

No.

BASIC DESIGN STUDY REPORT
ON
THE PROJECT
FOR
RENOVATION AND EXTENSION
FOR
APIA FISHERIES WHARF AND RELATED FACILITIES
IN
THE INDEPENDENT STATE OF SAMOA

MARCH 2005

JAPAN INTERNATIONAL CORPORATION AGENCY
ECOH CORPORATION

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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 renovation and extension for Apia fisheries wharf and related facilities and entrusted the study to the Japan International Cooperation Agency (JICA).

JICA sent to Samoa a study team from November 2 to December 2, 2004.

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.

March 2004

Sadako Ogata
President
Japan International Cooperation Agency

March, 2005

Letter of Transmittal

We are pleased to submit to you the basic design study report on the Project for Renovation and Extension for Apia Fisheries Wharf and Related Facilities in the Independent State of Samoa.

This study was conducted by ECOH Corporation, under a contract to JICA, during the period from November, 2004 to March, 2005. 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.

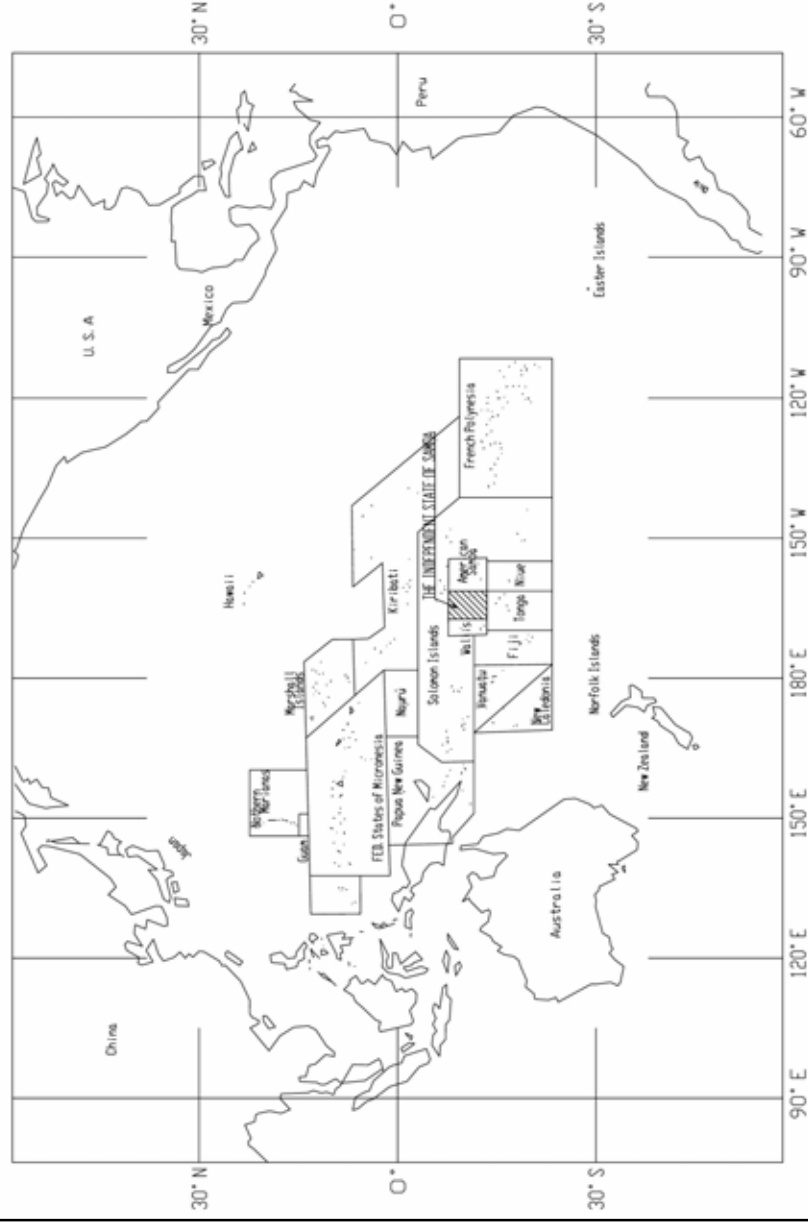
Finally, we hope that this report will contribute to further promotion of the project.

Very truly yours,

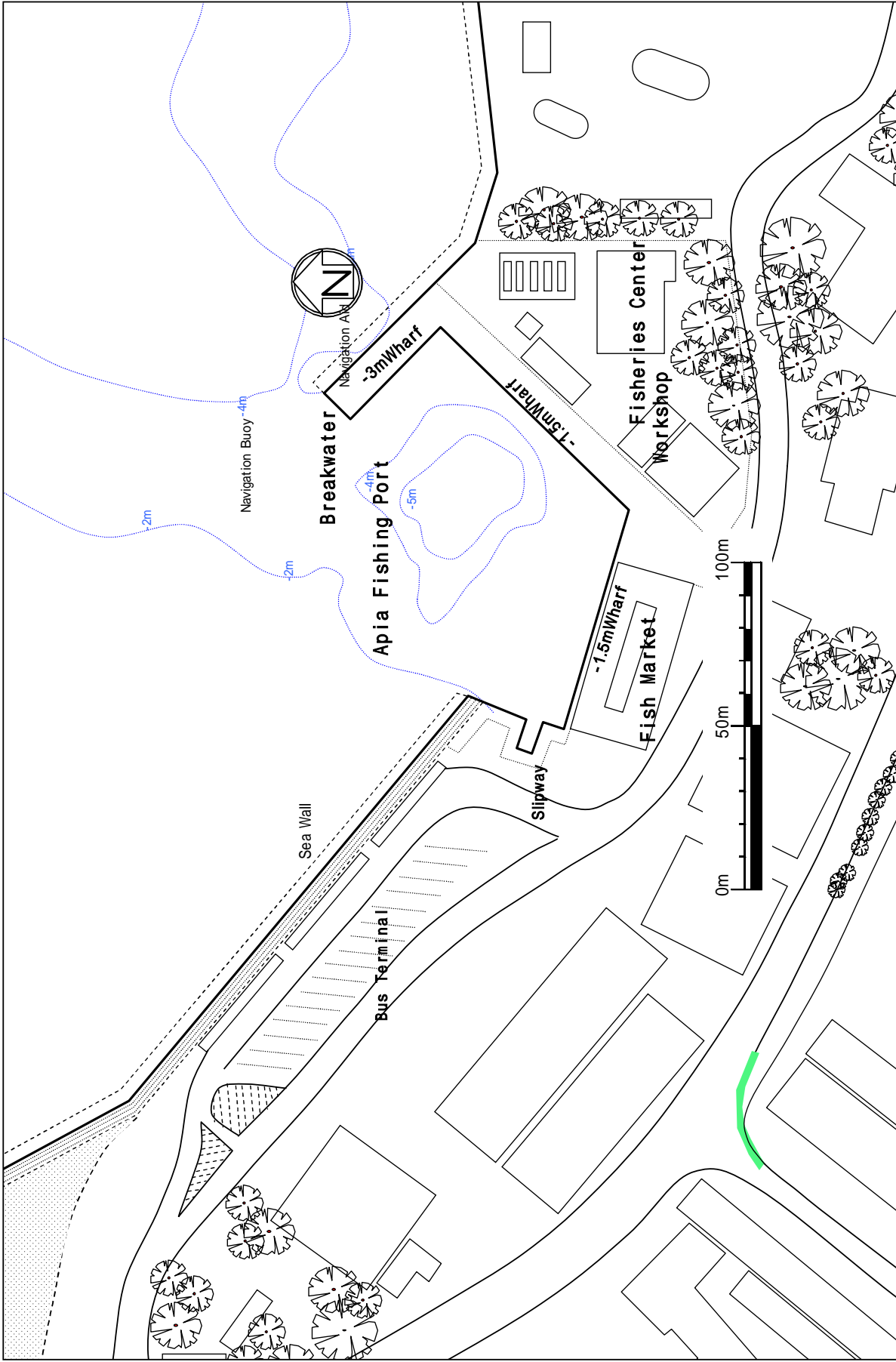


Kozo Matsumura
Project Manager,
Basic design study team on
the Project for Renovation and Extension
for Apia Fisheries Wharf and Related
Facilities
ECOH CORPORATION

LOCATION OF THE INDEPENDENT STATE OF SAMOA



Location Map of Samoa



Project Site



The Project for Renovation and Extension for Apia Fisheries Wharf and related Facilities

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ABLIBIATIONS

AAC	Autoclaved Aerated Concrete
AEP	Acrylic Emulsion Paint
BOD	Biochemical Oxygen Demand
CDL	Chart Datum Level
CEC	Commission of European Communities
COD	Chemical Oxygen Demand
DAC	Development Assistance Committee
DL	Datum Level
DO	Dissolved Oxygen
E/N	Exchange of Notes
EEZ	Exclusive Economic Zone
EIA	Environmental Impact Assessment
FAO	Food and Agricultural Organization of United Nations
FDP	Fisheries Development Fund
GDP	Gross Domestic Product
FRP	Fiber Reinforced Plastics
GL	Ground Level
GT	Gross Tonnage
HAT	Highest Astronomical Tide
HACCP	Hazard Analysis and Critical Control Point
HP	Horse Power
HWL	Mean Monthly-Highest Water Level
IDA	International Development Association
IEE	Initial Environmental Examination
IFAD	International Fund for Agricultural Development
JASS	Japan Architectural Standard Specification
JICA	Japan International Corporation Agency
JIS	Japan Standards Associations
LAT	Lowest Astronomical Tide
LOA	Length overall
LWL	Mean Monthly-Lowest Water Level
MHWN	Mean High Water Neap
MHWS	Mean High Water Spring
MLWN	Mean Low Water Neap
MLWS	Mean Low Water Spring
MSL	Mean Sea Level for
NHHWL	Nearly Highest High Water Level
NM	Nautical Mile
NT	Net Tonnage
ODA	Official Development Assistance
Ph	Hydrogenion Concentration

SPA	Samoa Ports Authority
SPREP	South Pacific Regional Environmental Program
SS	Suspended Solid
UNDP	United Nations Development Programme
UNTA	United Nations Regular Program for Technical Assistance
VP	Vinyl Paint
WFP	World Food Programme

Summary

Summary

The Independent State of Samoa (hereafter referred to as “Samoa”) is located in the center of the South Pacific Ocean and comprises two large islands (Upolu and Savaii) and seven small islands. The island nation has a total land area of 2,935 km² and a population of 176,710 (2001). Approximately 76% of the entire population lives on Upolu Island, which is where the capital of Apia is located. Samoa is located in the zone where cyclones that occur on the South Pacific Ocean tend to hit, and its social and marine infrastructures and other elements have suffered damage from cyclones in the past.

In terms of economic activities, Samoa is like other island nations in that its limited size prevents it from enjoying a wealth of onshore resources. The country’s principal industries are fishing, agriculture, and tourism. As a result of the introduction of tuna longline fishing in the 1990s and the development of the tuna export industry, fishing has grown into a mainstay industry in Samoa. It now ranks as the country’s most important industry, accounting for approximately 63% of Samoa’s total exports (2002).

Samoa’s fishing industry comprises traditional inshore fisheries (village fisheries), which is carried out in lagoons and areas bordered by coral reefs, using wooden canoes with outriggers, and a commercial fisheries in which alia fishing boats (small catamaran boats) and commercial fishing boats fish within Samoa’s EEZ (130,000 m²) and concentrate mainly on tuna.

The inshore fisheries is estimated to have an annual catch of approximately 7,360 tons (2003), consisting primarily of reef fish, crustaceans and mollusks, and plays a role in satisfying domestic demand. The commercial fisheries contributes to Samoa’s economy through exports of its fish catches. In the commercial fisheries, however, the volume of the tuna catch shrank dramatically from approximately 5,000 tons in 2002 to 2,800 tons in 2003 (this is said to be because the surface temperature of the sea rose because of the effects of El Niño, causing the tuna targeted by the industry to move to deeper regions according to Fisheries Division). As a result, the number of alia fishing boats in operation decreased as well. This is causing problems such as reduced income for fishermen and fewer employment opportunities.

The fisheries industry is ranked high in the importance in Samoa’s National Development Plan as a supply source of animal protein for the people and as a source for drawing foreign currency, and Samoa considers it necessary to strive for the sustainable usage and development of its native resources. The country’s new National Development Plan (2005 - 2007) lists objectives such as those noted below as its development policy for the fisheries sector, and aims to promote the fisheries sector.

- i. National Tuna Management implemented
- ii. Increase the proportion of tuna catch exported as high value fresh chilled fish
- iii. Supportive infrastructure to be in place e.g. berthing, refueling, and cooling facilities, seafood laboratory, and aquaculture hatcheries and algal lab

- iv. Village and district aquaculture ventures developed for commercial domestic and export markets
- v. Village fish nurseries in place for fish farming
- vi. Strengthen partnership between commercial fishermen and Ministry of Agriculture and Fisheries in managing fish resources
- vii. Village, Ministry of Agriculture and Fisheries and Ministry of Natural Resources and Environment

The Fisheries Center facilities, fishing port facilities and Fish Market for which renovates and expansion have been requested through the project were all built in 1978 and 1982 through Japan's Grant Aid Programme, and Samoa has repaired them several times through its own efforts, while struggling with the problems of roof damage caused by numerous cyclones that have hit the country in the past and rain leaks caused by the deteriorated state of the facilities. These facilities have been used more than any other as a base for fisheries production and the export of marine products, as a base where Fisheries Division works to promote the fishing industry, and as a domestic distribution base. As support facilities for the promotion and development of the fishing industry in Samoa, they currently rank as having highly important functions.

The planning conditions have changed greatly since the planning designed when the existing fishing port was built, and now include an increased number of commercial fishing boats (from one boat in 1978 to 20 in 2003) and an increased volume handled at the Fish Market (from 153 tons per year and 15 vendors using the facility in 1984 to 519 tons and approximately 90 vendors using it on Sundays in 2003). Because of this, fish landing facilities and Fish Market have become noticeably more cramped and congested. As a result, the safety of fishing boats navigating in the fishing port and the efficiency of fish landing operations are being severely hindered. At the Fish Market, the area for selling fish is cramped and crowded and can no longer accommodate the number of vendors using the facility.

The Fisheries Center Administration Building and Fish Market are in a state of pronounced deterioration and have been damaged by several cyclones. Although those running the facilities are attempting to repair, maintain and manage them on their own, problems that arise are handled on an emergency basis in many cases, and at the Fisheries Center Administration Building, daily operations are being hindered by problems such as rain leaking into the facility and damaging some of the rooms to the point where they cannot be used. Moreover, asbestos has been used in the ceilings and walls, which are now old and deteriorated, and there are concerns about adverse effects on health. In the Fish Market, there is severe corrosion of the steel that forms the structural building frame and **the roof under structure**, and sanitation conditions are worsening because of problems such as structural problems and improper floor drainage.

Based on this background, the Government of Samoa has requested Japan's Grant Aid Programme involving expansion of fishing port facilities such as the fish landing and

preparation wharves, renovation of the Fisheries Center Administration Building, and renovation of the Fish Market. In response to the request by the Government of Samoa, the Government of Japan decided to implement a basic design study, and dispatched a study team to Samoa as indicated below.

Basic design study: November 2 to December 2, 2004

Explanation of Draft Basic design: March 8 to March 19, 2005

With respect to the fishing port facilities, it was confirmed in the field survey that there is congestion in the fishing port because of insufficient landing and mooring facilities, and that the fish landing efficiency and the safety of boats entering and leaving the fishing port are being adversely affected. It was also confirmed that boats anchored outside the fishing port sometimes suffer damage in rough sea conditions. In order to solve these problems and to enable the fishing port to function as a base for the fisheries industry and for overseas exports, it was deemed necessary to expand the landing and preparation wharves.

With respect to the Fisheries Center Administration Building, the roof and walls are deteriorated and there is severe rain leakage, hindering daily operations. It was also confirmed that there are rooms that cannot be used, thus lowering the efficiency of the facility, and an increase in the number of staffs of Fisheries Division using the facility has resulted in reduced functions. It was considered that it would be appropriate to carry out renovations in order to restore the functions of the Fisheries Center Administration Building so that it can be used on a continuing basis and so that it can serve as a base for the Fisheries Management and for providing support services to the fishermen.

With respect to the Fish Market, it was confirmed that the roof has been damaged by cyclones, corrosion of the structural steel has reduced the strength of the frame, and the number of users (vendors) has led to insufficient and disorderly sales floor space. Like the Fisheries Center Administration Building, it was considered that renovations are necessary in order to use the facility on a continuing basis as a domestic distribution base.

The following table shows the contents of the planned facilities to be constructed and renovated through the project. A period of 1 year and 5 months (17 months) will be necessary for the implementation schedule for the project, including the detailed design.

An estimated project cost is approximately seven hundred nine million Japanese yen to be borne on the Japan side and 2 million yen on the recipient country side.

Contents of project facilities

(1) Civil Facilities

Facility name	Size	Content of plan
1)Jetty (for fish landing and preparation)	Availableness length : 40m Structure type : Steel pipe pile type Protection of jetty : 8m Structure type : Ruble mound type	Crown height : D.L.+2.0m Crown width : 8m
2)Seawall of reclamation area	Length : 80.46m Structure type : Ruble mound type	Crown height : D.L.+3.0m
3)Reclamation area (Preparation yard of fishing boat)	495m ²	Ground level : D.L.+2.0m
4)Removal of boulders	558m ³	depth - 0.5m
5)Improvement of Existing slipway	Installation of Boat pulling upper Installation of winch : 3 ton, 1 unit	
6)Incidental facilities	Lighting : 2 units at jetty, 2 units at reclamation area Drainage : 30m Navigation light : 1 unit	400 W/unit Width 20cm, Depth 40cm LED type, Range 2 N.M.

(2) Building Facilities

Name of facility	Size	Content of plan
1)Renovation of Fisheries Center Administration Building	Floor area: 707.48m ² Steel structure system Single story (Incl. Mezzanine)	Exterior Wall: Acrylic Splay membrane paint on Autoclaved Aerated Concrete (AAC) panel Roof: Trapezoid type steel sheet roofing and asphalt roofing on plywood panel Interior Wall: Re-layout Building height: 7.84m
2)Renovation of Fish Market Building	Floor area: 996 m ² (Renovation Area : 533 m ²) Steel structure system Single story	Steel column and beam: Reinforced and repainted Roof: Trapezoid type steel sheet roofing Sales Area Floor: Poleurethane floor paint
3)Construction of Fishing Port Office Building	Floor area: 120 m ² Reinforced concrete structure System	Exterior Wall: Corrugated steel sheet, partially acrylic splay membrane paint on cement mortar Roof: Trapezoid type steel sheet roofing on concrete slab Floor height: 0.35m Building height: 6.4m

Implementation of the project can be expected to produce results like those outlined below, so it is considered that the project is both appropriate and meaningful as a grant aid programme.

[Direct Effects]

- 1) New construction of the landing and preparation wharves will enable more efficient landing and preparation by alia fishing boats, and the fishermen's work hours will be reduced.
- 2) New construction of the landing and preparation wharves will make it possible to move the alia fishing boats to the new facility area, thus alleviating congestion in the existing fishing port and increasing the efficiency of the landing and preparation work of commercial fishing boats. Also, the fishermen will suffer less fatigue.
- 3) New construction of the landing and preparation wharves will alleviate congestion in the existing fishing port, thus increasing the level of safety when boats are entering and leaving the fishing port, assuring the safety of the fishermen.
- 4) Improving the existing slipway will make it easier to haul boats out of the water and allow faster evacuation of boats, so that the property of the fishermen will be preserved. Also, the fishermen will suffer less fatigue when hauling their boats out of the water.
- 5) Renovating the Fisheries Center Administration Building will eliminate problems such as rain leaks, and will boost operation efficiency.
- 6) Renovating the interior layout of the Fisheries Center Administration Building will make the functions of the various Fisheries Division sections more efficient, and will strengthen the management of the fishing industry and boost efficiency.
- 7) Renovating the training room in the Fisheries Center Administration Building will restore the locale and provide opportunities for courses to be held by Fisheries Division staff members on resource management, fishing gear and techniques, effective methods of fish farming, and other topics, and is aimed at modernizing the fishing industry.
- 8) Reinforcing the structure of the Fish Market Building will enable continuing use of the facility.
- 9) Renovating the sales area of the Fish Market Building will enable a more sanitary environment and make it possible to provide consumers with more sanitary and hygienic fish.
- 10) Renovating the sales area of the Fish Market Building will eliminate congestion in the area and will facilitate purchasing on the part of consumers.
- 11) Constructing a new Fishing Port Office Building located near Fish Market and Fishing Port will enable efficient management and operation of the Fish Market and the new fishing port facility. This will lead to timely operation of instructions

of mooring locations, control of illegal mooring, collection of berthing fees and the Fish Market usage fees, control of fish catch that are subject to regulation, etc.

[Indirect Effects]

- 1) Expanding the fishing port facilities will make it possible to carry out fishing activities more efficiently, and this will be step up the fishing activities as export industry.
- 2) Communication will be facilitated between the fishermen and the Fisheries Division, and this will facilitate fishing industry management and promote the fisheries sector such as development of market for fisheries sector and promotion of private sector.
- 3) Through renovating the Fisheries Center Administration Building, the opportunities for training and education of comprehensive resource management and guidance to inshore fishermen will be increased. As this result, sustainable usage of marine resources in inshore fisheries will be possible.
- 4) Through the renovation of the Fish Market Building, an increase can be expected in the volume of fish supply by inshore fishermen, and more sanitary and hygienic fish will be supplied to consumers.

After construction of the project facilities has been completed, in order to plan effective usage of the fish landing and preparation wharves and the Fishing Port Office Building that will be newly constructed and the Fisheries Center Administration Building, Fish Market Building and other facilities that will be renovated, and to solve the problems involving the Apia Fishing Port facilities, it is proposed that the Ministry of Agriculture and Fisheries, which is the implementing organization, and the Fisheries Division that will directly manage and run these facilities, will give sufficient consideration to the following in the course of managing and operating the facilities: (1) appropriate management and operation of the fishing port facilities, (2) periodic facility inspections and securing of maintenance cost, (3) assuring a sanitary environment for the Fish Market, and (4) the usage of ice in Fish Market.

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Main Report

Chapter 1

Background of the Project

Chapter 1 Background of the Project

Samoa was formerly a mono-culture economy that was reliant on agriculture, but the country has maintained strong economic growth in recent years accompanying the growth in the tourism and fishing industries and commercial activities starting from the latter half of the 1990s. At the same time, however, because it has a small-scale domestic market and the economic structure typical of an island nation, meaning it has to depend on imports for many of its consumer goods, Samoa struggles with a chronic trade deficit. In recent years, the Government of Samoa has been focusing its efforts on promoting the country's agricultural, fishing and tourism industries, with particular emphasis on cultivating private-sector companies in the agricultural and fishing industries.

The per capita GDP in 2003 in Samoa is US\$ 1,800 (Asian Development Bank), with the average ratio of contribution by the fishing industry to the GDP over the past six years being 7.7%. Moreover, the fishing industry constitutes a significant pillar of the export industry; although the figure fell because of a slump in tuna longline fishing in 2003, the fishing industry has made up more than half of all exports over the past five years, and plays an important role in bringing in foreign capital.

Samoa's fishing industry can be divided into traditional inshore fisheries (village fisheries) and commercial fisheries. In the latter, which primarily comprises tuna longline fishing, development of the tuna export market for albacore and other types of tuna that were caught through tuna longline fishing had resulted in an increase in the number of fishermen and the number of fishing boats employed in tuna longline fishing that had been engaged in the inshore fisheries until the latter half of the 1990s. In 1998 the total tuna longline fishing catch was approximately 6,700 tons, with 200 fishing boats employed in offshore fisheries. In 2003, however, because of the slump in tuna fishing, the catch had fallen to approximately 2,800 tons. Currently, in 2004, there are 110 registered fishing boats (90 fishing boats and 20 commercial fishing vessels).

The Apia Fishing Port, which was built in 1982 through Japan's Grant Aid Programme, was planned to accommodate 30 alia fishing boats (with an approximate hull length of 9 m) and one commercial fishing boat (with an approximate hull length of 21 m). The Fishing Port facilities consist of a 50-meter wharf for commercial fishing boats and a 150-meter wharf for alia fishing boats. Because the scale of the facilities cannot accommodate the current number of boats using the fishing port (33 alia boats and 20 commercial boats), there is severe congesting at the mooring facilities, which is causing problems such as reduced safety for fishing boats navigating in the Apia Fishing Port, lower efficiency in fish landing operations and in preparation work. The problem is also occurring of fishing boats moored outside of the fishing port being damaged and/or lost during rough sea conditions such as cyclones because of insufficient mooring facilities.

In order to solve the above problems, the Government of Samoa has formulated fishing port expansion plan aimed at providing safe navigation for fishing boats, improving the fish

landing efficiency, and keeping fishing boats safe, and has requested Japan's Grant Aid Programme. Additionally, problems are occurring with the Fisheries Center constructed in 1978 through Japan's Grant Aid, such as the roof and walls being old and deteriorated, and severe rain leakage that is making some of the rooms unusable. The columns of the steel skeleton frame of the Fish Market Building that was built in 1982 are corroding, as is the roof under structure. The sanitation environment is being adversely affected by problems such as tiles coming off from the retail selling counters, and a shortage of sales space is causing congestion in the Market. In order to solve these problems, a request has been made to renovate the building along with the expansion of the fishing port facilities. The construction facilities (the Fisheries Center Administration and the Fish Market building) suffered damage when Samoa was hit by large cyclones such as Cyclone "OFA" in 1990, Cyclone "VAL" in 1991 and Cyclone "HETA" in 2004. During that time, the Fisheries Division took steps such as repairing and waterproofing the roof of the Fisheries Center building, replacing ceilings and repainting the steel skeleton frame. At the Fish Market Building, the roof had blown off when Cyclone "HETA" struck in January 2004, but emergency repairs of locations that suffered damage have been made through cooperative efforts by the Fisheries Division and a private company. The Fisheries Division has managed in these and other ways to maintain and keep up the facility so that it can be used effectively, but it was decided that renovations are necessary in order to minimize the damage caused by the cyclones and assure ongoing use of the facilities.

Table 1 (1) shows the contents of the original request made by the Government of Samoa.

Table 1(1) Contents of Original Request

Facilities	Item
(1) Extension to the Fishing port	<ul style="list-style-type: none"> a. Dredging b. Reclamation c. Breakwater Works d. Concrete Works e. Floating jetty Works f. Ancillary Works g. Miscellaneous
(2) Renovations, Extensions and Demolitions (Fish Market)	<ul style="list-style-type: none"> a. Renovations, Extension ,Demolitions b. Equipment Ice machines, Refrigerator, Deep freezers, etc c. Ancillary works d. Miscellaneous
(3) Renovations to "Fisheries Center"	<ul style="list-style-type: none"> a. Renovations Works (Especially re-roofing overall and restructuring existing wall materials) b. Ancillary facilities to be replaced c. New equipment to be replaced d. Fleet of on-shore transportation

Chapter 2

Contents of the Project

Chapter 2 Contents of the project

2-1 Basic concept of the project

2-1-1 The Purpose of the Project

The fishing industry in Samoa consists of inshore fisheries (village fisheries) and a commercial fisheries that primarily comprises tuna longline fishing. The annual volume of fish catch in the inshore fisheries is estimated to be approximately 7,630 tons (2003), and this yield is consumed domestically and plays a role in supplying animal protein for the people of Samoa. The fish catch in the commercial fisheries that consists primarily of tuna longline fishing is between 5,400 and 6,700 tons per year (1999 to 2002), and over 90% of the catch is exported, contributing significantly to Samoa's economy as a source of foreign currency. Thus, the fishing industry in Samoa is ranked as an important industry that both provides food for the people and serves as a means for obtaining foreign currency. In the three-year plan developed by the Government of Samoa, promotion of the fishing industry is ranked as a principal strategic topic, and the industry is an important sector in terms of national policies.

The Samoan fishing industry, the bulk of which comprises albacore tuna, accounts for more than 60% of all exports (2002), but in recent years, fluctuations in oceanographic conditions (El Niño) have caused the volume of the catch to plummet according to Fisheries Division, and in 2003 the catch in the commercial fisheries fell to approximately 2,800 tons. As a result, the number of small catamaran boats called "alia" boats that are employed in the tuna longline fishing industry has also plunged, from 139 in 2000 to 25 in 2003. At the same time, however, since the middle of 2004 (July through October), the volume of tuna catch (volume exported) increased around 30% in comparison with the catch from the same period a year earlier, pointing to a recovery keynote. However, the slump of tuna longline fishing is still continuing. Currently, alia fishing boats that were engaged in tuna longline fishing have switched to reef fishing and bottom fishing and are continuing to operate, with the hope of seeing a recovery in tuna longline fishing.

The fishing infrastructure that supports key industries in Samoa consists of a Fisheries Center and Apia Fishing Port facilities (an landing wharf and a Fish Market) that were constructed in 1978 and 1982 through Japan's Grant Aid Programme from Japan. The infrastructure supporting the inshore fisheries consists only of small-scale ice-making machines (2.5 tons per day) introduced by the Government of Samoa in 2002 and 2003, on Upolu and Savaii Island.

The facilities provided by Japan were built 20 or more years ago, and there have been significant changes in conditions since the original design, such as an increase in commercial fishing boats (from one fishing boat in 1978 to 20 in 2003) and an increase in the volume handled at the Fish Market (from 153 tons per year and 15 vendors using the facility in 1984 to 519 tons and approximately 90 vendors using it on Sundays in 2003). For this reason, landing facilities and fish market facilities have become noticeably more cramped and congested. As a result, the safety of fishing boats that are entering and leaving Fishing Port facilities and the

efficiency of fish landing operations are being severely hindered. At the Fish Market, the area for selling fish is cramped and crowded and can no longer accommodate the number of people using the facility.

The Fisheries Center Administration Building and Fish Market Building are demonstrating pronounced aging, and have been damaged by several cyclones. Although those running the facilities are attempting to repair, maintain and manage them on their own, problems that arise are handled on an emergency basis in many cases, and at the Fisheries Center Administration Building, rain has seeped into the building and put some rooms out of commission, to the extent where everyday works is being hindered. Moreover, asbestos has been used in the ceilings and walls, which are now old and have deteriorated, and there are concerns about adverse effects on health. In the Fish Market, there is severe corrosion of the steel that forms the structural steel frames and the roof under structure, and structural problems are occurring.

It is still problematic for Samoa to handle the repair and expansion planning for these facilities as a whole on its own in terms of both technology and budget, and it is thought appropriate that the facilities be renovated and expanded through Japan's Grant Aid Programme. Consequently, the aim of this project is to renovate and expand these facilities in order to solve the problems outlined above, and to restore them to functions that are in line with the current situation.

2-1-2 The Basic Concept of the Project

(1) Problems at the project site and sorting out the issues involved

The following describes the problems and issues involved at the project site.

1) Fishing port facilities

Tuna longline fishing is flourishing in the project area, leading to a significant increase in the number of commercial fishing boats and alia fishing boats in operation, and as a result, the fishing industry has developed into one of Samoa's mainstay industries. In recent years, the volume of fish catch has plummeted because of changes in oceanographic conditions, and the number of alia fishing boats, which engage in longline fishing, has also plunged, with the result that currently many of the boat owners are switching to bottom fishing and reef fishing. Despite this situation, the number of fishing boats using the existing Fishing Port facilities has far surpassed the original planning, and the following problems are occurring as a result.

- i. The Fishing Port is congested because of insufficient landing and mooring facilities.
- ii. The landing efficiency has dropped.
- iii. Safety has decreased because of congestion as fishing boats try to get in and out of the Fishing Port.
- iv. Fishing boats are being damaged and washed away because they are anchored outside the Fishing Port in rough sea.

The following issues are involved in solving the problems outlined above.

- i. Alleviating congestion and improving the efficiency of fish landing operations by expanding and constructing the landing and mooring facilities.
- ii. Assuring safety when boats enter and leave the Fishing Port, by alleviating congestion in the Fishing Port.
- iii. Assuring safe evacuation routes for fishing boats when cyclones hit.

2) Fisheries center and workshop facilities

Problems involving the Fisheries Center are as described below.

- i. Rain leakage because the roofs and walls are old and have deteriorated.
- ii. Interference with everyday works operations
- iii. The existence of rooms that cannot be used, and a decrease in the functions of the facilities
- iv. The existence of rooms that are unsuitable for current activities, such as wet laboratories
- v. Reduced functionality because of an increase in the number of staff using the facility

The issues to be addressed in order to solve the above problems are as follows.

- i. Restoring and strengthening the functions of the facilities by renovating the Center facility

3) Fish Market facility

The problems involving the Fish Market facility are categorized as follows.

- i. Roof damage caused by cyclones
- ii. Decreased strength because of corrosion of the skeleton framework of the building
Insufficient sales space and crowding because of increases in the number of vendors using the facility
- iii. Unsanitary environment

The issues to be addressed in order to solve the above problems are as follows.

- i. Replacing the roof
- ii. Reinforcing and renovating the skeletal framework of the building
- iii. Improving the sanitation of the environment

4) Ice-making machines

Tuna exporters have ice-making machines in the Apia Fishing Port and are supplying ice to the commercial fishing boats and the alia fishing boats, but ice is not used at the Fish Market where the inshore fishermen are selling their fish (although some of the fishermen use ice that they make with their household refrigerators). Because of this, the quality of the catch

deteriorates while it is being sold. On the other hand, because the ice-making machines currently owned by the tuna exporters have more than sufficient capacity (total 29 tons/day), it is thought that the exporters could supply ice to fishermen who need it, including inshore fishermen, and that if strong guidance is provided by the Fisheries Division, the above problems can be solved.

Aside from the above problem, the project area is located in the center part of Apia, as shown in Figure 2-1-2(1), and the area also includes the Apia Fishing Port, the Fisheries Center facility, the Fish Market, a bus terminal, and the tuna exporters, and is a place where people, cars, marine products and other entities are all present. This makes the area extremely crowded and interferes with a smooth flow. Consequently, planning needs to be formulated that would allow the various facilities to function efficiently, based on flow lines planning.

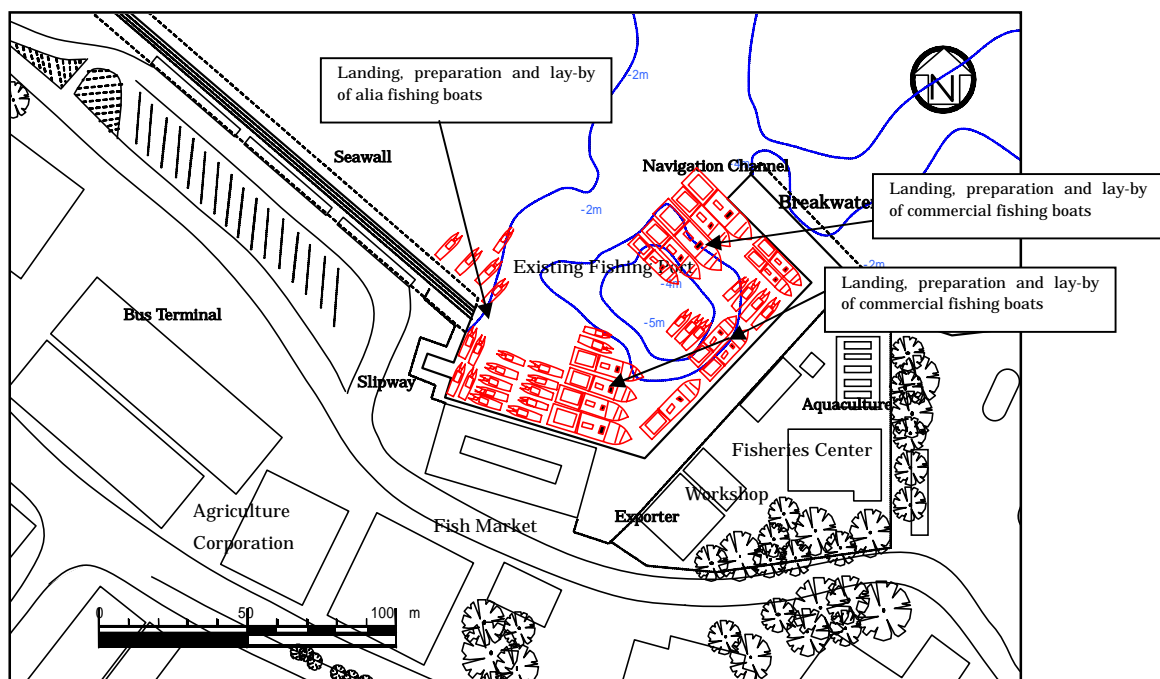


Figure2-1-2(1) Current situation at the Project Site

(2) The position of the project

The facilities to be planned in this project are positioned as indicated below with respect to the fisheries sector in Samoa.

- i. Fishing port facilities: Fishery Production bases, overseas distribution (export) bases
- ii. Fisheries Center facilities: Samoan fisheries management base, bases for control and running of fishing facilities
- iii. Fish Market facilities: Distribution base for domestic fishery products

As indicated above, the facilities to be covered in the project consist of bases with various functions, among them production, distribution, fisheries management, and operation,

and are important facilities in the fisheries sector in Samoa.

Consequently, the project is aimed at restoring and improving the functions of the above facilities, and is positioned as an important project in terms of promoting the marine sector in Samoa.

(3) The basic policies of the project

The basic policies of the project are deduced as follows, based on the issues that need to be solved in the fishing industry as a whole and in the project area, and the position of the project.

Overall goal: Promoting the fisheries sector in Samoa by restoring and improving the production/distribution and the fisheries management/operation functions

Basic policies:

- i. Improving fishing industry activities such as fish landing efficiency, by expanding the fishing port facilities
- ii. Assuring the safety of fishing boats in sea routes and mooring basins
- iii. Assuring evacuation routes for alia fishing boats
- iv. Improving the functions of the Fisheries Center by renovating the Center Administration Building
- v. Alleviating congestion and improving the sanitation situation by renovating the Fish Market Building

The expansion of the fishing port facilities will target the alia boats, and will be aimed at improving the fishing activities of the alia boats and within the existing fishing port.

In order to achieve the above goals, facilities that are deemed necessary and appropriate with respect to the fishing activities, distribution functions, and fisheries management/operation in the project area will be constructed and renovated in the project.

(4) Confirmation of the Contents of the Request

Table 2-1-2(1) shows the contents of the original request, while Table 2-1-2(2) shows the contents of the request following discussion concerning the basic design study (field study).

Table 2-1-2(1) Contents of initial request

Facilities	Item
(1) Extension to the Fishing port	a. Dredging b. Reclamation c. Breakwater Works d. Concrete Works e. Floating jetty Works f. Ancillary Works g. Miscellaneous
(2) Renovations, Extensions and Demolitions (Fish Market)	a. Renovations, Extension ,Demolitions b. Equipment Ice machines, Refrigerator, Deep freezers, etc c. Ancillary works d. Miscellaneous
(3) Renovations to “Fisheries Center”	a. Renovations Works (Especially re-roofing overall and restructuring existing wall materials) b. Ancillary facilities to be replaced c. New equipment to be replaced d. Fleet of on-shore transportation

Table 2-1-2(2) Contents of request following discussion

Facility	Priority of Facility	Item	Priority of Item
Extension to the Fishing port Facilities	1	a. Dredging b. Wharf for landing and unloading c. Wharf for preparation use for fuel d. Wharf for lay-by use e. Breakwater (Surrounding Wharf) f. Alternative measures for protecting against the rough waves. For example: Slip-way, boat yard or jetty	B A ⁺ B B C A
Renovation, Retrofit, & Extension for “Fish Market” and “Fisheries Center”	2	a. Renovation of roofs and structure b. Extensions c. Equipment : Ice making facility d. Equipment : Refrigerator e. Equipment : Deep freezers d. Cutting machines, shutters and new office f. Renovation of Fisheries center building (Especially re-roofing overall and finish materials of administration building) g. New equipments for seafood quality testing and aquaculture laboratories h. Reforming the Workshop to a new Laboratory for exported product testing and aquaculture i. Fleet of on-shore transportation	A A A C C B A B C B

After the requested contents were verified by and discussed with the Fisheries Division of the Ministry of Agriculture and Fisheries, which is the implementing organization in the recipient country, the following items were changed.

- 1) Initially, there was a request for floating pontoons, but this was changed based on the facility applications, and will specifically include a fish landing wharf, a wharf for preparation use for fuel, and a lay-by wharf. In terms of priority order, expanding the fishing port facilities has top priority, and among items included under that, for fish landing have the highest priority ranking.
- 2) With respect to the construction of a new breakwater, because this will be difficult technically from the Japan side, and also because there is a possibility that sand and sediment could lead to a worsening of the situation in the Fishing Port, it was explained that excluding this item from the project components was being considered, and basic agreement was obtained from the Samoan side. However, it was requested that a alternative plan be proposed because it is necessary to have a structure of some kind that will protect the requested wharves from waves, and to have safety measures to protect alia boats from rough waves. A breakwater (to surround the wharves) and an alternate measure for protection against rough waves (for example, a slipway, a boat yard, or a jetty) were added as requested facilities. With respect to this item, because the need for wharf expansion and the scale of the expansion are closely interrelated, it was confirmed that an overall study will be conducted, including whether or not there is a necessity, at the stage when the layout is drafted based on a survey of the natural conditions.
- 3) With respect to renovation of the Fish Market, solving problems concerning the building will be given priority. In terms of demolishing the Fish Market (170 m²), the existing Fish Market structure is an integrated steel skeleton construction. It was explained that it would be difficult to demolish only a part of it, and agreement was obtained from the Samoan side, so this item was excluded from the requested components.
- 4) From the standpoint of maintaining fish quality, ice-making machinery is a high priority, but because there is little need for refrigeration or freezing of the fish handled at the Fish Market, private exporters that deal in tuna have their own machinery, and this item was assigned a low priority. As the results of the field surveys, it is confirmed that ice making machines in tuna exporters have sufficient capacity at total 29 tons per day.
- 5) At the Fish Market, fish such as tuna and various types of shark are cut with saws for retailing, which is unsanitary. Cutting machines were added to the request. Also, because there are no walls at the current Fish Market and the space is open, nighttime security is a problem. Because of these two concerns, the installation of shutters was added to the request. Additionally, an office that would be located within the expanded Fish Market facility and that would be used by personnel in the Enforcement Section and Market Section of the Fisheries Division was added to the request.
- 6) The Fisheries Center is facing major problems in terms of renovation, such as rain leakage

and the use of asbestos, and renovation was made a high priority. Moreover, the facility was built more than 20 years ago, and both the number of Fisheries Division staff using it and the facility functions have changed, so there is a strong need to build partitions and other structures in keeping with the current situation.

- 7) The workshop on the Fisheries Center premises (built in 1978 with Japan's Grant Aid Programme) was renovated into an laboratory room to be used for inspections of export products and aquaculture, and inspection laboratory equipment was requested for quality inspections pertaining to seafood products and export products, as well as for fish farming, as equipment requested for the Fisheries Center. As background, at the beginning of 2004 a law was passed by the Cabinet pertaining to the National Seafood Safety Programme, and organizational establishment became an urgent issue.

(5) Examination of the Contents of the Request

1) Expansion of the existing Fishing Port facilities

(i) Dredging

The water depth in the area along the front of the bus terminal, which is the area targeted by the facilities expansion project, is shallow, ranging from -0.2 m to -0.5 m (water depth from low water level LWL ± 0.0 m). The sea bottom has a layer of boulder stones and other obstacles that are widely spread on top of the sea bottom sands (-0.2 m to -0.5 m).

Normally, when planning a mooring basin, planning is done based on a water depth to which some extra height (0.5 m) has been allowed between the low water level and the draft of the boat. Because the maximum draft of the alia boats targeted by the project is around 0.5 m, considering the water depth of the site foundation, it is necessary to have an extra dredging depth of 0.5 to 0.7 m. At the same time, however, the water areas for which dredging is considered necessary in this project are the area for the alia boats turning and the area for boats mooring. Because of this, alia boats that are moored are empty of fish, which makes the draft less than 0.5 m. Because the pertinent water area has a water depth of 0.7 to 1.0 m from the mean sea level (MSL+0.5 m), it is considered that there will be no obstacles to mooring or turning around the alia boats, and it was decided not to do dredging. However, because there are boulder stones and other obstacles spread over the sea bottom, there are concerns that the bottoms of the boats could be damaged because of pitching caused by waves, so it was decided that it would be necessary to remove obstacles such as the boulder stones. Because the only thing that will be done is removing obstacles from sea bottom, there is almost no need for maintenance dredging.

(ii) Wharves for landing and preparation

The existing Apia Fishing Port was constructed through Japan's Grant Aid Programme in 1982 (-3 m wharf of 50 m, -1.5 m wharf of 150 m). The number of boats designed for that facility was 30 alia boats (with a boat length of approximately 9 meters) and one commercial boat (with a boat length of more than 20 meters). The number of boats currently using the Apia

Fishing Port has increased beyond the point when the planning was designed and now consists of 33 alia boats (Classes A and B) and 20 commercial fishing boats (Classes C, D and E). Because of this, the mooring facility is extremely congested. The sufficient ratio of the existing Fishing Port is low at 33% (see Appendix-6, page A-38), and the length of the wharves is not appropriate for the number of fishing boats using the Fishing Port. Alia boats and commercial fishing boats are using the fishing port, which makes the congestion intense. This is causing problems in that it adversely affects navigation safety and reduces the fish landing efficiency and the efficiency of the preparation work.

Consequently, expanding the mooring facilities for landing and preparation of the boats is considered both highly necessary and urgent.

(iii) Lay-by wharf

As described earlier, the scale of the mooring facility at the existing Fishing Port is small, and both commercial fishing boats and alia boats are using the facility together, so there are no clear distinctions among the landing, preparation (refueling) and lay-by wharves. For this reason, fishing boats that are at rest are moored to the outer side of the boats that are being fish landed or prepared, and this is a factor that lowers the efficiency of the fish landing and preparation work. When tuna longline fishing was at its peak (in 2002), the alia boats were anchored in the water area in front of the bus terminal. During the rainy season (from December to March), when wave conditions are rough, waves come directly into the water area in front of the bus terminal, and boats cannot be anchored safely. It is considered that there needs to be a safe lay-by wharf or a mooring basin for alia boats, but the landing and preparation wharves have higher priority in this project, so the lay-by wharf will not be included in the project.

(iv) Breakwater

It was confirmed through an inspection along the coast that it is impossible for the Apia Fishing Port not to be affected by littoral drift. It was explained that it would be difficult to construct a new breakwater from technical, environmental, and cost standpoints, because there was a possibility that sand and sediment would worsen the conditions in the fishing port, the thinking was to exclude this component from the project, and basic agreement was obtained from the government of Samoa. As a result, the construction of a breakwater will be excluded from the project.

(v) Alternate measures of protection from rough waves

The Government of Samoa requested the study of a proposal for an alternative to a breakwater in order to protect the alia boats from rough waves.

Normally, when a cyclone hits, alia boats that use the Apia Fishing Port as a base are pulled out from the existing slipway and hauled up to the bus terminal, while commercial fishing boats are taken outside of the Apia Fishing Port and evacuated to the shelter of islands. According to disaster reports (Fisheries Division documents) from Cyclone “HETA”, which hit

Samoa in January 2004, of the fishing boats (Classes A - E) that were using the Apia Fishing Port as a base, one boat each from Class A, Class B and Class C (a total of three boats) were damaged. When Cyclones “VAL” and “OFA” hit Samoa in 1990 and 1991, because no slipway had been provided, approximately 35 alia boats were lost, and tremendous damage was suffered. Although the scale of the existing slipway is small, with a width of approximately 5 m, it currently functions as a sheltering facility for fishing boats. Because the existing slipway is located on the bus terminal side of the existing Fishing Port, there is enough space to shelter the fishing boats in the event of an emergency, so it was decided to continue using the existing facility, and construction of a new slipway was excluded from the project. Because the existing facility is on a steep slope, however, grounding of the boats requires enormous effort, so it is considered that improvement in the form of installing boat slider and hand-cranked winch are necessary.

2) Renovating, restructuring, and expanding the Fish Market and Fisheries Center

(i) Repairing the roof and structure of the Fish Market

The roof of the Fish Market building, which was constructed in 1982 through Japan's Grant Aid Programme, was destroyed when Cyclone “HETA” hit in January 2004. And the building was re-roofed through joint capital provided by the Fisheries Division and by a private company who occupies 50% of the floor space of the market building. However, because emergency repairs were made rather than carrying out thorough repairs, including the roof under structure, and no permanent repairs have been made since then, the roof, including the under structure needs to be renovated.

On 50% (12 columns) of the steel columns that comprise the framework of the building, the bases of the columns have corroded, and the thickness of the structural steel has decreased, so the yield strength needs to be restored quickly. Moreover, the paint has peeled off not only from the foot of the columns, but also from the steel columns themselves and from the beams, and because these have now rusted, repainting, including rust proofing, is urgently necessary in order to maintain the yield strength of the overall steel structure system.

Also, sewage drained from the market sales area is discharged into the sea without being treated, and because this practice does not meet the current standards set by the Government of Samoa for treating drainage water, improvement is needed here. Taking the sanitation of the Fish Market as a whole into consideration, the floor of the market sales area needs to be renovated, including drainage planning.

(ii) Expanding the Fish Market, fish cutters, shutters for the Fish Market, offices

Because the congestion in the Fish Market sales area is at such a level that it can be solved by changing the current layout of the sales area counters and eliminating insulated boxes or other items, it is considered that there is no need for construction to expand the Fish Market sales area. Moreover, the scale of the market is not such that the fish cutters that were requested are necessary. Also, with respect to the Fish Market shutters that were requested for security

purposes, it is considered that these shutters are not necessary for a number of reasons, one being that it is hard to think that the current situation is unusual; another being that if the shutters are installed on the existing steel skeleton frame, they will cause an additional load on the frame; and a third being that there is a strong possibility that constructing struts to support the existing column spans and other construction measures will hinder the functions of the market. Consequently, it was considered that the functions of the existing Fish Market building can be restored by renovating the roof, the steel skeleton framework and the floor.

If the Fishing Port is expanded, however, a Fishing Port office building will be necessary in order to enable more solid and substantial control functions on the part of the Enforcement Section and Market Section of the Fisheries Division.

(iii) Renovating the Fisheries Center

There are no abnormalities in the existing steel skeleton frame of the two buildings of the Fisheries Center (the Fisheries Center Administration Building and the workshop building) constructed in 1978 through Japan's Grant Aid Programme, but the waterproofing and the cracks and flaws in the other walls have reached the tolerance limit. The interior of the Fisheries Center Administration Building still contains asbestos, and this presents a threat in terms of health, so in order to restore the management functions of the Fisheries Center, overall renovation that includes both the interior and exterior is urgently necessary while using the existing steel skeleton frame.

A part of the Workshop Building is not currently used for the Fisheries Division function. 20% of the floor space is leased to the private sector, and 70% is used for storage. For the building itself, waterproofing only part of the roof will not be effective, and at the very least, the entire roof needs to be waterproofed. At this present, 10% of building is being used for aquaculture section and just the small part of storage space is being used for engine repair. Private company is using remained 20% area of building. With respect to use of the other 80% of the building following the completion of renovation, according to an explanation provided by the Government of Samoa that will be outlined later, this portion would be used as an inspection laboratory for inspections of export products and for fish farming. However, no specific usage program has been provided for the inspection laboratory. Conversely, complete renovation of the Fisheries Center Administration Building would enable the offices comprising 10% of the current Workshop Building to be housed in the Administration building, so the renovation of the Workshop Building was excluded from the project.

(iv) Renovation of the inspection laboratory for inspection of export products and for fish farming

Although the idea of an inspection laboratory can be understood in general, it cannot be said that the Fisheries Division of the Government of Samoa has prepared a specific and realistic usage program, so this was excluded from the project.

3) Equipment (ice-making machines, refrigerators, freezers, etc.)

(i) Ice-making machines

In the Apia Fishing Port there are ice-making machines for the tuna exporters, and ice is being supplied to commercial fishing boats and alia boats. Currently, priority is being given to fishing boats that have contracts with the tuna exporters when ice is being supplied. Moreover, in the Fish Market where inshore fishermen are selling their fish, some of the fishermen are making ice using household refrigerators, but are not using sufficient volume. Consequently, there is a noticeable reduction in the quality of the fish that are being sold. This is causing the following problems.

- i. Reduced quality and throwing away of items leftover in the Fish Market
- ii. Obstruction of the effective use of marine resources

On the other hand, because the ice-making machines currently owned by the tuna exporters have more than sufficient capability, it is thought that the exporters could supply ice to fishermen who need it, including inshore fishermen, and that if strong guidance is provided by the Fisheries Division, the above problems can be solved. There are also ice-making machines that have been provided by the Fisheries Division itself, so this can be handled through the self-help efforts of Samoa. As a result, for the reasons noted above, the provision of ice-making equipment was excluded from the project.

(ii) Refrigeration (chilling) equipment

When inshore fishermen have leftover fish from the catch that they bring to the Fish Market, they need refrigeration equipment to keep the leftover fish chilled. However, it is not thought, considering from the current amount of fish left over, that large-capacity equipment is necessary. Therefore, storage of leftover fish can be handled using the ice supplied by the tuna exporters as described above, and this equipment was excluded from the project.

(iii) Equipment for quick freezing and for keeping fish frozen

The necessity for quick freezing equipment is considered based on the purpose for which the fish in the catch are used and the manner in which the catch is distributed. Considering based on the current distribution configuration in Samoa, the product distribution configuration has not reached the level that the fish undergo freezing processing or refrigeration using vacuum packs. As a result, because the industry is not at a stage where sales of frozen fish are being transacted, the necessity for quick freezing equipment is low, and this equipment was excluded from the project.

With respect to frozen storage equipment, as with quick freezing equipment, there is no need to store frozen foods because frozen foods are not being processed. Therefore, there is little necessity for frozen storage equipment, and this equipment was excluded from the project.

(iv) Land transportation vehicles

These were excluded from the project based on considerations concerning the purpose of the Grant Aid Scheme and the degree of urgency.

2-2 Basic design of the Requested Japanese Assistance

2-2-1 Design policy

(1) Items for consideration at the project site

1) Corrective action to deal with sand drifts (sediment)

Inshore fishing ports such as the one targeted by the project are vulnerable to the effects of sand drifts, and in some cases serious situations can occur such as not being able to assure the necessary water depth because of sediment in the fishing port. For this reason, the following items are being considered concerning sand drifts in the area around the project site.

- i) This project site is located at the far back of Apia Harbor, and the wave conditions are gentle. Based on the results of past studies, the frequency at which waves exceeding three meters in height occur in the Apia Gulf is around 2%, and if these waves reach the target water area they have generally dropped to a height of one meter or less.
- ii) The source of the sand drifts coming into the area around the site is thought to be sand drifting in from offshore together with the waves that hit the area, and from sand and dirt coming in from the Vaisigano River, the mouth of which is located at the far southeast side of the gulf.

According to the results of a previous study (the Final Report on the Study on Improvement of Apia Port in Samoa, 1998), sand which is thought to be coming from these sand drifts has accumulated in the water area at the front of Apia Harbor, and the thickness of that accumulation averages around 4 cm a year. However, the area in which the sand is accumulating is a water area with a water depth of 10 meters or more at the front of Apia Harbor. The sand that has accumulated at this water depth does not move as an influence of ordinary waves.

- iii) Topographically, the front of the targeted water area is a channel-shaped configuration surrounded by reefs. Most importantly, the edge of the reef is a sharp slope that slopes down to a water depth of around 10 meters, and there is no sandy beach over which the sand drifts can pass (bed load) along the sea bottom.
- iv) The existing Apia Fishing Port was built in 1982, but no dredging or other operations have been carried out at the site since then. Comparing the results of soundings that were carried out prior to the construction of the fishing port (1981) with the results of survey carried out for the present project, the water depth at the center of the existing fishing port, which had formed a saucer shape with the water depth of around -7m, has now changed to about -5 m, but no large-scale changes in water depth have been observed in other water areas.

- v) Based on a study of oceanographic conditions conducted for the present project in which waves and current were observed, the waves in the area along the front of the fishing port are gentle, and no waves with a height exceeding one meter were observed. Moreover, looking at the current conditions around the fishing port, the current velocity is generally 10 cm/sec or less, and external force conditions with respect to sand drifts which are causing sand accumulations within the fishing port can be termed comparatively gentle.
- vi) In terms of the possibility of sand accumulation and other phenomena occurring, for example, there are cases in which sand (suspended sediment) stirred up by container ships calling at Apia Commercial Port is moved by coastal currents or tidal currents, and accumulates near the fishing port. However, the effects of this are limited, and the possibility of these changes occurring that affect the navigation or mooring of ships is small. When Cyclone “VAL” struck in 1991, sand flowing from Apia Harbor to the mouth of the Vaisigano River accumulated (factors such as the amount of accumulation are not clear). However, no large accumulations were seen along other coastlines in Apia Harbor.

As described above, it is thought that the effects of sand drifts are relatively small at the point targeted in this project. However, the phenomenon of sand drifts is complicated, and there is a possibility of serious effects occurring due to conditions that cannot be envisioned for the time being. Because of this, after construction has been finished, it will be necessary to ascertain the situation of sand accumulation in the fishing port, and to take corrective actions such as maintenance dredging as necessary.

2) Considerations concerning flow lines planning of people, vehicles, and fish catches

Currently, the Fisheries Center zone is surrounded by fences, and because there is no intermingling of the flow lines of people, vehicles, and fish catches, the place can be assumed as an independent zone (Figure 2-2-1(1)). However, with respect to the Fish Market zone, because the bus terminal is directly adjacent, and because expanding the fishing port will result in changes and intermingling of the various existing and new flow lines, the first step for assuring the convenience of the project and the safety will be to create organizational planning that makes it possible to handle these flow lines at shorter distances and assures that there is no intermingling. The flow planning that is put together as a result will simplify the operation and maintenance, and will also present a more organized appearance. (See Figure 2-2-2(13).)

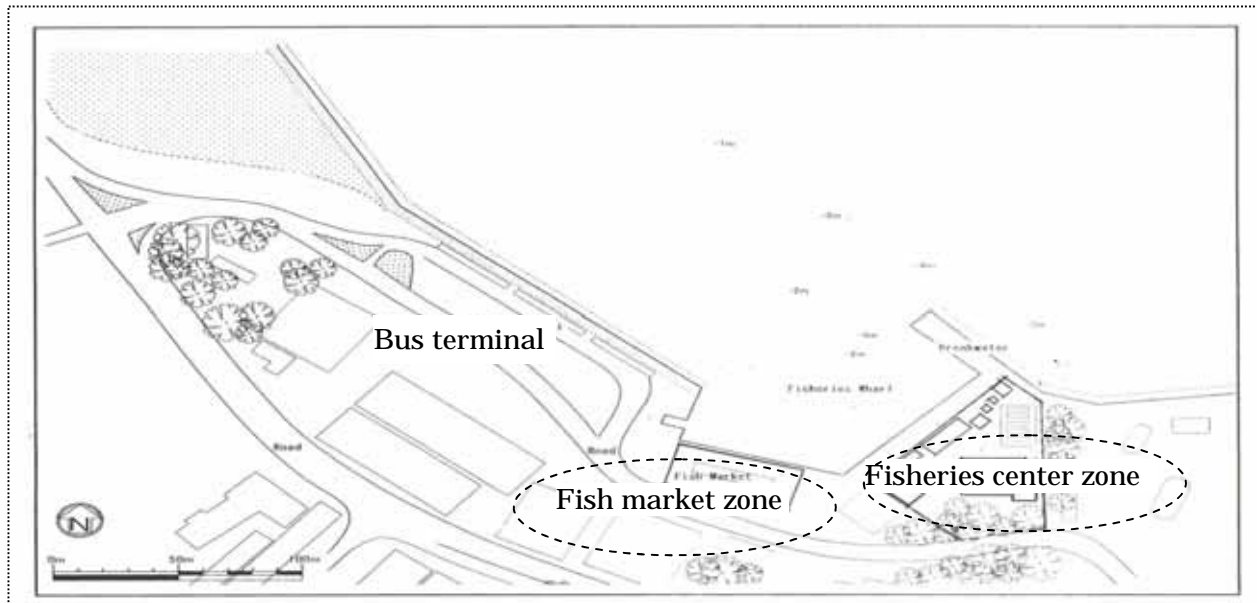


Figure 2-2-1(1) Onshore facility zone

(2) Basic policy for facility design

1) Basic policy for fishing port facilities

The basic concept of functionality with regard to the existing portion of Apia Fishing Port and the expansion planned under the project for the purpose of alleviating the current congestion is as shown below.

The number of boats to be covered by the project for Apia Fishing Port expansion has been set as indicated in Table 2-2-1(2), based on the operation situation of the registered boats as explained in Table 2-2-1(1).

Table2-2-1(1) Operating situation of registered fishing boats

Mooring Place	Class A	Class B	Class C	Class D	Class E	Total
Apia Fishing Port						
*Tuna longline fishing	13	6	6	8	3	36
*Bottom fishing, Reef fishing	14	0	0	0	0	14
*Not working	3	0	3	0	0	6
Main 15 villages						
*Longline fishing	1					1
*Bottom fishing, Reef fishing	25					25
*Not working	24					24
Other villages (N/A)	7					7
Total	87	6	9	8	3	113

Note: The difference of three fishing boats from the number of 110 registered boats is attributed to one non-operating Class C boat that is not registered and two operating Class D longline fishing boats that are not registered.

Table 2-2-1(2) No. of boats targeted by the project for Apia Fishing Port expansion

	No. of boats to be planned in the project
(i) Alia fishing boats engaging in longline fishing and bottom/reef fishing, landing at Apia Fishing Port (Class A)	27
(ii) Alia fishing boats engaging in longline fishing and bottom/reef fishing, landing at the 15 major fishing villages in Upolu Island, other than Apia Fishing Port (Class A)	26
(iii) Alia fishing boats engaging in longline fishing, landing at Apia Fishing Port (Class B)	6
Total	59

- i) Wharves for fish landing and preparation for alia boat (Classes A and B) will be provided in Apia Fishing Port expansion.

The number of boats targeted by the project will be the 59 boats indicated in Table 2-2-1(2) as boats using the landing wharf and the wharf for preparation. The 26 alia fishing boats outside of Apia Fishing Port were engaging in tuna longline fishing and were landing in Apia Fishing Port until 2002, but from 2003 to the present have been returning to the fishing villages in which the fishermen live during the off season, and are changing to longline fishing and to bottom and reef fishing.

Because these fishing boats are currently landing their catches in Apia Fishing Port, they will be using Apia Fishing Port to unload their catches and to prepare their boats for going out again (stocking them with ice, fuel and bait), and after landing the boats, the fishermen will return to their respective villages to take time off.

The existing slipway near the Fish Market will be used when boats are hauled out of the water if a cyclone hits.

- ii) The existing part of Apia Fishing Port will be used as a facility for landing, preparation and lay-by of commercial fishing boats (Classes C, D and E). The existing part of the fishing port is excluded from this project.

2) Basic policy for facility design

(i) The basic concept of the project

The purpose of the project is to restore the physical functions of the existing onshore facilities in the current Apia Fishing Port which were constructed in 1978 and 1982 through Japan's Grant Aid Programme, and also to construct the fishing port support facilities accompanying expansion of the fishing port through this project and to establish management functions.

(ii) Assuring the safety of existing buildings

Renovating the existing buildings will restore their structural safety and eliminate materials used in the existing buildings (asbestos) that are a threat to human health.

(iii) Striving for convenience and streamlined operation and maintenance

When the existing buildings are renovated, the floor planning will be reorganized in such a way that rain leaks are eliminated and the planning is tailored to the current positioning of organizational personnel. At the same time, planning of support equipment such as water supply and drainage, air conditioning and electrical equipment will be carried out in such a way as to enable streamlined and rational operation. Moreover, when building the expanded facilities, flow lines planning of the overall group of facilities will be drafted, and planning will be carried out in such a way that rational operation and maintenance is enabled.

(iv) Conformance with environmental policies currently in effect

When expanded facilities are built and when existing buildings are renovated, environmental improvements will be made by making sure that the facilities conform to drainage water standards currently in effect.

(v) Creating landscape scenery matching with the natural features of Samoa

The project will strive to coordinate the waterfront site with other areas and to create a landscape that is in harmony with the natural features of Samoa.

2-2-2 Basic facility plans

(1) Basic design for civil facilities

1) Setting the scale of the civil engineering facilities

(i) The mooring facility

A landing wharf and a wharf for preparation will be planned as mooring facilities for alia fishing boats.

i) Number of boats to be planned by the project

The number of boats to be planned by the project is as indicated in Table 2-2-2(1), in conformance with Table 2-2-2(2).

Table2-2-2(1) No. of fishing boats targeted by the project

Facility	Class A	Class B	Total
Landing wharf	53	6	59
Preparation wharf	53	6	59

ii) Fishing boat specifications

The specifications for the alia fishing boats targeted by the project are as indicated in Table 2-2-2(2).

Table 2-2-2(2) Specifications for the fishing boats targeted by the project

	Aver. length L(m)	Aver. Width B(m)	Aver. freeboard height (m)	Maximum draft (m)
Class A	9.7	3.1	0.8	0.5
Class B	11.7	3.9	1.0	0.5

iii) The required length for the wharves**(a) The landing wharf**

The conditions noted below were assumed in calculating the required length of the landing wharf.

- *Type of mooring: Parallel mooring is used that allows fish landing operations to be done safely and efficiently.
- *Number of boats landed per day: Because alia fishing boats basically work over two-day trip, this was set at 27 Class-A boats (53 boats / 2 days) and three Class-B boats (6 boats / 2 days).
- *Time during which landing is possible: Based on the business hours of the exporters (8:30 to 15:30), this was set at six hours.
- *Landing time per boat: Currently 40 to 60 minutes is required, including the waiting time for landing, but because a exclusive wharf will be provided through the project, this was set at 30 minutes.
- *Berth length per boat: Because parallel mooring is used, this was set at 1.15 L.
- * Berth rotational ratio: Time during which landing is possible / landing time per boat

Table 2-2-2(3) shows the results calculated for the required length of the wharves based on the presumed conditions described above. The required length of the landing wharf will be $23 \text{ m} + 14 \text{ m} = 37 \text{ m}$ 40 m.

Table 2-2-2(3) Required length for the landing wharf

	Operating hours	Number of boat for landing	Working time for landing per boat	Rotational ratio of berth	Required berth	Berth length per boat	Required berth length
Class A	6 hr	27	30 min	12	2(2.3)	11.2m	23m
Class B	6 hr	3	30 min	12	1(0.3)	13.5m	14m

(b) Wharf for preparation

The conditions noted below were assumed in calculating the required length of the wharf for preparation.

- *Type of mooring: Right angle mooring is used.
- *Number of boats prepared per day: Because alia fishing boats basically work over two-day trip, this was set at 27 Class-A boats and three Class-B boats.
- *Time during which the wharf will be used: Based on the current situation in the fishing

port, this was set at eight hours (8:00 - 17:00).

*Preparation time per boat: From the current preparation time, this will be set at 120 minutes.

*Berth length per boat: Because right angle mooring is used, this was set at 1.5 B.

* Berth rotational ratio: Wharf usage time / preparation time per boat

Table 2-2-2(4) shows the results calculated for the required length of the wharf based on the presumed conditions described above. The required length for the wharf for preparation will be $33 \text{ m} + 6 \text{ m} = 39 \text{ m} \rightarrow 40 \text{ m}$.

Table2-2-2(4) Required wharf length for preparation

	Using time of wharf	Number of boat for preparation	Preparation time per boat	Rotational ratio of berth	Required berth	Berth length per boat	Required berth length
Class A	8 hr	27	120 min	4	7(6.8)	4.7m	33m
Class A	8 hr	3	120 min	4	1(0.8)	5.9m	6m

(c) Planned water depth for the wharves

Taking into consideration a margin for waves of 0.50 m over the maximum draft of 0.50 m of the alia fishing boats, the planned water depth for the landing wharf will be -1.0 m. Because the boats at the wharf for preparation are empty of fish, the water depth will be -0.50 m from the current depth.

(d) Layout of the wharves

Taking into consideration that the required length for the landing wharf and the wharf for preparation will be 40 m for each wharf, and that the wharves will be jetty-type wharves that allow boats to be moored on both sides, the landing wharf will be located on the existing fishing port side (east side), where the water depth is deep, and the wharf for preparation will be located on the bus terminal side (west side). The layout planned for the jetties start from the Fish Market of the existing fishing port and run along the bus terminal, with the jetties being positioned along the contour lines such as the water depths of -1 m and -2 m, in the direction in which the vertical type seawall extends.

(ii) Mooring and turning basin for fishing boats

i) Mooring basin width and planned water depth

Because alia fishing boats will use right angle mooring at the preparation wharf jetty, the width of the mooring basin will be 2.0 times the boat length L of the Class B alia boats, or 20 m ($2.0 L = 2.0 \times 11.7 \text{ m} = 23.4 \text{ m}$). The water depth will be the same as that planned for the preparation wharf, which is -0.50 m.

ii) Turning basin width and planned water depth

The width of the turning basin needed for alia fishing boats to turn around when coming into and leaving the wharf for preparation is set at $2.8 L$ and 30 m ($2.8 L = 2.8 \times 11.7 \text{ m} = 32.8 \text{ m}$). The water depth will be the same as that planned for the wharf for preparation, which is 0.50 m .

(iii) Preparation yard for fishing boats

Because a fishing port office building are planned at the back of the jetty, taking the convenience of the jetty into consideration, a vehicle parking lot, a place for fishing gear, and other spaces for boat preparation work are being planned. A yard of 33 m length will be assured along the seawall in front of the bus terminal behind the jetty that will project out 15 m on the ocean side.

i) Boat preparation yard and reclamation area

A surface area of 561 m^2 (yard length of 33 m x site width of 17 m) is planned for the boat preparation yard, and the site will be paved with concrete. Because of the position of the fishing port office building that is planned on the existing bus terminal side, the site that will be formed as a result of reclamation will be 495 m^2 (length of 33 m x width of 15 m), and the existing bus terminal will be used for two meters of the width. Additionally, a rubble-mound structure will be used to form a seawall on the sea side of the reclamation area to protect waves when a cyclone hit. Figure 2-2-2(1) shows the positional relationships of the reclamation area, the existing bus terminal, and the fishing port office building (to be newly built as part of the project).

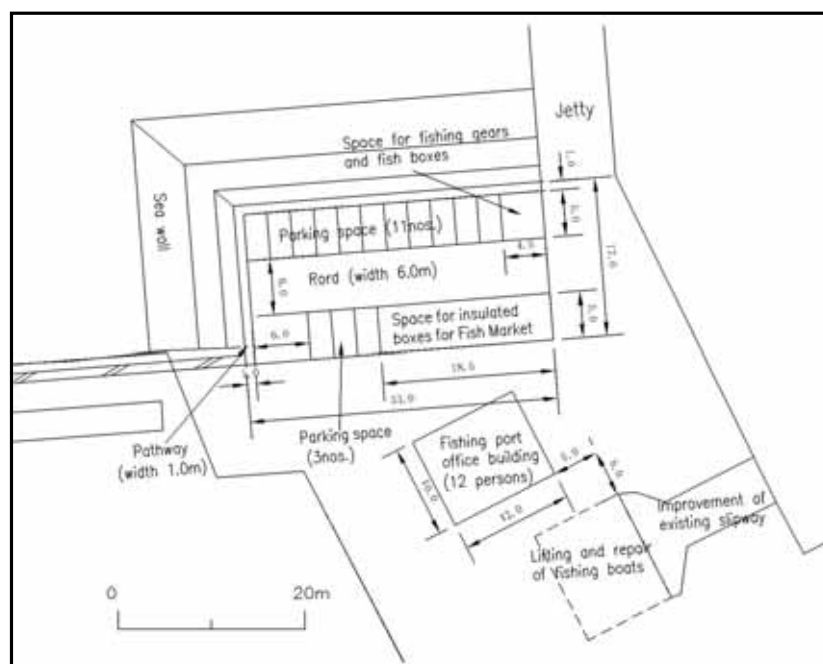


Figure 2-2-2(1) Usage classifications for the boat preparation work site

ii) Usage purposes for the boat preparation yard

The jetty was planned as a mooring facility where alia fishing boats can be landed and prepared. The purpose of the yard is to assure spaces such as a parking lot and a place where fishing gear and fish boxes can be repaired and stored, as a support facility making it possible for boats to be landed at the mooring facility and for preparation work to be carried out efficiently. Also, in order to assure the largest possible sales space without changing the surface area of the Fish Market, it will be used as a place where the insulated boxes for storing fish is located in the present Fish Market.

iii) The usage content of the boat preparation yard

(a) Parking lot space

The number of vehicles using the parking lot was set as indicated in Table 2-2-2 (5), based on the number of boats being landed and prepared at the jetty and the number of Fisheries Division staff using the fishing port office building. The vehicles are pickup trucks, and the parking lot surface area required per vehicle is 12.5 m² (length of 5 m x width of 2.5 m). The total parking lot surface area for 14 vehicles is 175.0 m².

There are lay by 19 boats to be anchored in the water area along the front of the yard (the figure of 19 was arrived at by taking the 30 boats that land and are prepared per day and subtracting three boats that are being landed at the time and eight boats that are being prepared at the time), but no parking space has been planned for lay-by boats.

Table 2-2-2(5) Number of vehicles using the parking lot

User	No. of units	Rationale	Frequency of use
Boats being landed	3	30 alia boats (consisting of 27 Class-A boats and 3 Class-B boats) use the landing wharf in 3 berths every day. See Table 2-2-2(3).	Coming and going every half an hour
Boats in preparation	8	30 alia boats (consisting of 27 Class-A boats and 3 Class-B boats) use the preparation wharf in 8 berths every day. See Table 2-2-2(4).	Coming and going every two hours
Fisheries Division staff	3	A total of 12 staff members of the Fisheries Division, consisting of 8 Enforcement and Statistics Section staff and 4 staff in charge of the Fish Market Section, use three vehicles.	Within their working hours
Total	14		

(b) Roads

The parking lots will be located on both sides of the road on which vehicles drive, and the road width will be 6 m. The road is constantly in use.

(c) Area where insulation boxes for the Fish Market

Currently, as shown in Table 2-2-2(6), there are 16 (wooden) insulation boxes both large and small that are kept in the Fish Market, and these will be moved from the Fish Market to the yard. Because the venders take fish out of the insulation boxes as needed, the insulation boxes will be placed 0.5 m apart, and the passage width will be 3 m. The layout will be as shown in Figure 2-2-2(2). Based on Figure 2-2-2(2), the surface area where the insulation boxes will be placed will be 92.5 m² (length of 18.5 m x width of 5 m).

Table2-2-2(6) Shape and number of insulation box

Type of insulation box	Number	Shape	Frequency in use
Large size	14 boxes	2.5m(L) × 1.2m(W)	Full-time
Small size	2 boxes	1.5m(L) × 1.0m(W)	
Total	16 boxes		

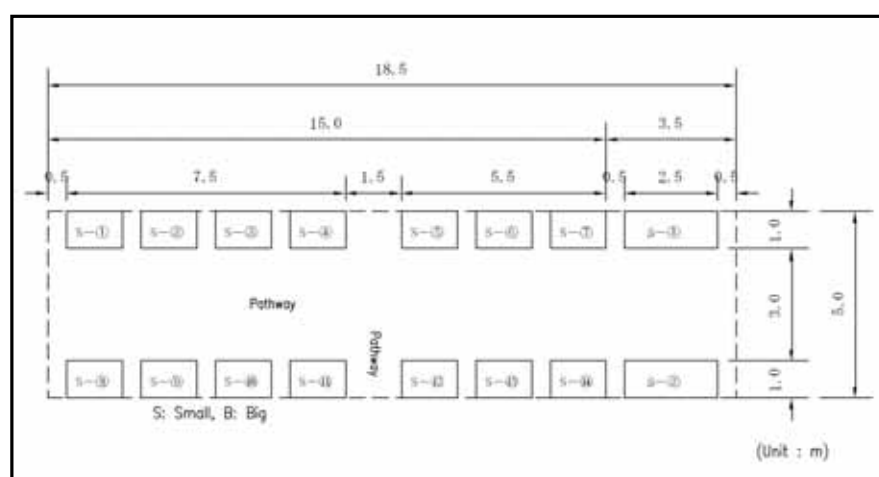


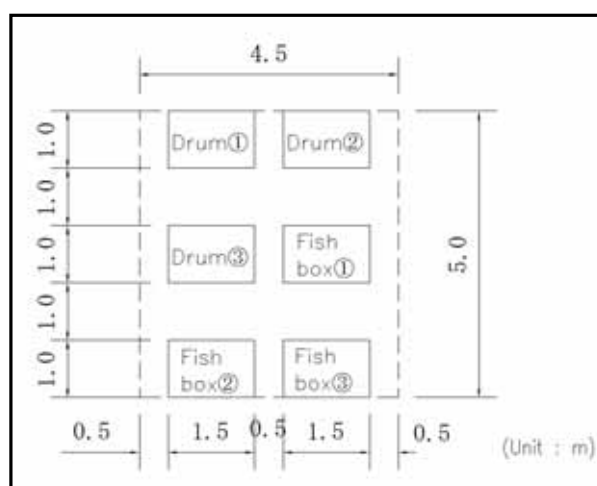
Figure 2-2-2(2) Layout of insulation boxes for the Fish Market

(d) Storage space for fishing gear and fish boxes

A space will be assured where fishing gear and fish boxes (Table 2-2-2(7)) for three boats, accounting for approximately 10% of the 33 alia fishing boats using Apia Fishing Port as a base (see Table 2-2-1(1),Page 2-15), can be repaired or held in reserve. The fishing gear consists of drums for winding long lines. The fishing gear and fish boxes will be placed 0.5 m apart, and the passage width will be 1 m. The layout will be as shown in Figure 2-2-2(3). Based on Figure 2-2-2(3), the surface area where the fishing gear and fish boxes will be placed will be 22.5 m² (length of 4.5 m x width of 5 m).

Table2-2-2(7) Shape and number of fishing gear and fish box

	Number	Shape	Frequency in use
Fishing gear	3 sets	1.5m(L) × 1.0m(W)	Full-time
Fish box	3 boxes	1.5m(L) × 1.0m(W)	
Total	6		

**Figure 2-2-2(3) Layout of fishing gear and fish boxes****(e) Pedestrian passageway**

The boat preparation yard is protected by seawall, and the water area along the front of the yard is used to moor lay-by alia boats. To allow fishermen to access their boats, a passageway for pedestrians with a width of 1 m will be placed behind the seawall. The pedestrian passageway will be in constant use.

(f) Usage categories of the boat preparation yard

The surface areas for the various usage purposes described above are summarized in Table 2-2-2(8).

Table 2-2-2(8) Usage categories for boat preparation yard

Utility partition	Contents of utility	Shape	Area(m ²)
(1)Space for car parking	14 pick-up trucks	1 car : 5m(L) × 2.5m(W)	175.0
(2)Road	Road for trucks	6m width	222.0
(3)Space for insulation box	Insulation box: 2 large size boxes, 14 small size boxes	18.5m(L) × 5m(W)	92.5
(4)Space for fishing gear and fish boxes	Fishing gear 3 sets, 3 fish boxes	4.5m(L) × 5m(W)	22.5
(5)Passage way	Passage way for fishermen	1m width	49.0
Total			561.0

(iv) Improvement of the existing slipway

Because the existing facility slopes sharply, boat sliders will be installed on the slipway

slope in order to make it easy to bring the boats out of the water. A Hand-operated winch will also be installed on the flat part at the top of the slipway.

2) Study of the design wave

(i) How the wave was computed

For the offshore design wave of the specified fishing port facility, the waves at the front of the fishing port were computed. The project site has a channel-shaped inlet at the front, and waves come directly into the fishing port through that inlet. Also, a large reef has developed on the west side of the fishing port front. Because the average water depth of the reef is around -0.5 m, at high tide (H.W.L. around +1.0 m), the effects of waves traveling along the edge of the reef cannot be ignored. At the front of the fishing port, these waves overlap. Here, the waves used for the structural design of the fishing port were studied using a procedure like that outlined below.

i) Computation of wave distortion in Apia Fishing Port

The wave distortion in Apia Fishing Port as a whole was computed in terms of offshore waves. The computation was done using a method that solves the energy equilibrium equation targeting irregular waves. Based on the computation results, the data from the waves coming into the channel at the front of the fishing port (a) and the waves at the edge of the reef at the front of the fishing port (b) were determined using the conversion offshore wave conditions.

ii) Computation of waves in the breaker zone in relation to the waves coming into the channel

Conversion computation for the breaker waves was carried out in relation to the waves coming into the channel, and the waves at the front of the fishing port (c) were computed. A wave calculation diagram of the waves in the breaker zone was used to compute the waves.

iii) Computation of the waves at the top of the reef slope

Breaker conversion computation was carried out on the waves at the edge of the reef slope, and those waves (d) were calculated using the same method as in ii). A wave calculation diagram of the waves in the breaker zone was used to compute the waves.

iv) Wave conversion computation on the reef

Based on the waves at the edge of the reef slope (d), calculations of wave deformation on the reef were carried out, and the waves at the front of the fishing port at the reef tip (e) were determined.

v) Computation of the waves at the front of the fishing port

The waves labeled (c) and (e) above strike the front of the fishing port. Here, we synthesized these two waves in terms of energy, and determined the data for the incoming

waves (f) in the fishing port.

Figure 2-2-2(4) shows a flow diagram for the wave computations described above, and Figure 2-2-2(5) shows the type diagram for the wave distortion.

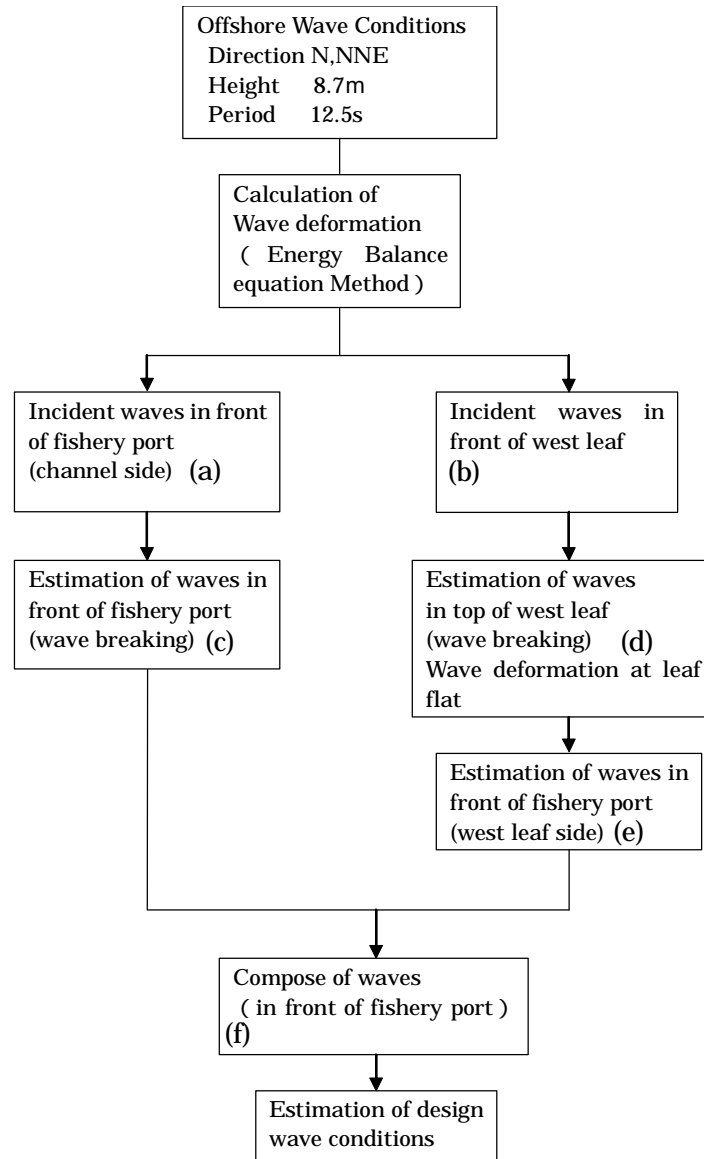


Figure 2-2-2(4) Flow of settings for the design wave

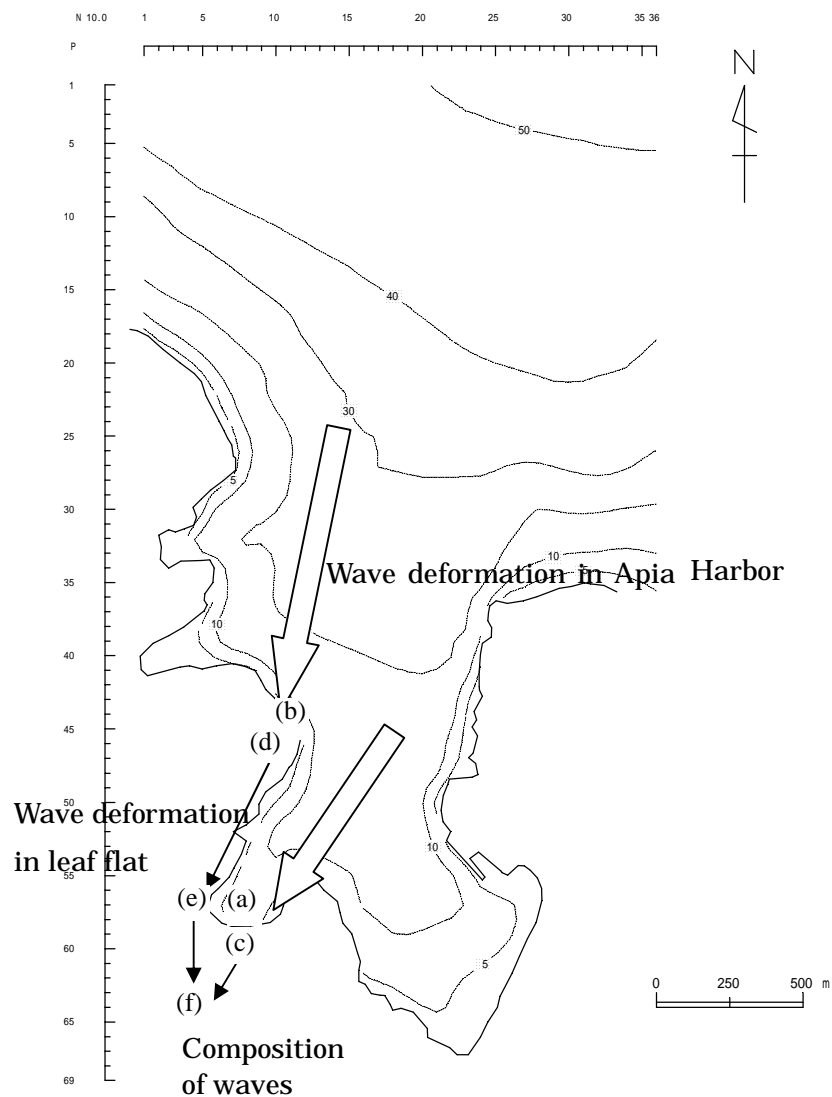


Figure 2-2-2 (5) Wave distortion type diagram
(circled numbers correspond to the flow diagram on
the previous page)

(ii) Results of the wave distortion computation

Figure 2-2-2(6) shows an example of the results of wave distortion computation for Apia Fishing Port. Computing the waves at the mouth of the fishing port using these results produces the following.

Table 2-2-2(9) Settings for the waves at the front of the fishing port

Wave condition of offshore wave		At mouse of fishing port (in channel)		At reef in front of fishing port			Combined wave height(f) combined (c) and (e))
		Wave height Ho' (a)	Breaking wave height (c)	Wave height Ho' (b)	Breaking wave height at reef edge (d)	Wave height at end of reef in front of fishing port (e)	
Direction	NNE N	N50 ° E	N50 ° E	N30 ° E	N30 ° E	N30 ° E	N45 ° E
Wave height(H)	8.7m	0.87m	1.52m	6.96m	1.98m	0.84m	1.74m
Wave period(T)	12.5s	12.5s	12.5s	12.5s	12.5s	12.5s	12.5s

Based on the above, the waves used for the design of the fishing port facilities were as indicated below.

Table 2-2-2(10) Design waves for the fishing port facilities

(waves in front of the jetty)

Direction (D)	N45 ° E
Wave height (H)	1.75m
Wave period (T)	12.5s

3) Basic design of the civil facility

(i) Jetty

The wharves for landing and preparation of alia boats will be planned using a jetty format. From the standpoint of calmness in the existing fishing port, the jetty will be constructed with piers through which the boats can maneuver, as indicated below. The side of the jetty on the existing fishing port side (east side) will be the fish landing wharf, and the opposite side (west side) will be used as a wharf for preparation. Also, taking into consideration the calmness behind the tip of the jetty and the effects of the jetty structure on the stability in the area, rubble stones will be used to construct a rubble mound protection

i) Selection of the jetty structure (study of the calmness in the fishing port)

In Apia Fishing Port, the problem sometimes occurs of fishing boats moored in the fishing port being damaged or washed out to sea in rough sea conditions such as cyclones. With respect to the expanded fishing port facility (jetty) being planned, a study is being carried out on the fishing port facility to assure calmness in the fishing port so that these boats can be moored and landed safely.

(a) Characteristics of waves coming into the fishing port

The results of a study on natural conditions were used with respect to waves coming into the Apia Harbor. According to the results, offshore waves occur in the Apia Harbor at the frequency indicated below.

Wave height	1 m-	32 days per year
	2 m-	16 days per year
	3 m-	8 days per year

Given these figures, the limit wave height for outgoing boats was set at three meters in the offshore wave conditions. In the technical standards and the Explanation of Standards for the Port Facilities (1999), when the degree of calmness in the mooring basin in front of the mooring facility was examined, it was found that anchoring or mooring can be assured on 97.5% of the days throughout the year. Looking at the conditions under which incoming waves occur as indicated above, the incidence of offshore waves that have a height of less than three meters is 97.8%, which closely parallels the figure for the number of days on which anchoring or mooring can be assured. For the wave period, a figure of 10 seconds was targeted, for which the occurrence rate is high for higher waves.

(b) Waves at the front of Apia Fishing Port

The waves at the front of Apia Port were computed in relation to the offshore waves described above. As with the computation for the design wave, composite waves

consisting of waves coming directly into the fishing port from the channel and waves traveling along the reef at the front of the fishing port on the west side were used for the computation.

Figure 2-2-2(7) shows the results of the wave conversion calculation for Apia Fishing Port. Using these results, computing the waves at the mouth of the fishing port produces the following data.

Table 2-2-2(11) Settings for waves at the front of the fishing port
(computation of the degree of calmness)

Wave condition of offshore wave		At mouse of fishing port (in channel)		At reef in front of fishing port			Combined wave height(f) combined (c) and (e))
		Wave height Ho' (a)	Breaking wave height (c)	Wave height Ho' (b)	Breaking wave height at reef edge (d)	Wave height at end of reef in front of fishing port (e)	
Direction	NNE N	N50 ° E	N50 ° E	N30 ° E	N30 ° E	N30 ° E	N40 ° E
Wave height(H)	3.0m	0.45m	0.65m	2.40m	1.56m	0.67m	0.93m
Wave period(T)	10s	10s	10s	10s	10s	10s	10s

(c) Study of calmness within the existing fishing port

Using the conditions for the waves at the mouth of the fishing port that were computed above, a study was conducted on the calmness within the existing fishing port. There were two proposed layouts targeted by the study; in one (Pattern A), the jetty had a pier type which wave can pass through the jetty, and in the other (Pattern B), waves are not able to pass through the jetty. The calculation results are shown in Figure 2-2-2(8).

Based on these results, for Pattern A, wave height ratio in front of the landing wharf on the existing fishing port side wave height ratio would be around 0.7. For Pattern B, on the other hand, in which wave are not able to pass through the jetty, it was found that the wave height ratio on the existing fishing port side, and particularly at the front of the landing wharf, is 1.0 or higher, and this hinders the safe landing of the boats. Also, with Pattern B, because the area inside the fishing port is sheltered, there are concerns that effects of seiche could cause disturbances in the fishing port.

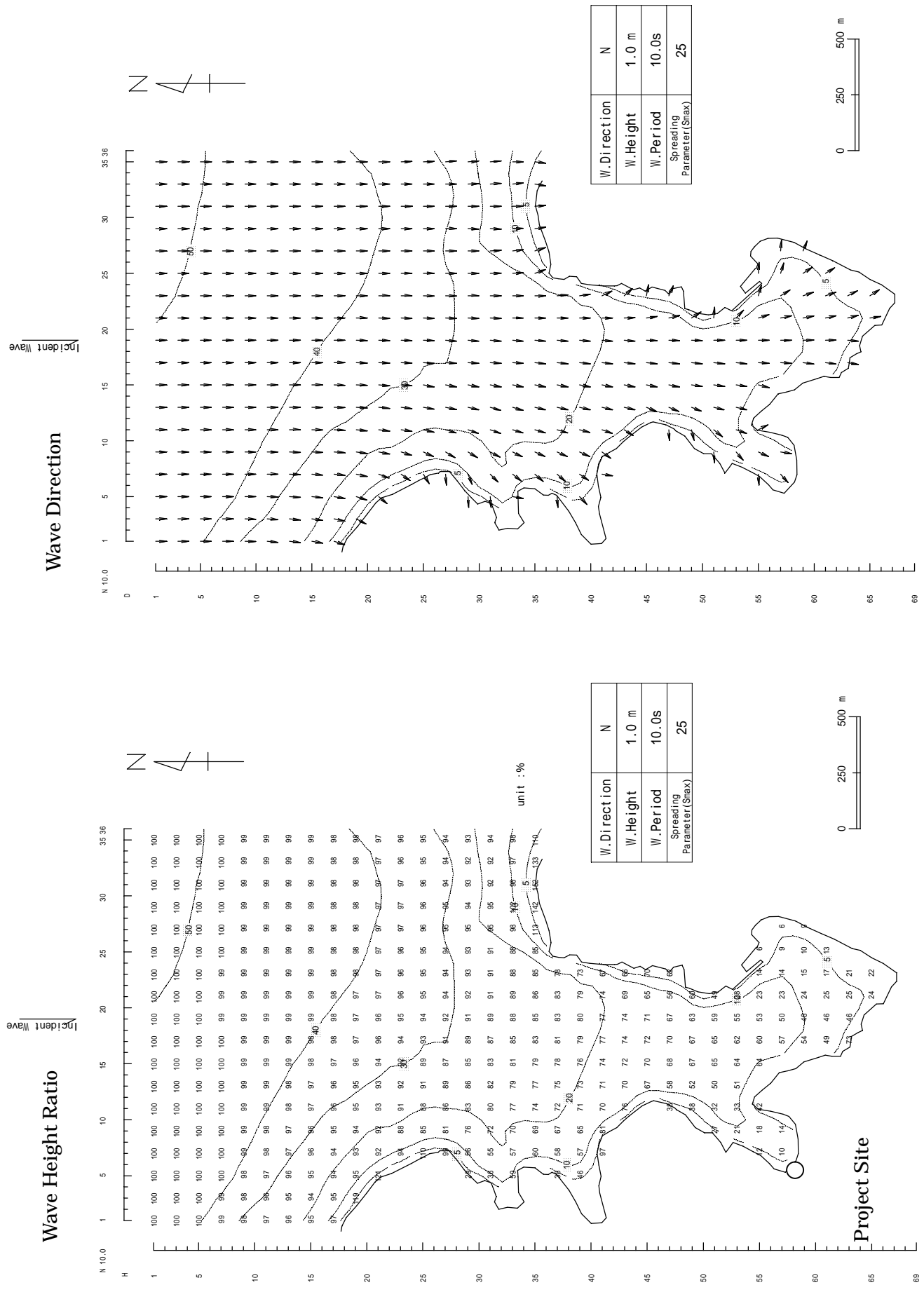


Figure 2-2-2(7) Results of the wave distortion computation

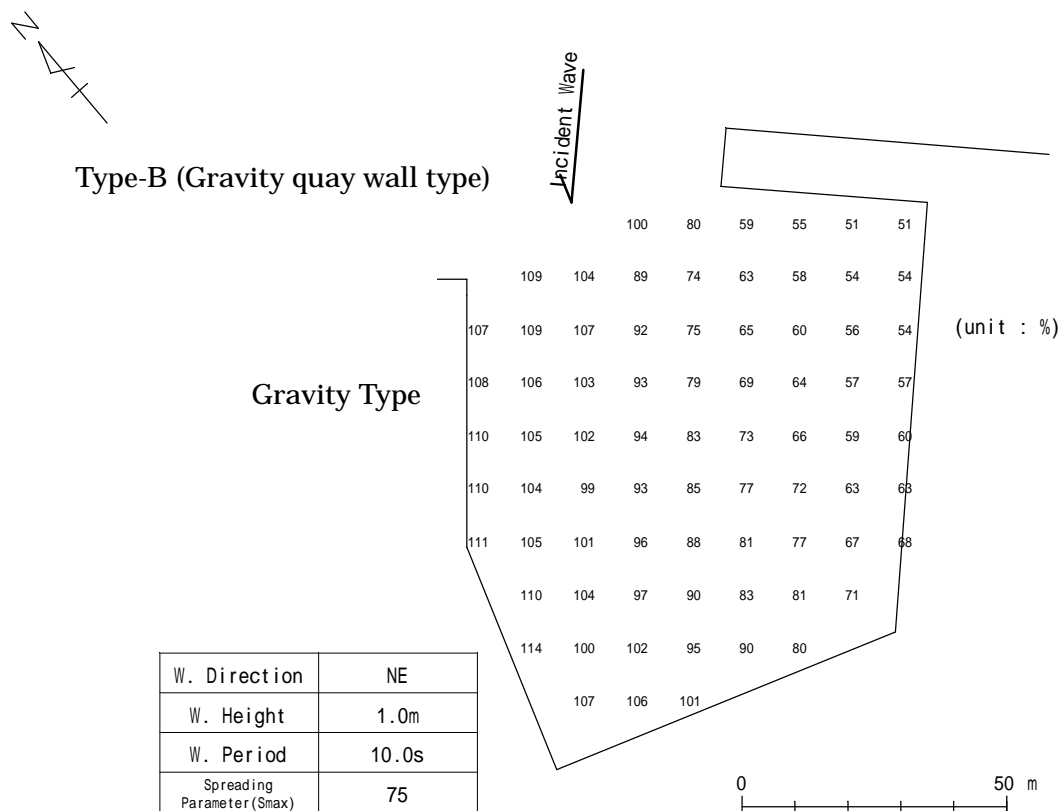
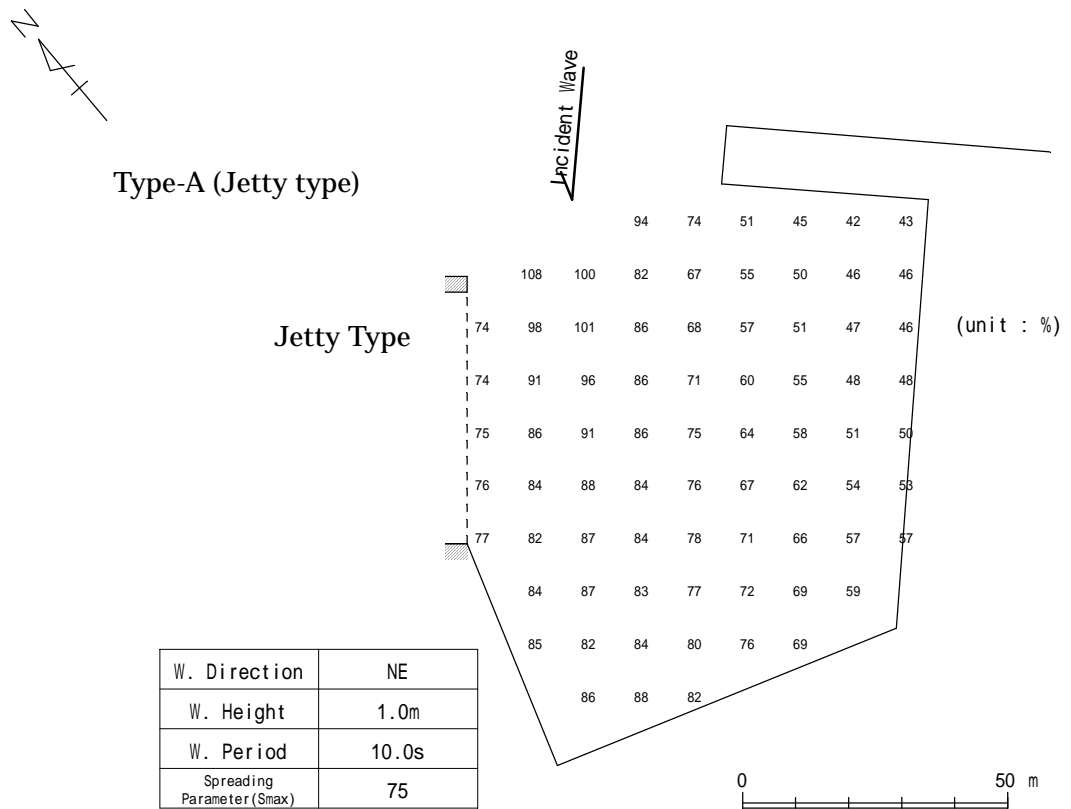


Figure 2-2-2(8) Results of calculating the degree of calmness in the fishing port

ii) The jetty length and crown height

The effective length of the jetty (the part that is used for mooring boats) is set at 40 m, and the crown height, like that of the wharves of the existing fishing port, is +2.0 m.

iii) Jetty width

As explained earlier, the side of the jetty that is on the existing fishing port side will be used for landing alia boats, and the side that is on the bus terminal side will be used for preparation. Because of this, forklifts (body width of 1 m and body length of 2.5 m, fork length of 1 m) and people will be going back and forth on the jetty in order to unload fish and supply ice.

Sections of both ends of the jetty measuring 1.5 m in width will be used as a handling area, and the center area needs to be 5 m to allow forklifts to come and go, and to turn around, so the width of the jetty will be 8 m.

iv) Jetty structure

The jetty will have a pier type structure made of steel pipe piles. The design conditions for the pier type structure are set as indicated below.

a) Tide level

H.W.L. +1.0m

L.W.L. 0.0m

b) Specifications

Planned water depth -0.50 m

Crown height +2.00 m

Width 8.00 m

Structure length 64.60 m

(For the jetty, the effective length where boats can be moored will be 40 m, and taking into consideration the yard width of 15 m for the rubble mound protection and for preparing boats, and the width of the seawall at the front of the site, the structural length of the jetty will be 64.6 m.)

c) Wave conditions

The design wave is as indicated below.

Wave height H=1.75 m

Wave period T=12.5 sec

d) Soil conditions

These will be based on the results of the soil investigation survey.

- e) Load weight
 - Load weight 1 t/m² (including a forklift weight of 2 tons)

- f) Planned boats
 - Alia fishing boats
 - Class A Length: 9.7 m, width: 3.1 m, waterline: 0.5 m
 - Class B Length: 11.7 m, width: 3.9 m, waterline: 0.5 m
 - The weight will be 2.0 tons.

- g) Fenders
 - Fender materials (100 H x 1,500 L) for the fishing port will be installed.

- h) Mooring posts and rings
 - Tractive force (at normal times): 10 kN
 - The mooring posts and mooring rings will be made of stainless steel.
 - Positioning interval: Mooring posts: Positioned on the pile rows
 - Mooring rings: Positioned in the center of the pile rows

- i) Design seismic coefficient
 - kh=0.15

- j) Steel pipe pile corrosion speed
 - H.W.L. or more: 0.3 mm/year
 - H.W.L. to L.W.L.-1.0 m: 0.1 - 0.3 mm/year
 - L.W.L.-1.0 m or deeper: 0.1 - 0.2 mm/year
 - In sea bottom soil: 0.03 mm/year

 - As a countermeasure of keeping the steel pipe piles from corroding, FRP mortar linings will be installed on pile heads that are shallower than L.W.L.-1.0 m.

- k) Service life: 30 years

Figure 2-2-2(9) shows cross section of the jetty.

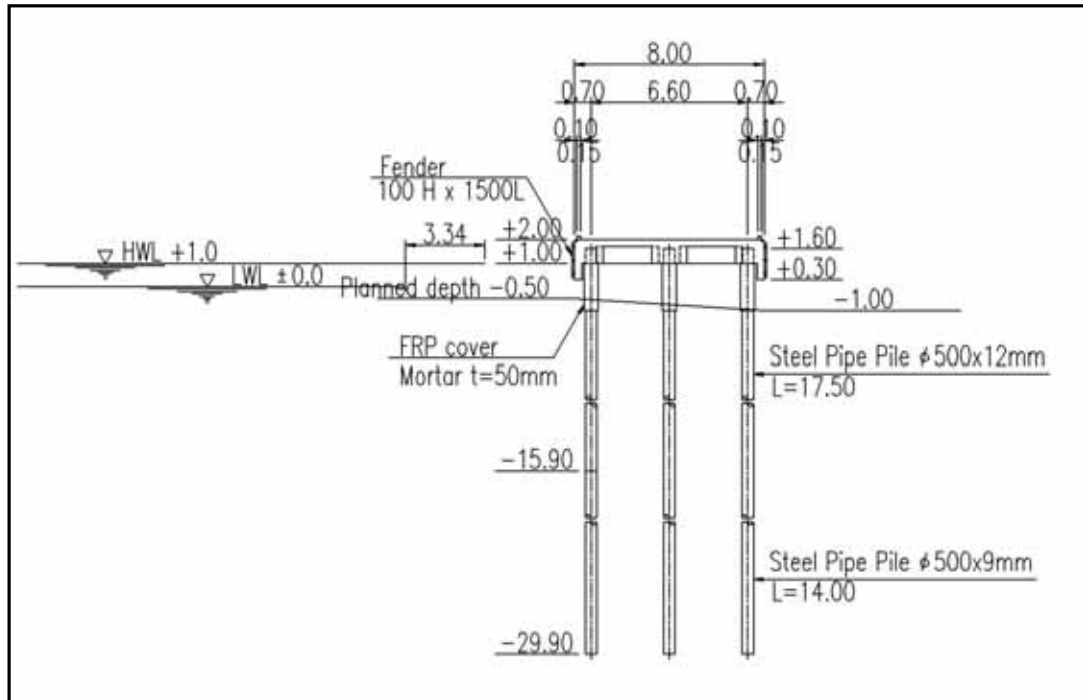


Figure 2-2-2(9) Cross section of the jetty

v) Rubble mound protection for the jetty

Because the jetty is to be built like a pier, incident waves coming into the area around it could affect the calmness and the uplift pressure in the wharf section. Taking this into consideration, as well as the stability of the coping of the jetty structure, a rubble mound protection will be installed at the tip of the jetty, using rubble stones. Because the rubble mound protection will protect only the tip of the jetty, the installation length will be met to the jetty width and will be 8 m. The specifications of the will be set as indicated below.

(a) Crown height

Because boats will be moored behind the rubble mound protection made of rubble mound, and because fishermen will be unloading their fish and preparing their boats on the jetty, the tolerable limit of overtopping rate will be used when studying the crown height of the rubble mound protection. Here, the tolerable limit of overtopping wave rate q (m³/m/s) is set to 0.02. Using a design diagram for the overtopping rate, the crown height h is calculated as follows.

$$h = 1.25 \times H_o'(\text{clearance}) + \text{H.W.L.} + \text{extra margin of height}$$

Here,

The equivalent offshore wave height for the $H_o' =$ design wave height ($H=1.75\text{m}$) = 1.30 m

$$\text{H.W.L.} = +1.0 \text{ m}$$

$$\text{Crown height} = 1.25 \times 1.30 \text{ m} + 1.0 \text{ m} + 0.37 \text{ m} = +3.00 \text{ m}$$

Based on the above, the crown height of the rubble-mound protection will be +3.00 m.

(b) Rubble mound weight and crown width

When the required rubble mound weight is calculated using the Hudson's equation, the result is 0.68 tons. Allowing some extra for the breakwater head, it was decided that one ton of armor stone will be used. With a rubble-mound type of protection, the crown will have to be wide enough to avoid slipping because of external force such as the force from waves. At least three rows of armor stone will be used at the crown, and the crown width will be 3 m.

(c) Water depth of the rubble mound protection

Based on the results of the bathymetric survey, the installation water depth of the rubble mound protection will be between -1 and -3 m. Figure 2-2-2(10) shows a standard cross section diagram of the rubble mound protection for the jetty

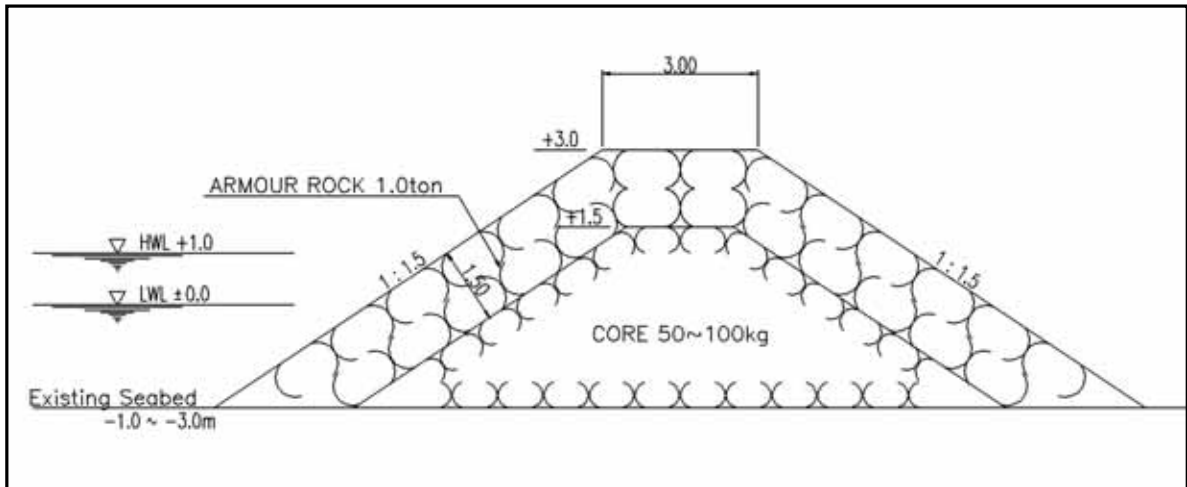


Figure 2-2-2(10) Cross section of the rubble mound protection for the jetty

(ii) Seawall for reclamation area

A yard where fishermen can prepare their boats is planned for the water area in front of the bus terminal, which is located on the west side of the jetty. Because the yard will be developed by reclamation, the sea side will be a seawall structure. Like the existing bus terminal, the seawall structure will be rubble mound type. The cross section of seawall will be set as indicated below.

i) Crown height

Like the rubble mound protection for the jetty, the crown height of the seawall will be calculated as shown below, using the design diagram of the wave overtopping rate.

$$\begin{aligned}\text{Crown height} &= 1.25 \times 1.30 \text{ m} + 1.0 \text{ m} + 0.37 \text{ m} \\ &= +3.00 \text{ m}\end{aligned}$$

ii) Rubble mound weight

When the rubble mound weight is calculated using the Hudson's equation, the result, like that for the rubble mound protection for the jetty, is 0.68 tons. Therefore, one ton of armor stone will be used. Similarly, the crown width will be also 3 m.

iii) Water depth of the seawall

Based on the water depth planned for the boat turning basin, the water depth of the seawall will be -0.5 m.

Figure 2-2-2(11) shows cross section of the seawall.

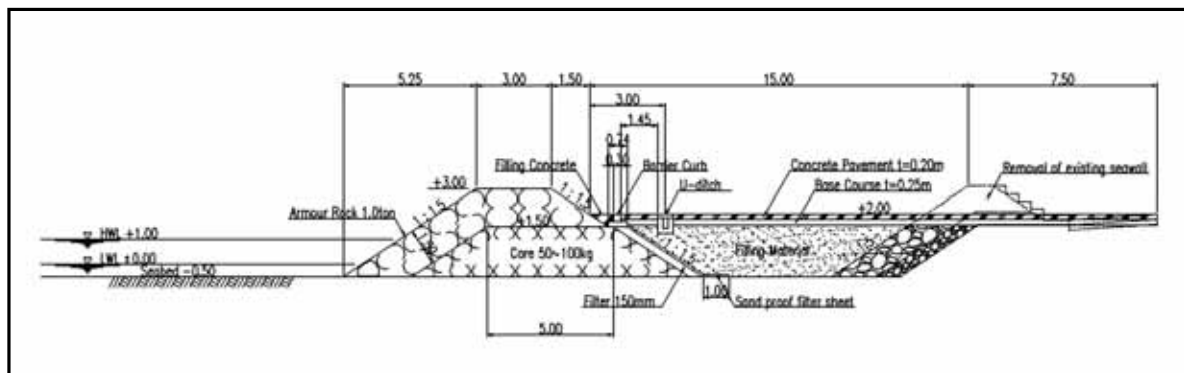


Figure 2-2-2(11) Cross section of the seawall

(iii) Improving the existing slipway

The existing slipway is used for evacuation of alia boats when cyclones hit and for repair of fishing boats. To make it easy to pull boats out of the water, boat sliders (height: 70 mm) will be installed. A hand-operated winch (3-ton type) will also be installed.

(iv) Incidental facilities

The following facilities are planned as incidental facilities for the jetty and the yard for fishing boat preparation.

- i) Lighting : For safety around the jetty and the preparation yard at night, two lights will be installed on the jetty, and two more will be installed in the boat preparation yard.

- ii) Water drainage: A water drainage gutter will be installed behind the seawall at the boat preparation yard, to drain off water from wave overtopping when cyclones hit and to drain off rainwater.
- iii) Navigation Aid: One beacon will be installed on the rubble mound protection for the jetty.

4) Project plan for the civil facilities

Figure 2-2-2(12) shows the project plan for the civil engineering facility planning.

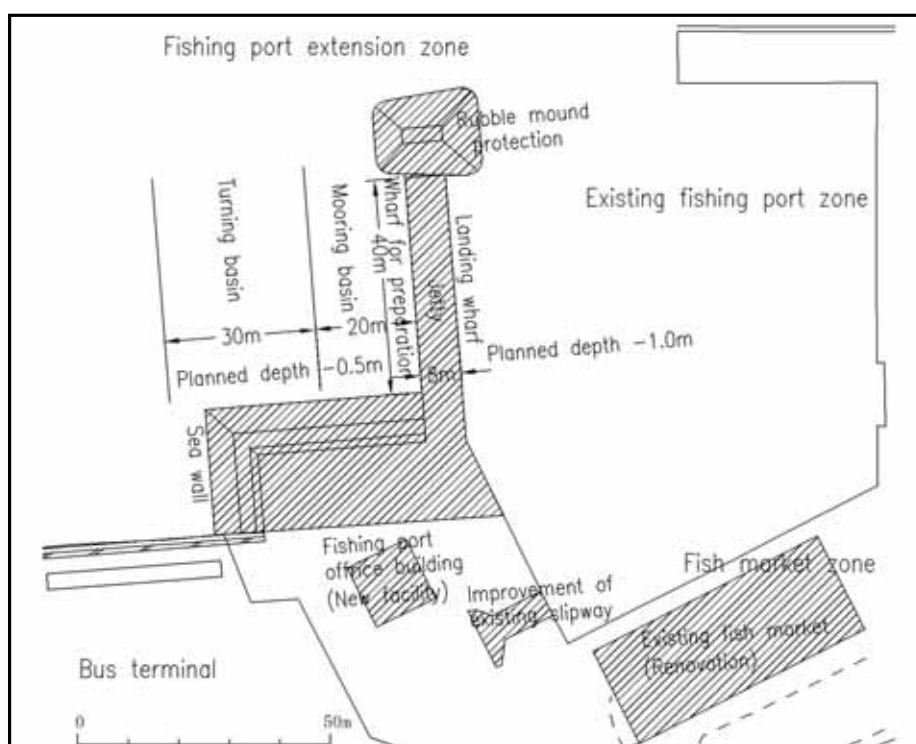


Figure 2-2-2(12) Project plan for the civil facilities

(2) Basic design for architectural facilities

1) Establishing space scope and scale for architectural facilities

(i) Fisheries Center Administration Building renovation

i) Selection of the buildings to be renovation at the Fisheries Center

Of the two buildings that were provided in 1978 through Japan's Grant Aid Programme, the Fisheries Center Administration Building, which is the core building at the Center, will be renovated. For the Workshop Building, most of the building is currently not in use, and the renovation works concentrates the Administration Building. Additionally, renovating the Administration Building can cover the current functions of the fishing port management organization. For these reasons, the renovation of the Workshop Building is excluded from the project, and the Administration Building will be renovated.

ii) Method for renovating the Fisheries Center Administration Building

In addition to the waterproofing surface layer of the roof, the roof AAC panels and the exterior wall panels have been severely damaged, so the exterior wall panels and the roof panels will be completely removed. Also, because there is still asbestos in the interior of the building, and because floor planning is needed that can accommodate additional personnel and departmental reorganization in the current Fisheries Center organization, the current interior walls will be completely removed. As a result, the current steel skeleton building framework, which is undamaged, will be used and comprehensive renovation will be carried out on both the interior and the exterior.

iii) Functional elements in the floor planning of the Fisheries Center Administration Building

Floor planning of the Fisheries Center Administration Building will be based on the following accommodation conditions.

(a) Departments in the Fisheries Division (of the 81 staff members currently employed in fiscal 2005, a total of 50 will be targeted, comprising 47 staff members and three volunteers)

Assistant Director (1), Inshore Fisheries Section (14), Extension Section (11), Enforcement and Statistics Section (5), Aquaculture Section (8), Administration Section (11)

(b) Fisheries Center support functions A (recovery of functions that existed when the building was constructed but have since become unusable)

Training Room, Library, Laboratory

(c) Fisheries Center support functions B (restoration of functions installed additionally at the Fisheries Center after the building was constructed)

Diving Instrument Storage, Showers

iv) Specification of scale for the various office space in the Fisheries Division Administration Building

Because this building is targeted for renovation, floor space already exists for the various existing rooms of the present departments. When these rooms are reorganized, the floor spaces of the existing rooms of the various departments will be taken into consideration and the standard office space per person will be set as follows, with reference to the Architectural Database compiled by the Architectural Institute of Japan.

Manager's office: Approximately 35 m²

Department head class: Approximately 12 m²

General staff: Approximately 5 m²

v) Functions and specification of scale of the training room in the Fisheries Division Administration Building

(a) Training room functions

When this building was first constructed, the training room existed, but it currently cannot be used because of rain leaks. However, a training room and meeting room rank high in necessity and importance in the guidance and instructional activities targeting fishermen that are being carried out by the Samoan Fisheries Division in order to promote the fishing industry, provide guidance in improvement, and protect the environment. Currently, these activities are being carried out in the former wet laboratory because of the rain leakage in the training room, but if repairing this section will result in a new office space, it will be necessary to assure space to be used as a training room.

(b) Specification of scale

There are 110 fishing boats registered with the Fisheries Division. Those 110 boat owners can basically be said to be the number of targeted fishermen. The number of participants will vary depending on the configuration of the training, but for technical courses conducted in a seminar format, participants have ranged anywhere from 5 or 6 to 20 people, depending on the topic. Also, at times around 40 people assemble for lecture-style gatherings. Consequently, as the target specification of scale for the training room, one-third (36) of the fishing boat owners noted above will be assumed as the target number for the design standard. At the same time, based on the Architectural Database compiled by the Architectural Institute of Japan, the necessary floor space for this type of lecture-style meetings is one table per three people, or approximately 1.7 m². As a result, the floor space for the training room will be 36 people x 1.7 m² = 61.2 m² → 60 m².

vi) Functions and specification of the scale of the library in the Fisheries Center Administration Building

(a) Library functions

When this building was first constructed, the library existed, but it currently cannot be used because of rain leaks. In order to protect the documents stored there, the Fisheries Division of Samoa is storing them in a building that it built through its own efforts, but that is more of a warehouse-type setup, and is not being effectively utilized. At the Fisheries Division, it is necessary to convert the current storage place to be used as an office to accommodate an increase in personnel, and to restore the new library. The necessity of this function is similar to that of the training room, from the standpoint of improving the technology and the research activities as the Fisheries Division and

providing guidance for fishermen.

(b) Specification of scale

The current document storage space is a warehouse-type setup, and there is approximately 20 m² of space. As a library, the space will provide bookshelves for storage, and the layout will include reading desks and desks for the library office staff. The scale will be set at 6 m x 6 m.

vii) Functions and the specification of scale of the meeting room for personnel in the Fisheries Center Administration Building

(a) The functions of the personnel meeting room

Currently, there is no meeting room for personnel in the Fisheries Center Administration Building. Discussions between the various departments have always been held in the offices as necessary, using the tables in the department manager's office that are normally used for meeting visitors, or being held in the former wet laboratory if it was raining, and the staff have always put up with the inconvenient conditions. Having a meeting room within the department is being assigned a high degree of necessity in order to make sure that the work of the Fisheries Division is carried out smoothly.

(b) Specification of scale

There are a total of 84 employees in the Fisheries Division. There are between 13 and 19 staff in each department. However, because there are around 10 participants taking part in most of the meetings held within the department or between departments, 10 people is set as the basic target number of people. At the same time, according to the Architectural Database compiled by the Architectural Institute of Japan, the floor space necessary for this kind of lecture format is 2-2.5 m² per person. Consequently, the floor space for the meeting room will be set at 10 people x 2.3 m² = 23 m².

(ii) Basic planning for repairs of the Fish Market building

i) Policy for renovating the current Fish Market building

Along with dynamic repairs to the steel skeleton frame of the current building, which is a steel frame structure, and complete replacement of the roof, including the roof bed, measures are being planned for the building as a public market to alleviate congestion at the sales counters and to improve the functions from a hygienic standpoint. The interiors of sections that are leased to the private sector, which makes up 50% of the entire floor space, are excluded from the project.

ii) Fish Market building items to be renovated

(a) Replacement of the roof

The roofing materials of the current roof were replaced jointly by the Fisheries Division of Samoa and the private company occupying the building, but poor-quality sheet steel was used, and because the purlin which is the roof under structure, was not thoroughly mended, the entire roof, including the under structure, will be replaced.

(b) Structural reinforcement of the steel column foots and repainting of the frame

Twelve severely corroded locations on the foots of the steel columns in the market sales area will be reinforced. Also, in order to conserve the strength of the steel skeleton frame, all of the frame parts will be repainted.

(c) Repairs to the floor in the market sales area

The floor drainage treatment in the market sales area relates back to the current drainage standards set by the government of Samoa. Also, from a standpoint of assuring sanitation and hygiene, the floor will be repaired, including floor drainage planning.

(d) Expansion of counters in the market sales area and redoing the counter layout

In order to alleviate congestion in the market sales area and to accommodate demand by venders for space, the counters in the market sales area will be organized and expanded, and the layout will be redone.

(e) Repainting of exterior walls

After the market building has been repaired, from the standpoint of overall hygiene and sanitation and also for the purpose of improving the market image, the outer walls, which comprise 50% of building exterior elevation, will be repainted.

(iii) Basic planning for the fishing port office building

i) The functions and construction locations for the fishing port office building

Along with the renovation and refurbishment of the Fish Market and the refurbishment of the expanded fishing port, the building is being planned in such a way as to provide functions for the Fisheries Division's "Enforcement and Statistics Section" office, in order to both bolster Fish Market management functions in the Fish Market zone and carry out the expanded fishing port management functions at a site closer to a cutting-edge facility.

The request by the Government of Samoa was for an expansion that would be integrated with the Fish Market building, but the roof of the current Fish Market building is a precisely symmetrical shape, and both economically and in terms of structural dynamics, it would not be possible to maintain the shape of the existing skeletal frame of the building. Additionally, when planning the layout for the expansion, the ability to ensure that the current Fish Market will remain open to the public as a market, and to avoid congestion in pedestrian and vehicle traffic between the Fish Market and the adjacent bus terminal must be taken into consideration. Consequently, the expansion will not be constructed at a position that integrates it with the

current Fish Market, but rather the building will be constructed as a separate new building serving as an intermediary through which services can be provided to both the current Fish Market building and the expanded fishing port.

ii) Specification of scale

This building will have a joint office scale that is shared between the Fishing Fisheries Division Enforcement and Statistics Section (8 of 13 people) and the Fish Market Administration Section (3 of 7 people), in order to allow management of the expanded fishing port to be carried out at a location that is close to a cutting-edge site. With respect to the office scale, as with the office in the Fisheries Center Administration Building described earlier, the standard floor space will be approximately 12 m² per person at the manager class and approximately 5 m² per person for general staff.

(iv) Regulatory criteria for the construction design

The construction facility design targeted by this project involves both the renovation of the existing building and expanded and new construction. Samoa has formulated its own “National Building Code in Western Samoa” modeled on the building standards laws and fire codes of New Zealand and Australia. The expanded construction and new construction will be designed based on the building codes of Japan while referring to these other laws. Also, it was confirmed with the Ministry of Works, Transport and Infrastructure that for buildings for which the existing structural framework will be used, rather than making the building standards relate back to the current “National Building Code in Samoa”, the original design standards would be ensured. It was also confirmed that, when structures are reinforced, the detailed designs would be provided to the authorities when they are drafted.

(v) Design criteria for the design wind velocity

Based on Samoa’s “National Building Code in Samoa”, 70 m/sec will be set as the maximum wind velocity for the ultimate stress limit, and a wind velocity of 57 m/sec, which is the design standard wind velocity in Samoa, will be used as the allowable stress design index.

(vi) Design criteria for the design seismic coefficient

Based on Samoa’s “National Building Code in Samoa”, 0.145 will be set as the seismic acceleration coefficient, and 0.67 will be set as the site classification.

(vii) Sewage water standards

Based on guidance provided by the Samoa Water Authority, soil sewage will be pumped up by being collected in the storage tank. Miscellaneous waste sewage will be treated by means of underground soakage.

(viii) Countermeasures against salt damage

Because the project site is a coastal area, salt damage presents a danger. As a result, resistance to saltwater will be taken into consideration when selecting principal structural materials and materials for electrical facilities that will be directly exposed to external conditions.

2) Floor layout planning

There are three facilities to be constructed in the project. Of these, two are existing buildings that are to be renovated, and one is an independent building in the Fish Market zone that is to be expanded. As noted in section 2-2-1(1) 2) page 2-14, the Fisheries Center zone and the Fish Market zone are adjacent to each other, but each of them forms an independent zone, and the only traffic between them currently consists of people. Although the “people” traffic will become stronger as a result of the renovation to be carried out in the project, there will be no significant changes in the current situation.

In the Fish Market zone, on the other hand, the existing Fish Market is adjacent to a public bus terminal and the site on which the bus terminal is located, and the traffic on the boundaries of that site includes not only public buses but taxis and passenger cars as well. The zone actually involves three elements; there is also a “people” element in the form of shoppers and pedestrians, as well as traffic in the form of fish catches being brought in from the sea.

As a result, a building layout is planned that will separate the various types of traffic as shown in the diagram below.

Moreover, in the existing fishing port zone and the expanded fishing port zone, operations conducted by the alia boats and the commercial boats, such as landing, lay-by, preparation, and other activities that take place in the fishing port, will be carried out independently, and the flow lines will be separated and congestion eliminated.

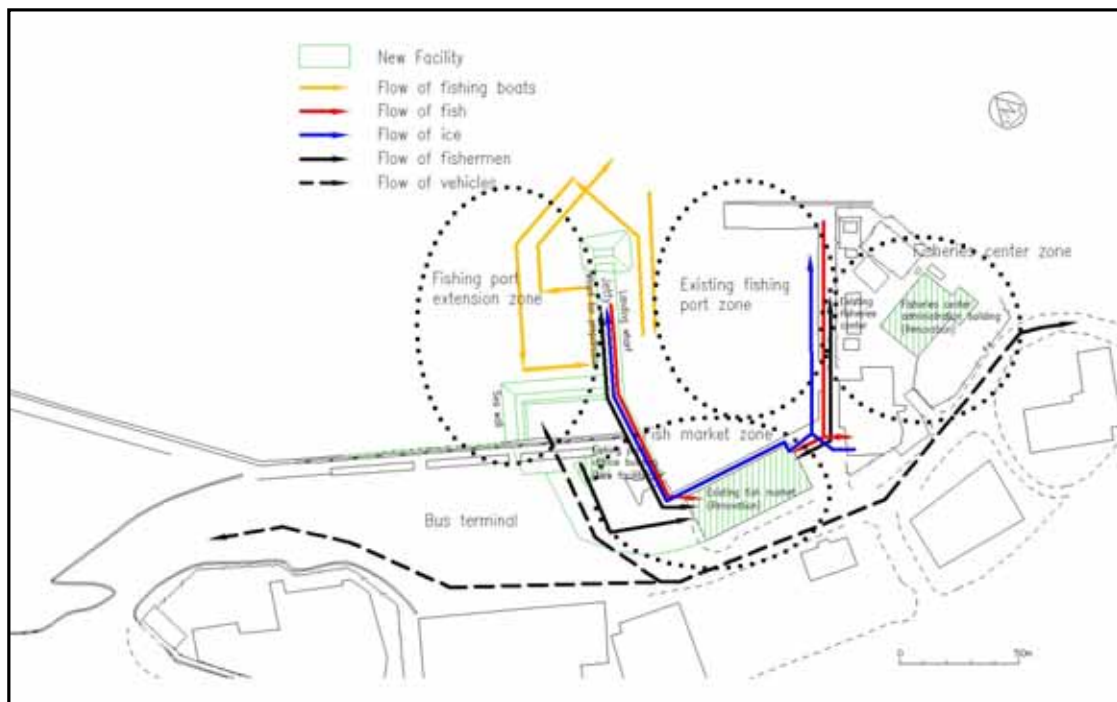


Figure 2-2-2(13) Function layout planning

(including planning of flow lines for fish catches, people and vehicles)

3) Basic plan for architectural facilities

(i) Layout planning for the facilities to be built

i) Floor planning for the Fisheries Center Administration Building

Because floor planning for this building will be carried out with the original steel skeleton framework left in place, the outer shape of the building will be the same as that of the existing building. In the floor layout of this building, there is a first floor at ground level and a deck-type mezzanine. Offices for the various departments laid out on the first floor, and there will be a library near the entrance. The library will serve not only as a document room of the Fisheries Division, but is also intended to be a facility that must be widely accessible to the public as a repository of documents belonging to Samoa. Moreover, direct access from the outside will be assured by providing a separate entrance that will allow fishermen to enter the training room outside of regular hours in order to attend courses. Also, the floor planning will be set up so that diving staff members and fish inspectors can access the building directly from the outside.

The director's office, which serves as the center of Fisheries Division management, the General Affairs Department office and the conference room (meeting room) in the department will be located on the mezzanine. The area under the mezzanine is currently a hideout for wild dogs and is filled with garbage that has blown in; from both a security and a sanitation standpoint, it should be effectively utilized as a multi-purpose storage space by pouring a concrete floor here and surrounding it with a fence.

ii) Floor planning for the Fish Market

Based on the basic renovation policy, the layout of the counters will be redone in the sales area, which comprises 50% of the building. Because the current layout is basically functioning appropriately, there is no need to change the thinking behind the layout, but the length of the permanent concrete counters will be increased, and movable wooden counters will be installed that will provide flexibility in the overall layout. Also, the interior will be redone without changing the position of the existing Fisheries Division Fish Market administration office.

iii) Floor planning for the fishing port office building

This building serves as an office for the Fisheries Division Enforcement and Statistics Section staff and the Fish Market staff. The office alone has only one sole function, but because it will be the pivotal facility for expanded fishing port management, including the existing fishing port, an unobstructed view of the entire fishing port will be assured, in order to permit close contact with the activities of the fishermen, and consideration will be given to providing easy access for the fishermen.

(ii) Cross-section planning for the facilities to be built

i) Cross-section planning for the Fisheries Center administration building

The existing Fisheries Center administration building has a flat roof, and is rain-proofed by means of an asphalt layer with a rain drainage gradient of 1/100. Technically, this flat roof construction configuration is one approach that is generally used, but most of the buildings in Samoa have sloping steel sheet roofs. Taking into consideration the natural conditions of Samoa, where the rainfall is heavy, a steel skeleton roof truss will be added and the shape of the roof will be changed from a flat roof to a sloping one.

ii) Cross-section planning for the Fish Market

For this building, the shape of the existing skeleton will be used as it is.

iii) Cross-section planning for the fishing port office building

The functions of this building are those of an ordinary office, and there are no special cross-section conditions caused by factors such as the installation of special machinery. Consequently, the cross-section building will have a sloping gable roof with a gradient of 1/4, designed to fit with the natural features of the landscape in Samoa. Taking into consideration the height of high tide when cyclones hit, the first floor deck height will be GL + 350, and the pole plate beam height will be 1 FL + 3,650 mm.

(iii) Structural planning for the facilities to be built

i) Structural planning for the Fisheries Center Administration Building

The existing structure is a steel skeleton rigid construction that uses an independent footing, and the exterior wall and roof slabs are covered with AAC panels. Because the existing skeleton can be used from a structural strength standpoint, it will be used just as it is as the structural framework. The AAC panel covering on the exterior walls will be restored, but the roof will be changed from flat slabs using AAC panels to a sloped gable roof. Because of this, a roof truss will be welded on in order to create a sloped roof shape within the range that does not exceed the existing dead load.

ii) Structural planning for the Fish Market

The existing structure is a steel skeleton rigid construction that uses a continuous footing. Repairing defects in the steel skeleton thickness of the steel frame column foots will restore the strength of the original design and the existing structural frame system itself will be used as it is.

iii) Structural planning for the Fishing Port Office Building

Because the functions of this building do not require the building to have a long span, a reinforced-concrete rigid construction will be used. The slabs will be reinforced concrete slabs,

and the exterior walls will be reinforced concrete blocks. As the fundamental design condition, a bearing capacity of 100 kPa is envisioned based on the boring N value of the project site. Because the building is single story, a concrete slab with a subsoil girder frame that has an independent footing and no piles will be used.

(iv) Building Finish Schedule

i) Finish Schedule of Fisheries Center Administration Building

Table 2-2-2(12) Exterior Finish Schedule

Exterior wall (Below existing steel beam)	Acrylic splay membrane paint on Autoclaved Aerated Concrete (AAC) panel
Exterior wall (Above existing steel beam)	Corrugated steel sheet on steel furring with grass-wool mat and steel wire net
Door and Window	Aluminum sash
Roof	Trapezoid type steel sheet roofing and asphalt roofing on plywood panel and steel furring with grass-wool mat and steel wire net

Table 2-2-2(13) Interior Finish Schedule

Room Name	Floor	Wall	Ceiling	Ceiling Height
Porch	Ceramic tile	Acrylic splay membrane paint on AAC)panel	Decorated acoustic board	3.0m
Entrance hall	Ceramic tile	Acrylic Emulsion Paint (AEP) on Gypsum Board	Decorated acoustic board	3.0m
Corridor	Vinyl tile	AEP on gypsum board	Acoustic board	2.7m
Reception office	Vinyl tile	AEP on gypsum board	Acoustic board	4.35m
Office	Vinyl tile	AEP on gypsum board	Acoustic board	2.7m
Library	Vinyl tile	AEP on gypsum board	Acoustic board	2.7m
Pantry	Vinyl tile	Vinyl Paint (VP) on gypsum board	Pre-finished gypsum board	2.5m
Training room	Vinyl tile	AEP on gypsum board	Acoustic board	3.0m 2.7m
Preparation room	Vinyl tile	AEP on gypsum board	Pre-finished gypsum board	2.7m
Laboratory	Vinyl tile	VP on gypsum board	Acoustic board	2.7m
Microscope room	Vinyl tile	Pre-finished light weight steel panel	Acoustic board	2.7m
Computer room	Vinyl tile	AEP on gypsum board	Acoustic board	2.7m
Conference room	Vinyl tile	AEP on gypsum board	Acoustic board	3.0m
Mezzanine step	Vinyl tile	AEP on gypsum board	Acoustic board	2.7m
Restroom and Shower room	Ceramic tile	Porcelain tile	VP on cement board	2.5m
Diving equipment storage	Mortar finish	VP on cement board	VP on cement board	4.0m
Storage	Mortar finish	VP on gypsum board	VP on cement board	2.7m

ii) Finish Schedule of Fish Market**Table 2-2-2(14) Exterior Finish Schedule**

Exterior wall	Acrylic enamel paint after cleaning
Window grill	Replacing aluminum grill
Roof	Trapezoid type steel sheet roofing

Table 2-2-2(15) Interior Finish Schedule

Room Name	Floor	Wall	Ceiling	Ceiling Height
Sales area	Pole-urethane floor paint on additional concrete t=120	Steel structure: Pole-urethane finish paint with epoxy resin-under-coat after surface cleaning with steel brushing	Trapezoid type steel sheet roofing	-
Fishery division office	Vinyl tile	AEP on gypsum board	Pre-finished gypsum board	2.8m

iii) Finish Schedule of Fishing port Office**Table 2-2-2(16) Exterior Finish Schedule**

Exterior Wall-1	Acrylic splay membrane paint on cement mortar
Exterior Wall-2	Corrugated steel sheet
Door and Window	Aluminum sash
Roof	Trapezoid type steel sheet roofing

Table 2-2-2(17) Interior Finish Schedule

Room Name	Floor	Wall	Ceiling	Ceiling Height
Porch	Pole-urethane floor paint on Cement mortar finish floor	Concrete column: Acrylic splay membrane paint	Vinyl paint on concrete slab	3.0m ~ 3.7m
Office	Vinyl tile	AEP on gypsum board	Acoustic board	2.8m
Restroom	Ceramic tile	Porcelain tile	VP on cement board	2.5m
Storage	Cement mortar finish floor	VP on gypsum board	VP on cement board	2.8m

(v) Water supply and drainage system planning**i) Fisheries Center Administration Building**

When the work begins on removing the leading-in water supply pipes on the premises, valves will be shut off and the water supply will be shut down temporarily. However, those leading-in pipes will be used as connecting pipes for the project.

ii) Fish Market Building

As with the Fisheries Center Administration Building, the existing leading-in pipes will

be used as connecting pipes for the project.

iii) Fishing Port Office Building

The water supply pipes (50 φ PVC) buried along the road that runs in front of the Fish Market on the south side will be connected directly to the Fish Market expansion.

iv) Daily water demand per building

Given below is a table showing the daily water demands by individual buildings.

Table2-2-2(18) Daily water demand

	Number of units	Demand per unit	Number of units per hour	Maximum demand per hour	Operatio n hour	Coeffici ent	Demand per day	Remarks
(上水)	n	(L)	(/h)	(L/h)	h	k	(L/day)	
A Fisheries Center								
Toilet closet bowl	4	12	9	432	8	0.5	1,728	
Urinal (flash valve)	2	5	16	160	8	0.5	640	
Wash basin	5	3	16	240	8	0.5	960	
Shower	3	42	3	378	8	0.5	1,512	
Faucet	1	15	9	135	8	0.5	540	
Lab sink	1	15	9	135	8	0.5	540	
(Sub total)							5,920	
B Fish Market								
Sink	2	30	9	540	8	0.5	2,160	
Faucet (floor wash)	2	30	9	540	8	0.5	2,160	
Toilet closet bowl (existing)	2	12	9	216	8	0.5	864	
Urinal (flash valve) (existing)	1	5	16	80	8	0.5	320	
Wash basin (existing)	2	3	16	96	8	0.5	384	
(Sub total)							5,888	
C Fishing port office								
Toilet closet bowl	1	12	9	108	8	0.5	432	
Wash basin	1	3	16	48	8	0.5	192	
Wash basin (kitchen)	1	15	9	135	8	0.5	540	
(Sub total)							1,164	
Grand total	Total demand						12,972 L/day	

(vi) Drainage plan

i) Fisheries Center Administration Building

Soil sewage will be pumped up by collecting it into a storage tank that has already been installed. Miscellaneous waste sewage will be treated by providing underground soak pits for the various sewage systems. Rainwater will be discharged into the sea by connecting the existing rainwater basin.

ii) Fish Market Building

Because lavatories that are already provided will not be repaired as part of the project, there are no plans in the project for soil sewage or waste sewage. Because the existing miscellaneous waste sewage treatment is not modeled on the underground soak system that is the current standard set by the Samoa Water Authority, this will be renovated into a soak-type system so that it conforms to the standard. Rainwater will be discharged into the sea by connecting the existing basin.

iii) Fishing Port Office Building

For soil sewage, a storage pit will be provided and water will be pumped up and treated. It is assumed that this storage pit will be connected to a public sewage network in the event that such a network is provided in the future. Miscellaneous waste sewage will be treated by providing underground soak pits for the various systems and carrying out soaking process. Rainwater will be discharged directly into the sea.

(vii) Air conditioning and ventilation equipment planning

A package- and separate-type air conditioning system will be used that has an air-cooled heat pump that allows air conditioning of individual rooms. The rooms for air conditioning are as follows.

i) Fisheries Center Administration Building

Offices, library, training room, inspection room, meeting room, computer room, microscope room

ii) Fish Market building

The Fisheries Division office

iii) Fishing port office building

Office

(viii) Electrical system planning

i) Fisheries Center Administration Building

The 3 - 4 W-230V/400V (50 Hz) leading-in lines already existing on the premises will be used just as they are to carry power to the newly built main distributing frame. Because buildings on the premises of the Fisheries Center other than the administrative building were being supplied with power from the existing administration building, the newly built main distributing frame will bear the burden of supplying power to the other buildings on the premises.

ii) Fish Market building

The main distribution frame for the existing Fish Market building is located in the area leased to the private sector, and because this section is not included in the project, renovations will be limited to trickle-power equipment such as the lighting and wall receptacles in the Fish Market sales area and the current Fisheries Division office area, which are included in the project. Fortunately, because the main distribution board divides the trickle-power systems of these areas by sub meter areas, the areas can be independent of and separated from the private sector area and the project implemented only in those areas.

iii) Fishing Port Office Building

There is a regional transformer station at the southeast corner of the current bus terminal, and the high voltage of 22 KV has already been stepped down to 3 - 4 W-230V/400V (50 Hz) at this regional station and can be distributed. This is directed to the fishing port office building included in the project.

iv) Electricity load capacity per building.

Given below is a table showing the electricity load capacities of individual buildings.

Table2-2-2(19) Facility power load

Table 2-2 (a) Building Power Load				
Name of building		Capacity (KVA)	Demand ratio (%)	Demand power (KVA)
A. Fisheries center				
	Lighting	10.5	80	8.4
	Receptacle	15.4	30	4.6
	Air-condition	45.9	83	38.1
	Sub total	71.8		51.1
Workshop (existing, out of the project)		19.5	60	11.7
Aquaculture unit office (existing, out of the project existing,)		3.7	60	2.2
Offshore unit office (existing, out of the project)		12.0	60	7.2
Canteen (existing, out of the project)		2.3	60	1.4
Fuel station (existing, out of the project)		26.6	60	16.0
	Sub total	64.2		38.5
B. Fish market(part of renovation)				
	Lighting	6.8	80	5.5
	Receptacle	3.4	30	1.0
	Air-condition	3.0	100	3.0
	Sub total	13.2		9.4
C. Fishing port office				
	Lighting	2.7	80	2.1
	Receptacle	2.8	30	0.8
	Air-condition	5.8	100	5.8
	Sub total	11.2		8.7
D. Lighting in jetty and preparation yard		1.3	100	1.3
	Sub total	1.3		1.3
Grand total		161.7		109.1

(ix) Telephone equipment construction

The telephone lines already installed on the premises can be used just as they are for the Fisheries center Administration Building and the Fish Market building. For the fishing port office building, Samoa will handle the construction for extending underground piping as far as the boundary lines of the premises. The project only encompasses piping construction for the interior of the three buildings included in the project.

2-2-3 Basic design drawings

2-2-3-1 Planned Facilities by the Project

Constructed facilities by the Project are shown in Table2-2-3-1(1) and 2-2-3-1(2)

(1) Civil facilities

Table2-2-3-1(1) Fishing port facilities

Facility name	Size	Content of plan
1)Jetty (for unloading and preparation)	Availableness length : 40m Structure type : Steel pile sheet type Protection of jetty : 8m Structure type : Ruble mound type	Crown height : D.L.+2.0m Crown width : 8m
2)Sea wall of reclamation area	Length : 80.46m Structure type : Ruble mound type	Crown height : D.L.+3.0
3)Reclamation area (Preparation yard of fishing boat)	495m ²	Ground level : D.L.+2.0m
4)Removal of boulders	558m ³	depth - 0.5m
5)Improvement of existing slipway	Installation of Boat pulling upper Installation of winch : 3 ton, 1 unit	
6)Incidental facility	Lighting : 2 unit at jetty,2 unit at reclamation area Drainage : 30m Navigation light : 1 unit	400 W/unit Width 20cm, Depth 40cm LED type, Range 2 N.M.

(2) Architectural facilities

Table2-2-3-1(2) Building facilities

Name of facility	Size	Content of plan
1)Renovation of Fisheries Center Administration Building	Floor area: 707.48m ² Steel structure system Single story (Incl. Mezzanine)	Exterior Wall: Acrylic splay membrane paint on Autoclaved Aerated Concrete (AAC) panel Roof: Trapezoid type steel sheet roofing and asphalt roofing on plywood panel Interior Wall: Re-layout Building height: 7.84m
2)Renovation of Fish Market Building	Floor area: 996m ² (Renovation Area: 533m ²) Steel structure system Single story	Steel column and beam: Reinforced and repainted Roof: Trapezoid type steel sheet roofing Sales Area Floor: Pole-urethane floor paint
3)Construction of Fishing Port Office Building	Floor area: 120m ² Reinforced concrete structure System	Exterior Wall: Corrugated steel sheet, partially acrylic splay membrane paint on cement mortar Roof: Trapezoid type steel sheet roofing on concrete slab Floor height : 0.35m Building height: 6.4m

2-2-3-2 Basic design drawings

Basic design drawings are listed below.

(1) Civil facilities

Figure 2-2-3-2(1) Overall layout plan of civil facilities

Figure 2-2-3-2(2) Plan and cross section of Jetty

Figure 2-2-3-2(3) Elevation view of Jetty

Figure 2-2-3-2(4) Cross section of rubble mound protection of Jetty

Figure 2-2-3-2(5) Layout plan of fishing boat preparation yard

Figure 2-2-3-2(6) Cross section of seawall

Figure 2-2-3-2(7) Elevation view of connection seawall of Jetty

Figure 2-2-3-2(8) Cross section of connection seawall of Jetty (1)

Figure 2-2-3-2(9) Cross section of connection seawall of Jetty (2)

Figure 2-2-3-2(10) Improvement plan of existing Slipway

(2) Architectural facilities

Figure 2-2-3-2(11) Overall layout plan of buildings

Figure 2-2-3-2(12) Layout plan of fisheries center administration buildings

Figure 2-2-3-2(13) First floor layout plan of fisheries center administration building

Figure 2-2-3-2(14) Mezzanine floor layout plan of fisheries center administration building

Figure 2-2-3-2(15) Roof plan of fisheries center administration building

Figure 2-2-3-2(16) Elevation of fisheries center administration building

Figure 2-2-3-2(17) Section of fisheries center administration building

Figure 2-2-3-2(18) Zone layout of fish market buildings

Figure 2-2-3-2(19) Layout of fish market building

Figure 2-2-3-2(20) Elevation of fish market building (1)

Figure 2-2-3-2(21) Elevation of fish market building (2)

Figure 2-2-3-2(22) Section of fish market building

Figure 2-2-3-2(23) Roof plan and Plan/section of fishing port office building

Figure 2-2-3-2(24) Elevation of fishing port office building

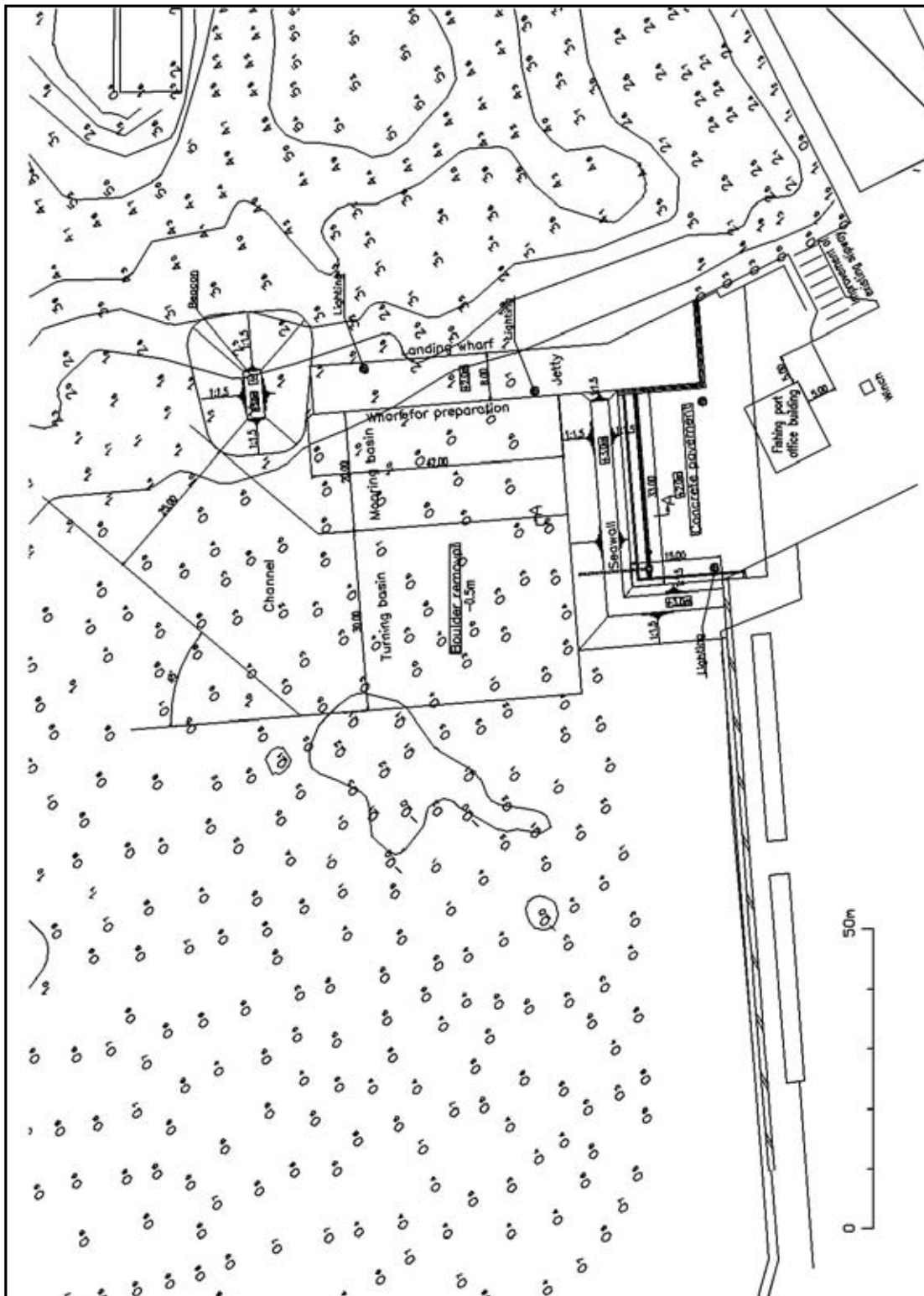
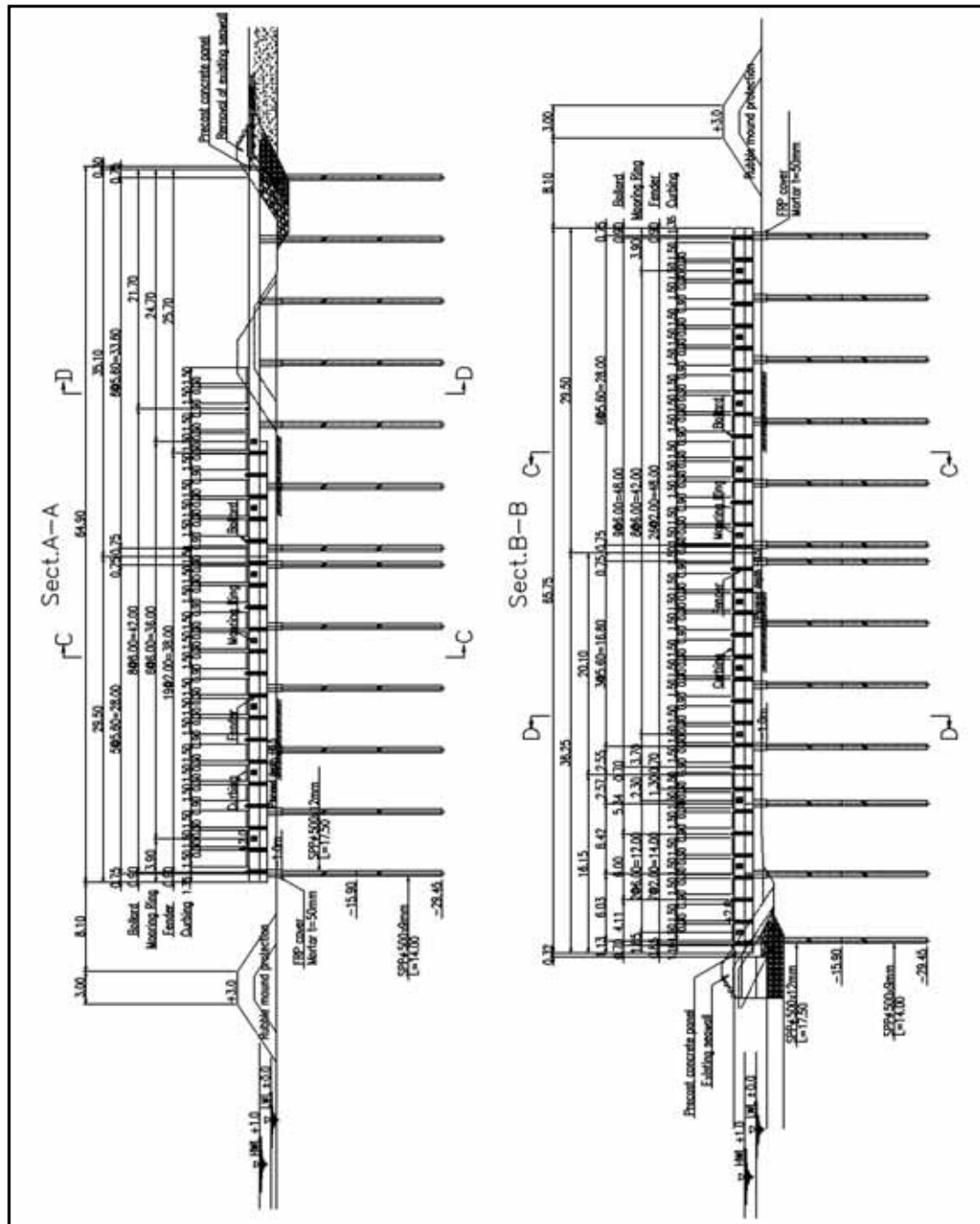
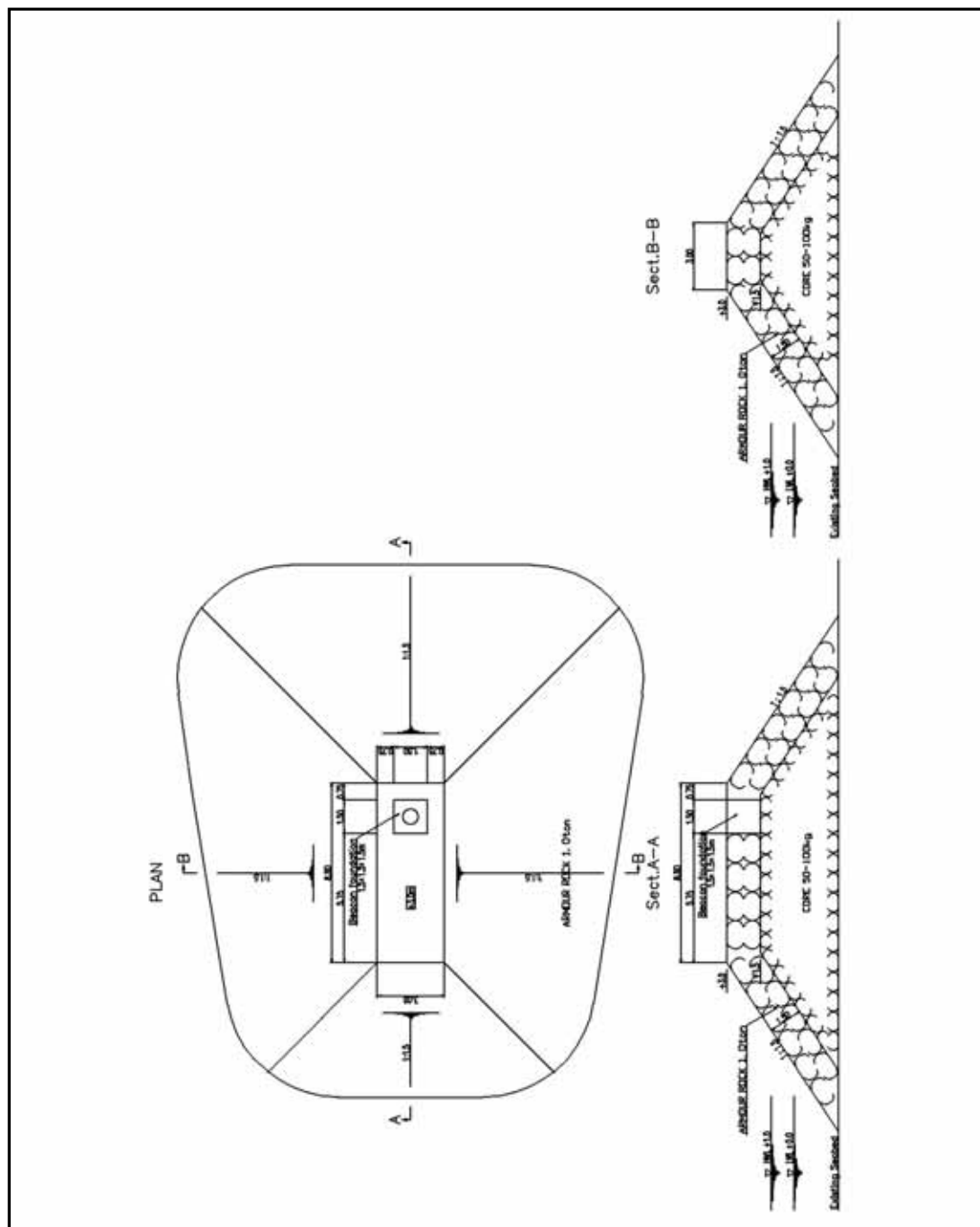
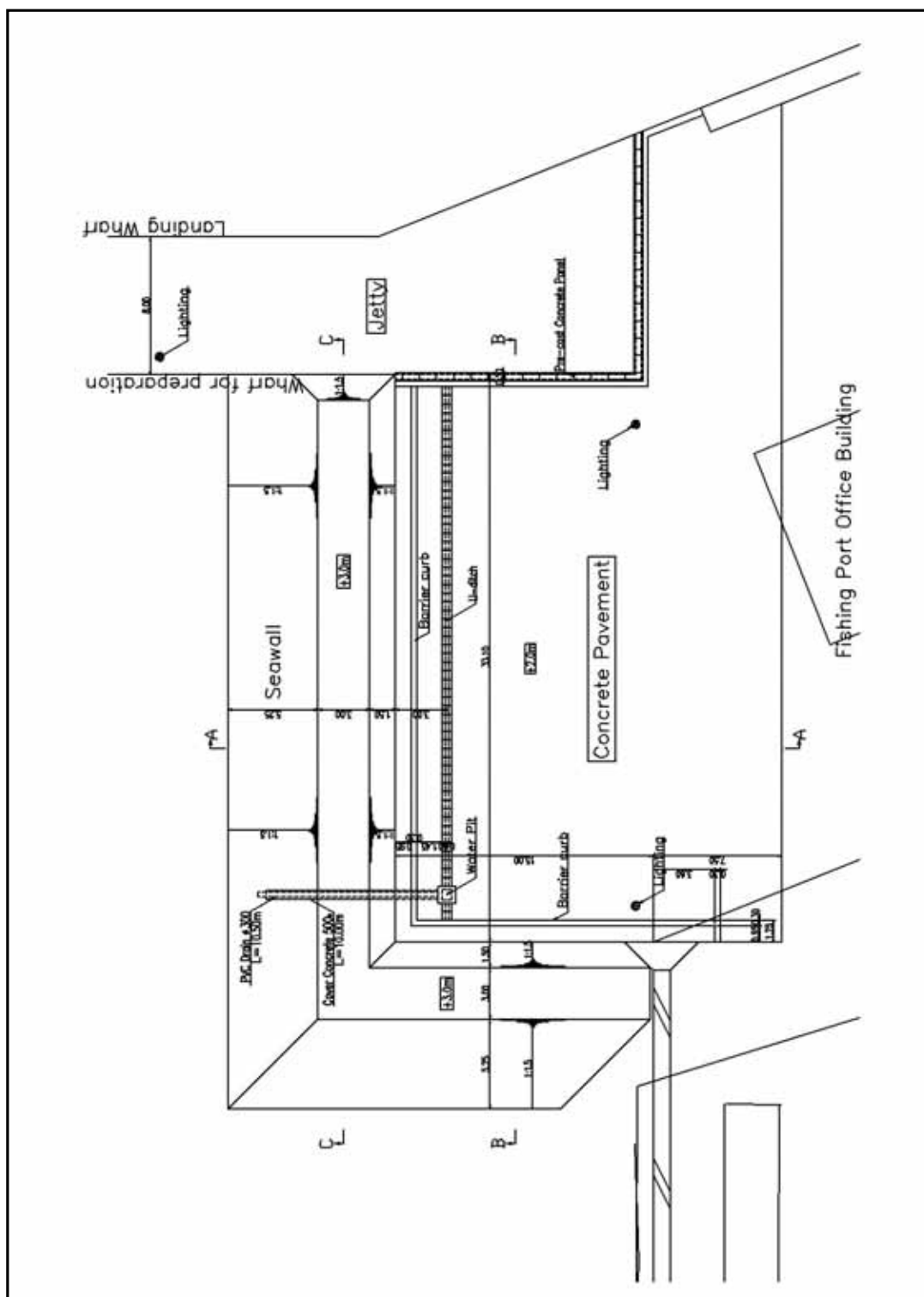


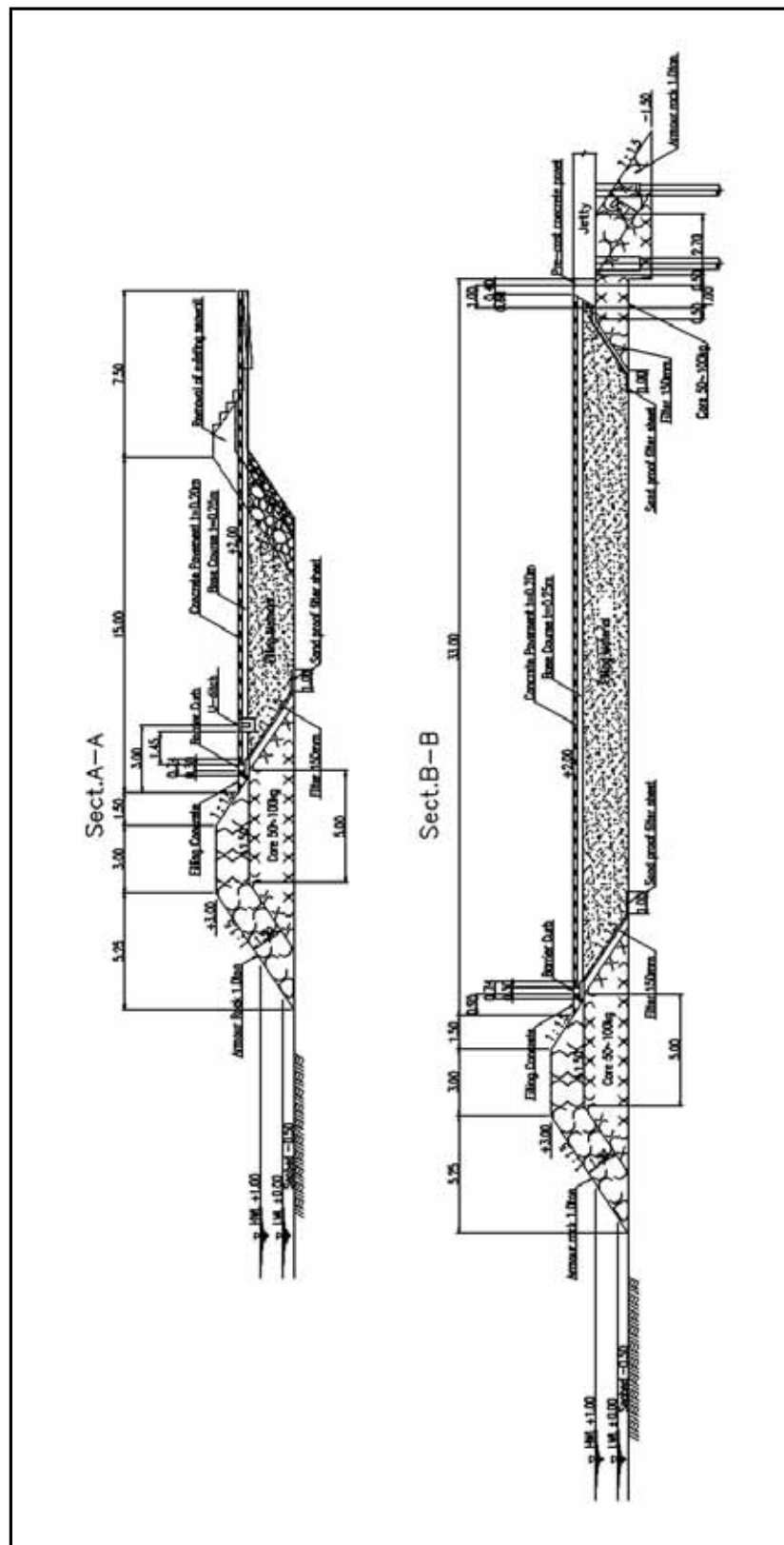
Figure2-2-3-2(1) Overall layout plan of civil facilities

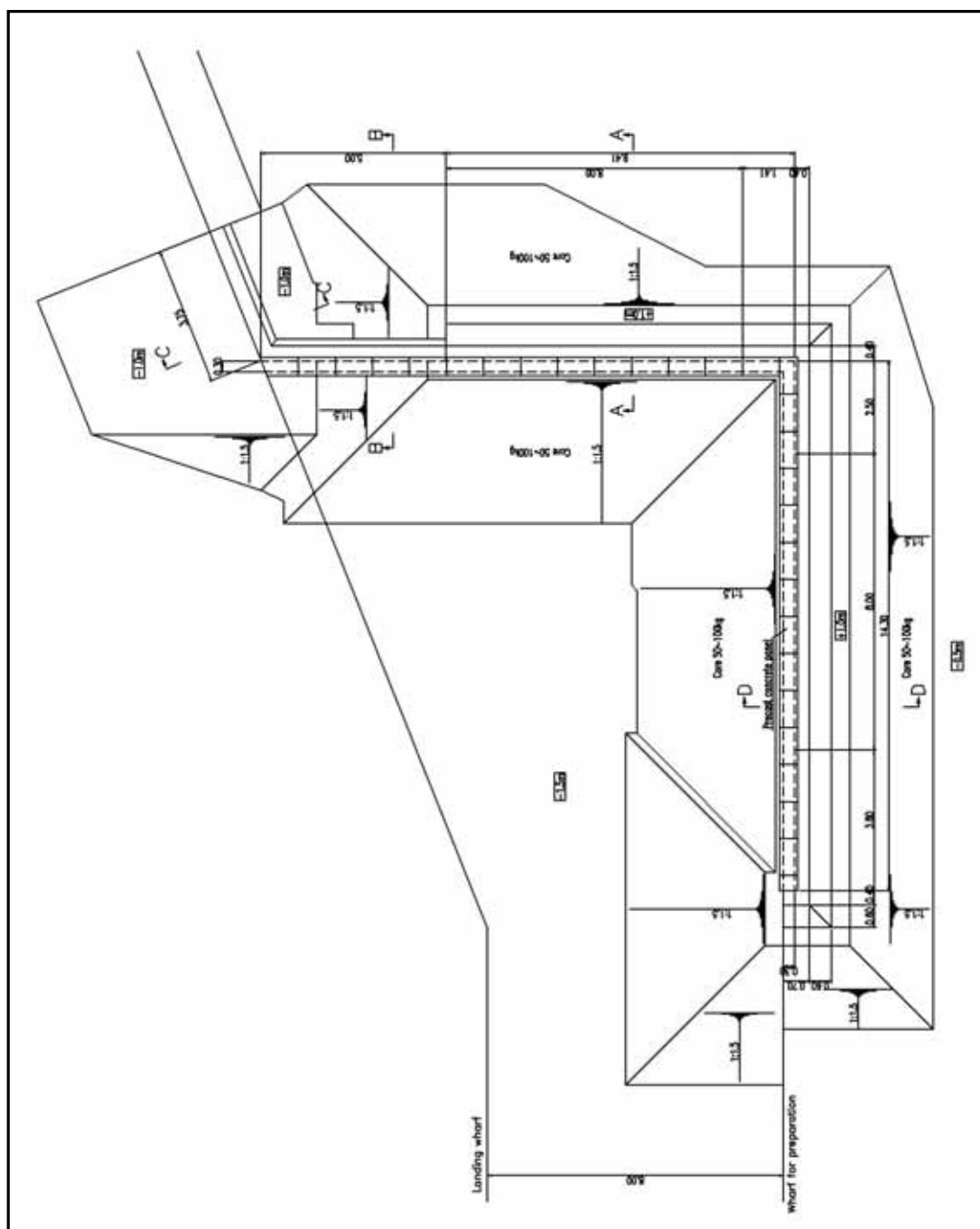


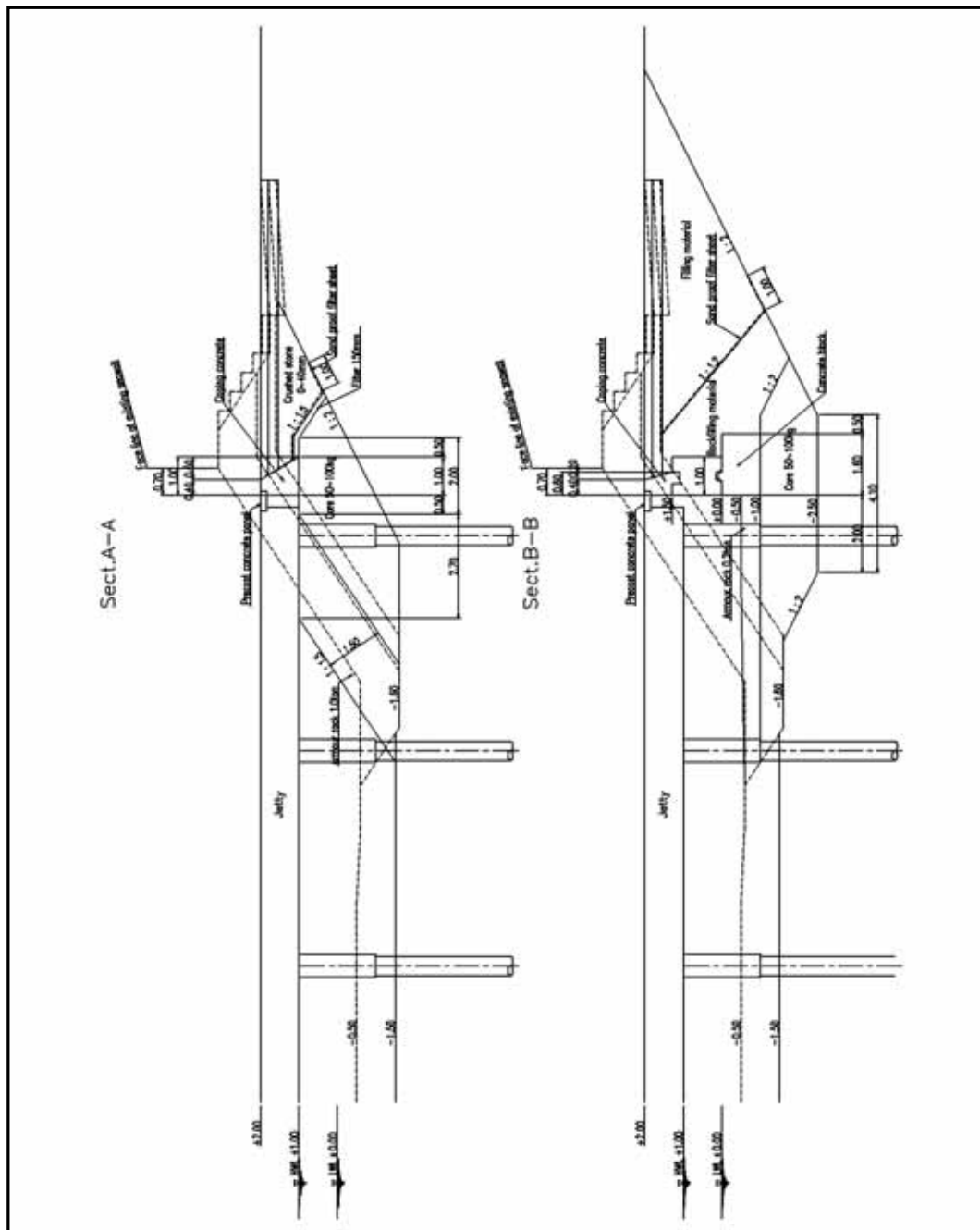


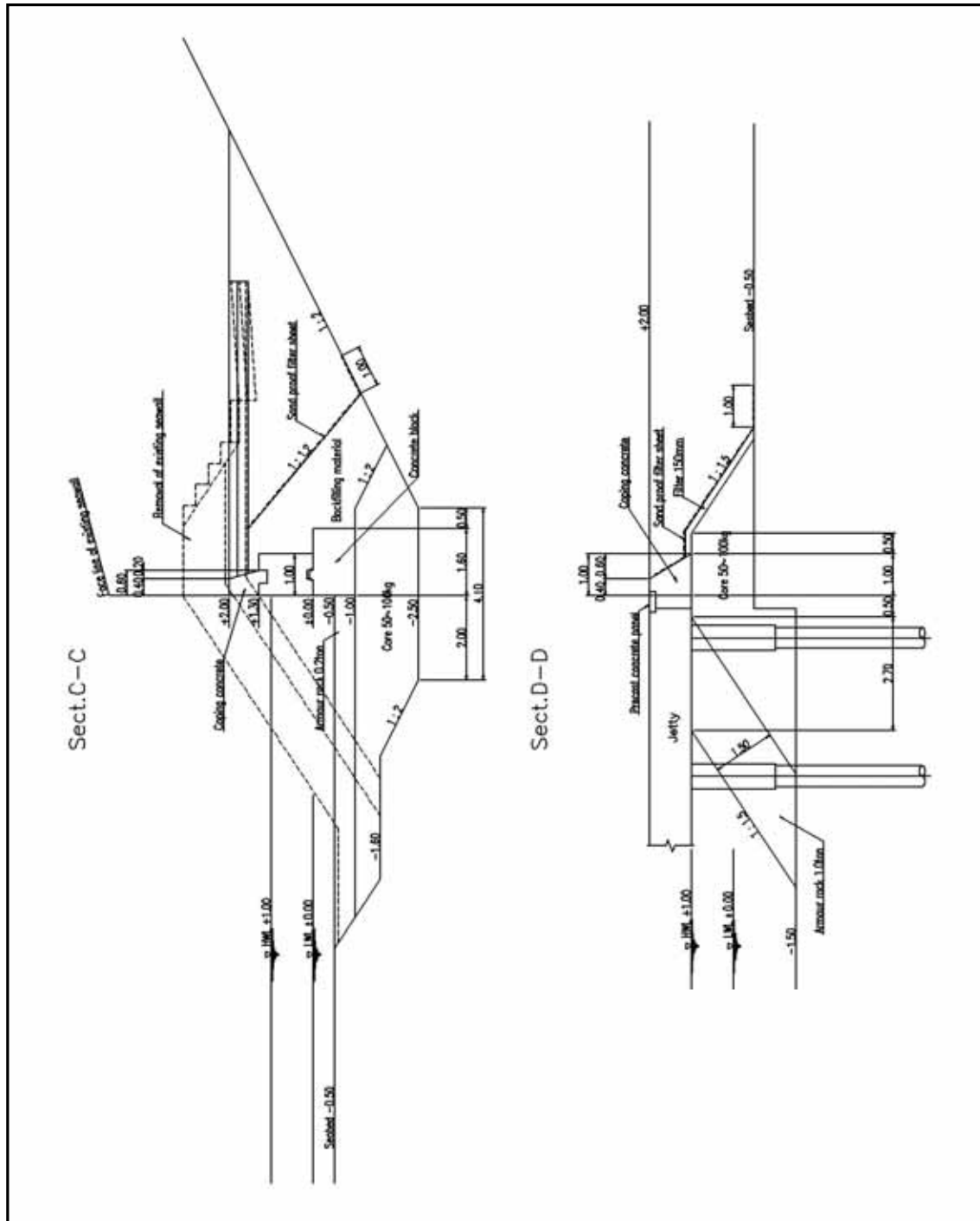












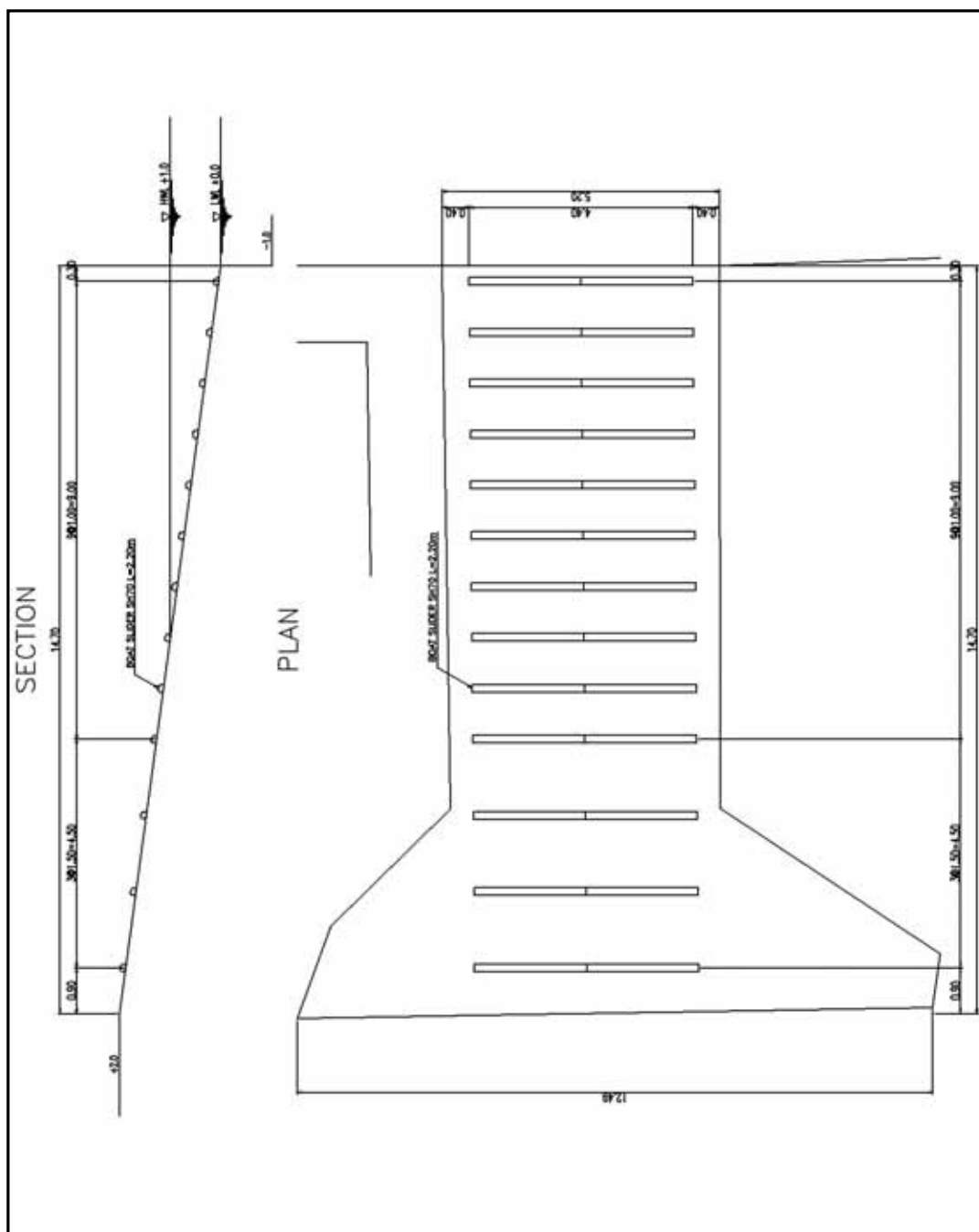


Figure2-2-3-2(10) Improvement plan of existing Slipway

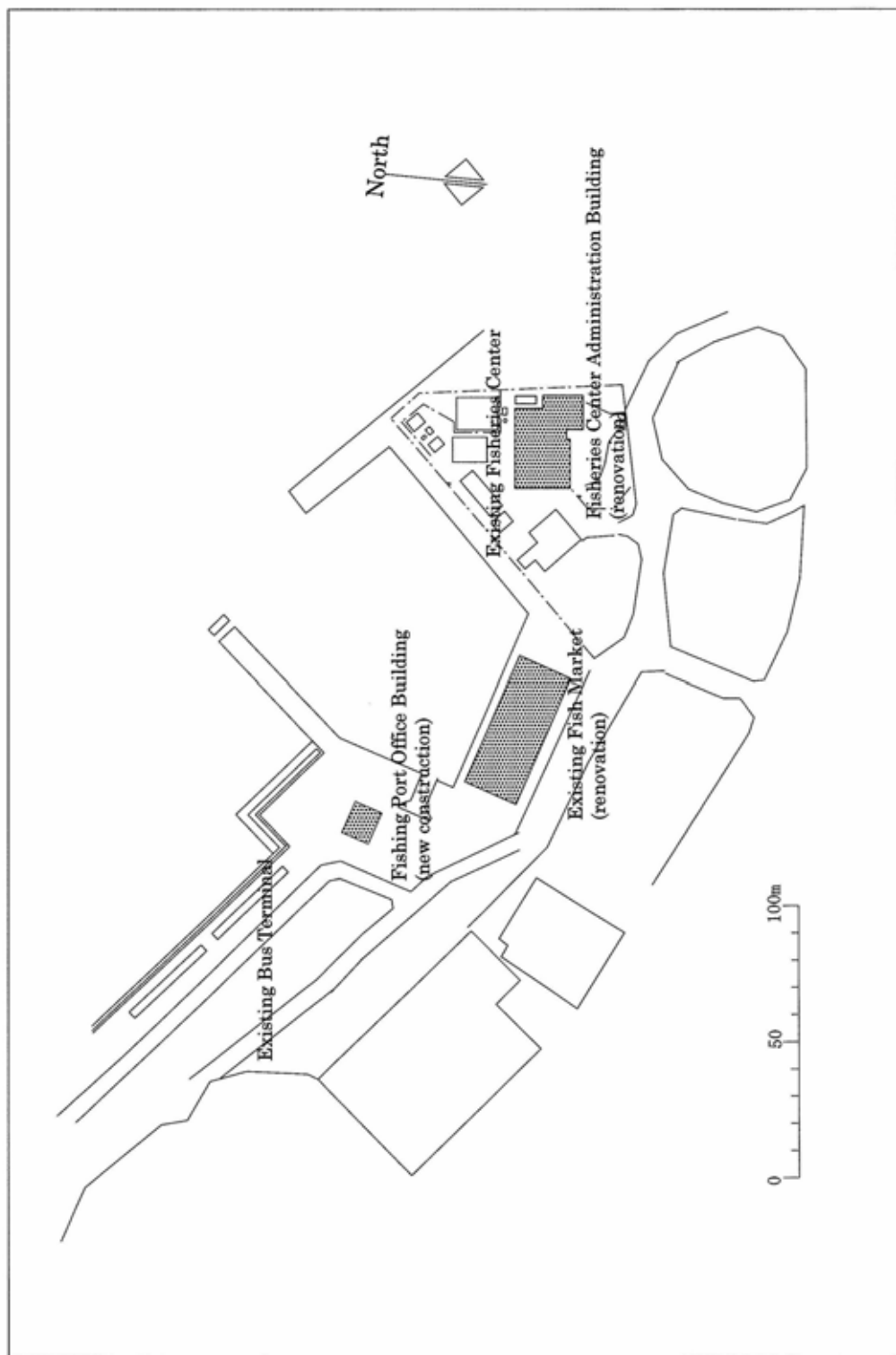


Figure2-2-3-2(11) Overall layout plan of buildings

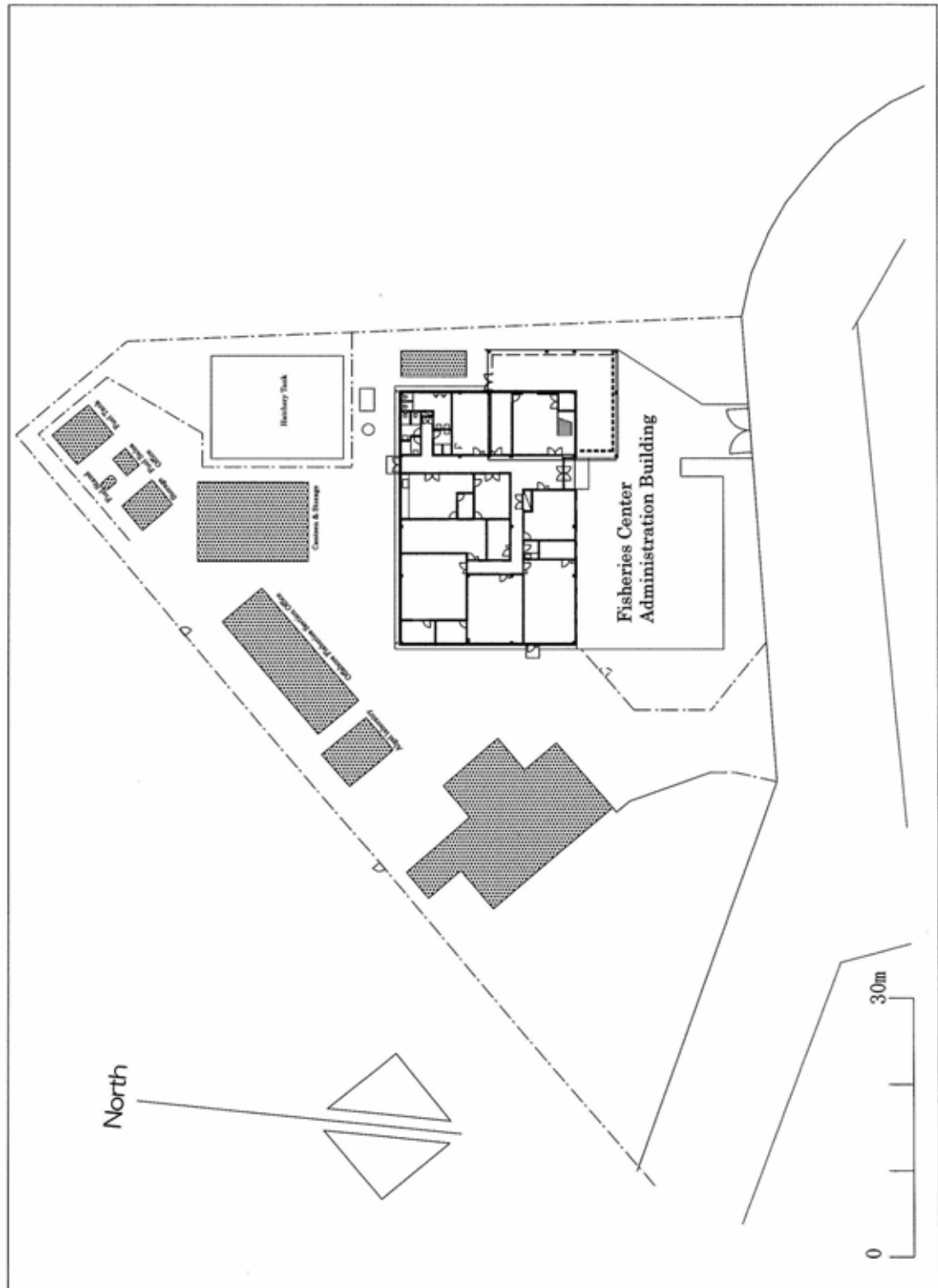


Figure2-2-3-2(12) Layout plan of fisheries center administration buildings

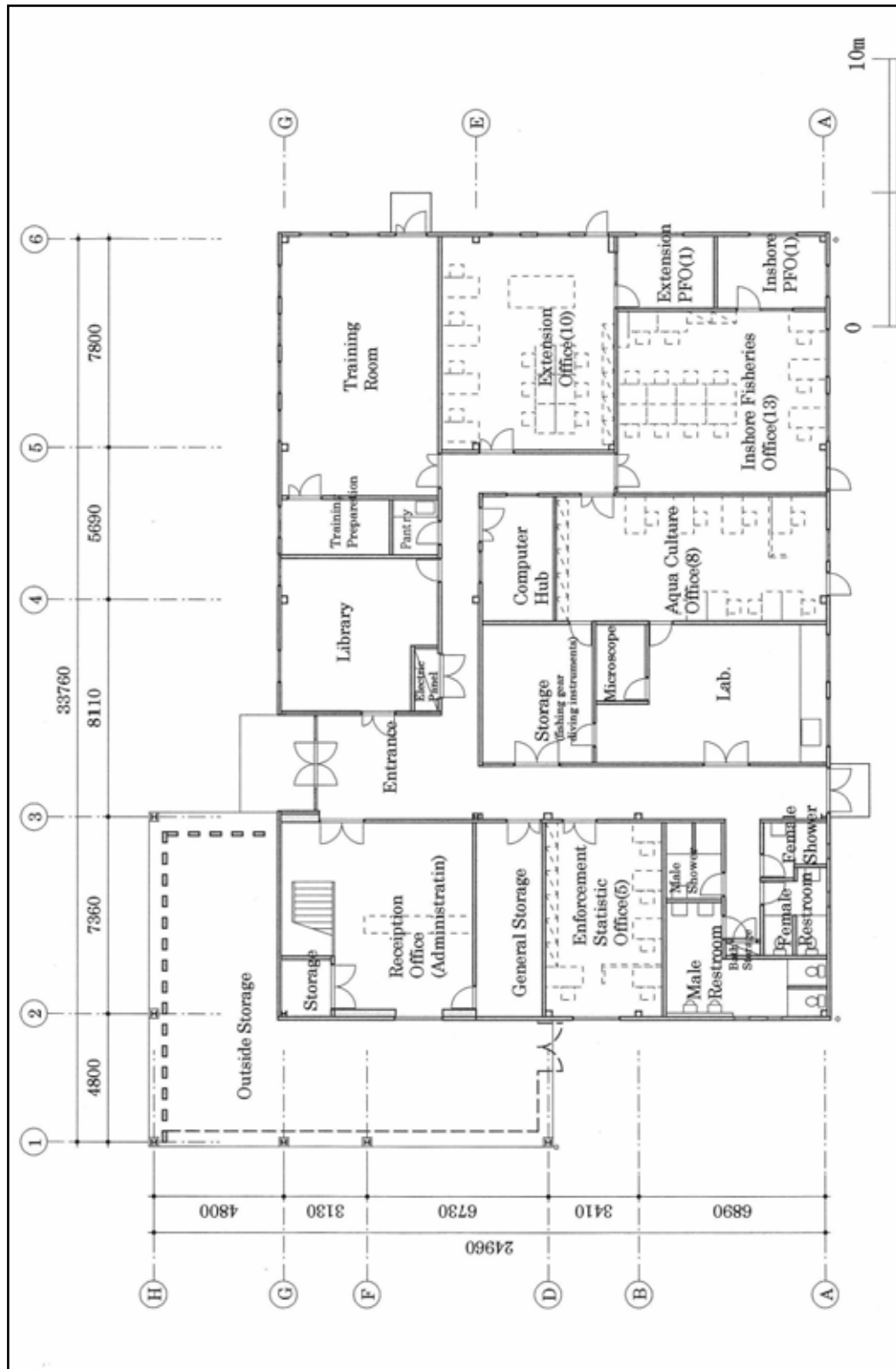


Figure2-2-3-2(13) First floor layout plan of fisheries center administration building

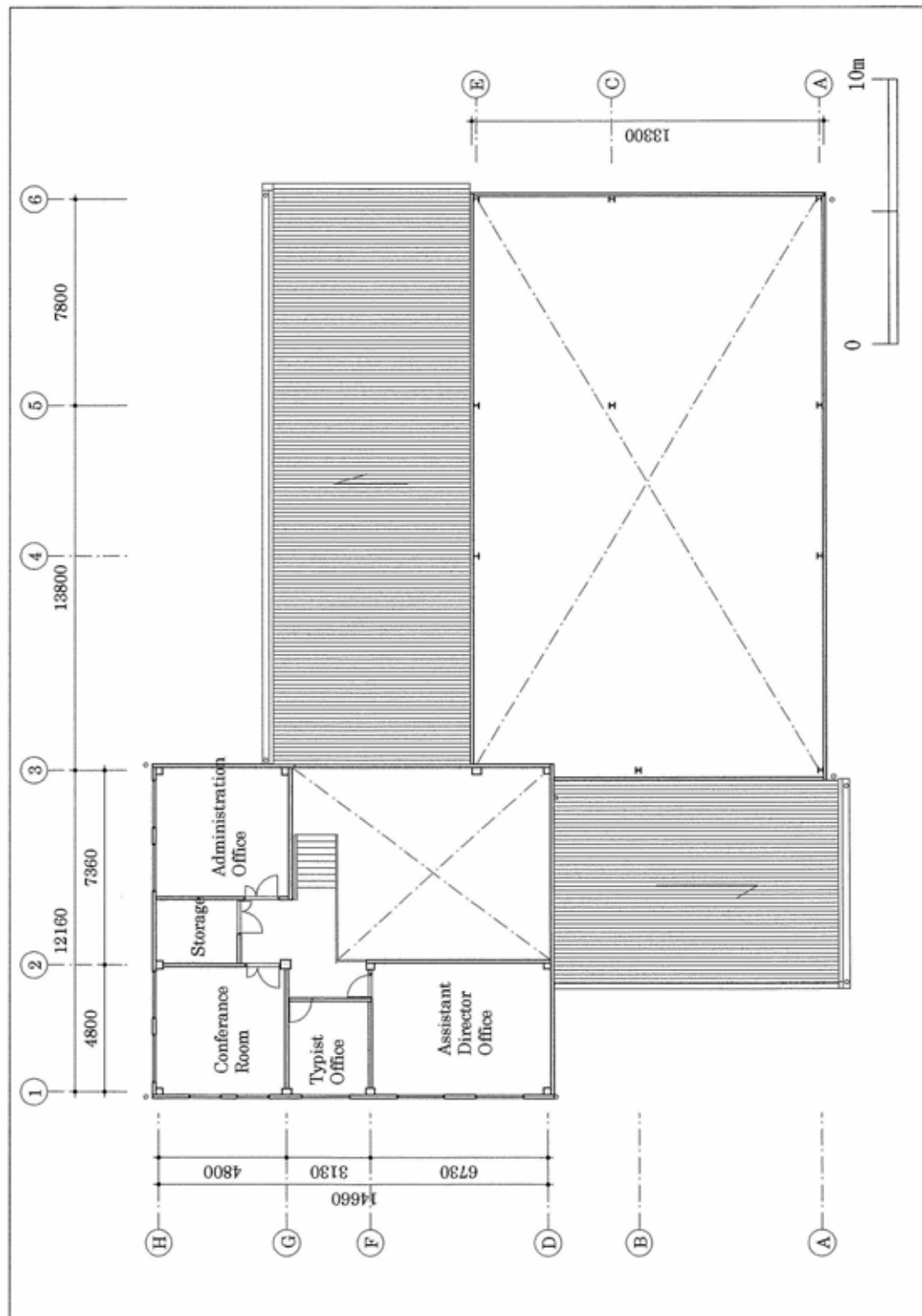


Figure2-2-3-2(14) Mezzanine floor layout plan of fisheries center administration building

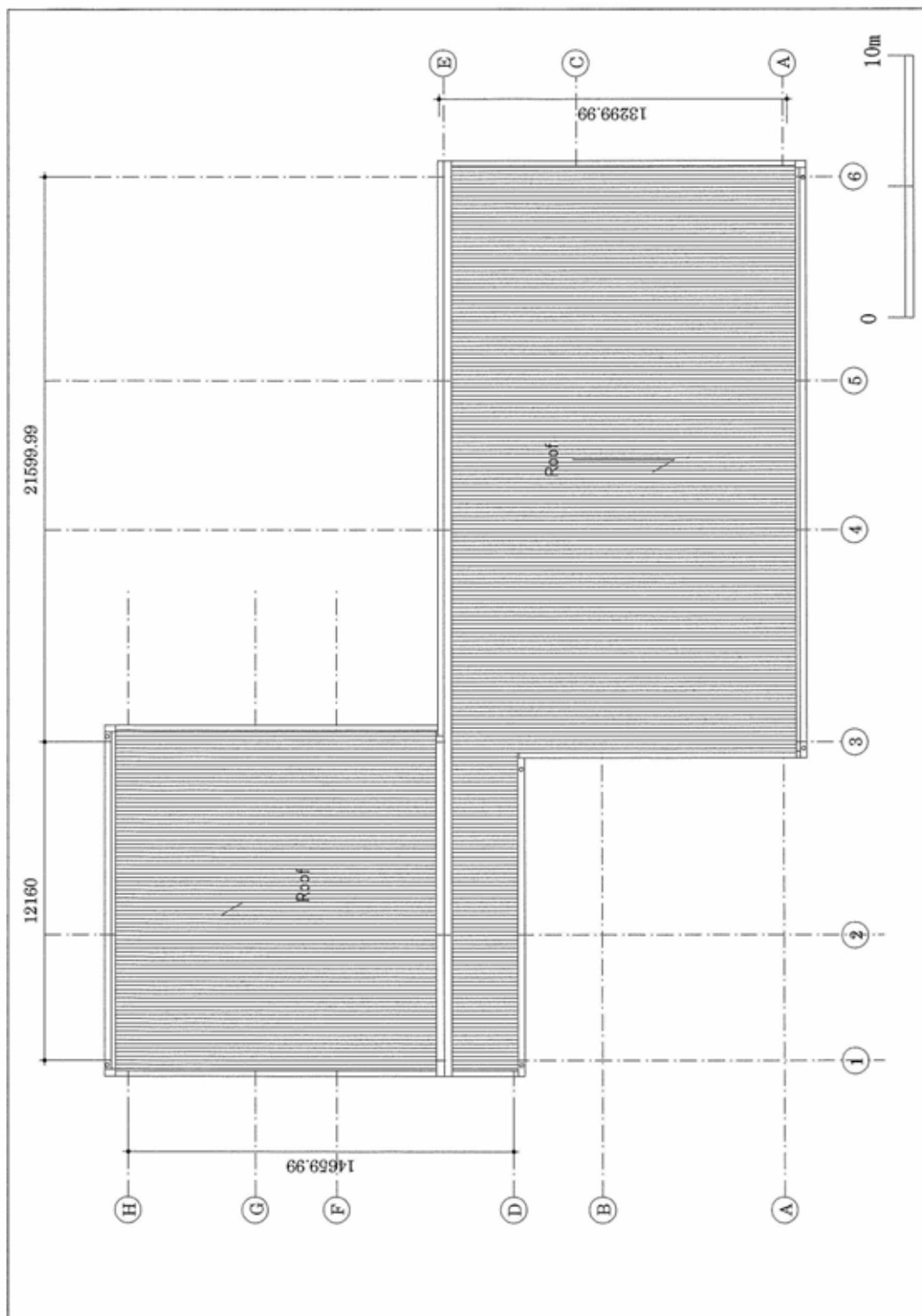


Figure2-2-3-2(15) Roof plan of fisheries center administration building

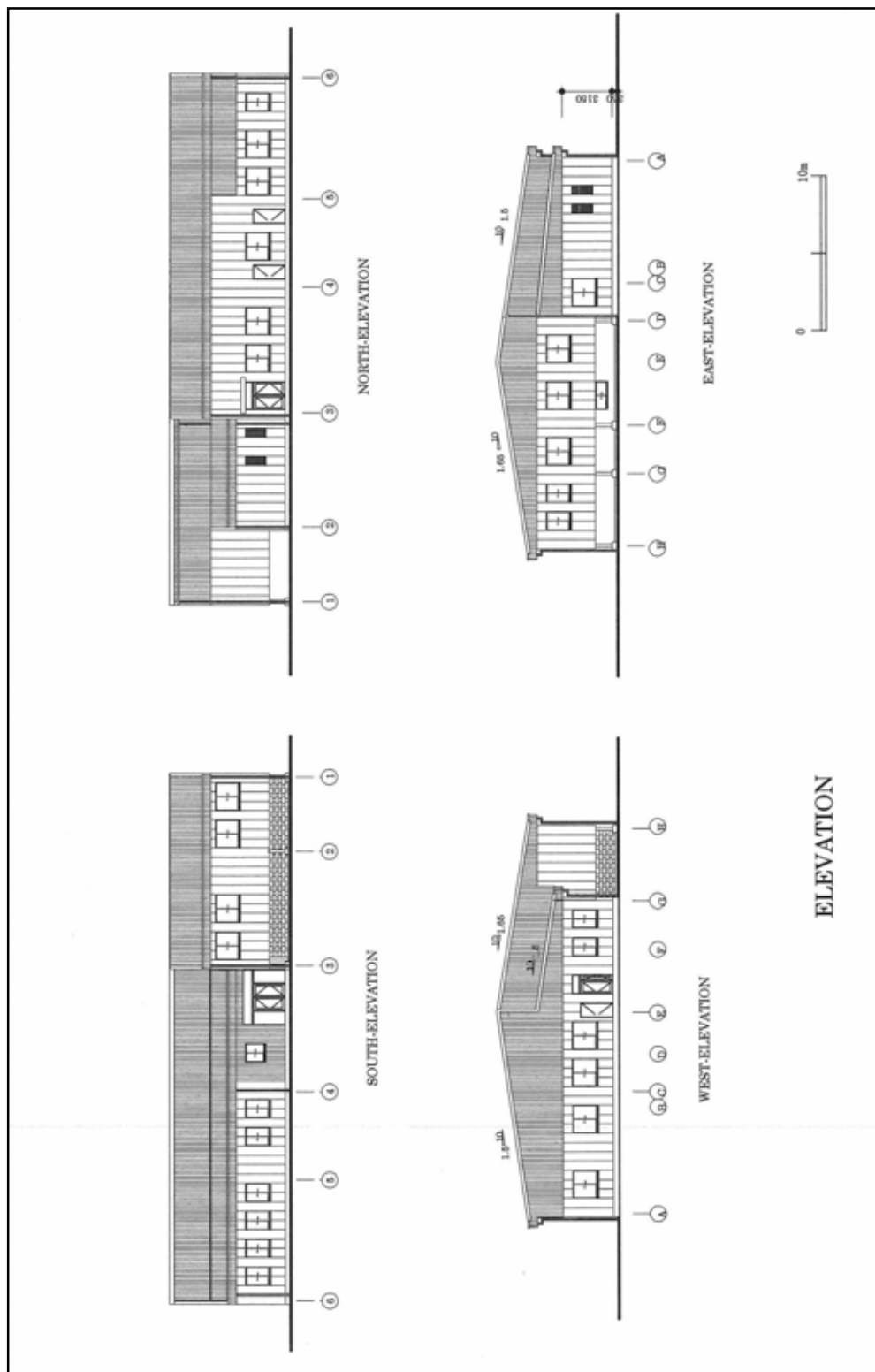


Figure2-2-3-2(16) Elevation of fisheries center administration building

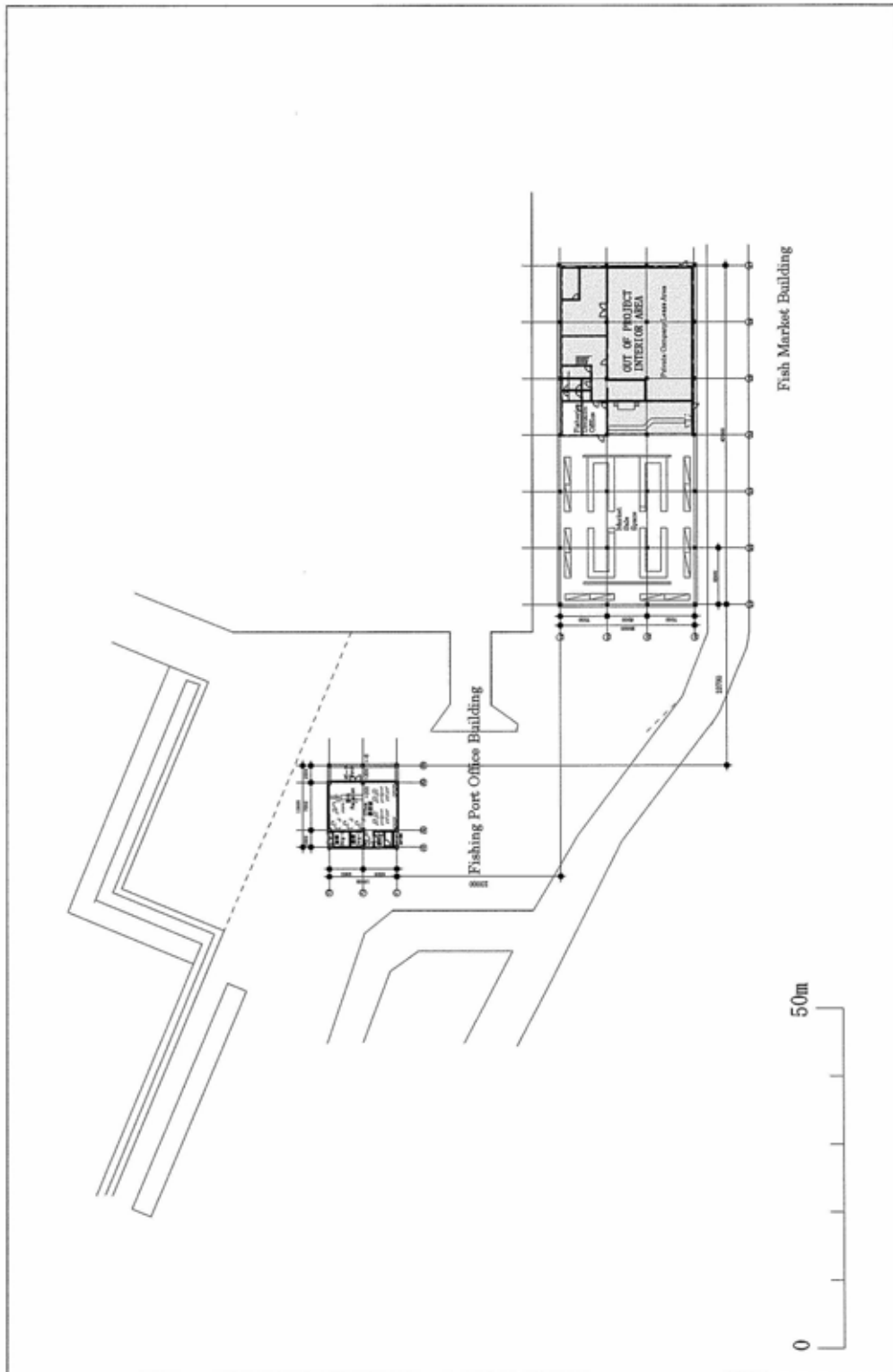


Figure2-2-3-2(18) Zone layout of fish market buildings

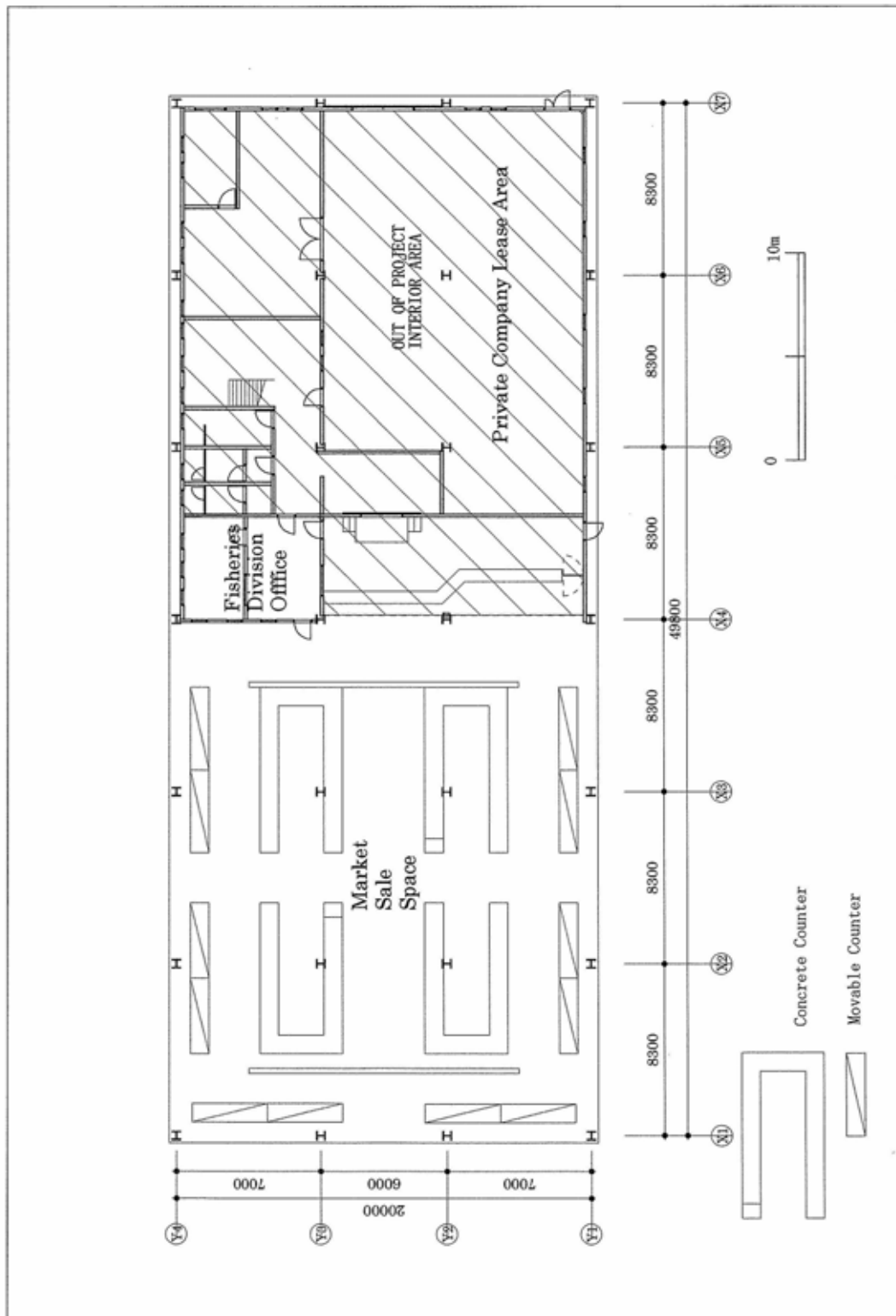


Figure2-2-3-2(19) Layout of fish market building

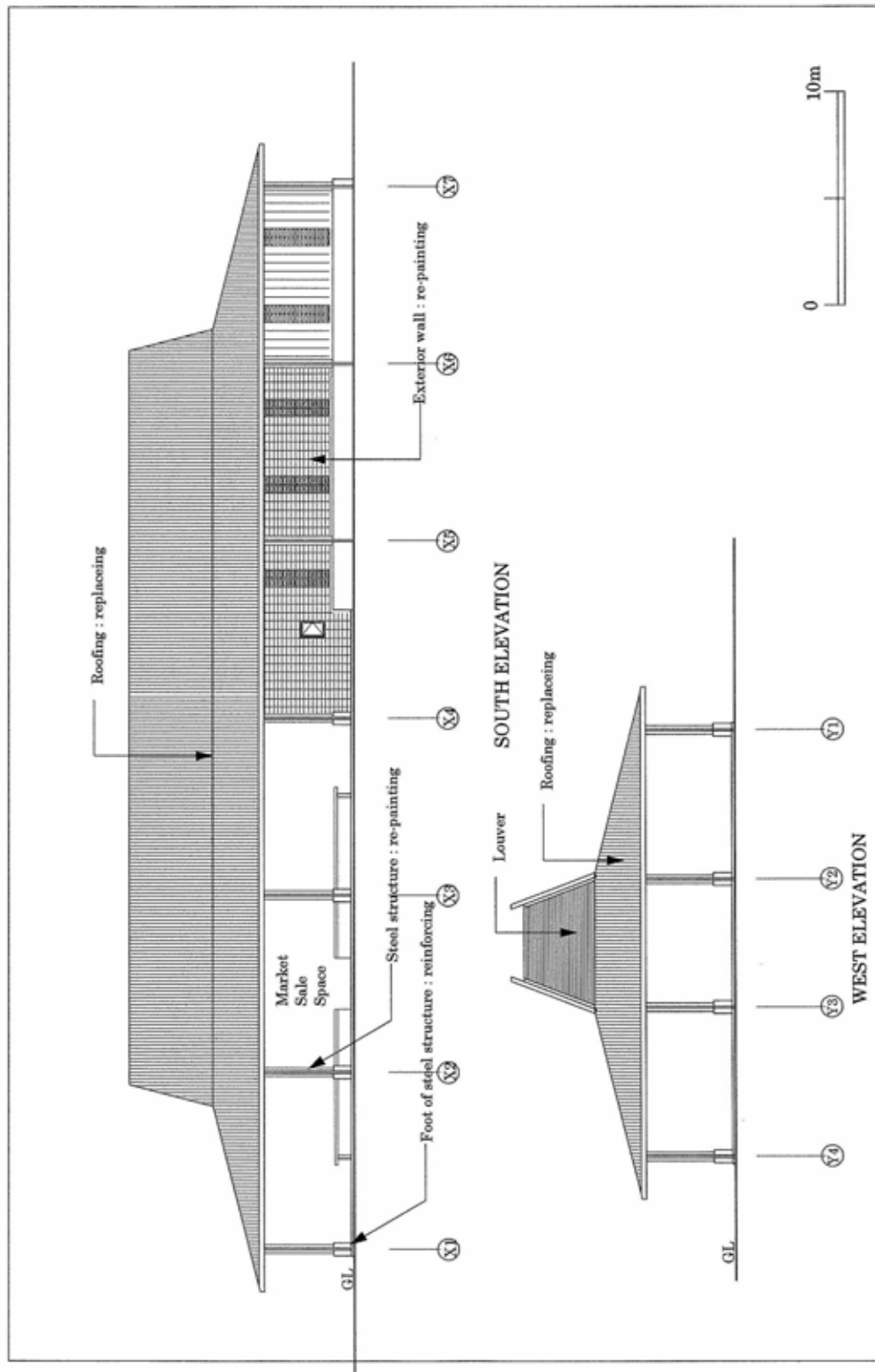


Figure2-2-3-2(20) Elevation of fish market building(1)

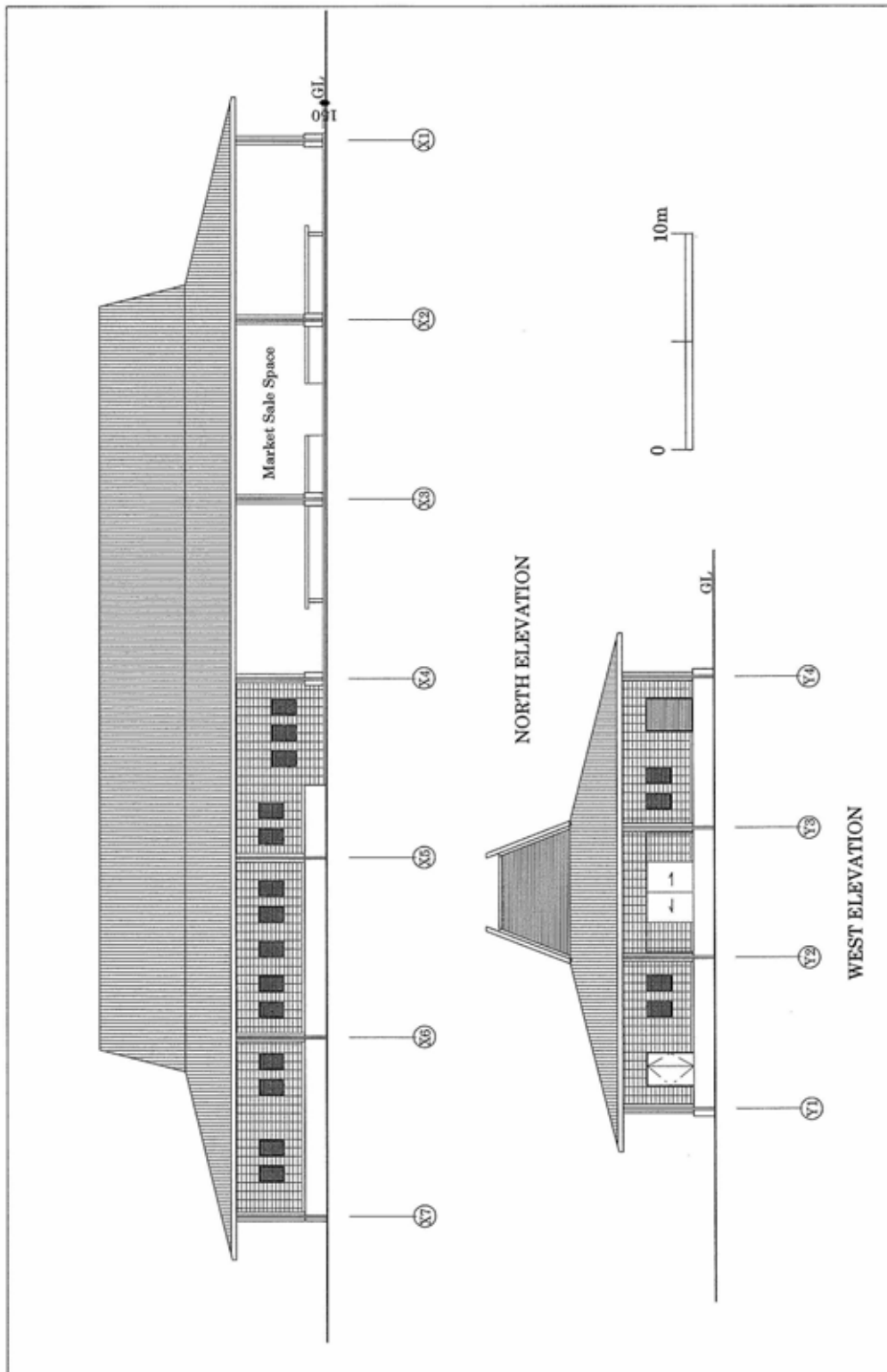
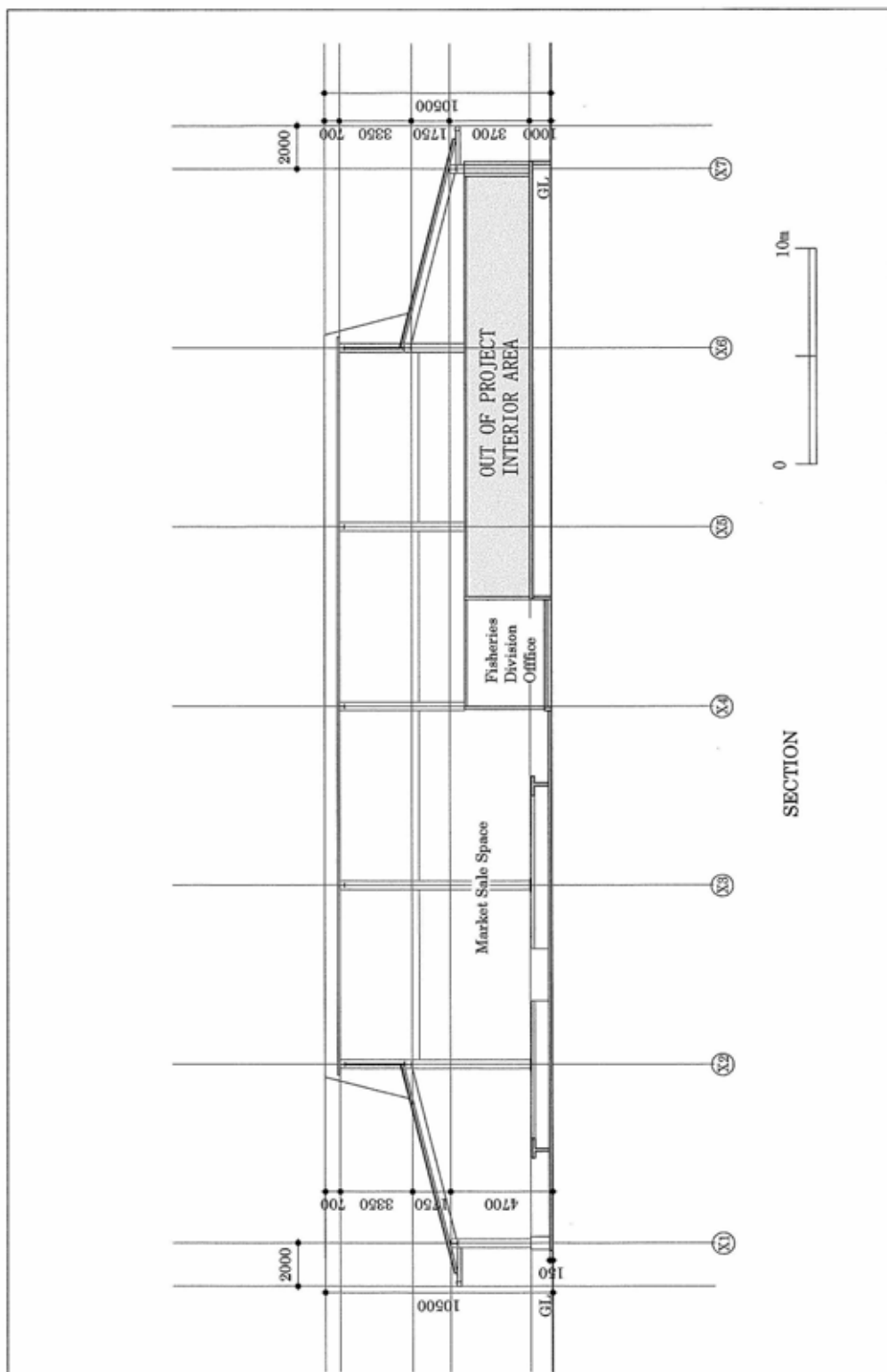
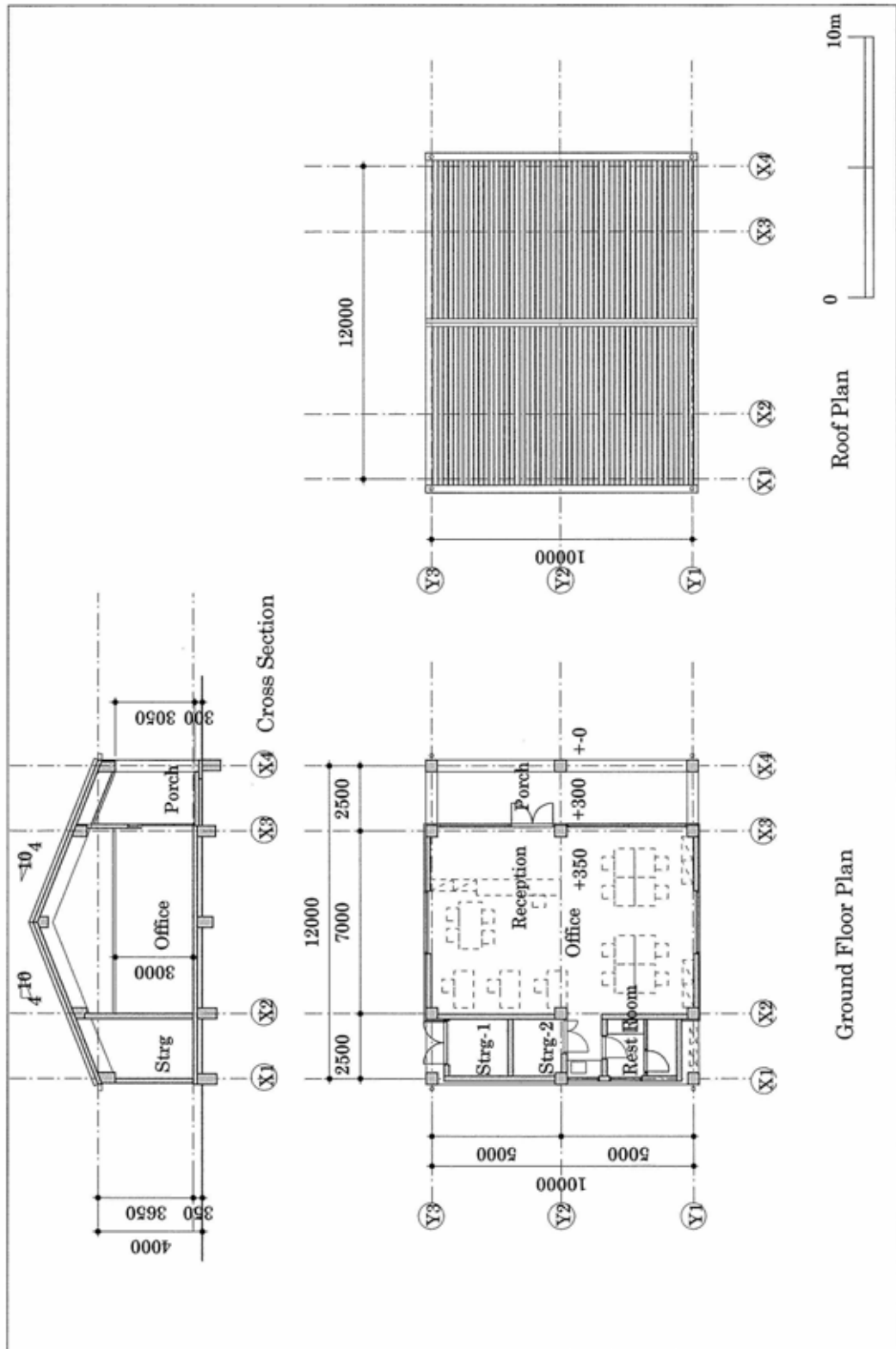


Figure2-2-3-2(21) Elevation of fish market building(2)





re2-2-3-2(23) Roof plan and Plan/section of fishing port office building

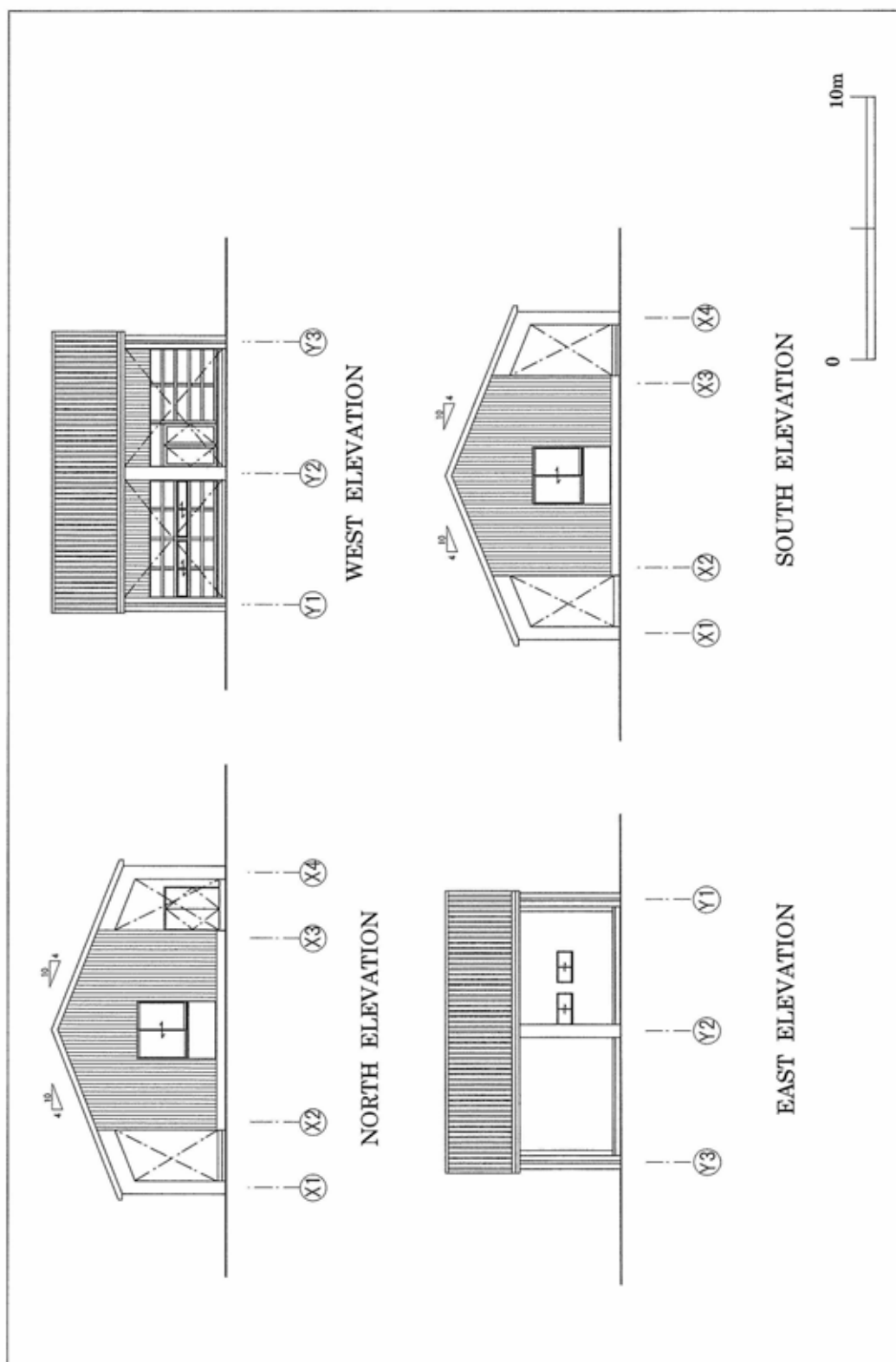


Figure2-2-3-2(24) Elevation of fishing port office building

2-2-4 Implementation Plan

2-2-4-1 Implementation policy

(1) Basic items involving project implementation

- 1) With respect to the implementation of the project for development of the Apia Fishing Port, following the signing by the Japanese Government of an Exchange of Notes (E/N) with the Government of Samoa, a consultant contract is to be signed between a consultant with Japanese nationality and the Government of Samoa.
- 2) The consultant will prepare all the documents required for the tender and concluding the contract such as the drawings, technical specifications, and so forth, and after approval of these documents by the Government of Samoa, a Japanese construction company entity will be selected through the procedure of the prequalification and the tender.
- 3) The construction work is to be carried out based on a construction contract signed between the Government of Samoa and the contractor.
- 4) The implementation period of the project will be 5.5 months for the detailed design and 11.5 months for the overall construction period.

(2) Execution policy / procurement policy

- 1) On-land construction based on use of temporary mound is assumed for the jetty, and efforts are to be made to minimize the construction costs and shorten the construction period. In consideration of the fact that the existing Fisheries Center Administration Building and the Fish Market building are to be renovated and the Fishing Port office building is planned to be newly constructed on existing land that has good soil quality, it should be made sure that the construction will be carried out on the soil with a sufficient bearing capacity.
- 2) There are very few local construction companies in Samoa that have experience in constructing harbor and port facilities. However, these local companies will be made best use of under the guidance to be provided by the Japanese contractor.
- 3) There are some companies that have experience in constructing hotels and other general architectures or equipment. Therefore, these local companies will be fully utilized.
- 4) Harbor and port construction requires various construction equipment, including large-size cranes and backhoes. Such machinery that are not available in Samoa will mainly be procured from either New Zealand or Japan. Special skills, such as scaffolding and welding, will be provided by Japanese or other foreign experts.
- 5) With respect to materials that can be procured locally, the quality and supply capability are to be carefully studied, with priority being given to local procurement as much as possible and procurement from Japan minimized in order to suppress costs.

2-2-4-2 Implementation conditions

(1) Conditions for Construction

1) Construction companies

There are several construction companies in Samoa, and they have an experience in construction, gained through Japan's Grant Aid Programme. The construction companies will be assisted as subcontractors under the supervision of the Japanese contractor.

2) Construction machinery

There are few companies in Samoa that lease construction machinery, but some local construction companies possess construction equipment, and it can be borrowed from them. At the same time, however, the machinery that can be leased is limited to items for road construction, such as backhoes, tire shovels, and dump trucks. The quantities are also limited, and the machinery has not always necessarily been subject to good maintenance. In formulating the execution planning for the on-land execution, working vessels such as pile driving barge are not being taken into consideration for this project. However, crawler cranes, barges for transporting sand and soil and tugboats that are necessary for removing obstacles such as boulder stones in the sea area in the front of the bus terminal, will be procured on lease from Samoa Ports Authority. Further, heavy equipment such as crawler cranes and truck cranes will be necessary over the long term, and those that can be procured in the country or neighboring countries (New Zealand) will basically be procured locally. Procurement from Japan should be kept minimum.

3) Workers

Guidance from skilled Japanese experts will be needed concerning pile driving and welding of steel pipe piles, etc. Moreover, installation of the concrete blocks of seawall, and ACC panel works for Fisheries Center Administration Building require guidance from Japanese experts as well. Ordinary skilled workers will be procured locally or from neighboring countries.

4) Construction materials

Construction materials produced domestically in Samoa consist of stones, ready-mixed concrete, aggregates for roads and for concrete, and building blocks. Cement and reinforcing bars are distributed as imports from New Zealand and Australia. Most other construction materials are imported from New Zealand and Australia, and can be procured from factories, agencies, and suppliers in the city. At the same time, however, sufficient volumes of stock are not on hand at all times. For the construction planned under this project, of those materials in insufficient stock, those for which it is difficult to assure the necessary quality or the necessary

volumes through local procurement will be procured from Japan. In addition, copper pipes will be procured from Japan.

5) Safety and sanitation control

With the construction planned under this project, the current Fisheries Center Administration Building and Fish Market building adjacent to the existing city area will be renovated, and the existing fishing port, (landing and preparation) wharves next to the bus terminal and preparation yard (reclaimed land) for fishing boats will be developed. With respect to construction of jetty, safety will have to be taken into consideration by clearly marking the construction area with buoys, so as to secure the navigation of fishing boats and other vessels that use the current fishing port. With respect to the execution of on-land construction, care will have to be taken to avoid causing transportation accidents to the third parties in Apia, when equipment and materials will be transported via roads running through the city. About half of the bus terminal will be allocated to a temporary construction yard.

When implementing renovation to the Fisheries Center Administrative Building and the Fish Market Building, extra attention should be paid to dust pollution, because the renovation work involves disassembly of the structure that inevitably cause dust. This is particularly so as to the Fisheries Center building that uses asbestos.

(2) Items to be considered in carrying out the construction

- 1) Considering the fact that Samoa is situated on the way of cyclones, the natural conditions of the local area are to be given ample consideration in formulating the planning for the temporary construction, the construction methods, and the duration.
- 2) Staff and experts will be dispatched from Japan, in respect of the number of people, timing, and duration, in accordance with the progress of the construction.
- 3) Local materials will be used as much as possible to minimize the cost for the procurement of materials from foreign countries.
- 4) Because this construction will be carried out in the vicinity of the fishing port currently in operation, it is necessary to prepare a construction plan which does not hinder the fishing activities. Thorough discussion should be held with the Samoan Government to secure an alternate land area, in order to assure a prompt start of construction for the existing facilities such as the Fish Market building and the Fisheries Center Administration Building.
- 5) Construction works at Apia Fishing Port will require a temporary construction yard that can be used to accommodate temporary facilities such as a site where stones and aggregates can be stored, storage yard where steel pipe piles can be temporarily stored, a processing plant for reinforcing bars, an area where materials and machinery can be placed, and other facilities. As noted in the minutes, this land is to be provided gratis by the Government of Samoa at a location close to the project site.

Furthermore, the Samoan Government will similarly provide a disposal site for boulder stones resulting from the removable of obstacles.

- 6) When removing obstacles (boulder stones) in the water area in front of the bus terminal, silt fences should be laid in order to prevent a spread of turbidity caused by removing widespread boulder stones on the sea bottom using working vessels (barges installed with backhoes).

2-2-4-3 Scope of Works

The scopes of works to be undertaken by the Government of Japan and the Government of Samoa are defined as follows.

(1) Scope of works to be undertaken by the Government of Japan

Construction works

<Civil engineering>

- Construction of jetty
- Seawall of reclamation area
- Construction of preparation yard for fishing boats (reclaimed land)
- Removal of boulders
- Improvement of existing slipways
- Incidental facilities

<Architectural construction>

- Renovation of the Fisheries Center Administration Building
- Renovation of the Fish Market Building
- Construction of the Fishing Port Office Building

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

- Construction to lay electrical cables, water pipes and telephone lines to the planned site
- Construction of fences to be used to separate the jetty and preparation yard for fishing boats from the bus terminal

2-2-4-4 Consultant Supervision

Based on the Government of Japan's policies for grant aid scheme, integrated and smooth implementation design operations and operations to oversee the execution of the project will be implemented for the project, by a consultant who fully understands the main gist of the basic design. At the stage of supervising the execution of the project, the consultant will send supervisors with ample experience to be in residence at the construction site, and in addition to supervising the construction and handling communication, the supervisor will make sure experts

are sent at the necessary timing based on the progress of the construction works, and will carry out inspections and implementation.

(1) Supervisory policies

- 1) The timeframe of the work will be strictly observed by close communication and reporting between the persons and organizations related in both countries, to prevent any delay in completing the facilities, based on the construction execution processes.
- 2) Prompt and appropriate guidance and advice will be provided to the contractor as to the construction of the facilities in compliance with the drawings and specifications agreed upon.
- 3) As far as possible, high priority will be given to the utilization of local materials technologies.
- 4) The efficacy of the project as a grant aid programme will be fully realized, with the attitude of promoting technology transfer relating to construction execution methods and execution technology.
- 5) Appropriate advice and guidance will be provided to encourage smooth running of the facilities, regarding the maintenance and control of the completed facility delivered to the recipient side.

(2) Supervisory work

1) Assistance on contracting

The Consultant will supervise the selection of a contractor to carry out the construction works, determining the type of contract, drafting the contract document, evaluating the contents of the bill of quantities, and witnessing a contract awarding.

2) Evaluation and approval of the shop drawings, etc.

The Consultant will evaluate and approve the shop drawings, materials, finishing samples, and equipments submitted by the contractor.

3) Instruction to construction works

The Consultant will review construction plans and schedules, provide instructions to the contractor, and report on the progress of the work to the Government of Samoa.

4) Assistance in procedure of payment

The Consultant will evaluate and approve the contents of the bills and other documents pertaining to the payment to be made to the contractor during and after the construction, and will provide assistance in necessary procedures.

5) Inspection and witness

The Consultant will conduct inspections, when necessary, the work in progress and provide appropriate instructions to the contractor. Having confirmed that the work has been completed and the contract fulfilled, the Consultant will witness the delivery of the Project and confirm the government's acceptance. The Consultant will also

report to the Government of Japan about any necessary items that arise during the construction concerning the progress of work, payment procedures and status, and the delivery of facilities completed.

2-2-4-5 Procurement plan

In the process of procuring the materials and equipment that are necessary for the Project, special attention will be paid to the followings.

(1) Procurement policies

With respect to materials that can be procured locally, the quality (and inspection conditions) and the supply capability (deadlines and quantities) will be thoroughly investigated, and local procurement, including procurement from neighboring countries, given priority as much as possible. Procurement from Japan will be kept to a minimum from the standpoint of cost and deadlines.

1) Procurement from Japan

A detailed procurement and transport schedule must be prepared well in advance for, of the materials and equipment to be procured from Japan, those that normally will take a long period of time before manufacturing, packaging and shipment of goods until completed.

Basically, construction machinery will be procured locally or from a neighboring country, and procurement from Japan will be kept to a minimum.

2) Local procurement

Of the materials to be procured locally, stone, aggregates and other materials that are primary materials will be decided with ample consideration given to the place of origin, the quality, the transport capability and other factors.

3) Costs

When materials are procured locally or from neighboring countries or Japan, cost comparisons will be made and the lower-cost materials used. If materials are being procured from Japan, additional costs for packaging, transport, insurance, and port charges will be given consideration, as well as tax-exempt handling.

(2) Procurement items

1) Construction materials

The following indicates the results of investigations of procurement sources conducted based on the previous page.

Table 2-2-4-5(1) Procurement Plan of Civil Engineering Materials

Material		Country of procurement			Remarks
		Local	Japan	Third	
Fuel	Diesel oil				
	Gasoline				
	Crude oil A				
Steel	Steel sheet pile				
	Steel mold form				
	Steel net				
	Steel bar				
	Slip bar				
	Tie bar				
	Steel sheet				
	Timbering material				
	Scaffold material				
	Leading material				
Crusher-run, Stone	Sand for reclamation				
	Crusher-run				
	Leveling stone				
	Ruble stone				
	Armor stone				
Timber	Plywood				
	Block				
Ready mixed concrete	Concrete				
	Cement				
	Aggregate				
Joint material	Elastite				
	Joint filler				
Accessory	Rubber fender				
	Curve				
	Conner protection				
	Winch (manual type)				
	Bollard				
	Mooring ring				
	Corrosion protection cover				
	Roofing				
	Sand release protection				
	Filter sheet				
	Subgrade paper				
	Welding rod				
	Acetylene gas				
	Oxygen gas				
	Curing sheet				
	Boat pulling upper				

Table 2-2-4-5(2) Procurement Plan of Architectural Construction Materials

	Material	Country of procurement			Remarks
		Local	Japan	Third	
Building	Aggregate for concrete				
	Steel bar				
	Cement				
	Concrete				
	Formwork material				
	Steel beam				
	Concrete block				
	Timber				
	Wall panel (AAC)				
	Steel sheet for exterior wall				
	Tile				
	Roof material				
	Aluminum window and door				
	Wooden door				
	Glass				
	Paint				
	Interior finish material				
Electric	Cable and wire				
	Conduit pipe				
	Panel boards, Switch boards UPS				
	Switch, receptacle				
	Lighting fixture				
	Air conditioner				
	Ventilating & exhaust fun				
Plumbing	Pipe				
	Valve				
	Glees trap				
	Sanitary fixture				

2) Construction Machinery

Table 2-2-4-5(3) Procurement Plan of Main Construction Machinery

Machinery	Country			Remarks
	Local	Japan	Third	
Barge with crane (10t), Barge with power shovel				
Barge Steel 100t load				
Tag-boat D90PS				
Traffic boat D70PS				
Oil pressure hummer 4.5t				
Vibratory hummer 60kw				
Generator 200KVA				
Generator 50KVA				
Welder Semi-automatic 500A				
Welder D300A				
Breaker 1300kg Class				
Power shovel 0.6m ³				
Power shovel 1.0m ³				
Dump truck 10t				
Bulldozer 15t				
Tire roller 8-20t				
Vibratory roller 0.8-1.1t				
Truck 2t				
Truck 4t				
Vibrator f60 1.5kva				
High frequency combater 6kva				
Vibrator for pavement 50mm				
Flat vibrator				
Sprinkler truck 3800L				
Truck with crane 4t load, 2t				
Concrete cutter 200mm				
Crawler crane 100t				
Truck crane 35t				
Trailer 20t				
Hammer drill 38mm				
Wheel loader 2.1m ³				
Clamshell bucket 1.2m ³				
Tamper 60-100kg				
Concrete bucket 1.0m ³				
Concrete breaker 20kg				
Air compressor 3.5-3.7m ³ /min				
Pickup truck				

2-2-4-6 Quality control plan

(1) Quality control of materials

With respect to the materials used in the construction, supervision is to be carried out in conformance with the following: the common specifications for port construction published by the Japan Fishing Ports Association, the common specifications for port construction published by the Ministry of Land, Infrastructure and Transport of Japan, the building construction standard specifications and descriptions in JASS 5, published by the Architectural Institute of Japan, the common specifications for building construction published by the Ministry of Land, Infrastructure and Transport of Japan, the building construction supervision policies published by the Ministry of Land, Infrastructure and Transport of Japan and the Japan Standards Association (JIS), and approval is to be obtained in advance before the materials are used.

(2) Concrete mixture design

The composition of the concrete and mortar to be used in the construction will be formulated and tested in advance to confirm the strength, time required for mixing, and other elements, and the methods by which they are to be applied will be investigated. Moreover, a table showing the test results for each mixture, a table showing the concrete strength control, and control charts (X-R control charts, etc.) will be drawn up and the quality maintained and controlled.

2-2-4-7 Implementation schedule

When this project is executed through grant aid cooperation from the Japanese Government, a Japanese corporate consultant will be selected by the Government of Samoa following the signing of an Exchange of Notes (E/N) between the two countries, and a consulting agreement will be concluded between the Government and the Consultant. After that, the implementation designs and tendering documents will be drawn up, and the undertaking completed by means of tendering, construction contracts and the building construction.

(1) Preparation of Detailed Design Document

After a consultant agreement is concluded between the executing agency of the Samoan side and the Japanese Consultant, the agreement will be submitted to the Japanese Government for verification, and once it is verified the Consultant will begin drawing up the detailed design. In the detailed design, the following tender documents will be drawn up based on this Basic Design Study report: design drawings, technical specifications, tendering guidelines and so forth. During this time, consultations will be held with the Government of Samoa concerning the contents of the facilities, and ultimately, the tendering documents will be approved by the Government of Samoa.

The time required for the implementation design will be approximately 3.0 months.

(2) Execution of tender





The contractor (a Japanese construction firm) who will be involved in the construction of the project facilities will be selected through tender. The tender will be conducted in the following order: public announcement of tendering, reception of requests to participate in the tender, examination of pr-qualifications, distribution of tender documents, submission of tenders, evaluation of the tender, designation of the contractor and conclusion of the construction contract. The whole procedure will require 2.5 months.

(3) Execution of construction work

The work will begin after the construction contract has been concluded and the contract is verified by the Japanese Government. As a result of calculations of the construction period made taking into account the scale and contents of the project facilities (including the problems relating to the local conditions), and on the assumption that no acts of nature beyond human control will occur, a period of approximately 11.5 months will be required.

The process for carrying out the project from the Exchange of Notes (E/N) to its completion is as noted in Table 2-2-4-7 (1) below.

Table 2-2-4-7(1) Implementation Schedule

Month	1	2	3	4	5	6	7	8	9	10	11	12	Remarks
Detailed Design		(Field survey)											Consultant agreement, Survey
							(Home works)						Design/Cost estimation
Procurement and Construction				(Confirmation)									Approval of Tender Documents
													Civil works
											(Demolish of temporary mound)		Preparation and Temporary works
													Removal of boulders
													Reclamation works (including preparation yard of fishing boat and Seawall)
													Concrete pavement work
													Jetty
													Connection seawall
													Incidental facilities works
													Clean up
													Building works
													Preparation/Temporary Work
													Fishery Center Renovation (Demolition Work)
													Steel Structure System Work/Roofing Work
													Exterior Wall Work (AAC)
													Finish Work
													Fish Market Building Renovation (Demolition)
													Steel Structure Reinforcing and Roofing
													Finish Work
													Fishery Port Office Building Struvture Work
													Roofing /Exterior Wall /Masonry /Window /Finish
													Electricity and Mechanical Work
													Inspection and Cleaning

 Field survey

 Home work

2-3 Obligations of the Recipient Country

The following is an overview of project share to be taken on by the recipient country as confirmed by the Minutes of Discussions and other sources taken during the Basic Design Study.

- 1) Securing the land necessary (temporary yard) for the project.
- 2) Obtaining permission to quarry sand and stone for the land reclamation.
- 3) Securing a location (close to the construction site) for disposal of construction waste (dredge).
- 4) Connecting electricity and public water, wiring/installation of telephones.
- 5) Exemption from duties at Customs for project construction supplies and materials imported into Samoa.
- 6) Exemption by Samoa from taxes, etc. for Japanese nationals in Samoa for the purpose of executing **approved** contracts or work related to such contracts.
- 7) Providing the necessary assistance for Japanese nationals in entering and staying in Samoa for the purpose of executing work related to the approved contracts.
- 8) Payment of fees related to making bank arrangements and payment authorizations.
- 9) Obtaining the necessary domestic authorization and approval for construction in Samoa.
- 10) Appropriate and effective use of facilities constructed through Japan's Grant Aid Programme.
- 11) Assumption of all costs necessary to carry out the project that are not included in the scope of the grant aid cooperation from Japan

2-4 Project Operation Plan

2-4-1 Project Cost

Project cost estimation is approximately 709 million yen. This cost estimate is provisional and would be further examined by the Government of Japan for the approval of the Grant.

Project Cost Estimate

Approximate 709 million yen

Construction of Apia Fisheries Wharf and related facilities

Item			Project Cost (million yen)	
Facility	Civil works	Jetty, Seawall for reclamation area, Preparation yard for fishing port, Removal of boulders, Improvement of existing slipway, Incidental facilities	375	616
	Building works	Repair of the Fisheries Center Administration Building and the Fish Market Building, new construction of the fishing port office building	241	
Detailed design/consultant supervision			93	

The cost borne by the Government of Samoa is estimated tentatively. Total cost will be 45,900 Talas (app. 1,766,000 yen). Details are as follows.

1) Electricity (10m) :	11,300 Talas
2) Water supply (10m) :	1,700 Talas
3) Telephones (10m):	5,300 Talas
4) Fence construction (53m) :	27,600 Talas
Total	45,900 Talas

2-4-2 Project Operation Plan

2-4-2-1 Operation and Maintenance

The operation and maintenance of the Fisheries Center Administration Building and the Fish Market building to be renovated as part of this project, the fishing port office building and landing/preparation jetty to be newly constructed, and the fishing boat preparation yard will be carried out by the Fisheries Division of the Ministry of Agriculture and Fisheries under the supervision of the ministry. Figure 2-4-2-1(1) depicts an organizational chart of the Fisheries Division, which oversees the management and operation of the facilities to be renovated or newly constructed by this project. The personnel needed are the same in number and organization as the personnel that have been used for the management and operation of the existing facilities with no new changes. This managing organizational chart is shown in Figure 2-4-2-1(1), while the distribution of duties is shown in Table 2-4-2-1(1).

In Samoa, the budget for personnel costs and operational costs, such as electricity and

water, for the operation of the Fisheries Center Administration Building, Fish Market Building, Fishing Port Office Building, landing/preparation jetty, the fishing boat preparation yard, and the existing fishing port, which are all to be renovated/constructed in this project, will be earmarked in July of each year at the start of the new fiscal year as part of the expense budget of the Fisheries Division as has been done in the past. Note that in the past, the Fisheries Division has repaired the Fisheries Center and the Fish Market and has worked to manage and maintain these facilities.

**Table 2-4-2-1(1) Management Structure and Distribution of Duties
at Apia Fishing Port Facility**

Management Facility	Number of People	Distribution of Duties
Fisheries center Administration Building	50	The Fisheries Division director is responsible for overseeing the management and maintenance of the Fisheries center, Fish Market and fishing port facilities. The managers responsible for each of the various section that use the Fisheries center administration office building (i.e. Inshore Fisheries Section, Extension Section, Administration Section, Aqua Culture Section, and Enforcement and Statistics Section) are responsible for the operation and management of each respective office. Areas of common use, such as the library and the training room are managed by the head of the Administration Section. The staff of Inshore Fisheries Section are responsible for collecting statistical materials.
Fish Market Building	7	There are seven staff in addition to the Fish Market Section director who handle the management and operation of the facility and the collection of fees. Also, the staff responsible for Enforcement and Statistics Section inspect the catch in the Fish Market.
Fishing Port Office Building	27	Nineteen staff in the Offshore Fisheries Section are in charge of the management and operation, berthing fees, and collection of statistical materials for fishing port facilities. Eight staff of Enforcement and Statistics Section conduct surveys regarding the operating status of fishing boats.

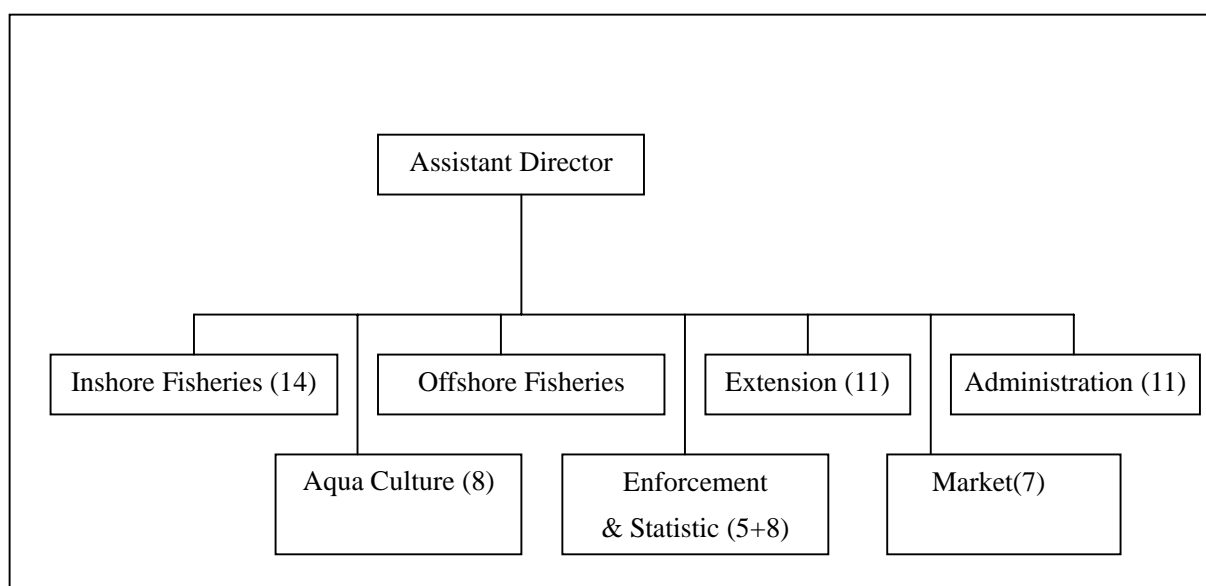


Figure 2-4-2-1(1) Organizational Chart of Operation and Management at Apia Fishing Port Facilities

2-4-2-2 Operation Cost

(1) Operation and Maintenance Cost

The operation and maintenance expenses necessary for this project are calculated as follows. Operation of the existing Fisheries Center, existing Fish Market, and existing fishing port facilities are carried out by the Fisheries Division, which will continue to operate and manage these facilities even after renovation/construction. The following are sources of new expenses that will result from the implementation of the project: increased electricity expenses from air conditioning and other sources resulting from the renovation of the Fisheries Center; water, heating and electricity expenses for the newly constructed fishing port office building; and electricity expenses for the newly constructed jetty and fishing boat preparation area. Personnel expenses are earmarked in the budget for each fiscal year. Accordingly, the following is a trial calculation of operation and management expenses based on the FY2004 (July 2004 – June 2005) expense budget of the Fisheries Division. Expenses collected by the Fisheries Division, including mooring fees, fishing boat registration fees, and Fish Market usage fees are calculated based on the fees set by the Fisheries Division. Also, water and electricity expenses are calculated based on tariffs charged by Samoa Power Authority and the Samoa Water Authority respectively.

Table 2-4-2-2(1) Operation and maintenance cost

Unit : Tala

1. Expenditure			
(1) Personnel			Budget of 2004
1. A.CEO		52,500	
2. Principal officer (6)		153,200	
3. Officer (38)		400,100	
4. Temporary worker (36)		132,000	
5. Overtime, etc.		55,800	
Sub total		793,600	
(2) Operation cost			
1) Electricity			
1.Fisheries Center and Fish Market		86,000	Renovated
2.Fishing port office		10,000	New
3.Lightig in Jetty and preparation yard		1,800	New
2) Water			
1.Fisheries Center and Fish Market		2,500	Renovated
2.Fishing port office		200	New
3) Communication		31,400	
4) Travel cost		60,000	Budget of 2004
5) Rental fee		35,100	Budget of 2004
6) Insurance		36,600	Budget of 2004
7) Maintenance		246,500	Budget of 2004
8) Welfare		34,200	Budget of 2004
Operation cost (1 ~ 8)	Sub total	545,100	
Operation cost	Grand total	1,337,900	

2. Income.			
(1)License fee			
Breakdown			
Class A	87 boats×200 Tala	17,400	Registered boat in 2004
Class B	6 boats×1,000 Tala	6,000	ditto
Class C	8 boats×5,000 Tala	40,000	ditto
Class D	6 boats×10,000 Tala	60,000	ditto
Class E	3 boats×15,000 Tala	45,000	ditto
	Sub-total	168,400	
(2)Mooring fee			
Breakdown			
Class A	53 boat (2 days fishing, 2 days unloading and preparation)	0	Using fishing port
Class B	6 boats (ditto)	0	Ditto
Class C	8 boats×30 Tala/day×37day(7days operation, 3 days unloading and preparation)	8,880	Ditto
Class D	6 boats×50 Tala/day×37days(ditto)	11,100	Ditto
Class E	3 boats×100 Tala/day×37days(ditto)	11,100	Ditto
	Sub-total	31,080	
(3)Rental fee in Fish market			
	87persons×4Tala/day×52days	18,000	Sunday
	37 persons×4Tala/day×260days	38,480	Tue—Sat
	11 persons×4Tala/day×52days	2,390	Monday
	Sub-total	58,870	
Income	Grand total	258,350	

The aforementioned fees collected by the Fisheries Division (i.e. mooring fees, fishing boat registration fees, and Fish Market usage fees) are earmarked in the national budget as public revenue. Also, the aforementioned electricity and water expenses are calculated based on the usage tariffs set by the Samoa Power Authority and the Samoa Water Authority.

(2) Income and Expenditures

The annual expenses for operating and managing the facilities to be constructed and renovated in this project are estimated to be 1,337,900 Talas. In contrast, the annual income in the form of fees collected by the Fisheries Division is estimated to be 258,350 Talas. Given that the annual amount set aside in the national budget as part of the Fisheries Division budget to cover operation and management expenses is 1,340,000 Talas, no problems are foreseen regarding the operation and management of the facilities. Also, the fees collected by the Fisheries Division are included as public income.

2-5 Other Relevant Issues

The following are items that should be dealt with promptly following the signature of E/N in order to ensure that the project targeted for cooperation is carried out smoothly.

- 1) Promptly carry out an environmental impact assessment when such assessments are deemed necessary by the government of the recipient country. Also, promptly carry out procedures to obtain authorization, etc. necessary for land reclamation and use of a part of the bus terminal for the fishing port site.
- 2) Have the Ministry of Agriculture and Fisheries provide government-owned land (approximately 4,140m² out of 7,550m² of the total bus terminal area) to be used as a temporary construction yard. At the time of the Basic Design Explanation Study, the Samoan government basically agreed to secure 4,140m² of the bus terminal area as a temporary construction yard to be used during the construction period, expressing that they would have to proceed by consultation with other related ministries, such as the Ministry of Works, Transportation and Infrastructure, etc., at a subcommittee in light of the direct involvement of such other ministries in the matter. The government also stated that they would report to JICA Samoa Office on the result of consultation at the subcommittee.
- 3) Have the Ministry of Agriculture and Fisheries secure a location near the Project Site for disposing of boulders removed from the water area in front of the bus terminal and asbestos and other substances arising out of the renovation work of the Fisheries Center Administration Building. The Samoan government agreed, at the time of the Explanation Study, to secure and provide lands, etc. necessary for this purpose.
- 4) The Fish Market Building and the Fisheries Center Administration Building are currently being used. It will be necessary to promptly secure an alternate location for these facilities to be used during the construction period and relocate them as quickly as possible as any delay in doing so will largely impact the execution of the project. It was confirmed during the Explanation Study that the Fisheries Division would secure sites and budgets needed for relocating the Fisheries Center Administration Building, the Fish Market and the private company in the Market and execute the relocation. The time periods planned for relocating respective bodies are as follows:
 - *Fisheries Center Administrative Building for about 12 months.
 - *Fish Market for about 9 months.
 - *Private company located in the Fish Market for about 10 months.

The Fisheries Division requested that the period of complete close-down of the private company segment in the Market be kept to three months at the maximum. At

An examination by the Study has derived that the renovation work on the roof of the segment should start six months after the conclusion of the construction contract, with consideration given to the relation between leadtime necessary for arranging materials and the delivery schedule. The examination has also found it possible to avoid confusion in traffics of the renovation work and the private company's operation at times other than the three month of complete close-down, by isolating the work area with temporary fences.

- 5) During construction, it will be necessary to partially restrict the fishing port usage as the construction will hinder fishing activities.

Chapter 3

Project Evaluation and Recommendations

Chapter 3 Project Evaluation and Recommendations

3-1 Project Effect

The fishing industry in Samoa largely consists of an inshore fisheries and a commercial fisheries. The inshore fisheries plays a role in supplying animal protein for the people of Samoa, while the commercial fisheries that consists primarily of tuna longline fishing contributes significantly to Samoa's economy as one of its sources of foreign currency. Samoa's National Development Plan ranks the fishing industry as an important supply of animal protein for the citizens of Samoa and as a source of foreign currency, and thus sees the sustained utilization and development of this domestic national resource as essential.

The facilities where renovation and expansion have been requested in this project (i.e. the Fisheries Center, the Fish Market and the fishing port facility) were built in 1978 and 1982 through Japan's Grant Aid Programme. Since then, although the facility roofs have been damaged by cyclones and have begun to leak rainwater due to the aging construction, repairs have been made time and again through efforts by the Samoan government. These facilities have now become to serve as an export base for fishery products, management base to promote the fishing industry, and a domestic distribution base.

The Basic Design Study has found out the following problems that need to be addressed with regard to the Apia fishing port facilities.

- 1) During the 20 or more years since the construction of the existing mooring facilities, the number of fishing boats that use the facilities have exceeded the initial design, one commercial fishing boat and 30 alia fishing boats, and reached 20 commercial boats and 33 alia boats in 2003. This increase has caused congestion within the fishing port, leading to significant hindrance to the safety of entering and leaving of fishing boats and the efficiency of fish landing.
- 2) Whereas the volume of fish handled in the Fish Market was 153 tons and the number of fish vendors was 15 in 1984, these figures increased to 519 tons and approximately 90 on Sundays respectively by 2003. The current floor area cannot accommodate such a large number of users particularly on Sunday, resulting in congestion. Further, the Market is also faced with a structural problem of severe corrosion of the steel of the structural frame and the roof under structure. Falling-off of tiles of the sales counters and poor drainage conditions on the floor are undermining the sanitary condition in the Market.
- 3) The Fisheries Center Administrative Building suffers from tremendous deterioration and has been damaged by recurrent cyclones. Despite Samoa's self-help efforts in repairing and maintaining the facility, these efforts remain at the first-aid level and are not sufficient to prevent rainwater leakage, which is thwarting daily operations.

To solve these problems, the project has deemed it necessary to conduct the following building renovations and fishing port facility expansion.

(1) Fishing Port Facility

- 1) Construction of an additional jetty for landing and preparation to alleviate congesting and improve fish landing efficiency.
- 2) Reclamation of land for preparation where fishing boats can prepare themselves efficiently.
- 3) Improvement of the existing slipway in order to secure evacuation routes in case of cyclones.

(2) Fish Market Facility

- 1) Reinforcing and renovating the structural frame and replacing the roof to ensure the continued usability of the facility.
- 2) Improving drainage on the sales floor and renovating the sales counters in order to alleviate congestion and improve the sanitary conditions in the Facility.
- 3) Construction of a Fish Market Administration Building for the purposes of control of fish caught that are subject to regulation and adequate administration of the new landing and preparation wharves.

(3) Fisheries Center Facility

- 1) Renovating the roof and walls to maintain daily operations.
- 2) Re-layout the facility floor plan to restore the functionality of the facility.

Based on the aforementioned background, the following benefits are expected to be seen through the implementation of this project plan.

[Direct Effects]

- 1) New construction of the landing and preparation wharves will enable more efficient landing and preparation by alia fishing boats, and the fishermen's work hours will be reduced.
- 2) New construction of the landing and preparation wharves will make it possible to move the alia fishing boats to the new facility area, thus alleviating congestion in the existing fishing port and increasing the efficiency of the landing and preparation work of commercial fishing boats. Also, the fishermen will suffer less fatigue.
- 3) New construction of the landing and preparation wharves will alleviate congestion in the existing fishing port, thus increasing the level of safety when boats are entering and leaving the fishing port, assuring the safety of the fishermen.
- 4) Improving the existing slipway will make it easier to haul boats out of the water and allow faster evacuation of boats, so that the property of the fishermen will be preserved. Also, the fishermen will suffer less fatigue when hauling their boats out of the water.
- 5) Renovating the Fisheries Center Administration Building will eliminate problems such as rain leaks, and will boost operation efficiency.
- 6) Renovating the interior layout of the Fisheries Center Administration Building will make the functions of the various Fisheries Division sections more efficient,

and will strengthen the management of the fishing industry and boost efficiency.

- 7) Renovating the training room in the Fisheries Center Administration Building will restore the locale and provide opportunities for courses to be held by Fisheries Division staff members on resource management, fishing gear and techniques, effective methods of fish farming, and other topics, and is aimed at modernizing the fishing industry.
- 8) Reinforcing the structure of the Fish Market Building will enable continuing use of the facility.
- 9) Renovating the sales area of the Fish Market Building will enable a more sanitary environment and make it possible to provide consumers with more sanitary and hygienic fish.
- 10) Renovating the sales area of the Fish Market Building will eliminate congestion in the area and will facilitate purchasing on the part of consumers.
- 11) Constructing a new Fishing Port Office Building located near Fish Market and Fishing Port will enable efficient management and operation of the Fish Market and the new fishing port facility. This will lead to timely operation of instructions of mooring locations, control of illegal mooring, collection of berthing fees and the Fish Market usage fees, control of fish catch that are subject to regulation, etc.

[Indirect Effects]

- 1) Expanding the fishing port facilities will make it possible to carry out fishing activities more efficiently, and this will be step up the fishing activities as export industry.
- 2) Communication will be facilitated between the fishermen and the Fisheries Division, and this will facilitate fishing industry management and promote the fisheries sector such as development of market for fisheries sector and promotion of private sector.
- 3) Through renovating the Fisheries Center Administration Building, the opportunities for training and education of comprehensive resource management and guidance to inshore fishers will be increased. As this result, sustainable usage of marine resources in inshore fisheries will be possible.
- 4) Through the renovation of the Fish Market Building, an increase can be expected in the volume of fish supply by inshore fishermen, and more sanitary and hygienic fish will be supplied to consumers.

The extent of benefits and improvements resulting from this plan are summarized in Table 4-1(1).

Table 3-1 (1) The Effects and Improvements Resulting from Project Implementation

Current status and problems	Measures taken in this project (within the scope of cooperation)	Extent of project effects/improvements
1) Fishing Port Facility		
The number of commercial fishing boats and alia fishing boats using the existing fishing port have increased, causing congesting, which has had detrimental effects on fishing activities, such as a decrease in the fish landing efficiency.	Expand the fishing port facility to include an area reserved for alia fishing boats.	Improvement in the fish landing efficiency and preparation work for alia fishing boats; decrease in labor required from fishermen. Improvement in the fish landing efficiency and preparation work for commercial fishing boats; decrease in labor required from fishermen.
The number of commercial fishing boats and alia fishing boats using the existing fishing port have increased, which has caused congesting and has increased the risk of danger for boats entering and leaving the fishing port.	Expand the fishing port facility to include an area reserved for alia fishing boats.	Improvement in safety for fishing boats entering and leaving the fishing port; improved mooring efficiency.
2) Fisheries Center Administration Building		
The Fisheries Center facility Administration Building is aging, resulting in severe rainwater leakage and rooms that are no longer able to be used. Furthermore, business activities must sometimes be halted in rainy weather.	Renovate the Fisheries Center Administration Building	Prevention of hindrances to daily operations through the renovation of the Fisheries Center Administration Building.
Some rooms (meeting rooms, library, etc.) are no longer usable, decreasing the functionality of the Fisheries Center.	Renovate the Fisheries Center Administration Building	Restoration of Fisheries Center Administration Building functionality. Revitalization of Fisheries Center's role as a place for communication with fishermen; increase in opportunities for holding workshops; development of fishing industry.
Asbestos has been used in the ceilings and walls, which could lead to health problems.	Renovate Fisheries Center Administration Building to eliminate health risks.	Elimination of health risk concerns.
The number of staff has increased and some rooms no longer fit the functions of the center; sections of the center are no longer able to carry out their activities well.	Renovate the Fisheries Center Administration Building layout	Functional operation of each section; increase in work efficiency.

3) Fish Market Building		
The steel used in the structural frame is corroding; the sturdiness of the building is decreasing.	Renovate the Fish Market Building (reinforcement / renovation of structural frame).	Extension of the lifespan of the facility.
The number of fish exporters is increasing, causing the size of the sales floor to no longer be sufficient, resulting in crowding.	Renovate layout of the retail sales area of the Fish Market Building.	Alleviation of crowding in the Fish Market; increase in sales efficiency.
Sales counters are aging (tiles are coming off the walls), resulting in unsanitary handling conditions of fish.	Renovate Fish Market building sales counter.	Improved sanitary conditions of fish sales to provide cleaner fish to customers.
Fish Market floor drains is poor and can clog, causing unsanitary conditions.	Renovate Fish Market Building floor.	Improvement in sanitary conditions of the Fish Market to create a location where clean fish can be sold.

3-2 Recommendations

Once the planned facilities have been constructed, including the new construction of the landing and preparation jetty and the Fishing Port Office Building, and the renovation of facilities such as the Fisheries Center Administration Building and the Fish Market Building have been completed, the following advice regarding the operation and management of the facilities should be closely followed by the implementing agency (i.e. the Ministry of Agriculture and Fisheries) and the ministry's Fisheries Division, which will directly manage and operate the facilities, to ensure the effective use of the facilities and resolve problems related to the Apia fishing port facilities.

1) Appropriate Operation and Management of the Fishing Port Facility

The completion of the facilities planned by this project will create new mooring facilities and alleviate congestion in the existing fishing port. The Fisheries Division will provide guidance to ensure the smooth operation of fishing activities by dividing the fishing boats into two categories, with the alia fishing boats using the new facility and the commercial fishing boats using the existing facility. Furthermore, observations of the existing fishing port facility show that the mooring of fishing boats not in operation causes congestion, thus it is necessary to ensure compliance of and provide guidance regarding fishing port usage regulations and remove fishing boats not in operation from the port.

2) Periodic Inspection of the Facilities and Securement of Maintenance Costs

Periodic inspections and maintenance of the facilities will be necessary to prevent a decline in the facility functionality and to increase the lifespan of the facilities. Regarding the rainwater leaks in the Fisheries Center, the warranty of the waterproofing provided (in Japan) is 10 years, thus inspections and repairs will be necessary once this period has elapsed. Also, if the structural frame of the Fishing Market was repainted as soon as signs of rust appear, that would lower repair costs, prevent deterioration of the frame, and extended the lifespan of the structure. It is thus expected that after completion of the facilities, the Fisheries Division, which oversees the facility management, will establish a list of items to be inspected (e.g. checking for rust on the building structure or on mooring posts), carry out such inspections on a regular basis, and promptly repair any problems that appear. It is also expected that they will consider creating a system to promptly secure a maintenance budget that will cover a preset period for updating and repairing each facility in the event that repairs become necessary and the funds to carry out such repairs are needed.

3) Ensuring Sanitary Conditions in the Fish Market

Currently in the existing Fish Market, once fish trading is over for the day, the inside of the market is cleaned to maintain sanitary conditions. Once this project is completed, the fish sales counter will be renovated and the floor drains will be renovated, improving sanitary conditions within the market even more. Accordingly, it will be necessary to continue current efforts to maintain sanitary conditions within the market.

4) Ice Usage

As ice is necessary to preserve the quality of fish, it is expected that the Fish Market will use ice to provide fish with a high degree of quality to consumers. Since private exporters produce ice and have sufficient facilities for doing so, an ice-making facility has not been included in the scope of this project; however, the Fisheries Division should provide guidance to examine the creation of a collaborative system for purchasing ice from such private exporters so that ice will be used at the Fish Market in fish sales.