water Supply	Investigation of Port Management	ditto
	13	Thu			ditto	Investigation of Construction Company in Samoa		Investigation of Port Management	ditto
	14	Fri	Joint Meeting		Reporting to MOT, SPA, Joint Meeting				ditto
	15	Sat			Investigation of Apia Port	Investigation of Construction Company in Samoa (Additional)		Investigation of Apia Port	ditto
	16	Sun			Data Analysis	Investigation of Existing Wharf	Data Analysis		Investigation of Existing Wharf
	17	Mon			Reporting to JICA, Courtesy Call to MOT,PWD,MOF		Samoa06:00(QF324)→	Samoa11:15(FJ252)→	
	18	Tue			Samoa06:15(PH821)→		→10:15Auckland Investigation of procurement from third country	→12:15Nadi	
	19	Wed			→12:10Wellington Reporting		Auckland11:20(NZ033)→ 19:20Tokyo	Investigation of procurement from third country	
	20	Thu			Wellington6:00(QF118)→07:40Sydney09:35(JL772) →18:10Tokyo			Nadi07:45(FJ302)→13:55Tokyo	

Explanation of Draft Basic Design

Date			Tsutomu MORIYA	Michiyuki WATANABE	Hisanori KATO	Hitoshi TAKEMOTO
			Leader	Technical Adviser	Chief Consultant Operation and Maintenance Planner	Construction Planner Cost Estimator
7	9	Sun		Tokyo 22:55 (JL090) → 10:40+1 Auckland 16:20 (NZ056) → 21:05-1 Apia		
	10	Mon	Meeting at JICA Courtesy Call (Ministry of Foreign Affaires, Ministry of Transport and Samoa Ports Authority)			
	11	Tue	Explanation of Draft Basic Design Report to Ministry of Transport and Samoa Ports Authority			
	12	Wed	Meeting with Ministry of Transport and Samoa Ports Authority			
	13	Thu	Meeting of Minutes of Discussions			
	14	Fri	Signing of Minutes of Discussions			
	15	Sat	Internal Meeting			
	16	Sun		Apia 13:00 (PH731) →		
	17	Mon		→ 16:15 Auckland 18:00 (NZ463) → 19:00 Wellington		
	18	Tue		Report to Embassy of Japan (New Zealand) Wellington 17:30 (NZ464) → 18:30 Auckland		
	19	Wed		Auckland 11:20 (NZ033) → 19:20 Tokyo		

Appendix 3 List of Concerned in the Recipient Country

1. National Government

1) Ministry of Transport

Hon. Hans Joachim Keil	Minister
Mr. Vaaelua Nofo Vaaelua	Secretary for Transport

2) Ministry of Foreign Affairs

Mr. Aiono Mose Sua	Secretary for Foreign Affairs

3) Public Works Department

Mr. Isikuki Punival	Director of Works
Mr. Paul Philips	Chief Engineer

4) Treasury Department

Mr. Benjamin Pereira	Senior Research Officer

5) Economic Policy & Planning Division

Mr. Iulai Lavea	Assistant Financial Secretary
Mr. Ben Pereira	Senior Research Officer

6) Lands, Survey & Environment Department

Mr. Tuuu Luafatasaga Dr. Ietitaia Setu Taulealo	Director
Mr. Faumuina Salimalo Patiliu	Assistant Director
Mr. Vainuupo Jungblut	Environment Planning Officer
Mr. Salinala Pati Lin	
Mr. Laavase Malue	

7) Metrological Division

Mr. Faatoia Malele	Superintendent
Mr. Steve Kamu	

8) Ministry of Agriculture, Forests, Fisheries & Meteorology

Mr. Antonio Mulinola	Principal Fisheries Officer
Mr. Frank Fonk	Chief Agriculture Economist
Dr. Sonny Lameta	Senior Research, Economic Advisor

2. Public Cooperation

1) Samoa Ports Authority

Mr. Papalii John J. Ryan	General Manager
Mr. Tepatasi Risale	Port Master
Mr. Asalemo Tuimauga	Operation Manager

2) Samoa Shipping Corporation Ltd. (SSC)

Mr. Oloialii Koki Tuala	General Manager
Mr. Tomohiko Amimoto	JICA Expert

3) Central Bank of Samoa

Mr. Faaoso Setu — Assistant Manager, Research & Statistics

3. Private Sector

1) South Pacific Regional Environment Program (SPREP)

Mr. Sefanaia Nawadra — Marine Pollution Project Officer

2) Yazaki EDS Samoa Ltd

Mr. Masaru Nakamura — Vice President

3) Mobil Oil Samoa

Mr. Peter Pipley — Samoa Manager

4) Forum Shipping Agencies

Mr. Mike Faatoia — Agency Manager

5) Seair Trans Forwarding

Mr. Peseta Fred Schmidt — Managing Director

6) Shipping & Custom Agency

Mr. Tulatoa Fapiano Pilimai — Manager

7) Pacific Forum Line

Mr. Roy Andrews — Branch Accountant

8) Betham Brothers Enterprises Limited

Mr. Mark Betham — Director

9) Trans AM Samoa Ltd.

Mr. Graham Hogarth — Manager

10) Morris Hedstrom Samoa Ltd.

Mr. Maselino Tommy Ulugia — Manager

11) T. V. Corporation Ltd.

Mr. Tui Vaai Jnr. — Operation Manager

12) Fletcher Construction

Mr. George Muir — Manager

13) Samoa Builders' Supplies Ltd.

Mr. Levine Siemu — Sales & Merchandise Manager

14) Apia Concrete Products Ltd.

Mr. Tupua Frederick W. Wetzell — President

15) Elon Betham & Associates Ltd.

Mr. Elon P. Betham — Managing Director

16) Otto Transport

Mr. Lealitte Otto — Director

17) Blue Bird Transport

Mr. Henry Waterlund — Managing Director

18) Raghwan Construction Ltd.

Mr. Vijay Raghwan	Managing Director

19) Vinod Patel

Mr. Aiyub Khan	Sales Representative
Mr. Mohammed Iqbal	Sales Representative

20) Thompson Transport

Mr. David Mcfadyen

21) Pacific Purchasing Limited

Mr. Chris Emerson	Director

Appendix 4 Minutes of Discussions

MINUTES OF DISCUSSIONS
ON THE BASIC DESIGN STUDY
ON THE PROJECT FOR THE SECOND DEVELOPMENT FOR APIA PORT
IN THE INDEPENDENT STATE OF SAMOA

In response to a request from the Government of the Independent State of Samoa (hereinafter referred to as "Samoa"), the Government of Japan decided to conduct a Basic Design Study on The Project for the Second Development of Apia Port (hereinafter referred to as "the Project") and entrusted the study to the Japan International Cooperation Agency (hereinafter referred to as "JICA").

JICA sent to Samoa the Basic Design Study Team (hereinafter referred to as "the Team"), which is headed by Mr. Hidetoshi Takama, Resident Representative, JICA Samoa Office, and is scheduled to stay in the country from March 28, 2000 to April 18, 2000.

The Team held discussions with the officials concerned of the Government of Samoa and conducted a field survey at the study area.

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

Apia, March 31, 2000

Mr. Hidetoshi Takama
Leader
Basic Design Study Team
Japan International Cooperation Agency

Mr. Va'aelua Nofo Va'aelua
Secretary for Transport
Ministry of Transport

Mr. Papalii John J. Ryan
General Manager
Samoa Ports Authority

witness:

Mr. Aiono Mose Sua
Secretary for Foreign Affairs
Ministry of Foreign Affairs

ATTACHMENT

1.Objective of the Project

The objective of the Project is to secure safe and effective activities in Apia Port by construction of a new wharf, improvement of breakwater, pavement of staging area and other necessary facilities as enumerated under Section 4.

2.Project site

The site of the Project is shown in Annex-1.

3.Responsible and Implementing Agency

The Responsible Agency is the Ministry of Transport. The Implementing Agency is Samoa Ports Authority. The organization charts are shown in Annex-2.

4. Items requested by the Government of Samoa

After discussions with the Team, the items described below were finally requested by the Samoan side. JICA will assess the appropriateness of the request and will recommend to the Government of Japan for approval. The following reflects the priority of the Samoan side.

(1) Construction of new wharf
(2) Improvement of breakwater
(3) Pavement of staging area
(4) Repair works of ferry dolphin
(5) Repair work of existing wharf
  - Replacement of damaged fenders
  - Dredging in front of existing wharf
  - Corrosion protection of piles
(6) Construction of administration office

Regarding item (5), the Japanese side mentioned that the Japanese Grant Aid may not include the repair work of the existing wharf.

On the contrary, the Samoan side stated that it will still be very necessary to use the existing wharf after completion of a new wharf.

5.Japan's Grant Aid Scheme

5-1. The Samoan side understands the Japan's Grant Aid Scheme explained by the Team, as described in Annex-3.

5-2. The Samoan side shall take the necessary measures, as described in Annex-4, for smooth implementation of the Project, as a condition for the Japanese Grant Aids to be implemented.

6.Schedule of the Study

6-1. The consultants will proceed to further studies in Samoa until April 18, 2000.

6-2. JICA will prepare the draft report in English and dispatch a mission in order to explain its contents probably in July 2000.

6-3. JICA will complete the final report and send it to the Government of Samoa probably by September 2000.

7.Other relevant issues

7-1. Procedure of Environment Impact Assessment

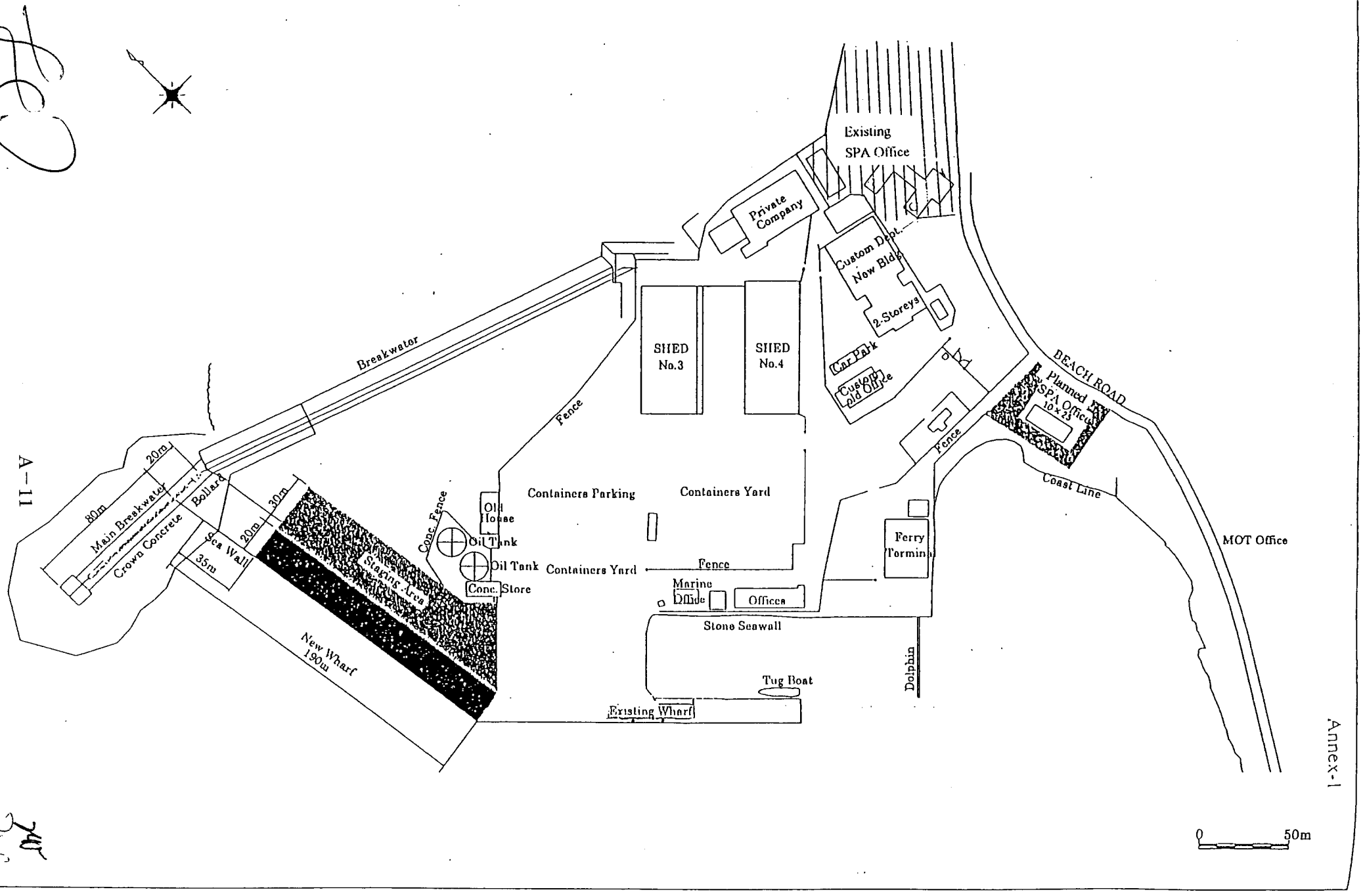
The Samoan side shall make necessary arrangement under the new Environment Impact Assessment Regulation.

7-2. Procedure of Tax Exemption for the Project

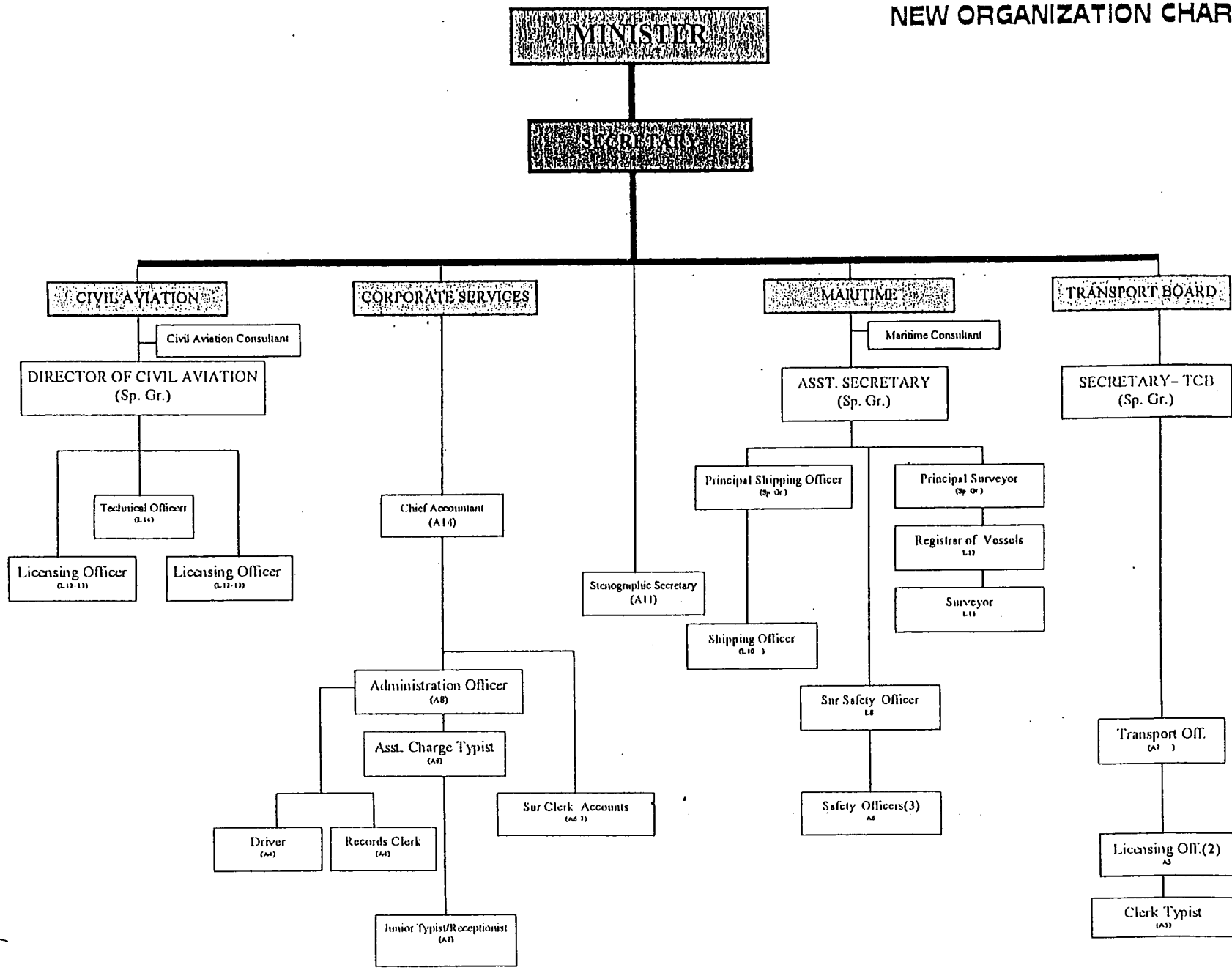
The Team explained the time frame of the Project and requested the preparation of the tax exemption for the Project in the 2001/2 budget.

7-3. Other

The Samoan side shall lay pipes in oil ducts crossing the staging area, provide water supply line, electricity line and telephone line to the new administration office, and provide general furniture necessary for the office.

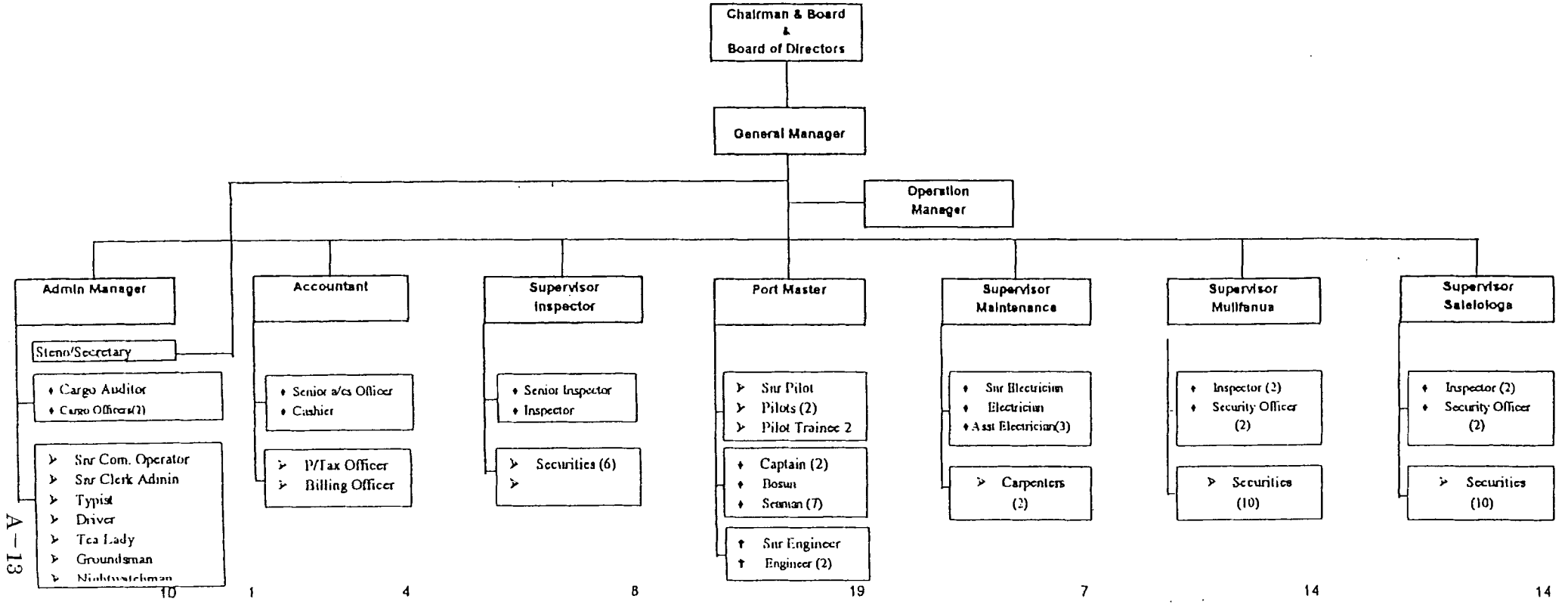

Existing
SPA Office
Private Company
Custom Dept.
New Bldg
2-Storeys
SHED
No.3
SHED
No.4
Car Park
Custom old Office
BEACH ROAD
Planned SPA Office
10×25
Fence
Breakwater
20m
80m
Main Breakwater
Crown Concrete
Bollard
30m
20m
Sea Wall
35m
Staging Area
Conc. Fence
Old House
Oil Tank
Oil Tank
Conc. Store
Containers Parking
Containers Yard
Containers Yard
Fence
Coast Line
Ferry Terminal
MOT Office
Marine Office
Offices
Stone Seawall
New Wharf
190m
Tug Boat
Dolphin
Existing Wharf
0
50m
A-11
Annex-I

M.O.T
NEW ORGANIZATION CHART



SAMOA PORTS AUTHORITY

ORGANISATION STRUCTURE



Total Staff 77

JAPAN'S GRANT AID SCHEME

1. Grant Aid Procedures

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

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

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

Secondly, JICA conducts the study (Basic Design Study) using (a) Japanese consulting firm(s).

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

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

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

2. Basic Design Study

1) Contents of the study

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

a) Confirmation of the background, objectives, and benefits of the Project and also institutional capacity of agencies concerned of the recipient country necessary for the Project's implementation.

b) Evaluation of the appropriateness of the Project to be implemented under the Grant Aid Scheme from a technical, social and economic point of view.

c) Confirmation of items agreed on by both parties concerning the basic concept of the Project.

d) Preparation of a basic design of the Project.

e) Estimation of costs of the Project.

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

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

2) Selection of Consultants

For smooth implementation of the Study, JICA uses (a) registered consultant firm(s). JICA selects (a) firm(s) based on proposals submitted by interested firms. The selected firm(s) carry(ies) out a Basic Design Study and write(s) a report, based upon terms of reference set by JICA. The consultant firm(s) used for the Study is(are) recommended by JICA to the recipient country to also work on the Project's implementation after the Exchange of Notes, in order to maintain technical consistency.

3. Japan's Grant Aid Scheme

1) Japan's Grant Aid

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

2) Exchange of Notes (E/N)

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

3) "The period of the Grant Aid" means the one fiscal year which the Cabinet approves the Project for. Within the fiscal year, all procedures such as exchanging of the Notes, concluding contracts with (a) consultant firm(s) and (a) contractor(s) and final payment to them must be completed. However, in case of delays in delivery, installation or construction due to unforeseen factors such as weather, the period of the Grant Aid can be further extended for a maximum of one fiscal year at most by mutual agreement between the two Governments.

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

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

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

5) Necessity of "Verification"

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

6) Undertakings required of the Government of the Recipient Country

In the implementation of the Grant Aid Project, the recipient country is required to undertake such necessary measures as the following:

(1) To secure land necessary for the sites of the Project and to clear, level and reclaim the land prior to commencement of the construction.

(2) To provide facilities for the distribution of electricity, water supply and drainage and other incidental facilities in and around the sites.

(3) To secure buildings prior to the procurement in case the installation of the equipment.

(4) To ensure all the expenses and prompt execution for unloading, customs clearance at the port of disembarkation and internal transportation of the products purchased under the Grant Aid.

(5) To exempt Japanese nationals from customs duties, internal taxes and other fiscal levies which will be imposed in the recipient country with respect to the supply of the products and services under the Verified Contracts.

7) "Proper Use"

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

8) "Re-export"

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

9) Banking Arrangements (B/A)

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

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

Major Undertakings to be taken by Each Government

NO	Items	To be covered by Grant Aid	To be covered by Recipient side
1	To secure land		●
2	To clear, level and reclaim the site when needed		●
3	To construct gates and fences in and around the site		●
4	To construct the parking lot	●	
5	To construct roads		
	1) Within the site	●	
	2) Outside the site		●
6	To construct the building	●	
7	To provide facilities for the distribution of electricity, water supply, drainage and other incidental facilities		
	1)Electricity		
	a.The distributing line to the site		●
	b.The drop wiring and internal wiring within the site	●	
	c.The main circuit breaker and transformer	●	
	2)Water Supply		
	a.The city water distribution main to the site		●
	b.The supply system within the site (receiving and/or elevated tanks)	●	
	3)Drainage		
	a.The city drainage main (for storm, sewer and others) to the site		●
	b.The drainage system (for toilet sewer, ordinary waste, storm drainage and others) within the site	●	
	4)Gas Supply		
	a.The city gas main to the site		●
	b.The gas supply system within the site	●	
	5)Telephone System		
	a.The telephone trunk line to the main distribution frame / panel (MDF) of the building		●
	b.The MDF and the extension after the frame / panel	●	
	6)Furniture and Equipment		
	a.General furniture		●
	b.Project equipment	●	
8	To bear the following commissions to a bank of Japan for the banking services based upon the B/A		
	1) Advising commission of A/P		●
	2) Payment commission		●
9	To ensure prompt unloading and customs clearance at the port of disembarkation in recipient country		
	1) Marine(Air) transportation of the products from Japan to the recipient country	●	
	2) Tax exemption and customs clearance of the products at the port of disembarkation		●
	3) Internal transportation from the port of disembarkation to the project site		●

10	To accord Japanese nationals whose services may be required in connection with the supply of the products and the services under the verified contract such facilities as may be necessary for their entry into the recipient country and stay therein for the performance of their work		●
11	To exempt Japanese nationals from customs duties, internal taxes and other fiscal levies which may be imposed in the recipient country with respect to the supply of the products and services under the verified contract		●
12	To maintain and use properly and effectively the facilities constructed and equipment provided under the Grant Aid		●
13	To bear all the expenses, other than those to be borne by the Grant Aid, necessary for construction of the facilities as well as for the transportation and installation of the equipment		●

MINUTES OF DISCUSSIONS
ON THE BASIC DESIGN STUDY
ON THE PROJECT FOR THE SECOND DEVELOPMENT OF APIA PORT
IN THE INDEPENDENT STATE OF SAMOA
(EXPLANATION ON DRAFT REPORT)

In April 2000, the Japan International Cooperation Agency (hereinafter referred to as "JICA") dispatched a Basic Design Study Team on the Project for the Second Development of Apia Port (hereinafter referred to as "the Project") to the Independent State of Samoa (hereinafter referred to as "Samoa"), and through discussion, field survey, and technical examination of the results in Japan, JICA prepared a draft report of the study.

In order to explain and to consult Samoa on the components of the draft report, JICA sent to Samoa the Draft Report Explanation Team (hereinafter referred to as " the Team "), which is headed by Mr. Tsutomu Moriya, Resident Representative, JICA Samoa Office, from July 9 to July 16.

As a result of discussions, both parties confirmed the main items described on the attached sheets.

Apia, June 14, 2000

Mr. Tsutomu Moriya
Leader
Draft Report Explanation Team
Japan International Cooperation Agency

Mr. Va'aelua Nofo Va'aelua
Secretary for Transport
Ministry of Transport

Mr. Papalii John T. Ryan
General Manager
Samoa Ports Authority

Witness:

Mr. Aiono Mose Sua
Secretary for Foreign Affairs
Ministry of Foreign Affairs

ATTACHMENT

1.Components of the Draft Report

The Government of Samoa agreed and accepted in principle the components of the draft report explained by the Team.

The Team explained that the repair work of existing wharf consisting of replacement of damaged fenders, dredging in front of existing wharf and corrosion protection of piles have been excluded from the scope of this project. The Samoan side has agreed to this exclusion, however stressed that all these works are still of absolute necessity for efficient operation of Apia Port.

2.Japan's Grant Aid Scheme

The Samoan side understands the Japan's Grant Aid Scheme and the necessary measures to be taken by the Government of Samoa as explained by the Team and described in Annex-3 and Annex-4 of the Minutes of Discussions signed by both parties on March 31, 2000 and again attached hereto.

3.Schedule of the Study

JICA will complete the final report in accordance with the confirmed item and send it to the Government of Samoa by September 2000.

4.Other Relevant Issues

1)Procedure of Environment Impact Assessment

The Samoan side shall make necessary arrangement under the new Environment Impact Assessment Regulations before implementation of the Project.

2)Procedure of Tax Exemption for the Project

The Samoan side shall make necessary arrangement of the tax exemption for the Project in the 2001/2 budget by the end of April, 2001.

3)The Works to be Borne by the Samoan side

The Samoan side shall relocate the oil protection wall and oil separator and lay diesel and coconut oil pipes in the concrete duct planned in the Project.

JAPAN'S GRANT AID SCHEME

1. Grant Aid Procedures

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

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

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

Secondly, JICA conducts the study (Basic Design Study) using (a) Japanese consulting firm(s).

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

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

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

2. Basic Design Study

1) Contents of the study

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

a) Confirmation of the background, objectives, and benefits of the Project and also institutional capacity of agencies concerned of the recipient country necessary for the Project's implementation.

b) Evaluation of the appropriateness of the Project to be implemented under the Grant Aid Scheme from a technical, social and economic point of view.

c) Confirmation of items agreed on by both parties concerning the basic concept of the Project.

d) Preparation of a basic design of the Project.

e) Estimation of costs of the Project.

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

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

2) Selection of Consultants

For smooth implementation of the Study, JICA uses (a) registered consultant firm(s). JICA selects (a) firm(s) based on proposals submitted by interested firms. The selected firm(s) carry(ies) out a Basic Design Study and write(s) a report, based upon terms of reference set by JICA. The consultant firm(s) used for the Study is(are) recommended by JICA to the recipient country to also work on the Project's implementation after the Exchange of Notes, in order to maintain technical consistency.

3. Japan's Grant Aid Scheme

1) Japan's Grant Aid

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

2) Exchange of Notes (E/N)

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

3) "The period of the Grant Aid" means the one fiscal year which the Cabinet approves the Project for. Within the fiscal year, all procedures such as exchanging of the Notes, concluding contracts with (a) consultant firm(s) and (a) contractor(s) and final payment to them must be completed. However, in case of delays in delivery, installation or construction due to unforeseen factors such as weather, the period of the Grant Aid can be further extended for a maximum of one fiscal year at most by mutual agreement between the two Governments.

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

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

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

5) Necessity of Verification

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

6) Undertakings required of the Government of the Recipient Country

In the implementation of the Grant Aid Project, the recipient country is required to undertake such necessary measures as the following:

(1) To secure land necessary for the sites of the Project and to clear, level and reclaim the land prior to commencement of the construction.

(2) To provide facilities for the distribution of electricity, water supply and drainage and other incidental facilities in and around the sites.

(3) To secure buildings prior to the procurement in case the installation of the equipment.

(4) To ensure all the expenses and prompt execution for unloading, customs clearance at the port of disembarkation and internal transportation of the products purchased under the Grant Aid.

(5) To exempt Japanese nationals from customs duties, internal taxes and other fiscal levies which will be imposed in the recipient country with respect to the supply of the products and services under the Verified Contracts.

7) "Proper Use"

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

8) "Re-export"

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

9) Banking Arrangements (B/A)

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

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

Major Undertakings to be taken by Each Government

NO	Items	To be covered by Grant Aid	To be covered by Recipient side
1	To secure land		●
2	To clear, level and reclaim the site when needed		●
3	To construct gates and fences in and around the site		●
4	To construct the parking lot	●	
5	To construct roads		
	1) Within the site	●	
	2) Outside the site		●
6	To construct the building	●	
7	To provide facilities for the distribution of electricity, water supply, drainage and other incidental facilities		
	1)Electricity		
	a.The distributing line to the site		●
	b.The drop wiring and internal wiring within the site	●	
	c.The main circuit breaker and transformer	●	
	2)Water Supply		
	a.The city water distribution main to the site		●
	b.The supply system within the site (receiving and/or elevated tanks)	●	
	3)Drainage		
	a.The city drainage main (for storm, sewer and others) to the site		●
	b.The drainage system (for toilet sewer, ordinary waste, storm drainage and others) within the site	●	
	4)Gas Supply		
	a.The city gas main to the site		●
	b.The gas supply system within the site	●	
	5)Telephone System		
	a.The telephone trunk line to the main distribution frame / panel (MDF) of the building		●
	b.The MDF and the extension after the frame / panel	●	
	6)Furniture and Equipment		
	a.General furniture		●
	b.Project equipment	●	
8	To bear the following commissions to a bank of Japan for the banking services based upon the B/A		
	1) Advising commission of A/P		●
	2) Payment commission		●
9	To ensure prompt unloading and customs clearance at the port of disembarkation in recipient country		
	1) Marine(Air) transportation of the products from Japan to the recipient country	●	
	2) Tax exemption and customs clearance of the products at the port of disembarkation		●
	3) Internal transportation from the port of disembarkation to the project site		●

10	To accord Japanese nationals whose services may be required in connection with the supply of the products and the services under the verified contract such facilities as may be necessary for their entry into the recipient country and stay therein for the performance of their work		●
11	To exempt Japanese nationals from customs duties, internal taxes and other fiscal levies which may be imposed in the recipient country with respect to the supply of the products and services under the verified contract		●
12	To maintain and use properly and effectively the facilities constructed and equipment provided under the Grant Aid		●
13	To bear all the expenses, other than those to be borne by the Grant Aid, necessary for construction of the facilities as well as for the transportation and installation of the equipment		●

Appendix 5 Cost Estimation Borne by the Recipient Country

The cost to be born by the Government of Samoa is estimated as follows. Total cost is estimated as 73,600 Tala. Details of the cost are broken down as follows.

1) Plumbing work of the oil pipes in the concrete duct	49,000 Tala
2) Removal and reconstruction of the oil retaining wall and the oil separator	24,600 Tala
Total	73,600 Tala

Appendix 6.1 Results of Damaged Fenders Survey

Table 1 Results of Damaged Fenders Survey (1) sheet-1

Fender No.		Fender				Front Steel Pad			Remarks
		Rank of Damage(%)	Level of Damage	Evaluation of Function	Anchor Bolts	Steel Frame	Plastic Pads	Chain and Shackle	
1	A	100 (torn off)	6	●	2 bolts torn off		7 pads fallen down and surface chipped		heavily damaged
	B	57 (cracked)	6	●	3 bolts torn off				
2	A	21 (cracked)	6	●	3 nuts loosen		1 pad fallen down and 2 pads peeled off		heavily damaged
	B	21 (cracked)	6	●	1 nut loosen				
3	A	0	0	○	1 washer damaged		surface chipped		
	B	0	0	○	1 nut loosen				
4	A	11 (cracked)	4	▲			1 pad peeled off and surface chipped		
	B	0	0	○					
5	A	11 (cracked)	4	▲			1 pad fallen down and 1 pad peeled off		heavily damaged
	B	21 (cracked)	6	●					
6	A	0	0	○			2 pads peeled off and surface chipped		
	B	0	0	○					
7	A	64 (cracked)	6	●			1 pad fallen down, 1 pad dented and surface chipped		heavily damaged
	B	64 (cracked)	6	●					
8	A	86 (cracked)	6	●	1 nut loosen		1 pad peeled off and 1 pad dented		heavily damaged
	B	86 (cracked)	6	●					
9	A	100 (torn off)	6	●		fallen down	3 pads dented and surface chipped	1 chain torn off	heavily damaged
	B	100 (torn off)	6	●					
10	A	100 (torn off)	6	●		fallen down		2 chains torn off	heavily damaged
	B	100 (torn off)	6	●					

Evaluation of Fender Function:

● As the level of damage is more than 6, the fender is not functioning.

▲ As the level of damage is from 3 to 5, the fender is not functioning well.

○ As the level of damage is less than 3, the fender is functioning.

Table 2 Results of Damaged Fenders Survey (2)

sheet-2

Fender No.		Fender				Front Steel Pad			Remarks
		Rank of Damage(%)	Level of Damage	Evaluation of Function	Anchor Bolts	Steel Frame	Plastic Pads	Chain and Shackle	
11	A	100 (torn off)	6	●		fallen down		2 chains torn off	heavily damaged
	B	100 (torn off)	6	●					
12	A	93 (cracked)	6	●			1 pad fallen down and 1 pad peeled off		heavily damaged
	B	100 (cracked)	6	●					
13	A	14 (cracked)	4	▲			2 pads fallen down and 2 pads peeled off		
	B	8 (cracked)	0	○					
14	A	0	0	○			surface chipped		
	B	0	0	○					
15	A	8 (cracked)	0	○	1 nut torn off		2 pads fallen down and surface chipped		
	B	4 (cracked)	0	○					
16	A	11 (cracked)	4	▲			1 pad fallen down and surface chipped		
	B	11 (cracked)	4	▲					
17	A	0	0	○			2 pads dented and surface chipped		
	B	0	0	○	1 bolt torn off				
18	A	0	0	○	1 nut torn off		surface chipped		
	B	0	0	○	1 nut torn off				
19	A	0	0	○			surface chipped		
	B	0	0	○					
20	A	11 (cracked)	4	▲			surface chipped		heavily damaged
	B	29 (cracked)	6	●					

Evaluation of Fender Function:

● As the level of damage is more than 6, the fender is not functioning.

▲ As the level of damage is from 3 to 5, the fender is not functioning well.

○ As the level of damage is less than 3, the fender is functioning.

Table 3 Results of Damaged Fenders Survey (3) sheet-3

Fender No.		Fender				Front Steel Pad			Remarks
		Rank of Damage(%)	Level of Damage	Evaluation of Function	Anchor Bolts	Steel Frame	Plastic Pads	Chain and Shackle	
21	A	7 (cracked)	0	○			surface chipped and dented		
	B	0	0	○					
22	A	0	0	○			surface chipped and dented		
	B	7 (cracked)	0	○					
23	A	0	0	○			2 pads fallen down, surface chipped and dented		
	B	8 (cracked)	0	○					
24	A	0	0	○			surface chipped		
	B	0	0	○					
25	A	4 (cracked)	0	○			1 pad fallen down and 1 pad peeled off		
	B	0	0	○	2 nuts loosen				
26	A	0	0	○			surface chipped		
	B	0	0	○					
27	A	1 (cracked)	0	○			surface chipped		
	B	8 (cracked)	0	○					
28	A	43 (cracked)	6	●			surface chipped		heavily damaged
	B	36 (cracked)	6	●					
29	A	0	0	○			1 pad peeled off and surface chipped		
	B	10 (cracked)	0	○					
30	A	36 (cracked)	6	●			surface chipped		heavily damaged
	B	43 (cracked)	6	●					

Evaluation of Fender Function:

● As the level of damage is more than 6, the fender is not functioning.

▲ As the level of damage is from 3 to 5, the fender is not functioning well.

○ As the level of damage is less than 3, the fender is functioning.

Table 4 Results of Damaged Fenders Survey (4)

sheet-4

Fender No.		Fender				Front Steel Pad			Remarks
		Rank of Damage(%)	Level of Damage	Evaluation of Function	Anchor Bolts	Steel Frame	Plastic Pads	Chain and Shackle	
31	A	0	0	○			surface chipped and dented		
	B	0	0	○					
32	A	0	0	○			1 pad peeled off and surface chipped		
	B	0	0	○					
33	A	0	0	○			surface chipped		
	B	0	0	○					
34	A	0	0	○			1 pad peeled off and surface chipped		
	B	0	0	○					
35	A	0	0	○			1 pad peeled off and surface chipped		
	B	0	0	○					
36	A	0	0	○			surface chipped and dented		
	B	0	0	○					
37	A	0	0	○			surface chipped		
	B	0	0	○					
38	A	0	0	○			surface chipped		
	B	0	0	○					
39	A	0	0	○			1 pad fallen down and surface chipped		
	B	0	0	○					
40	A	0	0	○					
	B	0	0	○					

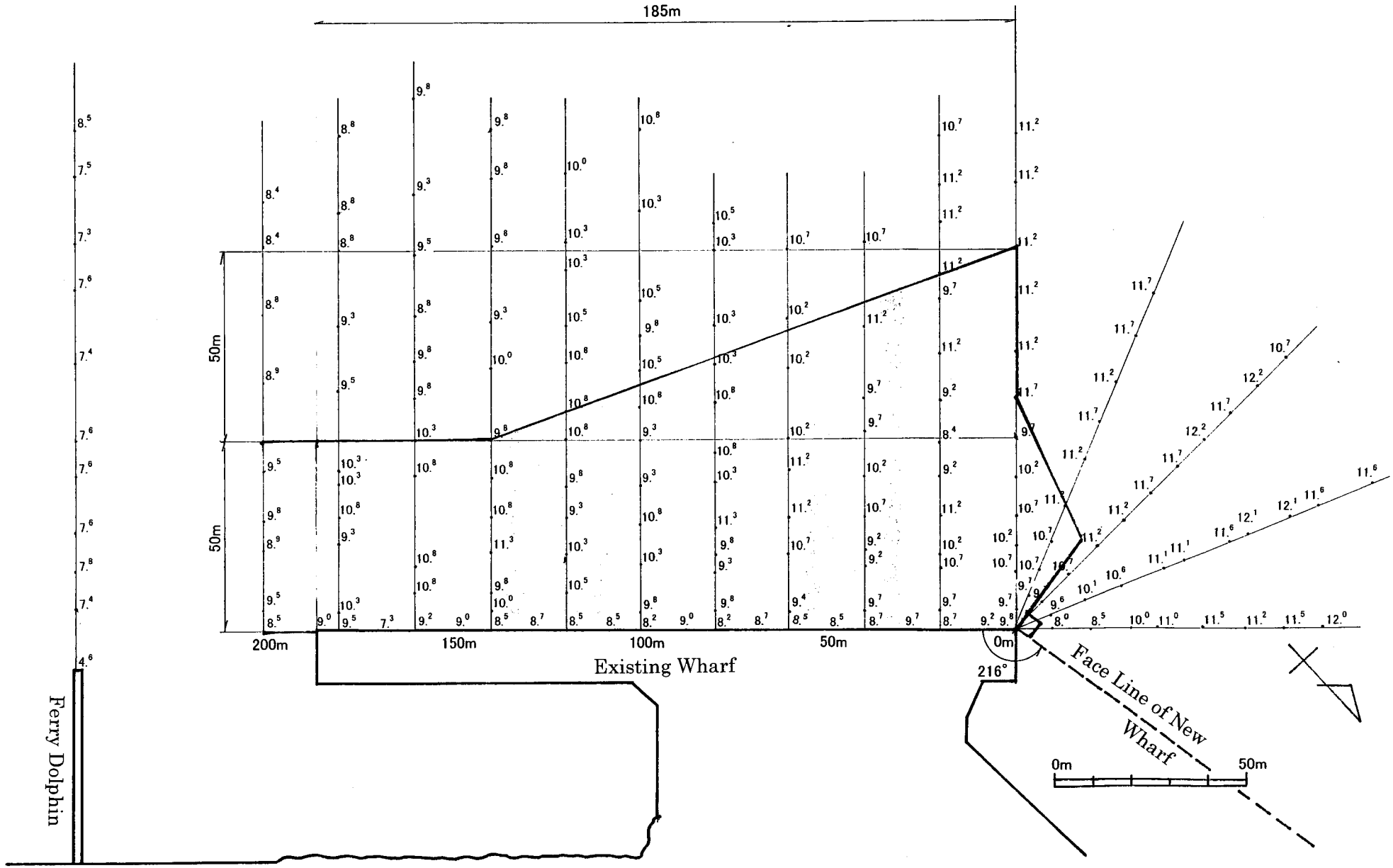
Evaluation of Fender Function:

● As the level of damage is more than 6, the fender is not functioning.

▲ As the level of damage is from 3 to 5, the fender is not functioning well.

○ As the level of damage is less than 3, the fender is functioning.

Appendix 6.2 Results of Sounding Survey in front of Existing Wharf



Appendix 7 Supplementary Data on Basic Design

Appendix 7.1 Calculation of Calmness in front of New Wharf and Rate of Effective Working Days

The results of calculation of calmness in front of a new wharf and the existing wharf and rate of effective working days are presented as follows. In this calculation, the reduction of transmitting waves by improvement of breakwater (installation of the crown concrete) is considered.

1. Calculation Method

The dimension of offshore wave is applied the typical waves presented in "The Study on the Development of the Ports in Western Samoa" in 1987 as shown in Figure 1.

Table 1 Dimension of Offshore Wave

	Direction	Period	Ratio of Wave Height
Offshore	N 10 ° E	10 sec	1.0
Breakwater	N	10 sec	0.64

The Wave transmission coefficient of the breakwater is applied as follows.

Before improvement (at present) 40%

After improvement 10%

These transmission coefficients are calculated by wave transmission coefficient of a mound breakwater constructed with concrete blocks (Figure 2) and wave transmission coefficient for a vertical breakwater (Figure 3) as follows.

<Conditions of study>

Lo=156m

L=106.1m(water depth 14m)

Tidal level: H.W.L +1.0m

Crown height of breakwater +4.6m (clearance R=3.6m)

Crown height of crown concrete +2.5m (clearance r=1.5m)

Crown width l=10m

Water depth of breakwater h=14m (including tide)

Water depth of rubble mound d=1.6m (including tide)

1) At present

Ho' =1.64m,

(Equivalent offshore wave height (Ho') is set by the critical wave height in front of the wharf of 0.50m, wave height ratio in front of the existing wharf of 0.32 and shoaling coefficient of 0.95.)

Ho'/Lo=1.64/156=0.011

Wave transmission coefficient is set to be K_T=0.4 by Figure 2.

2) Improvement of breakwater

①Transmitting wave height without crown concrete

Ho' =1.50m,

(Equivalent offshore wave height (Ho') is set by the critical wave height in front of the wharf of 0.50m, wave height ratio in front of the existing wharf of 0.35 and shoaling coefficient of 0.95.)

Ho'/Lo=1.50/156=0.010

Wave transmission coefficient is set to be K_T=0.4 by Figure 2.

②Wave height in front of crown concrete

Wave transmission coefficient of a mound breakwater constructed with concrete blocks (Figure 6) is applied.

<Conditions of study>

Breakwater width B=10.4m (above sea level, from offshore side to crown concrete)

Concrete block length d=3.77m (20 ton type Dolos block)

B/d=2.75

H_I/L=Ho'×0.95(shoaling coefficient)/L

=1.43/106.1=0.0135

H_T/H_I=-0.416・LogB/d+0.816 (Hi/L=0.01, B/d＜18)

H_T/H_I=-0.400・LogB/d+0.621 (Hi/L=0.03, B/d＜17)

According to interpolating the above two formulas, wave transmission coefficient in front of the crown concrete is calculated to be H_T/H_I=0.60 and H_T=0.86m.

③Transmitting wave height through crown concrete

Transmitting wave height through crown concrete is calculated by Figure 3, wave transmission coefficient for a vertical breakwater.

d/h=1.6/14=0.11

hc/H=1.5/0.86=1.74

Therefore, K_T=0.10

As shown in Figure 3, in case that relative crown height (d/h) is more than 1.5, wave transmission coefficient becomes almost uniform. In case the crown height is higher than a uniform height, it is considered that wave transmission coefficient have little effect by wave overtopping at the vertical wall and have effect by transmitting waves through only the rubble mound under crown concrete.

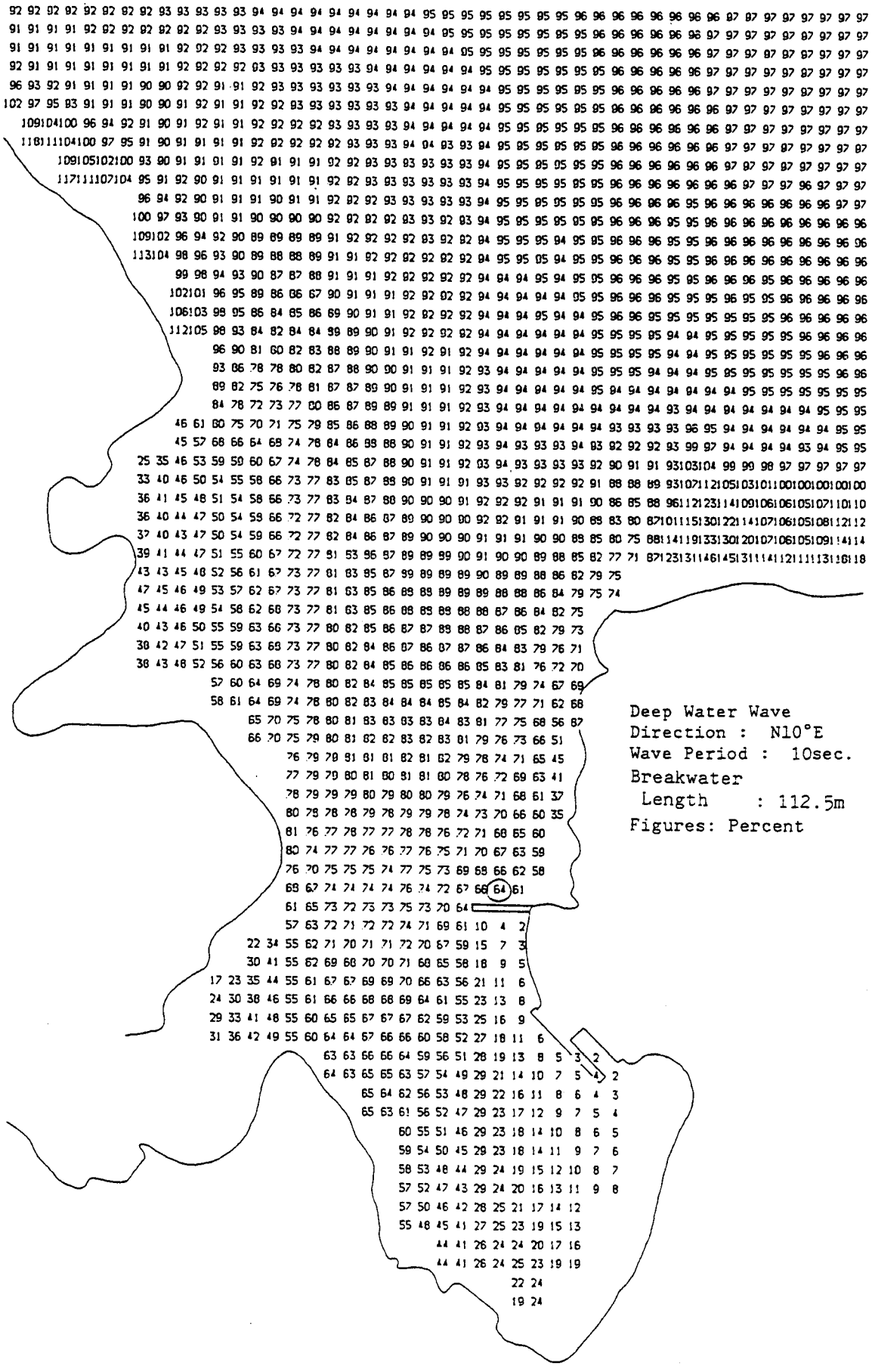


Figure 1 Wave Height Ratio on Offshore

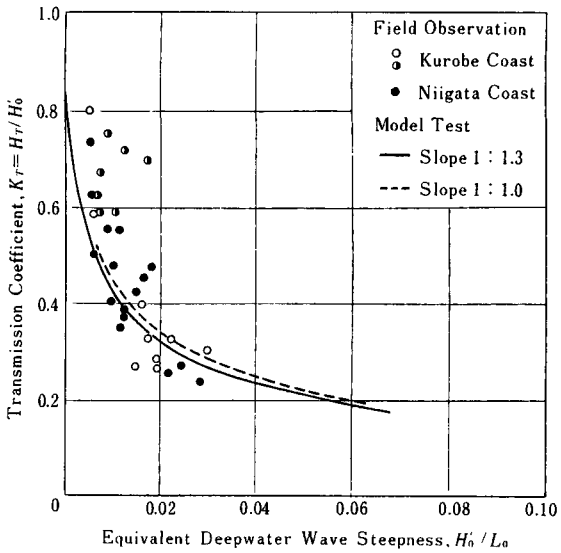


Figure 2 Wave Transmission Coefficient of A Mound Breakwater Constructed with Concrete Blocks

(Hattori,S.:Coastal development and wave control, Lecture Series on Hydraulic Engineering, 75-B2, Hydraulics Committee, Japan Soc. Civil Engrs., 1975)

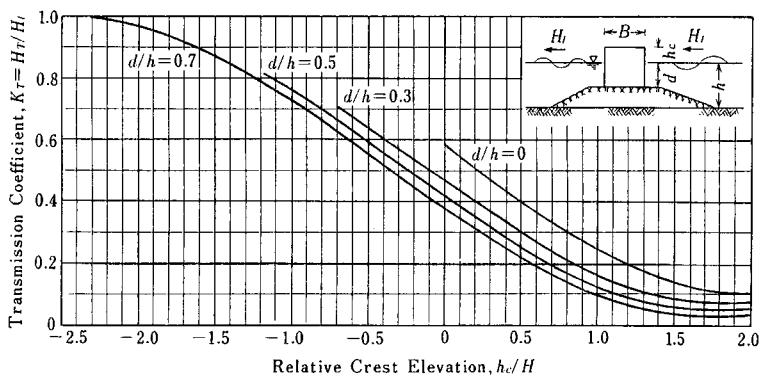


Figure 3 Wave Transmission Coefficient for A Vertical Breakwater

(Goda,Y.:Re-analysis of laboratory data on wave transmission over breakwaters, Rept. Port and Harbour Res. Inst., Vol.8, No.3, 1969)

2. Results of Calculation

The rate of effective working days of the new wharf is calculated from results of transmitting wave height through the breakwater improved and the frequency of wave height. The critical wave height is applied to be 50cm in front of berthing area.

The frequency of wave height is presented in "The Study on the Development of Ports in Western Samoa" in 1987 as follows.

Wave height	1m to 2m	32 days a year
	2m to 3m	16 days a year
	more than 3m	8 days a year

The results of calculation of calmness in front of the new wharf are shown in Figure 4. The average of wave height ratio in front of the new wharf is calculated and the rate of effective working days and working days per year are calculated as shown in Table 2.

Table 2 Calculation of Rate of Effective Working Days

	Wave transmission coefficient	Wave height ratio	Wave height ratio (to offshore wave)	Rate of effective working days	Working days per year (not working days)
1.Existing wharf at present	40%	0.329	0.211	96%	349 days (16 day)
2.New wharf at present	40%	0.487	0.312	91%	331 days (34 days)
3.New wharf after improvement	10%	0.357	0.228	95%	345 days (20 days)

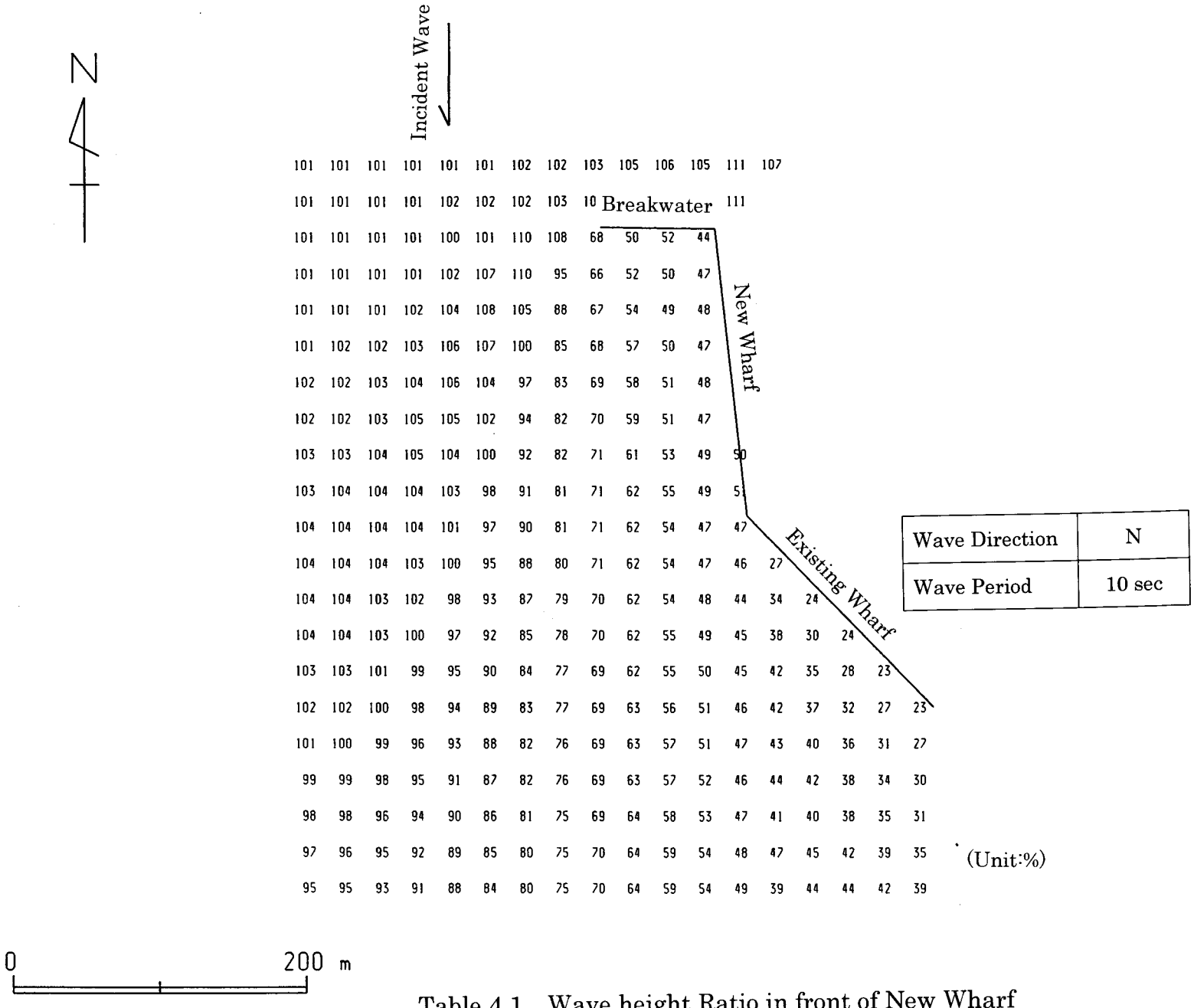
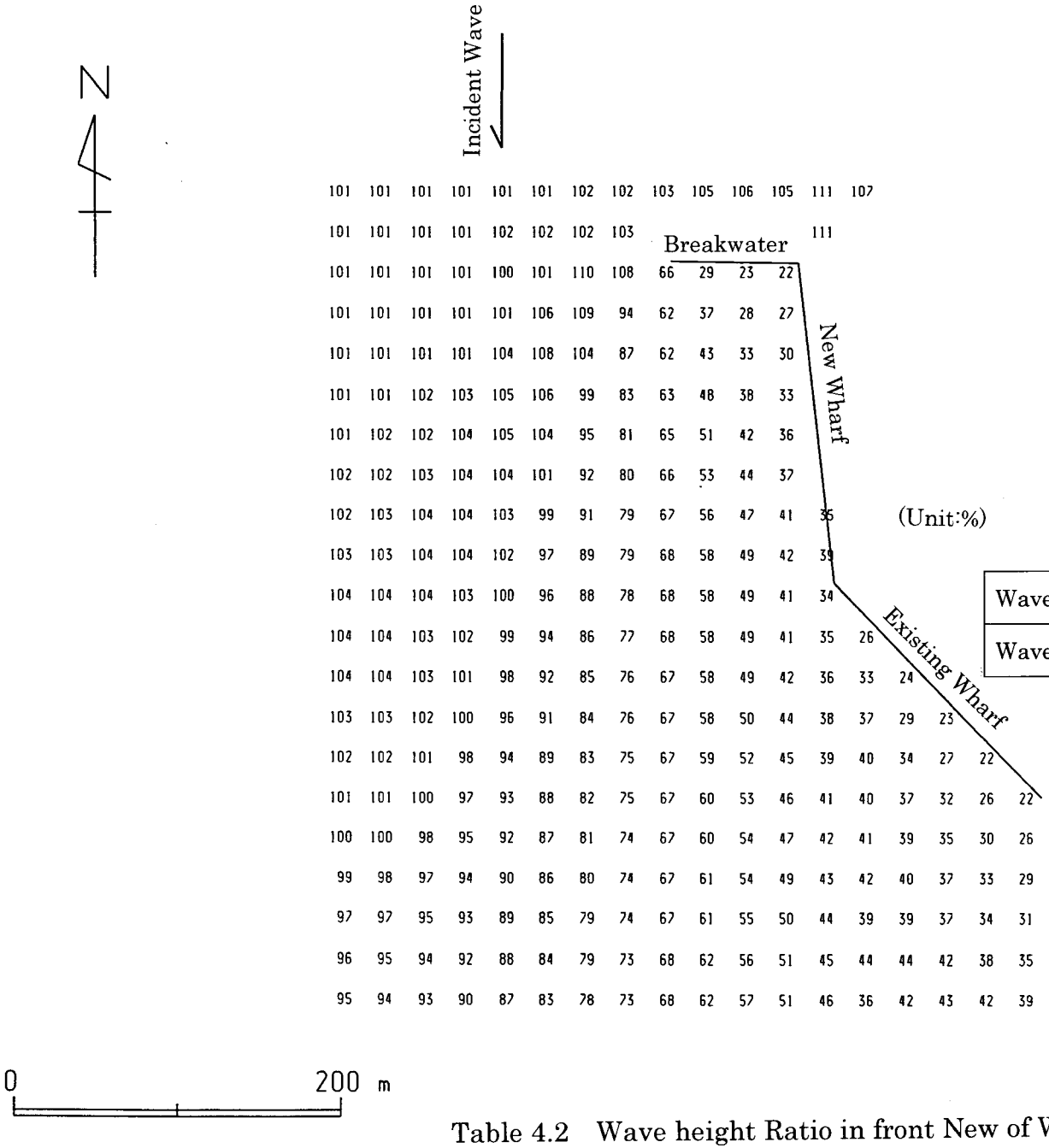


Table 4.1 Wave height Ratio in front of New Wharf
(Wave transmission coefficient of breakwater 40%)



Wave Direction	N
Wave Period	10 sec

Table 4.2 Wave height Ratio in front New of Wharf
(Wave transmission coefficient of breakwater 10%)

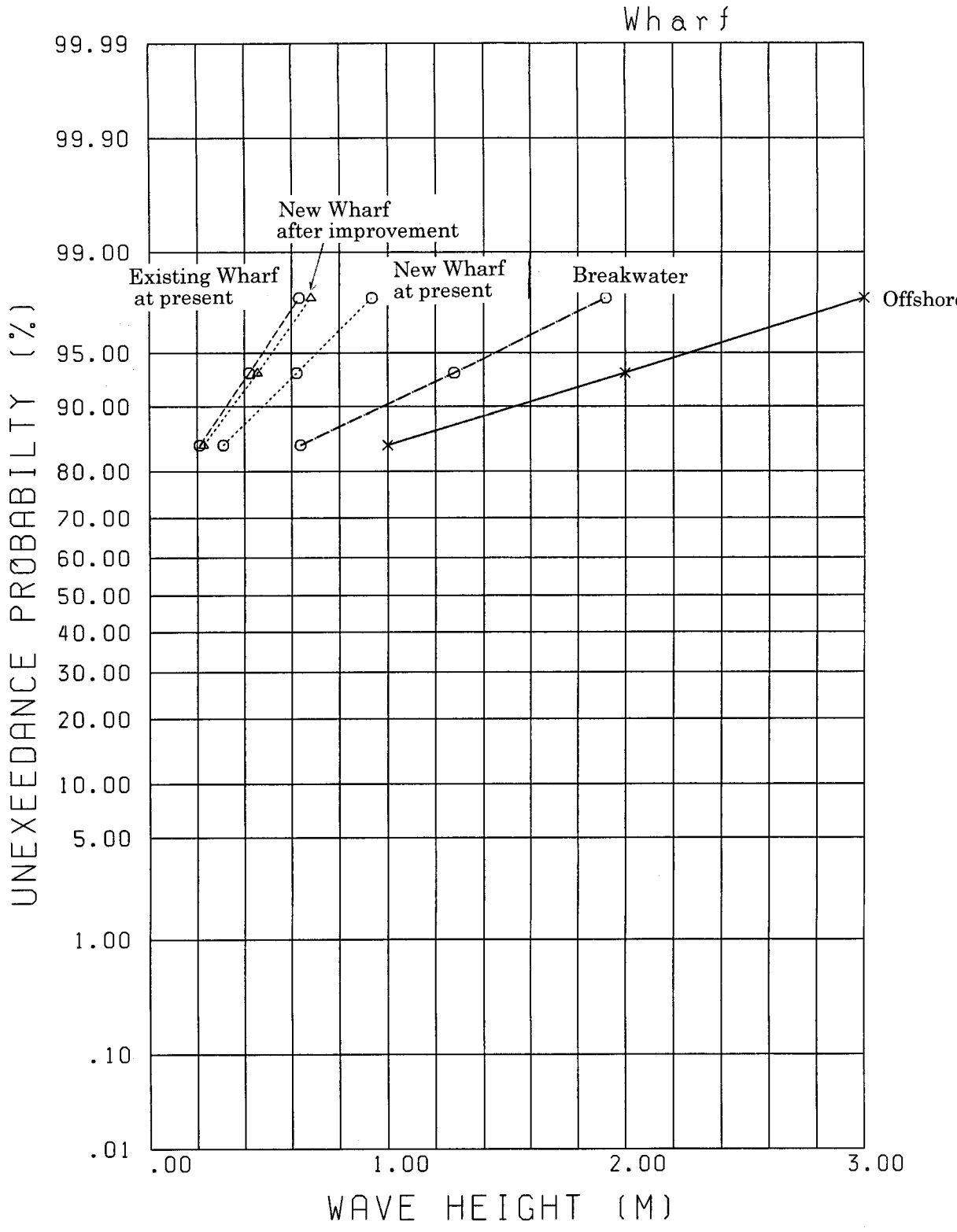


Figure 5 Working Ratio of Cargo Handling

Appendix 7.2 Stability of Crown Concrete on Improvement of Breakwater

The stability of the crown concrete installed in the breakwater in order to reduce transmitting wave is calculated as follows.

1) The dimension of equivalent offshore waves and waves in front of the breakwater are calculated by results of calculation of wave deformation on design offshore wave.

2) Wave height in front of the crown concrete is calculated considering reduction of wave height by concrete blocks placed in front of the crown concrete.

3) Assuming that the above waves act to the crown concrete directly, the stability of the crown concrete is calculated by the formula for wave force proposed by Goda.

1. Dimension of Offshore Wave

Dimension of offshore wave	Wave height:	Ho=10.0m
	Wave period :	T=12.5sec (Lo=244m)
Refraction coefficient in front of breakwater		Kr=0.54
Equivalent offshore wave height		Ho'=5.4m
Water depth in front of breakwater		h=14m (L=137.6m)
Wave height in front of breakwater		$H_{1/3}$=5.67m
		H_{max}=9.29m

2. Wave Height in Front of Crown Concrete

Wave height in front of crown concrete is calculated by Figure 2 and Figure 6, 7, results of laboratory test on wave transmission coefficient of a mound breakwater constructed with concrete blocks.

Ho'/Lo=5.4/244=0.022

K_T=0.28

Wave height behind breakwater Ht=9.29×0.28=2.60m

Effects of breakwater width are shown as the relation of concrete block length as shown in Figure 6, wave transmission coefficient of a mound breakwater constructed with concrete blocks. Wave height in concrete blocks is calculated by Figure 5.

<Conditions of calculation>

Breakwater width:	B=20.8m(above sea level)
Concrete block length:	d=3.77m(20ton type dolos block)
	B/d=5.5(behind breakwater)
	B'/d=2.75(in front of crown concrete)
	$H_I(H_{max})/L$=9.29/137.6=0.0676

The wave transmission coefficient behind breakwater is calculated to be K_T=0.28 by Figure 6 and almost corresponds to the results calculated by Figure 2. The effect of breakwater width is calculated by Figure 7. As shown in Figure 7, the wave transmission coefficient reduces rapidly with widening of breakwater width and the wave transmission coefficient is proposed to be the following formulas in the thesis.

H_T/H_I=-0.338・LogB/d+0.545 (Hi/L=0.05, B/d<16)

H_T/H_I=-0.382・LogB/d+0.502 (Hi/L=0.07, B/d<15)

According to interpolating the above two formulas, wave transmission coefficient in front of the crown concrete is set to be H_T/H_I=0.34.

H_T=9.29×0.34=3.16m

3. Calculation of Stability

<Conditions of calculation>

Wave height: $H_D(=H_{max})$=3.16m

β=0°

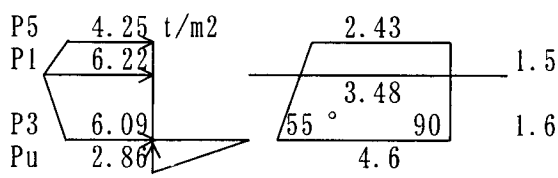
Tidal level: +1.0m

h=hb=h'=14.0m

d=1.6m

Friction coefficient: η=0.8

Concrete bags are spread on the rubble mound and the crown concrete is united with the rubble mound by joint bars. Therefore, the friction coefficient between rubbles and rubbles is applied to be 0.8.



Total wave force

Pa=17.70 t/m Weight above sea level: 10.19 t/m

Element of Horizontal force

P=14.50t/m Weight under sea level: 8.21t/m

Total weight Wo 18.40 t/m

Uplift force

Pu=2.86 t/m^2, Wo－Pua+Pd=21,97t/m

All uplift force Pua= 6.59 t/m

Element of downward direction of wave force Pd=10.15 t/m

Safety factor against sliding:

η(Wo－Pua+Pd)/P=0.80×21.97/14.50=1.21

η=0.8

Safety factor against overturning:

(Wot－Pua×t1+Pd×t2)/Mp=1.74

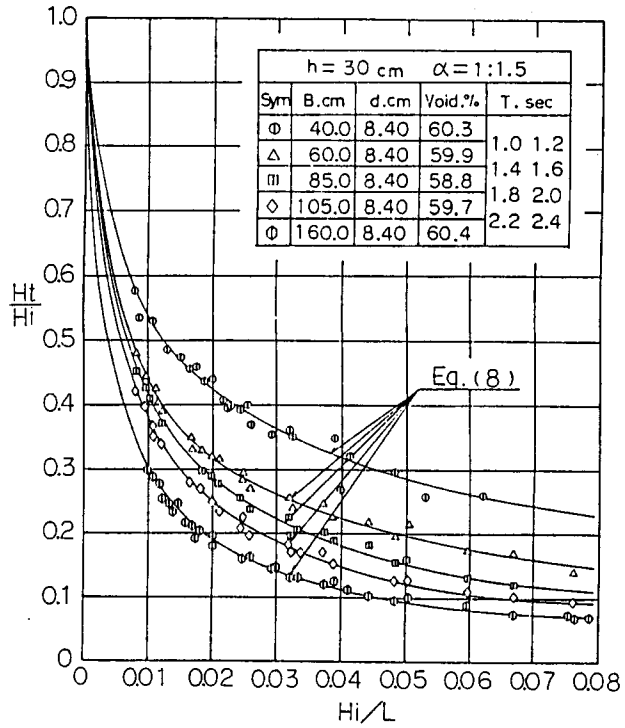


Figure 6 · Wave Steepness and Wave Transmission Coefficient

(Miura and Endo, Laboratory test on wave transmission coefficient of a rubble mound constructed with concrete blocks, Proc. 23rd Japanese Conf. Coastal Engg., 1976)

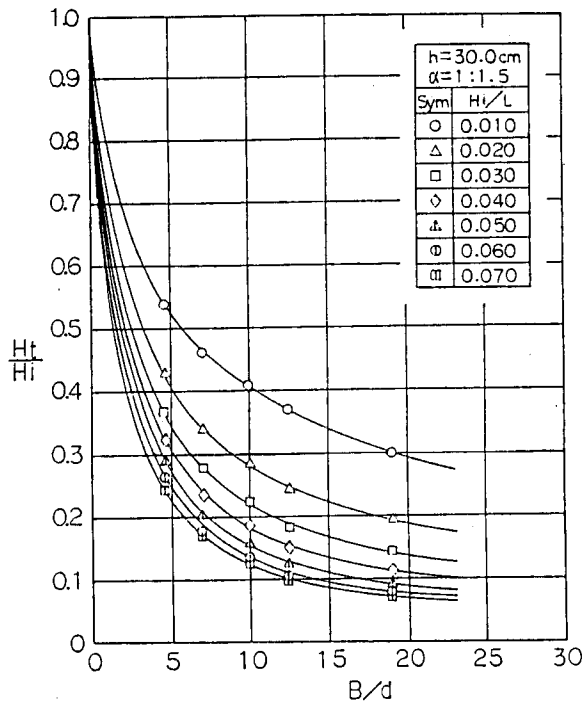


Figure 7 B/d and Wave Transmission Coefficient

(Miura and Endo, Laboratory test on wave transmission coefficient of a rubble mound constructed with concrete blocks, Proc. 23rd Japanese Conf. Coastal Engg., 1976)