No.

Pohnpei Port Authority
The Federated States of Micronesia

BASIC DESIGN STUDY REPORT

ON

THE PROJECT FOR IMPROVEMENT

OF

TAKATIK FISHING PORT IN POHNPEI STATE

IN

THE FEDERATED STATES OF MICRONESIA

FEBRUARY 2000

Japan International Cooperation Agency

Pacific Consultants International

G R 4
CR (2)
00-010

Preface

In response to a request from the Government of the Federated States of Micronesia, the Government of Japan decided to conduct a basic design study on the Project for Improvement of Takatik Fishing Port in Pohnpei State and entrusted the study to the Japan International Cooperation Agency (JICA).

JICA sent to Micronesia a study team from July 28th to August 20th, 1999.

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

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

I wish to express my sincere appreciation to the officials concerned of the Government of the Federated States of Micronesia for their close cooperation extended to the teams.

February, 2000

Kimio Fujita
President
Japan International Cooperation Agency

February, 2000

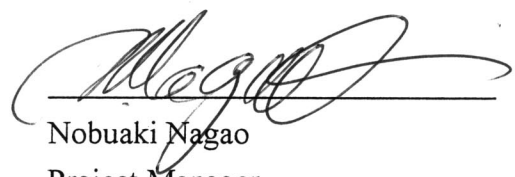
Letter of Transmittal

We are pleased to submit to you the basic design study report on the Project for Improvement of Takatik Fishing Port in Pohnpei State in the Federated States of Micronesia.

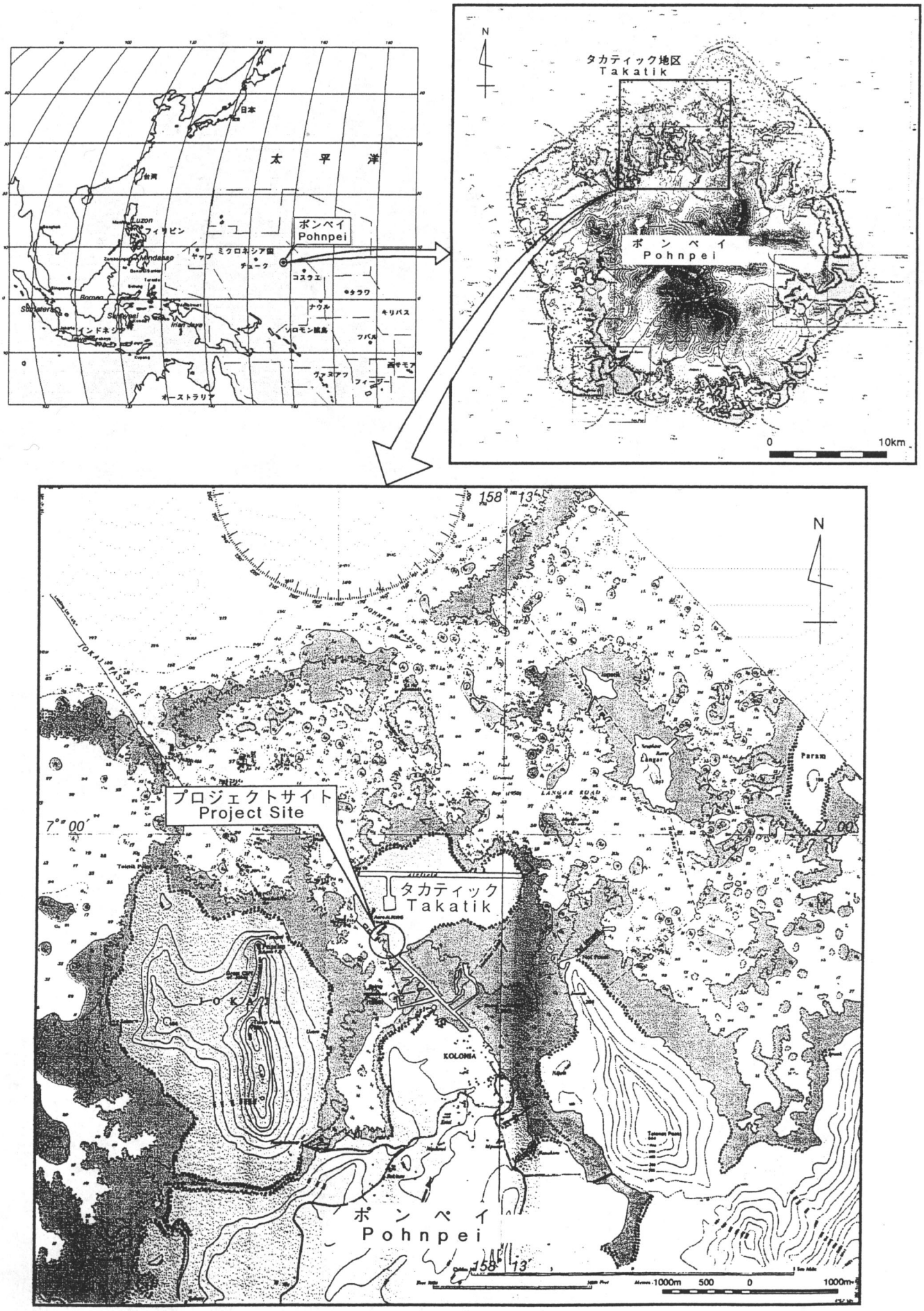
This study was conducted by Pacific Consultants International, under a contract to JICA, during the period from July 21st, 1999 to February 24th, 2000. In conducting the study, we have examined the feasibility and rationale of the project with due consideration to the present situation of Micronesia 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,

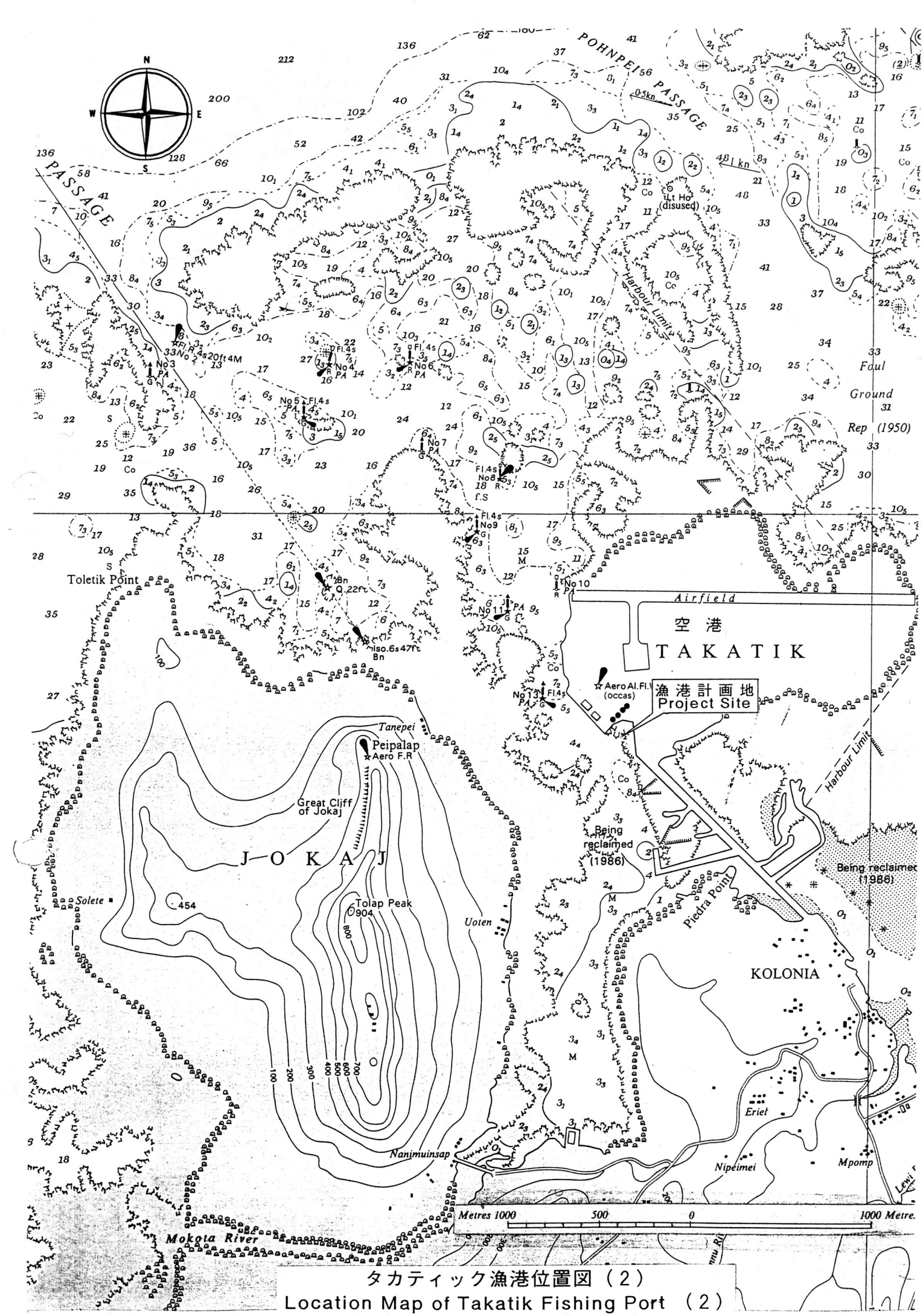


Nobuaki Nagao
Project Manager,
Basic design study team on
The Project for Improvement of
Takatik Fishing Port in Pohnpei State
Pacific Consutatnts International



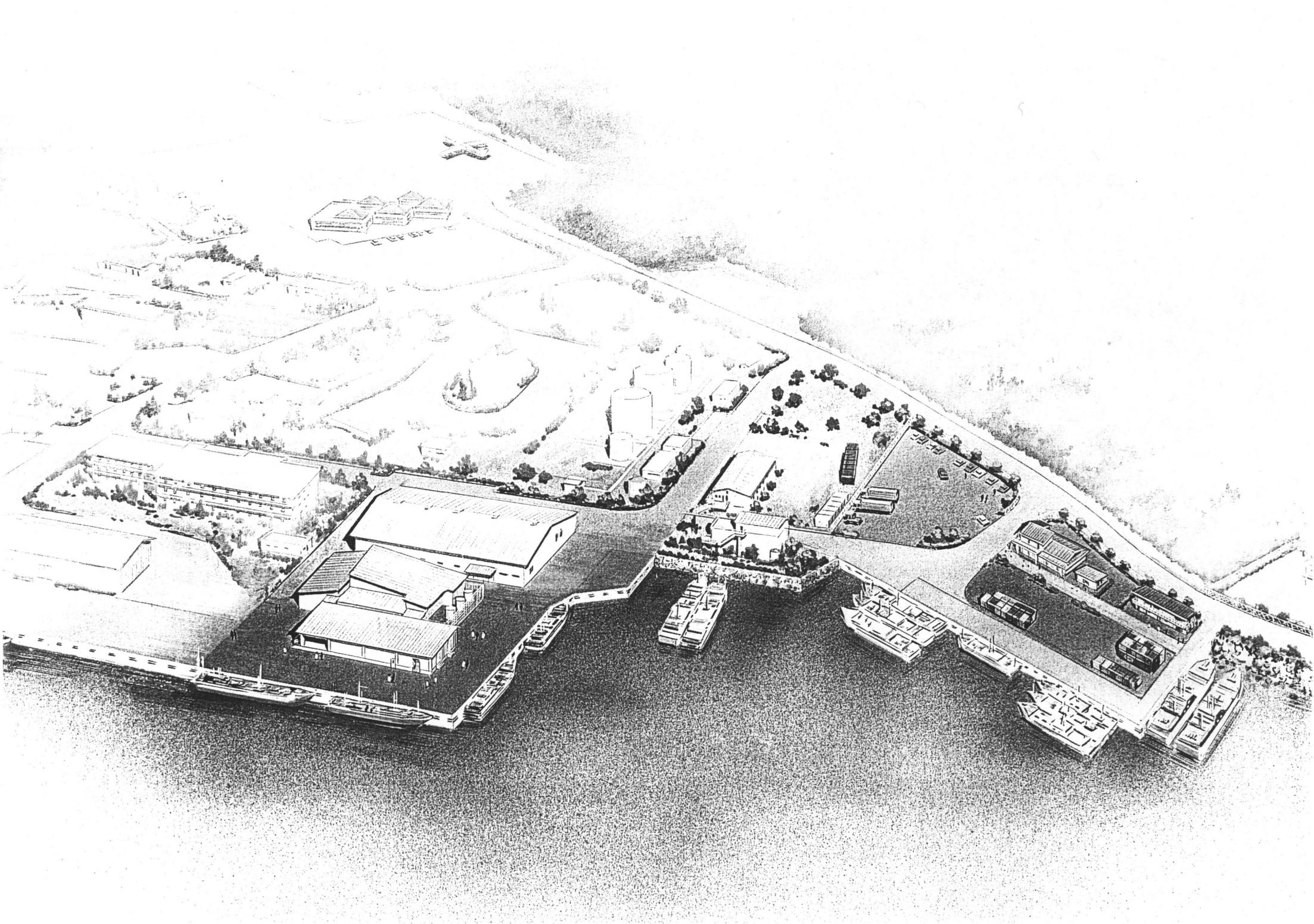
タカティック漁港位置図（１）

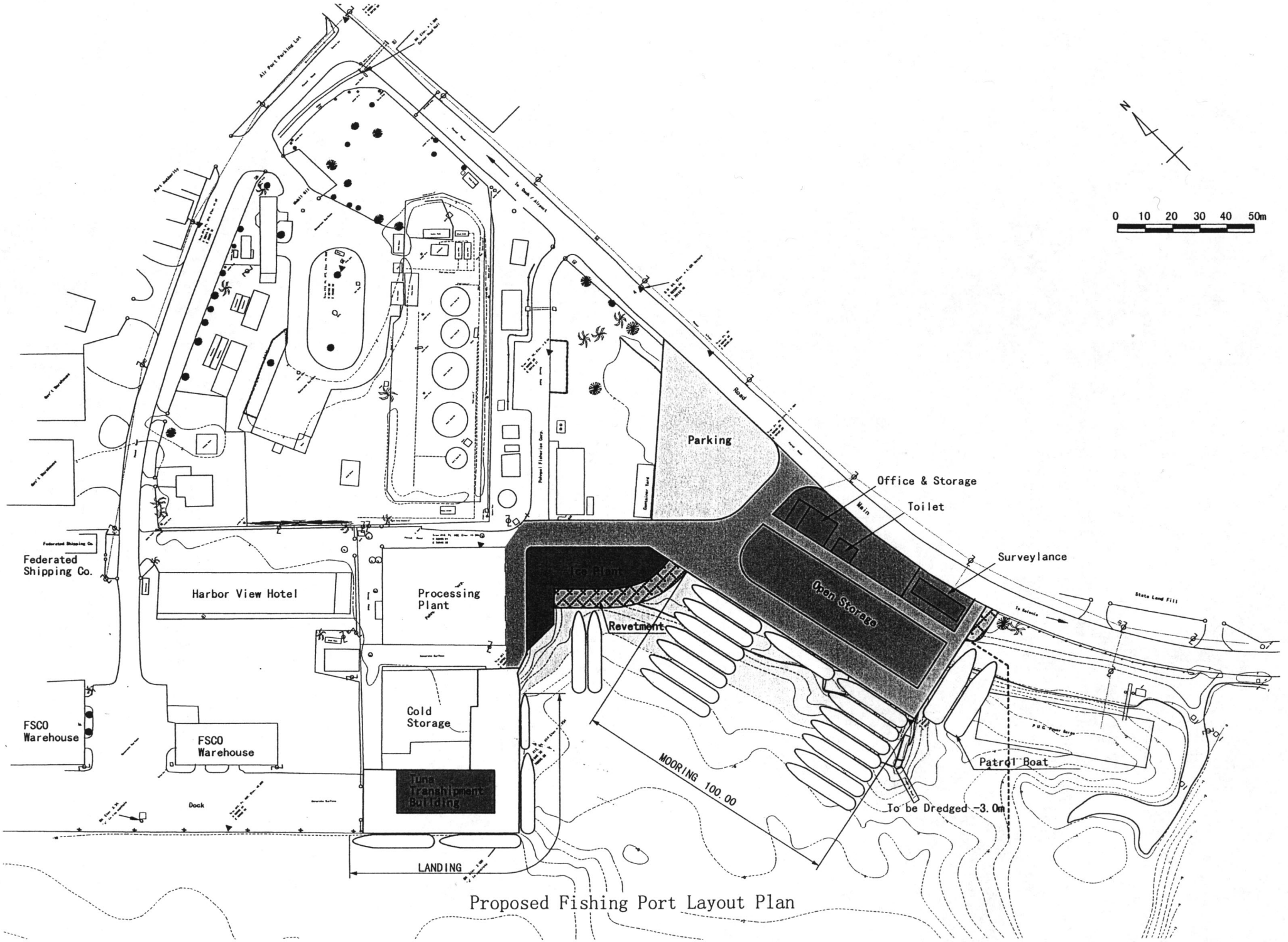
Location Map of Takatik Fishing Port （１）



タカティック漁港位置図（２）

Location Map of Takatik Fishing Port （２）





Proposed Fishing Port Layout Plan

ABBREVIATIONS

CFC:	Caroline Fisheries Corporation
DWFN:	Distant Water Fishing Nations
EDA:	Economic Development Authority
EEZ:	Exclusive Economic Zone
EPA:	Environmental Protection Agency
FSCO:	Federated Shipping Corporation
FSM:	Federated State of Micronesia
HWL:	High Water Level
IEA:	Initial Environmental Assessment
LWL:	Low Water Level
MMA:	Micronesia Maritime Authority
MSL:	Mean Sea Level
NFC:	National Fisheries Corporation
PFC:	Pohnpei Fisheries Corporation
PPA:	Pohnpei Port Authority
PUC:	Pohnpei Utilities Corporation

TABLE OF CONTENTS

APPENDICES

CHAPTER 1 BACKGROUND OF THE PROJECT

1-1 Background of the Project

The Federal States of Micronesia is an archipelago country that stretches from the south of Mariana Islands and the Philippine Sea to the East, lying between 0°~14° North latitude and 135°~166° East longitude, consisting of 607 islands, and being the federation consisting of four states, that range from the East in following order: Kosrae State, Pohnpei State, Chuuk State and Yap State. Exclusive Economic Zone (EEZ) of the country cover the area with dimensions of approximately 1,300 km from North to South, and 3,500 km from East to West, being one of the major tuna fishing grounds in the world. As of 1994, the total population of the country stood at about 105 thousand, with approximately 33 thousand of it living in the Pohnpei State, the site for this Project.

The islands are located in the zone of maritime tropical climate, and the temperature is practically unchanged here through the year (average temperature 27°C). The differential temperature is also insignificant, with maximum of 33~35°C, and minimum of 16~20°C. Normally, dry season lasts from January to March, and the period from April to November is a rainy season. Humidity is high throughout the year, with relative humidity at 80% in dry season, and 83~88% in rainy season. Pohnpei is a spot with exceptionally pluvious climate, with yearly rainfall amount of 4,700 mm and a number of rainy days reaching 300. Micronesia is located in the zone of typhoon occurrence, but in comparison with the other islands of the Federated States, the damage caused to Pohnpei by typhoons is small.

The industry of the country is not developed, with any noteworthy export items besides the marine products and copra. Approximately 57% of the national revenues are covered by the financial assistance from the United States, and the share of domestic tax revenues makes up only 14.6% (as of 1997). The US financial assistance is scheduled for termination since 2001, and corresponding efforts for economic self-sustenance have been made in the Federated States of Micronesia. However, the progress achieved is lagging behind expectations.

After the establishment of the EEZ, the activities of foreign fishing companies and corporations rapidly increased in Micronesian waters. This, in turn, has stimulated the Micronesians to realize the acute necessity of their own direct participation in utilization of fishing and marine resources undertaken in their exclusive waters. To this effect, the

National Fishery Corporation (NFC) with 100%-government participation in capital was established, and subsequently started to develop fishing operations.

In the initial period, the development of commercial fishing was aimed at the promotion of seiner-trawler fishing, however, this direction of business did not succeed, and 3~4 years ago the objective was shifted to the development of longline fishing by small vessels. Since then, the progress, though reached by small degrees, has become evident. Until 1995, the share of Micronesia in the amount of total fish catch in its exclusive waters fell short of 1% in 1998, however, it reached 11%. On the other hand, the fishing and marine reserves of the EEZ of the Federated States of Micronesia are so abundant, that they cannot be developed only by Micronesian fishing fleet, whatever development it may achieve. Therefore, it is necessary to acknowledge the participation by the fishing vessels under the flags of other countries as well, under the appropriate manner of their operations, and to promote advanced utilization of the marine resources in coordination with foreign fishermen. From the standpoint of the status of public finance, in order to secure budget revenues it is also essential to admit operation in EEZ for foreign fishing vessels and to take steps to achieve increase of license revenues.

The marine product industry supported by abundant resources of country's waters was positioned by the Federal Government in the "Second 5-year Program of National Development (1992~1996)" as the most important national industry, as a resource for supply of animal proteins for domestic market, and also as a means to alleviate the existing over-dependency on foodstuffs import and to obtain hard currency revenues. Thereupon, the Takatik Fishing Port development is incorporated into this program as an individual concrete project for program implementation.

Pohnpei State, where the site of this Project is located, has the biggest territory among the states of the Federated States of Micronesia. Here, on Pohnpei island, which is the mainland of the State, both the capitals of the State (Kolonia) and of the Federate States of Micronesia (Palikir) are situated. This island is the center of political and economic activity of the State. In the structure of foreign trade of Pohnpei State in 1990~1996, main import items included foodstuffs, drinks, machinery, vehicles, petrochemical products, chemicals, etc.; the amount of import increases from year to year, and imports exceed exports. Main export commodities include marine and fishery products (the amount of export of this category started to increase rapidly since 1990-ies), copra, black pepper, and other agricultural products. Marine and fishery products constitute approximately 80% of the total value of exports, being the most prominent export item.

Like the Federal Government, the Government of Pohnpei State has also positioned the fishery industry as the most important locomotive industry of the State, and in the "Complex State Development Program (1997~2001)" set the objectives for this industry as follows: " to utilize effectively abundant marine resource, to increase revenues, to foster participation by private enterprises, to create employment opportunities, to provide foodstuffs for self-supply, and to create recreational facilities". Concerning the development of commercial fishing, the Government aims (1) securing stable provision of raw fish materials for effective operations of the existing fishery facilities; (2) improvement of the infrastructure that would enable foreign fishing vessels to use efficiently the Port as the base for their fishing operations; and (3) improvement of facilities in order to achieve efficient management of tuna transshipment operations, etc.

The Takatik Fishing Port, where the site of this Project is located, is the only port and harbor facility in the Pohnpei State, and incorporates both the fishing and the commercial ports. The total number of ship calls to the Port in 1998 was 991, including 867 calls by fishing vessels. Main port users include 25 Micronesian fishing vessels that use the Port as their mother port here, and 37 longline tuna fishing vessels under foreign flags. The fishing trips of these vessels last between seven to ten days; subsequently the longliners return to the Port for 3 to 7 days to unload their catch, re-supply their vessels with ice, water, food, fishing gear, bait etc. If necessary, vessels stay moored for servicing and repair.

At present, all such fishing vessels mooring for needs of unloading, preparation, and rest is performed using the 67 m quay wall specially assigned for fishing vessels. However, as it is practically impossible to accommodate all fishing vessels using the capacity of only fishing vessels' quay, many fishing vessels are compelled to moor by the quay of the Commercial Port. In particular, through the days prior to fresh tuna exports cargo air flights, fishing vessels deliberately practice multiple mooring by each other's side, and even mooring at anchorage in the port. Such circumstances become the reason of a decrease in operation efficiency both for fishing and commercial vessels, and jeopardize the safety of ship traffic in the harbor.

Though transshipment of fresh tuna catch for delivery to export airfreight flights is the main function of the Port, there is no transshipment facility on the quaywall of the Fishing Port. Further, the cooling temperature of tuna catch unloaded from longliners is not sufficient, as well as the quality of washing after extraction of internal organs. Furthermore, sorting/weighing/packing operations are performed out-of-doors, in front of the Cold Storage Facility. Consequently, the freshness of tuna decreases, problems with

hygienic status occur, and, as a result, this causes deterioration of the commercial value. Therefore, establishment of a functional and hygienic transshipment facility is strongly required in the Port.

Such chronic deficit of the quay wall length represents not only the major obstruction for efficient fishery operations, but also becomes the reason of tuna freshness decrease, works as an obstacle to attract foreign fishing vessels, and as a barrier for the development of fishery industry in the Federated States of Micronesia as a whole. Besides, the extra port usage time is incurred by the commercial ships that enter the Commercial Port, because they have to wait for fishing vessel to withdraw from their berths there. This affects negatively commercial ship management, because their demurrage is high. Further, the congested usage of the quay by fishing and commercial vessels is fraught with danger of accidents.

Under such circumstances, in order to eliminate the deficit of the quay length for fishing vessels, and to further promote commercial fishing activities with tuna fishing as its main element, and recognizing such fishery as the core for achieving national self-sustenance, the Grant Aid was requested from Japan for the extension of the existing quay of the Takatik Fishing Port and for provision of required land facilities and equipment.

1-2 Components of the Project

The components of the initial request included the following 11 items:

(1) Quay wall (95 m, 261 m)
(2) Reclamation (9,420 m^2)
(3) Revetment Wall (120 m)
(4) Yard Area (7,000 m^2)
(5) Apron Concrete Pavement (2,405 m^2)
(6) Dredging (825 m^3)
(7) Workshop Building (160 m^2)
(8) Storage House (240 m^2)
(9) Ice Transportation Device (1 lot)
(10) Fuel oil pipe line (1 lot)
(11) Workshop Equipment (1 lot)

Corresponding content of the request as confirmed through the Field Survey was as follows.

(1) Items (5) and (11) (workshop building and its equipment) are to be substituted with Tuna Transshipment Building (the facility where sorting and packing of unloaded tuna will be carried out in in-door conditions and under regulated temperature) and its equipment.

(2) The following equipment was additionally requested for installation in the Port Office (adjacent to the Storehouse) projected for construction under this Project.

(1) Computers	2 sets
(2) Printer	1 set
(3) Software (equivalent to PORTCAM)	1 set
(4) Buggy car (as a golf car)	1 unit
(5) Public address system (speakers)	1 set
(6) VHF wireless equipment (walkie-talkie type)	5 sets

CHAPTER 2 CONTENTS OF THE PROJECT

2-1 Objective of the Project

2-1-1 Tasks of the Fisheries Industry

Like the Federal Government, the Government of Pohnpei State has also positioned the fishery industry as the most important locomotive industry of the State, and in the "Complex State Development Program (1997~2001)" set the objectives for the mentioned industry as follows: " to utilize effectively abundant marine resource, to increase revenues, to foster participation by private enterprises, to create employment opportunities, to provide foodstuffs for self-supply, and to create recreational facilities". Concerning the development of commercial fishing, the Government aims (1) securing stable provision of raw fish materials required for effective operations of the existing marine industry facilities; (2) improvement of the infrastructure that would enable the foreign fishing vessels to use efficiently the Port as a base for their fishing operations; and (3) improvement of facilities in order to achieve efficient management of tuna transshipment operations, etc.

For the purpose of optimal utilization of marine resources, the Government of Pohnpei State has so far promoted investment not only into the fishing sector itself, but also into transshipment and processing executed at ground-based facilities, refueling of fishing vessels entering the Port, supply them with food, ice etc. However, the processing facility of the State Corporation, that was constructed with the aim of fresh tuna air transportation promotion, effective usage of disqualified tuna materiel, and enlargement of employment opportunities, is unable of profitable commercial operation due to the sluggish unloading of catch and inefficient handling works. Further, indirect economic impact of this business on the local community has not been achieved like it had been expected.

At the initial stage of the development of the Micronesian commercial fishery, it was fostered towards promotion of seiner-trawler fishing, while longline fishing was carried out only by NFC (a public enterprise) in extremely small size. However, the Government of the Federated States of Micronesia has failed to achieve success in seiner-trawler fishing, and 3~4 years ago shifted to the development of longline fishing using small-sized fishing vessels, with the objective to promote export sales of "*sashimi*" grade tuna. Therefore, in 1996~1997 private fishing companies also started to participate in such commercial fishing activities and longline fishing started to progress rapidly.

2-1-2 Problems of Takatik Fishing Port

The Takatik Fishing Port, which is the site for this Project, is the only port and harbor facility in Pohnpei State, and incorporates both the fishing and the commercial ports. The quay wall is divided by the fence in three sections; of the total 337 m length of the quay, the northern 56 m section is employed for catch transshipment operations of the CFC (Carolina Fishing Company), middle portion of about 214 m is used as the Commercial Port. Near the southernmost quaywall of approximately 67 m, the Cold Storage Facility managed by EDA is located, neighbored by the fish processing workshop of PFC, Ice Preparation facility, etc.; this section is used as berth place for unloading of catch from tuna longline vessels, for supplying ice, water, bait, for refueling etc.

In 1998, among the total number of 991 ship calls to the Port, the overwhelming portion of 867 calls is attributed to the fishing vessels. Main port users include 25 Micronesian fishing vessels that have their mother port here, and 37 longline tuna fishing vessels under foreign flags. Such fishing vessels make fishing trips by groups consisting of 4~6 ships; after about 7~10 days trip they return to the mother port and stay here for 3~7 days, executing fish unloading, preparation for sail and resting, and then depart for the next fishing trip. Thus, a new working cycle repeats.

At present, all such by-pier cargo handling operations, preparation and rest must be executed along the 67 m-long quaywall specially allocated for fishing vessels. However, the capacity of the quay wall of the Takatik Fishing Port nowadays actually allows unloading operations only to 2 vessels at a time at maximum; quay section assigned for preparation and rest is also not specified clearly. It may be said, that at present the utilization of the quay is heavily congested and practically chaotic. Because of this, the fishing vessels waiting for unloading often face the following problems.

(1) The freshness of fish catch deteriorates during waiting hours, and its commercial value dramatically decreases.
(2) Frequently, it turns out, that fresh tuna catch is late for the export flight, so the freshness of tuna decreases with consecutive loss of commercial value.
(3) Unloading and other related works last continuously for a very long time, casing extreme fatigue of crewmen.
(4) The places for preparation and rest are not fixed, so that fishing vessels are compelled to change their positions depending on the circumstances, jeopardizing thereby traffic safety in the harbor.
(5) The time till next departure becomes long, leading to the decrease in profitability

of overall longline tuna fishing business, including the management of ground-based facilities.

Because of the deficit of the Fishing Port quaywall length, many fishing vessels moor by the quay of the Commercial Port. However, whenever a commercial ship appears in the Port, these vessels have to remove temporarily to anchorage. Further, as fishing vessels practice multiple mooring by each other's side, they hamper entrance and exit of commercial ships. This decreases the efficiency of operations for both fishing and commercial vessels, and also creates a danger for safety of traffic within the Port.

Though transshipment of fresh tuna catch for delivery to export airfreight flights is the main function of the Port, there is no transshipment facility on the quay wall of the Fishing Port. Further, the cooling temperature of tuna catch unloaded from longliners is not sufficient, and the same may be said about the quality of washing after extraction of internal organs. Furthermore, sorting/weighing/packing operations are performed out-of-doors, in front of the Cold Storage Facility. Consequently, the freshness of tuna decreases, problems with hygienic status occur, and, as a result, the commercial value of tuna deteriorates. Therefore, establishment of a functional and hygienic transshipment facility is strongly required in the Port.

2-1-3 The Objectives of the Project

Under this Project, with consideration to the importance of tuna cargo handling works in the Takatik Fishing Port, the length of the quaywall will be provided in order to sufficiently secure the usage of the unloading quay by longline tuna fishing vessels without waiting. Also, the Tuna Transshipment Building equipped with air conditioning devices will be outfitted, so that the unloaded, washed and packed fresh tuna will not loose quality to the extent of possible before being delivered to the Cold Storage Facility. Further, under this Project, a new specialized fishing preparation and rest quay will be outfitted, and the unloading quay length will be secured. Concurrently, the fishing gear storehouse, toilets, water supply and refuel equipment will be installed. Thereby, the Project is envisaged to promote longline tuna fishery industry, which constitutes the core of economic development in Pohnpei State and the Federated States of Micronesia in general.

2-2 The Basic Concept of the Project

2-2-1 Targeted Fishing Vessels

In the improvement of the Takatik Fishing Port, the task of ultimate priority lies in providing support for stable operations of 25 Micronesian longline vessels, whose tuna fishing activities are expected to continue in future as well. Together with this, it is necessary to pay attention in order to avoid the withdrawal from the Takatik Fishing Port by foreign fishing vessels for the reason of incurred unequal share of inconvenience in the question of port operation. From this point of view, the Project is targeted not only on the Micronesian fishing vessels, but also on all tuna longline fishing vessels that use at present the Takatik Fishing Port as their mother port.

2-2-2 The Fishing Port Planimetric Layout Plan

When drafting the planimetric layout plan of the Fishing Port, the decision must be adopted with taking into consideration all the following issues in complex.

(1) Securing of quay wall extension and quay wall line layout with considerations to maneuverability of fishing vessels.
(2) Securing of the quay wall layout and required site within the Port with considerations to the convenience of operation by fishing vessels in the Port.
(3) Convenience of access to different related facilities deployed in rear areas.
(4) Coordination with the existing facilities in vicinity of the projected site.
(5) Guarantying flexibility from the standpoint of the long-term development of the whole Takatik Fishing Port.
(6) Securing safety of natural conditions in vicinity of the projected site (in case of the Fishing Port under consideration, particularly, the subsoil conditions of the sea bottom)
(7) Keeping the construction cost in acceptable limits.
(8) Keeping the construction period in acceptable limits.
(9) Providing for easy maintenance and control after the accomplishment of works, etc.

After the complex evaluation of the above mentioned factors, and, more specifically, taking into consideration the major factor - that the soil properties of the sea bottom in the area of the Project site are excessively soft down to the depth of over 20 m - it was decided that under this Project, the optimal layout for the newly built quaywall line would be along the existing coast line, at the west side of the course way to the airport.

2-2-3 The Components of the Project

1) The Quay Wall

At present, there is an approximately 57 m-long quay wall in the northern section of the Takatik Fishing Port, adjacent to the Commercial Port (used exclusively by the Carolina Fishery Corporation (CFC) as a mooring and preparation quay for its seiner-trawlers), and an approximately 67-m long quay at the southern end of the Port (used for catch unloading, preparations and rest of general tuna longline fishing vessels). The northern section of the quay, accordingly, is a quay in exclusive use by single fishing corporation, and it does not represent a public use facility. Therefore, the Project is targeted on the latter 67 m-long quay, which is referred to as "the Takatik Fishing Port". At present, 25 Micronesian longline fishing vessels and 37 foreign longliners use the Takatik Fishing Port as their mother port. The record of Port calls by tuna longline fishing vessels in 1998 stood at 867 in total; usually, such vessels after 7~10 days fishing trip return to the Port and stay moored there for 3~7 days, unloading the fish catch and getting re-supplied with ice, water, bait, refueling etc.

At present, all such by-pier unloading operations, preparation and rest must be carried out by the 67 m-long quay of the Fishing Port. However, in reality it is impossible to accommodate all the fishing vessels only by mean of the Fishing Port quay, and many fishing vessels are deliberately compelled to moor by the adjacent quay of the Commercial Port. In particular, by the days when the date of fresh tuna export airfreight flight is approaching, the fishing vessels practice multiple mooring by each other's side, and have to stay at anchorage within the Port.

Both for the Federated States of Micronesia and for Pohnpei State, fresh tuna export business is the most important industry, and its development is indispensable for economic self-dependency of the nation. However, because of the deficit of quaywall length for unloading operations, deterioration of the commercial value of the catch occurs frequently due to the decrease in tuna freshness.

Therefore, it can be assessed that the improvement of the unloading quaywall, aimed at prevention of deterioration of fresh tuna prior to export, is the component of ultimate priority among the tasks concerning the Port's improvement.

Further, quaywall length for fishing preparations and rest is also deficient, and multiple mooring by vessels by each other's side is frequently observed. However, foreign vessels make up a big proportion of the Port user vessels, but long-term forecast concerning this category of users is uncertain. Therefore, prudence is required in the

issue of improvement of quay for fishing preparations and rest.

2) Tuna Transshipment Building

At present, transshipment of tuna delivered by longliners is performed using the EDA platform, where sorting, packing and other operations are carried out. However, the mentioned facility is narrow and inconvenient, and it is difficult to execute there fish chilling works using water and ice. The facility has no walls, and room temperature control is impossible here. Due to these and other reasons it is difficult to preserve freshness and quality of tuna for exports.

Unloading of fresh tuna from longliners and its export by airfreight flights is the most important function of the Fishing Port, and utmost efforts are required for prevention of decline in commercial value due to decrease of freshness. Thereupon, it was judged that the construction of the Tuna Transshipment Building for indoor fish handling in conditions of regulated temperature is necessary.

The size of the Tuna Transshipment Building is projected to enable the unloading of tuna from two longline fishing vessels in a time, each vessel carrying 5 tons of catch, and to accomplish such work in approximately 2 hours, with 2 working gangs, each consisting of 16 members, simultaneous executing their duties within the building. It is also necessary to outfit a fish washing room, transshipment room, and a platform.

3) The Storehouse Building and Administration Office

At present, there exists the deficit not only of a quay wall length in the Takatik Fishing Port, but also the deficit of land facilities in the rear areas of the Port. There is no facility for storage of fishing gear, instruments, spare part and accessories for engines, etc. Because of this, it is difficult for the fishing vessels to get such reserve items when they are required. Therefore, they are compelled to keep excessive reserve stock on ships and to undertake other deliberate inefficient measures. Keeping excessive reserve stocks aboard small longline vessels is not only uneconomical, but it also creates hygienic and safety problems. For Micronesian fishing vessels, that include many high-aged ships, the demand for such reserve stock is particularly high, and the necessity to construct a facility for their storage within the Port is acute.

Such Storehouse must be equipped with shelves allocated for storage of different categories of gear: inspection items; spare parts; deck accessories; spare parts for engines. Besides, it is necessary to provide space for table and chair of a stock-keeping clerk, for shelves to keep stock-accounting books, catalogues and manuals, and also for

passageways in amount of 30% of the overall space.

At present, the Administration Office of PPA, which executes management of the Takatik Fishing Port, is located in several hundred meters from the Fishing Port, so that it is difficult to keep communication with ships. Due to such remote disposition, there exists a problem of inefficiency and insufficiency of dispatching permits and instructions, or execution of inspections and other activities. The quaywall, tuna transshipment building, storehouse, open storage site and other facilities that are to be constructed under this Project will be even more remote from the existing PPA office. Consequently, it is necessary to locate the officers in charge of the Fishing Port management closer to the site, in order to execute communication with the fishing vessels and control of various fishery activities in close interaction with the site, improving thereby the functions of the Fishing Port administration and management.

It is supposed that the administration and management of the Takatik Fishing Port will be executed by total personnel of 5, including 1 person in charge, 1 accountant, 1 technician, and 2 workers. It is supposed, that office space must be provided for 3 of the above mentioned personnel; also, working space and multifunctional space for meetings and negotiations with users of the facility will be projected. Further, space for toilets, water heaters, and in-house broadcast facility will be provided.

4) Public Toilet

For preservation of water properties within the harbor, the crews of the fishing vessels moored in the Port are prohibited from using their ships for toilet, shower, washing and other similar conveniences. Therefore, it is necessary to outfit toilets and showers for crewmen on the land, in places with easy access. In shower rooms, corners for simple washing will be provided.

The public toilet and shower that are located near the Cold Storage Facility must be relocated due to construction of the Tuna Transshipment Building; therefore the mentioned works represent the removal of the existing public toilet and showers.

However, the size of the mentioned facilities will be projected with consideration to the number of fishing vessels moored in the Fishing Port on an average day, as specified in “2-3-3 (2) Design of Mooring Quay”; namely, the size of the facilities should not create obstacles for usage by 11 Micronesian and 25 foreign fishing vessels.

5) Marine Surveillance Office Building

At present, the administration office of sea patrol boats (introduced in 1990 through the assistance from Australia) is located near the Cold Storage Facility of the Economic Development Authority (EDA). These patrol boats are engaged in surveillance of fishery activities in the exclusive waters of the Federated States of Micronesia, and also execute prevention of smuggling from the sea etc., playing thereby the important role for such marine nation like Micronesia. The marine surveillance office is a two-story building of reinforced concrete, comprising the office, crew's quarters, maintenance shop, storehouse, etc., and having total floor area of 246 m^2. This Office and the patrol boats' berths in front of it are the facilities of extreme importance for the Federated States of Micronesia.

However, in order to efficiently deploy the unloading quay for the fishing vessels and the Tuna Transshipment Building, it is necessary to remove the existing berths of patrol boats and the marine surveillance office building. Consequently, due to the ultimate importance of these facilities for Micronesian fisheries, it is projected to outfit the new marine surveillance office building and attached patrol boats' berths at the southern tip of the newly constructed Fishing Port.

6) Equipment and Materials for the Tuna Transshipment Building

(1) Belt conveyors
(2) Cool water tank for washing
(3) Weighing machines
(4) Roller conveyors
(5) Banding Machines
(6) Air conditioning equipment

Equipment is necessary for transportation of fish from a vessel to the Tuna Transshipment Building. At present, the transportation is carried out using 1 superannuated truck crane and a forklift; however, operation with employing this gear takes much time and is not desirable from the standpoint of fresh fish temperature control. Therefore, 6 m-long belt conveyors will be procured for transportation of fresh tuna from a fishing vessel to the fish washing room of the Tuna Transshipment Building. Two belt conveyors will be installed at each of three berths at the unloading quay, meaning that each vessel will be serviced by 2 conveyors; in total, 6 conveyors will be necessary.

At present, chilled water is poured at the transshipment site into the boxes for transportation from a fishing vessel to the site; after such transportation, fish is only extracted from the boxes, but one can hardly say that it is washed. Such handling at

this stage is an important reason of deterioration of commercial value of fresh tuna. Fresh fish, which is unloaded from the fishing vessels, must be delivered to the tuna handling premise upon being completely washed with chilled water. To this end, cool water tank for washing is required, equipped with the functions of water cooling, water storage, and pressure feed.

After being washed in the washing premise, fresh fish will be delivered for sorting operations, and weighed using weighing machines. Then, sorted and weighed fresh fish will be transported to the banding machine for packing. For such transportation, roller conveyor is required. At present, EDA has at its disposal one set of weighing machines and one roller conveyor, but both are superannuated and require renewal. Operations subsequent to sorting will be carried out by 2 working gangs in parallel, therefore 2 sets of weighing machines are required; also, 2 roller conveyors for each working gang must be procured, making up 4 roller conveyors in total.

At present, tuna handling works are carried out under the canopy of the Cold Storage Facility, where direct sunlight reaches in daytime. Because of this, deterioration of fresh fish quality frequently occurs. For improvement of such situation and for the increase of the commercial value of exported fresh tuna, it is necessary to install the air conditioning equipment that will permit to perform all operations from sorting to packing within the Tuna Transshipment Building under controlled temperature.

7) Ice Transportation Equipment

(1) Forklift truck
(2) Containers for ice transportation
(3) Loading hopper

For delivery of ice to the fishing vessels moored by the fishing preparation and rest quay, which is projected for construction under this Project, a more powerful pressure feed machine than the existing one is required. The existing ice preparation machine uses the transportation pipe that employs air pressure feed method. However, because in case of long-distance transportation (50 m or more) such method is pregnant with troubles specified below, under this Project a simple transportation with use of forklift is planned.

- friction loss increases because of the increase of free water amount, due to melting of ice, caused by the ambient temperature;
- time loss that happens because of long time required for recovery after the air pressure feed machine stops after failure (long time is required for ice removal

works);
- removal and loss of ice remaining in the pressure feed pipe after the accomplishment of loading works.

The required set of equipment is as follows: ice transportation containers (boxes); forklift trucks to transport such boxes; loading hopper to unloading ice from the boxes into the fishing vessels' tanks. In comparison with the currently employed method, the proposed option features small possibility of troubles, easy maintenance and control, and cheap cost.

8) Fishing Port Local Communication System

(1) Public Address System
(2) VHF Wireless Devices

At present, PPA head-quarters are located at a remote distance from the Port Patrol Office and the fishing vessels' berths; this, and also a frequent need of relocations by the moored vessels, caused by the deficit of the Fishing Port's quay, make it necessary to maintain different types of communication within the Port. However, such communication is inconvenient; in particular, this is true concerning the communication with foreign vessels. This is the reason of increasing number of accidents involving the foreign vessels within the Port. Consequently, such communication devices are necessary for safe and speedy control and management at the Fishing Port.

9) Items Excluded from the Content of the Request

(1) Workshop Building and Equipment for the Workshop

At present, the repair of fishing vessels is carried out by private entrepreneurs, with usage of slipway constructed at the seacoast near the Fishing Port. The vessels that need repair are moored there and works are performed inside the vessels. For repair works that require more complex and high-level technologies, vessels must be transported to Guam or other remote places. Therefore, the repair facility can be hardly evaluated as sufficient, but it was deemed, however, that at the present moment it is possible to meet the existing needs by mean of private facilities, so the related item was excluded from the content of the Request.

(2) Computer / Printer / Software / Buggy Car

The request for procurement of computer, printer, and software for the Administration Office of the Fishing Port was submitted by the Micronesian side, but it was judged that the urgency of this request is low, because the divisions of PPA are currently equipped with such devices. As for the software, it was acknowledged that for the improvement of data management and office management, introduction and development of a new software instead of the existing one is necessary, but the urgency of such issue is low, so it was excluded from the Project.

Table 2.2.1: Project Components

Item	Quantity
1. Civil Works	
1.1 Subsoil Improvement	36,400m^3
1.2 Yard Preparation for Buildings	1,600 ㎡
1.3 Quay Wall(Anchored Steel Sheet Pile Type)	Length:150m Crown Height: +2.2m, Water Depth: - 3.0m Apron Width:10m
1.4 Removal of Pre-loading Soil	16,200m^3
1.5 Revetment(Masonry)	500m^3
1.6 Pavement (Apron: Concrete, Road & Parking Lots: Asphalt, Other Area: Gravel)	7,000 ㎡
2.Building Works	
2.1 Tuna Transshipment Building	465 ㎡
2.2 Storage & Office Building	240 ㎡
2.3 Public Toilet	48 ㎡
2.4 Surveillance Office Building	246 ㎡
3. Utilities	
3.1 Water Supply System	1 set
3.2 Waste Water Discharge System	1 set
3.3 Lighting & Electricity System	1 set
4. Equipment	
4.1 Equipment for Transshipment Bldg.	
1)Belt conveyor	6 units、6m long each
2)Weighing Machine	2 units
3)Roller Conveyor	4 units
4)Banding Machine	2 units
5)Cold Water Tank	1 unit
6) Air Conditioning Equipment	1 unit
4.2 Ice Handling System	
1)Forklift Truck	1 units、3t Diesel engine drive type
2)Container for Ice Handling	2 boxes、2t
3)Hopper	1 unit
4.3 Communication Devices	
1)Public Address System	1 set
2)VHF Radios	5 units

2-3 Basic Design

2-3-1 Design Concept

(1) Basic Consideration and Natural Conditions

1-1) Plan and structure of quay wall with consideration of subsoil conditions

Upon the survey of sea bottom soil properties, it was clarified that the sea bottom soil along the extension line of the existing quay is excessively soft at the projected site. It was evaluated, that taking into consideration the bottom soil properties in the projected locations, the application of a load created by the quaywall construction will cause a consolidation settlement of several meters, while the process of such settlement will last for more than 50 years. Thereupon, it was decided that in such location sheet-pile quaywall construction method or gravity-type quaywall construction method is unrealistic.

On the other hand, in the rear areas in proximity to the coastline, soil conditions make it possible to expect foundation bearing capacity and lateral bearing capacity, making it possible to employ a usual sheet-pile quaywall structure. Therefore, the line of the quaywall will be set back along the existing coastline, and anchored steel sheet pile structure will be used as its design policy.

1-2) Tidal current in the port area

In result of Field Survey, it became clear that tidal current in the port area are extremely weak, only about 0.2 knots in maximum even in high tide. Therefore, drift of bottom materials by tidal current practically may be considered negligible.

1-3) Tidal range

In the Port under question, mean level of high water spring tide (MHWS) is +1.22 m. Taking into account that objective vessels are longline tuna fishing vessels that have gross tonnage of 20~125 tons, the top elevation of quay wall should be 1 meter higher than high water level, therefore it is envisaged to be 2.2 meters above chart datum (CD).

1-4) Ocean waves

The Project site is a natural harbor surrounded by coral reef, therefore affect of ocean waves is generally non-existent, and it may be considered that such

affect does not occur even when tropical cyclones come.

1-5) Rainfall

The Project site is an extremely rainy place, with yearly rainfall amount of 5,000 mm and 300 rainy days through the year. This circumstance should be adequately taken into consideration when planning methods and schedule for construction works.

1-6) Earthquakes

No special measures are envisaged for civil engineering and construction in relation to earthquakes, as there is no experience of damage of this sort on the island. However, it cannot be asserted that there will be no earthquakes in future as well, so seismic intensity coefficient $k_h = 0.05$ is assumed in the Project for design of constructions, as minimal earthquake countermeasure.

1-7) Sand (fine aggregate used in concrete)

Procurement of field sand for use as concrete fine aggregate is problematic on the island, and coral sand produced of crushed coral reefs is ultimately used for such purposes. Such sand contains saline matter, and there is a high possibility that it would give impetus to corrosion of steel bars if used for reinforced concrete. For these reasons, only coral sand washed by fresh water or black sand made of basalt shall be used for reinforced concrete involved in this Project.

1-8) Convenience in operation/maintenance

In civil engineering and construction design, usage of materials that are available through domestic procurements will be envisaged, in order to make future operation/maintenance easy. As for usage of steel materials, anti-corrosion measures will be taken in order to secure their prescribed useful life period.

(2) Consideration for social conditions

It is stipulated by the Project, that such fishing vessels, as large size trawling ships and refrigerating ships that enter the Port will be handled like commercial vessels and will enjoy common use of existing quay of Commercial Port. On the other hand, purely fishing port facilities will be basically used by tuna fishing vessels under flags of Micronesia, Japan, China and other countries.

(3) Background of Construction Industry

3-1) Applicable codes and standards relating to construction project

For reasons of ecological considerations, it is required in Federated States of Micronesia to undergo inspection by Pohnpei Environmental Protection Agency and obtain its approval prior to implementation of works that include dredging, landfill, and boring/excavation operations. Basic procedure includes submitting application to Environmental Protection Agency by the subject of works, and implementation of advance inspection by the Agency due to such application. If in result of such inspection it is deemed that ecological consequences are significant, then ecological assessment must be prepared by external consultant employed by the subject of works. Environmental Protection Agency examines results of such assessment and issues its decision on the matter of implementation of works.

Concerning the works under question, it is agreed with the recipient country that advance inspection will be accomplished prior to Exchange of Notes.

3-2) Local contractors and consultants

In Pohnpei State there are government-related construction public companies and private construction companies. Government-related construction public companies are mainly engaged in road/paving works. Private construction companies are involved in wide range of small-scale construction works, such as housing construction, construction of governmental offices, dredging works, landfill works etc.

During implementation of Japanese Grant Aid project in 1993 (The Power Supply Rehabilitation and Improvement Project) the companies noted above have been used as subcontractors for Japanese companies. In case of such large scale construction works projects, local companies participate as subcontractors for foreign companies in many forms; above mentioned companies are engaged in practically all major construction works in the State, having expertise concerning specific domestic circumstances, so they can be used adequately under control of Japanese companies.

Concerning the issue of consultant(s), though several private companies are existing in the Sate, they are small-sized enterprises, so the Project envisages employment of foreign consultant(s) and implementation of planning and design works.

However, concerning tests of materials that are required for public works in Federated States of Micronesia, concrete tests and other tests are often commissioned to private companies that operate in Pohnpei State. These companies have their headquarters' offices located on Guam and branch offices in Pohnpei State. Such companies can be used for general tests under this Project as well.

(4) Consideration for utilization of local contractor and local materials/equipment

4-1) Local contractor

As it was mentioned above, foreign companies act as principal contractors in many cases of large-scale construction works, while local entrepreneurs are involved as subcontractors. Such situation is due to the fact that operation and maintenance of construction equipment possessed by local entrepreneurs is not necessarily proper, and its reliability is often low; besides, local companies suffer deficit of various skilled personnel. Therefore, with local entrepreneurs involved in construction works as subcontractors there is no anxiety concerning quality of construction works and process management. What is more, expertise that local entrepreneurs possess in issues of local procurements and specific local circumstances makes it possible to efficiently employ them as subcontractors under control of Japanese companies.

4-2) Procurement of local materials/equipment

In order to execute cost estimates, unit prices concerning construction and equipment were obtained from local entrepreneurs during the Field Survey of this Basic Design Study. However, amount of equipment available through domestic supply is limited on the island. General stone materials including fine aggregate for use in concrete can be named as materials that are available by means of stable local supply. Procurement of cement, steel frames, building wood is possible through local market, but commodities may run short in case of short-term splashes of demand. As for other equipment, practically all items are imported at present, according to necessity.

Equipment that is not available through local supplier will be completely procured from Japan. Further, equipment that are available on Guam, are mainly procured from the USA and Japan, therefore priority should be as well assigned to satisfying demand on Guam.

Concerning heavy equipment, it has been confirmed during Field Survey that large size crane (30 ton grab × 1 unit), bulldozers (D7 × 1 unit, D5 × 2 units,

D3 × 2 units), backhoe (0.7 m^3 × 2 units, 1.2 m^3 × 3 units) and other machinery are in operation. It cannot be necessarily said that their operation/maintenance condition is adequate, so there exists possibility that they will not withstand long-term continuous operation. Furthermore, if in case of catastrophe or accident necessity occurs to execute emergency works for rehabilitation of local infrastructure, it will be required to assign this machinery to rehabilitation works as higher priority, and this may affect process of works under the Project. Therefore, the plan of procurement for heavy equipment to be used for construction works will be developed, with supply of such machinery mainly from Japan.

4-3) Tariff

Until present, imports of equipment from foreign countries as items of Grant Aid have been subjected to exemption of custom tariffs and other levies in Federated States of Micronesia, and it was confirmed that such exemption will be provided for the Project under question as well.

(5) Consideration for manageability of operating agency

5-1) Quay Wall / Concrete Apron

Pohnpei Port Authority, that will be the subject of operation/maintenance, has personnel of 12 officers engaged in administration work in Facilities and Construction Division. Actual maintenance control works are often commissioned to external entrepreneurs. Condition of existing quay wall and concrete apron is good, so it may be considered that there are no specific problems concerning operation/maintenance potential of Pohnpei Port Authority.

5-2) Fish processing facilities

At present, management and operation/maintenance of existing fish processing facility is executed by Pohnpei Fishing Corporation, while management and operation/maintenance of Cold Storage Facility is executed by Economic Development Agency (EDA) of Pohnpei State. According to the results of Field Survey, no specific problems were revealed concerning their respective operation/maintenance potentials.

5-3) Ice making plant / refueling / water supply facilities

Management, operation/maintenance of existing ice preparation facility and refueling facility are exercised respectively by Pohnpei Fishing Corporation (PFC) and Mobil Oil Co. Results of Field Survey revealed no specific

problems concerning their operating/management potential. Administration over water supply facility is exercised by Facilities and Construction Division of Pohnpei Port Authority. At present, due to several broken valves in water supply pit at the side of Fishing Port (section of concrete apron), supply of water to fishing vessels is executed by hoses, from water supply pit located at the side of Commercial Port.

In order to provide proper operation/maintenance of water supply facilities for the Project, it is necessary to demand from Pohnpei Port Authority to strengthen water supply operation/maintenance system.

(6) Consideration for scope and grade of facilities and equipment

6-1) Port Facilities

a) Quay Wall

According to the option of location plan for quay constructions adopted the Project, the quay wall line will run along coral reef, while sheet pile-type construction is envisaged for quay wall. In order to provide economically efficient steel sheet cross-section, with increased fixed point due to computation for sectional force (bending moment) of steel sheet pile wall, partial replacement of sea bed soft foundation and improvement works with usage of surcharge fill sand will be implemented. Technology of anchored piles will be employed for anchors in line with considerations concerning speed of construction works. As for tie rods, tie wire will be used due to considerations concerning affects of foundation subsidence. Designed water depth is stipulated as - 3.5 meters, including - 3.0 m water depth in front of quay wall and additional excessive excavation depth of - 0.5 m.

b) Dredging of harbor basin

Dredging for water depth not less than – 3.0 m will be executed for mooring berths for longline vessels under national flags of Micronesia, Japan and other countries. Having soft property, dredged soil cannot be used as landfill material for projected site, so therefore options will be investigated of either carrying it away and damping on the land site near the airport which is projected for future industrial zone, or burying it in open sea. In case of burying in open sea, option of damping in deep waters in proximity to existing navigation lines will be examined.

c) Land Reclamation

In order to limit influence upon ecology, soil produced by dredging works conducted by PPA at present near the zone of seabed dredging will be used as material for landfill works under the Project. During landfill works, pre-load technology will be employed in order to accelerate compression subsidence, in cases when it is necessary.

d) Pavement of Apron, etc.

Apron will be used for forwarding fish catch by vehicles; 10 meters-wide paving will be provided for the apron. Apron will be designed with water drainage inclination. Designed load is projected to withstand T-20 in general conditions, surcharge load of 1 t/m, and load of 15-ton truck crane. Soft asphalt paving will be used for paving of rear areas of land site, as countermeasure against subsidence.

6-2) Buildings

a) Tuna Transshipment Building

Tuna Transshipment Building is assigned for following process: tuna is served from fishing vessels moored alongside the pier with use of belt conveyor or combination of crane and forklifts, then cooled with ice, subjected to sorting and appraisal, and placed into boxes on scales; then box-packed tuna is palletized here. It is envisaged that two fishing vessels will be able to use this facility simultaneously, and that space sufficient for operation by two work gangs (each consisting of 16 workers) will be secured. Following quantity of equipment and specifications are projected for this facility.

Cool water tank for tuna washing
Ice tank for tuna chilling
Waterproof scales for weighing
Working tables / roller conveyor
Belt conveyor for tuna handling facility
Storage site for packing materials
Air conditioning facility (+15°C ~ +20°C)

The building will be projected as reinforced concrete structure with thermal insulation for purposes of air conditioning, with natural ceiling lighting. Saline matter-resistant materials will be used for roof and siding. In order to provide for hygienic and non-slippery floor, resin coating will be applied upon steel trowel finish.

b) Storehouse

Provision of a building of size practically equal to that requested by Application will be examined. However, for convenient taking in/out of stored gear etc., in-line configuration is envisaged for storehouse chambers. Leasing of separate storehouse chambers to fishing companies is planned, so electricity meter will be installed in each chamber.

c) Public Toilet

One public toilet will be erected for users of Fishing Port, and in the first place for crewmembers of fishing vessels. Squad-type construction will be used for toilet design (so-called Japanese-style toilet); also, adjacent shower-room will be equipped.

6-3) Equipment

a) Water supply / power supply

For water supply, pipeline branch will be installed, taking its beginning from principal PUC pipeline (φ6 inches) laid along main road. This pipeline branch will serve water into the buildings, into water supply pits used by fishing vessels (approximately 2 places). Section from principal pipeline to main water meter device is projected to be assigned to responsibility of recipient country.

Power supply, like water supply, will be provided from principal PUC power cable (13.8 kV, φ 3 inches, 60 Hz) through line tap, with further transformation and power distribution. Service voltage is 240V/480V. Major consumers include air conditioning equipment of Tuna Transshipment Building, building premises' lighting / wall sockets, streetlights, apron lighting and other devices. Like it is projected for water supply, section that stretches from PUC principal pipeline tap to transformer device and further to electricity meter will be in responsibility of recipient country.

b) Sanitary Drainage

Sewage water produced by fish washing at Tuna Transshipment Building, sewage from toilets and shower rooms will be canalized through gravity-fed pipelines to sewage storage tank of PFC. It should be confirmed that amount of sewage does not exceed PFC capacity.

c) Storm Run-off

Storm run-off facilities capable to cope with rainfall of 80~100 mm will be

outfitted. In particular, attention should be paid to run-off and sewerage from oil tank yard of Mobil Oil Co., and from shoulders of roads.

6-4) Equipment

Set of necessary equipment will be provided for equipment of Tuna Transshipment Building. As for ice transportation system, instead of option of transportation which is contained in Application and which involves laying of pipelines, transportation system that uses forklifts will be provided. Besides, provision of system for communication within the Harbor will be examined.

(7) Construction Period

Period of construction works for Project implementation will be divided into two stages. First of all, improvement of foundation ground will be executed, because soil property at the projected site is soft; then, priority will be assigned to construction of buildings and related constructions of Tuna Transshipment Building, which is the core of Fishing Port activities, and also to procurement of equipment. During the 1st stage, improvement of foundation ground, construction of buildings/facilities, and also procurement of equipment will be executed. During the 2nd stage, it is planned to perform all other works, namely construction of quay wall, construction of incidental facilities, and paving of roads and yards within the Port.

2-3-2 Design Conditions and Criteria

(1) Design Conditions

1-1) Natural conditions

a) Tide level

Highest tide level	HHWL	+1 .58 m（+5.2 ft）
Mean High Water Spring	MHWS	+ 1.22 m（+4.0 ft）
Mean Water Level	MWL	+ 0.70 m（+2.3 ft)
Mean Low Water Spring	MLWS	+ 0.30 m（+1.0 ft）
Datum Level of Works	DL	±0.00 m

b) Wave (wave height, wave period, wave direction) Negligible

c) Subsoil condition of foundation ground
Refer to Figure 1 to 13 in Appendix VI.

d) Seismic coefficient k_h=0.05

e) Design wind speed 30 m/sec (storm wind)

1-2) Design conditions for use

Design conditions for use of port facilities are as follows.

a)	Objective vessels	longline fishing vessels（20GT～125GT）
b)	Design water depth	DL-3.0 m
c)	Design water depth	DL-3.5m (in case of no riprap)
d)	Crown height of quay	DL＋2.2 m
e)	Surcharge load	1.0 t/m^2 (0.5 t/m^2 in case of earthquake)
f)	Dead load	Own weight of quay wall
g)	Live load	15-ton truck crane
h)	Life span	50 years

(2) Design Standards for Civil Structures

The Federal States of Micronesia does not have technical standards of design of their own, and usually apply American technical standards. However, in cases of Grant Aid projects it is not necessarily required here to hold to the terms of American technical standards, and usage of technical standards of donor country is admitted. Therefore, basic design for the Project will keep considerations to American standards, but on equal terms with them, or even to greater extent, will apply current Japanese standards

for design, construction works and technology, and also JIS.

Standard Design Method for Fishing Port Facilities	Japan Fishing Ports Association (1990)
Standard Specifications for Concrete	Institution of Civil Engineers (enacted in 1996)
Japanese Industrial Standards (JIS)	Japan Standards Association
General Outline of Asphalt Paving	Japan Roads Association (December, 1990)
Technical Standards for Harbor/Port Facilities and their Interpretation	Japan Port and Harbor Association (1999)

(3) Design Standards for Building and Utilities

Japanese Building Codes will be applied to design of buildings. As for architectural materials, it is projected that in many cases procurements will rely upon local materials and items imported from the USA that are available in the market, so therefore appropriate examination concerning application of American and Japanese standards will be executed.

Japanese design standards will be employed for design of water supply and water sewage/drainage and hygienic facilities, for air conditioning equipment, for cooling equipment, and for ice preparation facility.
Standards of Federated States of Micronesia will be used as design basis for electrical equipment and basis for minimal wage.

All other design basis will be in line with Japanese building standards, as follows.

a) Wind load pressure: wind load pressure that acts upon buildings differs accordingly to their shape and height. Respective computations are as follows.
   Wind load pressure = Speed pressure（q）×Wind pressure coefficient（C）
   $q = 60\sqrt{h}$ (h: height from foundation ground)
b) Seismic force： stipulated horizontal seismic coefficient k_h=0.05
c) Main materials to be used:
   Concrete ： F_c=250kg/cm^2
   Steel frames ： SD29

2-3-3 Basic Design

(1) Site and Layout Plan

1-1) Present status of the site

Topographic features of shore and marine portions of Project site are shown on Fig. 2.3.1. The site has triangular configuration, stretching to the west from course way that links urban area with airport, and is limited by southwestern tip of Takatik Port, having area of approximately 2 ha. At present, most southwestern section of Takatik Port is the location of PFC marine products processing workshop, ice preparation/storage facility, EDA Cold Storage Facility, Marine Surveillance office, PPA Patrol Office and other facilities. On the other hand, southern tip of the site serves as mooring place for idle power generation barge, with following facilities situated in proximity: PUC equipment storage zone, PPA quay wall for mooring of small boats, and also a floating pier.

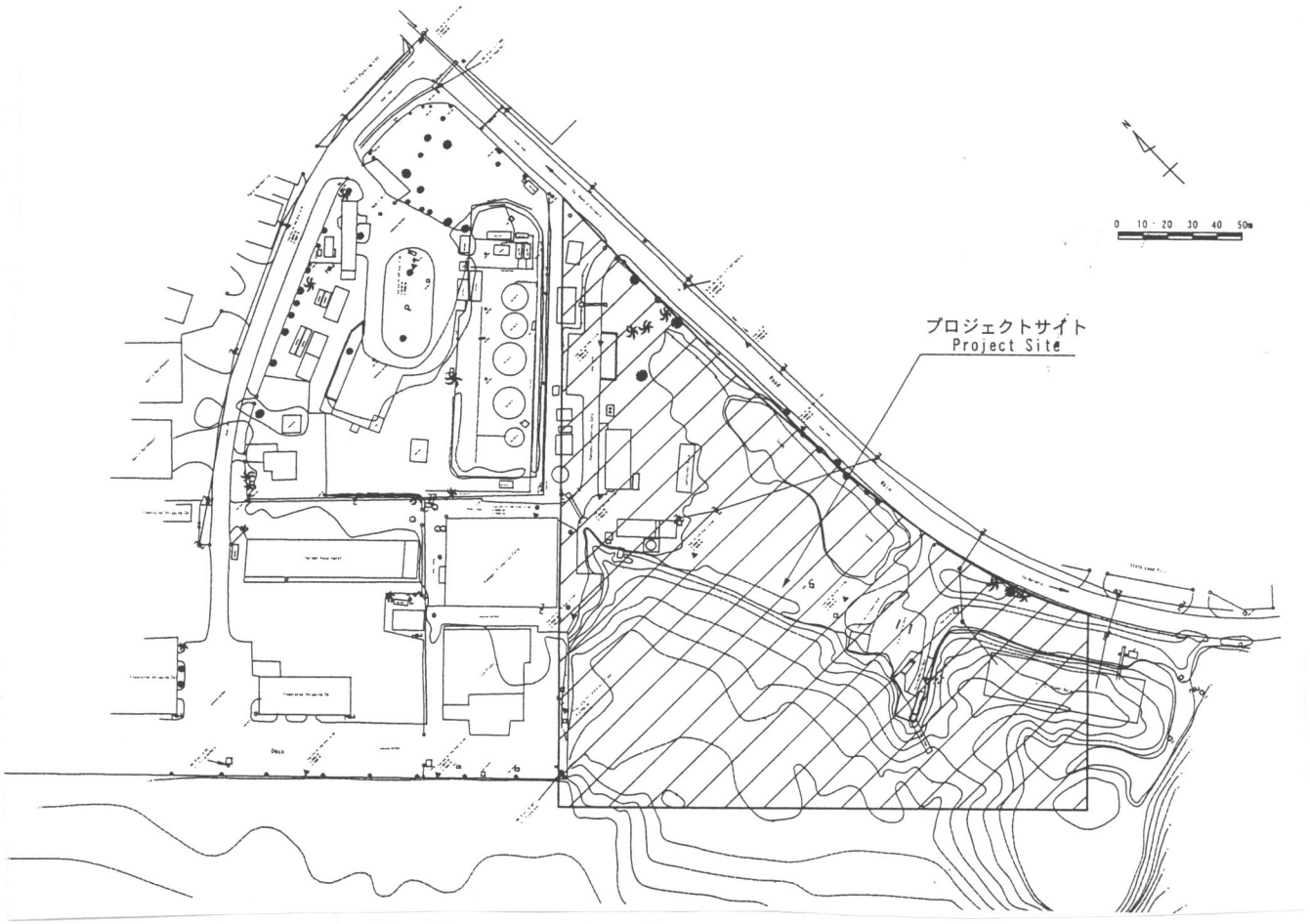


Fig. 2.3.1: Prospective Project Site

1-2) Basic layout plan of port facilities

With consideration of above mentioned current situation at the site, basic layout plan of port facilities was adopted as follows.

(a) Due to reason that seabed foundation ground is covered with thick layer of extremely soft soil, the line of new quay wall will be basically aligned with existing coastline. Such configuration takes into consideration both problem of site foundation ground conditions and future expansion of the Fishing Port.

(b) There is an access road to the site that runs through the PUC equipment storage zone (is situated at the nearest side, if one looks from urban quarters in direction of course way) and this access way is not equipped with gate. Approximately 250 m further there is a special PFC access road equipped with gate.

The Project pays consideration to access conditions both to new facilities of Fishing Port and to existing facilities, and also to conditions of vision field at access point, and plans to locate special main gate of the Port at intermediate point between the curve of course way and PFC access road.

(c) A promise was obtained from PPA that power generating barge moored at the southern tip of the site can be relocated at any time when it is necessary; however, due to adopted option for the Project this problem can be resolved by mere partial relocation of anchors and slight change in barge's present position.

(d) PPA-owned quay for small boats and floating pier are constructions that are basically designed for temporary use, and PPA has manifested its agreement to remove them if they obstruct landfill works for the Project and construction of quay wall.

(e) Projected quay wall will be clearly divided according to respective functions into unloading zone, zone for fishing preparations, and rest zone. Area neighboring existing cooling facility will be divided into unloading zone, preparatory zone for ice loading (mooring zone in front of ice preparation facility, as at present), water / fuel / fishing gear supply and rest zone located on newly constructed quay wall section.

(f) Newly constructed quay wall will be employed in immediate future for preparatory works and rest, but in case of further expansion of the Port due to

growth of fishing activities its functions may be changed for serving as unloading quay. Therefore, areas to the rear of quay apron will be assigned for location of open storage ground for refrigerated containers, and possible efforts will be made not to erect constructions here. Storehouse, offices, toilet and other constructional buildings will be to possible extent deployed in distance from quay apron.

A Basic Layout Plan is shown in Fig.2.3.2.

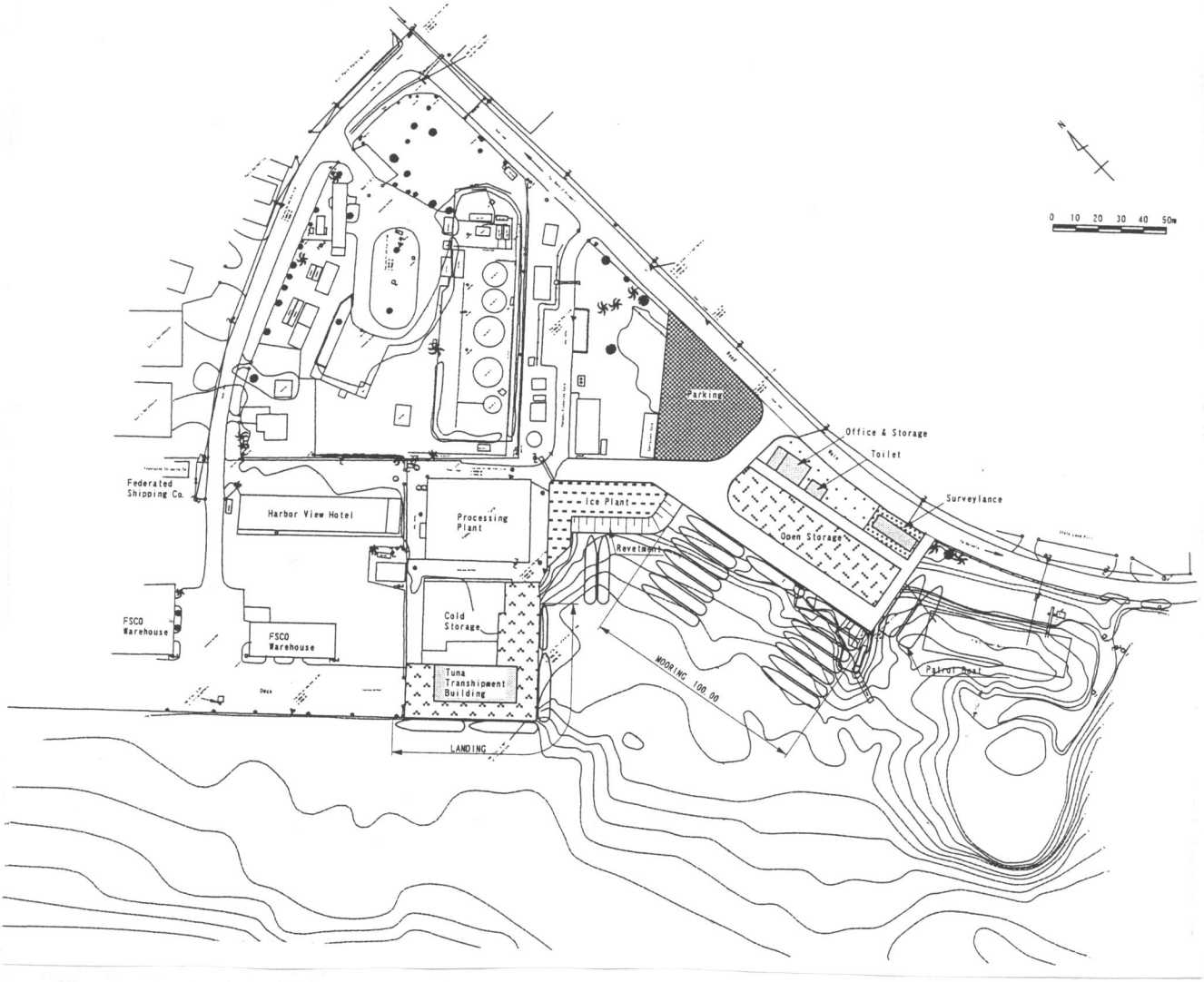


Fig. 2.3.2 : Basic Layout Plan of Takatik Fishing Port

(2) Design of Mooring Quay

2-1) Objective fishing vessels

This Project envisages outfitting of mooring facilities for longline tuna fishing vessels that execute their activities using services of Takatik Port. As it is shown in Table 2.3.1, by the end of July 1999 25 longline fishing vessels under Micronesian national flag used Takatik Port as their registered mother port. Besides, there were 37 large-sized longline fishing vessels under national flags of other countries, administered by Micronesia Fishing Venture that used Takatik Port as their registered mother port.

See Table 2.3.2 for data on these longline fishing vessels and types of their operations.

Table 2.3.1: Fishing companies using Takatik Fishing Port as home port and number of vessels

Name of fishing company	Number of vessels in operation
Micronesia Longline Fishing Company (MLFC)	12
National Fishing Corporation (NFC)	6
Pohnpei Marine Industries Company (PMIC)	4
Pohnpei Longline & Service Inc. (PLS)	3
Total	25

Table 2.3.2: Data on longline fishing vessels and types of operations

	Longline fishing vessels under Micronesian flag	Longline fishing vessels under flags of foreign countries
Data on vessels *1		
Length of vessel（LOA）	15～25 m	25～30 m
Width of vessels（B）	3.5～5 m	4.5～6 m
Draught (d)	1.4～2 m	2.0～2.5
Displacement（GRT）	17～60 ton	50～125 ton
Type of operation		
Average number of days for navigation per fishing trip	13days	10 days
Average number of days for stay at port per fishing trip	7 days	3 days
Number of user vessels per day *2	3.1	11.4
Number of vessels to use projected facilities	25	37

2-2) Standard Daily Number of Vessels Using Facilities

a) Number of vessels using facilities daily for unloading

Computation of number of fishing vessels that use facilities daily (on standard day) is presented below, reflecting usual standard situation with usage. Namely, following method is stipulated for such computations: 2 consecutive months with highest amount of unloading were picked out from 3-year period; then, 10 days with highest amount of unloading were picked out from these 2 month-period, positions from 1^{st} to 10^{th} , and average value (N) was calculated for number of vessels that executed unloading in these 10 days. (Source: "Guidance for Fishing Port Planning", All Japan Association of Fishing Ports).

However, record of unloading for past 3 years, compiled in daily units, does not exist in Takatik Fishing Port. Available data includes record of port calls by vessels in monthly units from January 1997 to July 1999, and record of port calls by vessels in daily units from January 1999 to July 1999. Therefore, it is assumed that average number of vessels calling on port in top 10 days picked out of 2 consecutive months with most calls will be accepted as number of vessels that use facilities. See Table 2.3.3 for record of port calls by longline vessels, by month.

Table 2.3.3: Record of longline vessel calls to Takatik Fishing Port by month.

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
1997	81	79	67	75	77	72	65	79	74	72	48	56	845
1998	52	65	58	63	58	56	63	73	71	92	93	84	818
1999	38	58	68	69	91	37	27						

The Table above makes it clear that October and November of 1998 were two consecutive months with highest amounts of unloading; however, data by day units is unclear, therefore computation of standard daily number of user vessels was made on the basis of data for next two consecutive two months with highest unloading amounts, i.e. April and May of 1999. This computation is presented in the following table.

Table 2.3.4: Number of daily port calls by vessels (1999)

Registration of vessels	Month	1st	2nd	3rd	4th	5th	6th	Average top10s
Micronesian longline vessels	April	5	3	3	2	2	2	3.1
	May	6	3	3	2	2	2	
Foreign Longline vessels	April	14	12	10	10	6	5	11.4
	May	16	12	12	10	9	9	

b) Daily number of vessels using facilities for fishing preparation

Table 2.3.5: Number of vessels leaving port daily (1999)

Registration of vessels	Month	1st	2nd	3rd	4th	5th	6th	Average top 10s
Micronesian longline vessels	April	4	3	3	2	2	2	3.6
	May	6	5	4	4	3	2	
Foreign Longline vessels	April	12	11	10	9	6	5	10.0
	May	16	12	10	8	6	5	

c) Daily number of vessels using mooring quay

Table 2.3.6: Number of vessels using daily mooring quay (1999)

Registration of vessels	Month	1st	2nd	3rd	4th	5th	6th	7th	Average top 10s
Micronesian longline vessels	April	10	10	9	9	8	8	8	10.6
	May	12	12	12	11	11	10	9	
Foreign Longline vessels	April	24	24	23	22	22	21		24.9
	May	28	28	26	25	24	24	23	

2-3) Amount of Unloading per Vessel

According to record of unloading by fishing vessels in June 1999, per vessel amount for Micronesian longline vessels is 4.1 t, and for foreign vessels –1.8 t. Consequently, per vessel amount of unloading is set in this Project as follows.

Micronesian / foreign longline fishing vessels: 4.0 t/vessel
Foreign longline fishing vessels: 2.0 t/vessel

2-4) Required Length of Unloading Quay

Total length of required quay is calculated according to the following formula. (Source: “Guidance for Fishing Port Planning”, Japan Fishing Ports Association).

Total length of quay = $N/r \times L$,

where N : daily standard number of user vessels,

r : berth turnover number = available unloading time/ time of use per vessel

L: berth length = vessel length + reserve length (in amount of 15% of vessel length. Source: “Guidance for Fishing Port Planning”, All Japan Association of Fishing Ports).

a) Portion, Targeted for Micronesian Vessels

N=3.1 vessels

r=12 hours ÷ 3 hours = 4 times

Here, Time available for unloading

= 4 hours(8:00～12:00)+ 4 hours(13:00～17:00) +4 hours(18:00～22:00) =12 hours

Time of usage per vessel

= time of unloading works＋mooring time/offshore time＋other time (procedures, preparations. waiting)

= 100*min＋30 min＋50 min=180 min=3 hours

* time for 1 cycle of catch handling = 200 kg/5 min

Catch yield ÷time for 1 cycle

= 4000 kg ÷ 200 kg/5 min=100min

L=（15～25 m）× 1.15=17.25～28.75 m

Consequently,

Required length of quay wall for unloading

=3.1÷4 ×（17.25 ～ 28.75）=13.4 ～ 22.3 m

b) Portion, Targeted for Foreign Vessels

N= 11.4 vessels

r = 12 hours ÷ 2 hours = 6 times

Here, Time available for unloading

= 4 hours（8:00 ～12:00）＋ 4 hours（13:00～17:00）＋4 hours（18:00～22:00）=12 hours

Time of usage per vessel

= time of unloading works＋mooring time/offshore time＋other time (procedures, preparations, waiting)

= 50*min＋30 min＋40 min=120 min=2 hours

* time for 1 cycle of catch handling = 200 kg/5 min

Catch yield ÷time for 1 cycle

= 2000 kg ÷ 200 kg/5 min=500min

L=（25～30 m）× 1.15=28.75～34,5 m

Consequently,

Required length of quay wall for unloading

=11.4÷6 ×(28.75～34.5 m）=54.6～65.6 m

c) Required Length of Overall Unloading Quay

Required length of overall unloading quay

= (13.4～22.3 m) + (54.6～65.6 m) = 68.0 ～87.9 m

At present, quay wall at Fishing Port has length of 67m, but user vessels include not only fishing vessels of smallest size, therefore existing quay length is not sufficient. Deficit of quay length results not merely in increases of idle waiting hours, but also brings about lost of fish freshness and decrease in price of catch. This is the issue of vital importance for fishing vessels. Therefore, it is stipulated, that even if it turns out in result of consequent examination that it is not possible to provide 100% of required length for fishing preparations and rest portions of quay, required length of 87.9 m for unloading zone will be 100%-secured.

2-5) Required Length of Fishing Preparations Quay

Formula for computation of required length for fishing preparations quay is completely identical with that used for required length of overall unloading quay. Micronesian vessels do not require supplies of ice, while foreign vessels have necessity in such supplies. For this reason, there is discrepancy in facility usage time between these two types of vessels.

a) Portion, Targeted for Micronesian Vessels

N=3.6 vessels

r =12 hours÷2 hours = 6 times

Here, Time available for fishing preparations

= 4 hours（8:00～12:00）＋ 4 hours（13:00～17:00

＋4 hours（18:00～22:00）= 12 hours

Time of usage per vessel

= time of drinking water supply＋refueling time＋other time

= 30 min＋60 min＋30 min = 120 min = 2 hours

L=(15～25 m)× 1.15=17.25～28.75 m

Consequently,

Required length of quay wall for fishing preparations

= 3.6÷6 ×(17.25～28.75 m）= 10.4～17.3 m

b) Portion, Targeted for Foreign Vessels

N = 10 vessels

r = 12 hours ÷ 3 hours = 4 times

Here, Time available for fishing preparations

= 4 hours（8:00 ～12:00）＋ 4 hours(13:00～17:00）

＋4 hours(18:00～22:00）= 12 hours

Time of usage per vessel

= time of drinking water supply＋refueling time

＋ice supply time + other time

= 30 min＋60 min＋60 min＋30 min = 180 min = 3 hours

L=（25～30 m）× 1.15= 28.75～34.5 m

Consequently,

Required length of quay wall for fishing preparations

=10 ÷4 ×（28.75～34.5 m）=71.9～86.3 m

If it is stipulated that ice supply is provided on berths in front of ice preparation facility, then the length of quay required for preparation works will become somewhat shorter, as follows.

r =12 hours÷2 hours=6 times

Here, Usage time per vessel

= time of drinking water supply＋refueling time＋other time

= 30 min＋60 min＋30 min = 120 min = 2 hours

Consequently,

Required length of quay wall for fishing preparations

=10 ÷6 ×（28.75～34.5 m）=47.9～57.5 m

c) Required Total Length of Fishing Preparations Quay

In case ice supply is executed at the quay:

Required length of quay wall for fishing preparations

= (10.4～17.3m）＋（71.9～86.3m）=82.3～103.6m

In case ice supply is executed on offshore berths:

Required length of quay wall for fishing preparations

=(10.4～17.3m）＋（47.9～57.5m）=58.3～74.8m

2-6) Required Length of Rest Quay

Mooring by stern/rostrum is generally used as method for rest quay mooring. However, in Takatik Port broadside mooring and multiple mooring are used due to tide conditions. In such case, following formula is used for computation of required total length of quay.

Required length of rest quay = $n \div m \times L$,

where n : number of vessels moored daily

m :numbers of vessels simultaneously moored to the same berth (multiple coefficients)

L : berth length = vessel length + reserve length (15% of vessel length)

a) Portion Designed for Usage by Micronesian Vessels

n=10.6 vessels

m=5 vessels

L=(15～25m)× 1.15=17.25～28.75 m

Consequently,

Required length of rest quay

=10.6÷5 ×(17.25～28.75)=36.6～61.0 m

b) Portion Designed for Usage by Foreign Vessels

n= 24.9 vessels

m= 5 vessels

L=(25～30 m)× 1.15=28.75～34.5 m

Consequently,

Required length of rest quay

=24.9÷5 ×(28.75～34.5)=143.2～171.8m

c) Required Total Length of Rest Quay

Required total length of rest quay

= (36.6～61.0m)+(143.2～171.8m)=179.8～232.8 m

Overview of results of computations performed in 2-4), 2-5), 2-6) above is presented in following table.

Table 2.3.7: Required Length of Quay

Type of quay	Micronesian vessels	Foreign vessels	Total
Required length of unloading quay	13.4～22.3	54.6～65.6	68.0～87.9
Required length of fishing preparations quay (case of usage of off-shore berths)	10.4～17.3 （10.4～17.3）	71.9～86.3 （47.9～57.5）	82.3～103.6 （58.3～74.8）
Required length of rest quay	36.6～61.0	143.2～171.8	179.8～232.8
Total （case of usage of off-shore berths	60.4～100.6 （60.4～100.6）	269.7～323.7 （245.7～294.9）	330.1～424.3 （306.1～395.5）

2-7) Basic layout plan of port facilities

If one takes into consideration required length of quay wall (as computed above), current situation with facilities, soil property conditions and area available for usage, and also prospective development plan for overall Takatik Port, then following 3 alternatives can be put forward.

a) Straightaway extension alternative:
Alternative that envisages extension of existing quay line of Commercial and Fishing Port straightway, and outfitting of 3 berths at unloading quay, and of 3 berths at fishing preparations / rest quay. According to this alternative, berth for patrol vessels should be relocated to the southern tip of the Port, while usage of existing Patrol Office and other ground-based facilities will continue as before.

Most attractive point of this alternative is that existing quay and newly constructed quay will be arranged as continuous straight line, thereby securing flexibility necessary for future development and expansion of Fishing Port and Commercial Port. Further, vast land site with area of 1.6 ha will be established on rear outskirts of the quay, so various fishing industry-related facilities may be located there, making it possible to create Fishing Port that will be functional for long-term period.

Weakest point of this alternative refers to extremely soft property of seabed foundation ground in the area projected for the site. It means that not only large amounts of construction costs for erecting facilities and protracted construction period will be necessary, but also that compression subsidence will continue for 40~50 years after accomplishment of works.

b) Quay line setback alternative (200 m-long quay):
Alternative that provides for construction of 200 m-long new quay wall for mooring of fishing vessels, to the south of existing PFC ice preparation facility. Existing berths for patrol vessels and office constructions will be removed to the southern tip of new site of Fishing Port. Vacant space will be converted into unloading quay. New tuna transshipment facility will be erected on the place left vacant by Patrol Office, and Cold Storage Facility will use the area occupied now by EDA.

Under this alternative, existing 67m-long quay wall of Fishing Port and 53 m section of patrol boats' berths will be employed for unloading quay, while 2 berths (66 m) for fishing preparations quay and 4 berths (133 m) for rest quay will be provided at newly constructed quay wall.

According to this alternative, unloading quay will satisfy 100% of demand, while demand coverage coefficient for fishing preparations quay and rest quay, that perform refueling, water supply etc., can make up 82~97%.

c) Quay line setback alternative (100 m-long quay):

Previously noted alternative, that envisages relocation of patrol boats' berths and 253 m extension of Fishing Port quay in one go, is fraught with possibility that newly erected berths will not be utilized in full, and that power generating barge may not be relocated instantly, and also that Project cost will become excessively high. Therefore, the alternative now presented provides for executing works firstly up to the point where power generating barge is located, and the remaining works for other portion of extension will be executed when prospect for barge's relocation is established, upon confirmation of trends for demand. In such case, berths for patrol boats will be relocated to the southern tip of new site of Fishing Port, and highest priority will be assigned to unloading quay and Tuna Transshipment Building. It is also stipulated that ice supply from PFC will be executed at off-shore berths, as at present, and that other needs, such as fishing preparations and rest, will be satisfied with use of newly constructed 100 m quay wall.

Under this alternative, unloading quay is supposed to cover 100% of demand, while estimates for fishing preparations/rest quay indicate that respective needs can be satisfied in total only by 49~55%. However, calculations that were made assume conditions of peak operation load, when the Port is cramped with vessels. Thereby this alternative provides capacity that practically completely covers the needs of 14 vessels staying at Port, as yearly average number. Space at catch unloading quay can be secured permanently, under condition of proper operation of quay. Therefore, it is projected to execute 1st stage of works in accordance with this alternative, and then, upon confirmation of future demand trends, to proceed with extension of works, in incremental steps.

Overview of demand coverage ratio under different alternatives for the length of quay is presented in Table 2.7.1. Results of detailed comparative examination of merits and demerits for three alternatives that were described above are presented in Table 2.7.2.

As it becomes evident from the details of comparison between 3 alternatives, noted in Table 2.3.9, the straightaway extension alternative (Alternative A) is absolutely not recommendable, due to the problem of subsidence, and from the standpoint of the construction cost.

Concerning the improvement of the project port, it is necessary to take into consideration its peculiar feature, namely that the fishing vessels under the flags of foreign countries constitute here more than a half of users. The number of such vessels

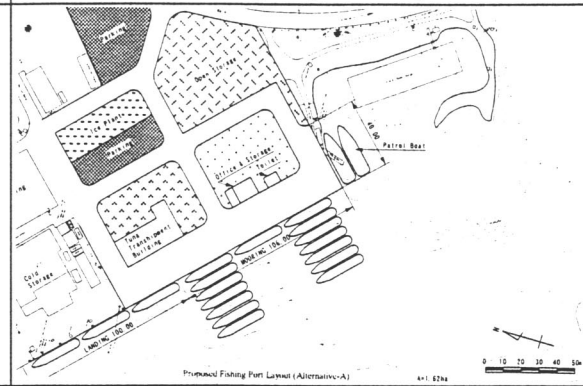
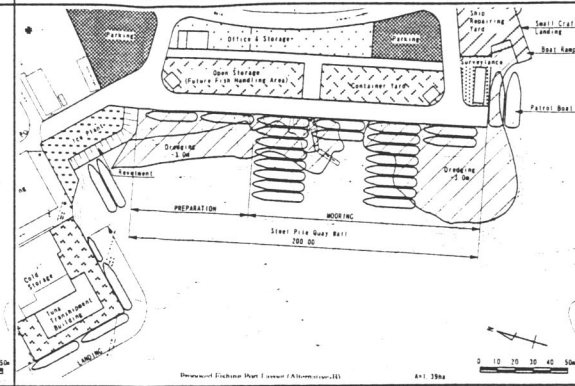
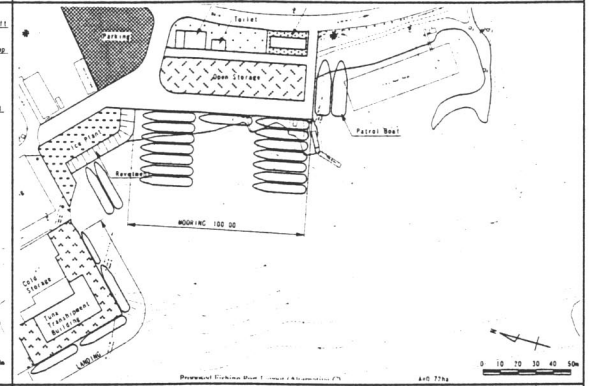
may increase, if the Micronesian side suggests them favorable conditions for fishing in the EEZ, and provides them with facilities and services in the fishing port; on the other hand, due to circumstances, such ships may suddenly change the location of their mother port to other fishing ports. As it is specified in Table 2.3.8, the rate of demand satisfaction by the preparation and rest quay in case of set-back location of the quaywall (100 m quaywall) (Alternative C) is low (49~55%); however, as it was explained above, this value is calculated towards the periods of peak operation in the port, while the needs of an average number of user vessels can be sufficiently saturated.

Consequently, while the scope of construction of the unloading quaywall, which is the issue of high priority for the Takatik Fishing Port, cannot be diminished, the construction of the quay for the fishing preparations and rest will not be started from the very beginning as a large-scale extension project, but rather will be promoted in incremental steps, in order to sufficiently meet the demand of the foreign vessels. Such approach was deemed appropriate in the sense that it excludes excessive investment; therefore, the setback quaywall line location alternative (100m quaywall) is recommended.

Table 2.3.8: Alternatives for projected quay wall length and comparison of respective demand coverage ratio

	Alternative A	Alternative B	Alternative C (Recommendable)
Unloading quay Quay length Demand coverage ratio	68～88m 100%	68～88m 100%	68～88m 100%
Fishing preparations quay Quay length Demand coverage ratio	118～138m 41～45%	231～251m 82～97%	131～151m 49～55%
Rest quay Quay length Demand coverage ratio		However, water supply is supposed to be executed at off-shore berths	However, water supply is supposed to be executed at off-shore berths

Table 2.3.9: Comparison of Layout Plan of Port Facilities

	Items	Alternative A: Straightaway extension option		Alternative B: Setback-designed quay wall option (200 m)		Alternative C: Setback-designed quay wall option (100 m)	
	Layout						
1	Mooring capacity	Quay wall: 3 discharge berths for fishing vessels; 3 berths for fishing preparations and rest of fishing vessels; 1 berth for surveillance vessel Off-shore mooring berths: none Most inferior mooring capacity	△	Quay wall: 4 discharge berths for fishing vessels; 2 berths for fishing preparations, 4 berths for rest of fishing vessels; 1 berth for surveillance vessel Off-shore mooring berths: 1 berth for fishing preparations Mooring capacity makes it possible to correspond sufficiently to some change in number of user vessels.	◎	Quay wall: 4 discharge berths for fishing vessels; 3 berths for fishing preparations and rest of fishing vessels; 1 berth for surveillance vessel Off-shore mooring berths: 1 berth for fishing preparations Mooring capacity will be in deficit in times of peak number of user vessels. However, it sufficiently meets needs of the average number of user vessels.	○
2	Operationability	Operationability of fishing vessels is exceptionally good. However, operationability of commercial vessels may be affected to some extent in case of multiple mooring by fishing vessels.	△	Operationability of both fishing vessels and large-size commercial vessels is exceptionally good.	◎	There are some problems concering multiple mooring by fishing vessels at quay inside the harbor. Operationability of large-size vessels is excellent.	○
3	Flexibility of quay wall usage	Usage of quay wall can be changed according to circimstances, in order to match mooring by vessels of different size, and with different purposes, and also in order to suit increase of user vessels. Even if in future necessity to extend the quay of Commercial Port arises, continous usage of existent quay of Commercial Port is possible, by means of relocation of Fishing Port quay to southern direction.	◎	Usage of newly constructed 200-m portion of quay wall can be changed according to circimstances, in order to match mooring by vessels of different size, and with different purposes, and also in order to suit increase of user vessels. However, if in future necesity to extend the quay of Commercial Port arises, its straightaway extension is impossible.	○	Straight portion of quay is short, so it will be difficult to change mode of its operation according to circimstances, in order to match mooring by vessels of different size, or with different purposes, or in order to suit increase of user vesels. Further, if in future necesity to extend the quay of Commercial Port arises, its straightaway extension is impossible.	△
4	Ecology conditions of waters within the Harbor	In comparison with other alternatives, water will not stagnate in harbor, and ecologically healthy water conditions will be maintained naturally due to tidal flows.	◎	In comparison with Alternative A, water in the harbor will be more stagnant. However, the quay will be constructed along existing coastline, so conditions will not be inferior to those existing at present.	○	Same as in Alternative B.	○
5	Land site for ground-based facilities	Land site for facilities of practically rectangular form and area of approximately 1.6 ha will be established. Not only parking lots for vehicles and open storage sites, that are in deficit at present, will be provided, but office and storage facilities of fishing companies, that are dispersed on the territiry, will be accumulated in one complex entity, thereby contributing to formation of functional area of Fishing Port.	◎	Land site that has extended rectangular form with width of approximately 50 m and area of 1.6 ha will be established. The area is narrow, so flexibility yields to Alternative A. However, formation of functional area of Fishing Port as possible, just as according to Alternative A.	○	Land site that has extended rectangular form with width of approximately 50 m and area of 0.7 ha will be established. The site does not provide opportunity to concentrate dispersed offices of fishing companies or other facilities. However, area of the site is large enough to outfit parking lots and other facilities that are required in the immediate future.	△
6	Foundation ground subsidence	Foundation ground of sea bed at the projected site for landfill works has extremely soft soil properties, and the depth of such layer exceeds 20 m. Foundation subsidence at the site can last for 40 or 50 years. Further, such subsidence may affect constructions of Marine Surveillance Office, ice preparation facility and other facilities that are located near by.	●	Foundation ground at northern portion of projected site is soft, but it consists of sand silt, so subsidence will be completed in several months, and there will be no long-lasting subsidence. However, at place of power generating barge's location water depth is substantial, requiring larger amounts of sand fill in comparison with northern portion. Subsidence at this portion of site will be considerable.	△	Foundation ground at projected site is soft, but it consists of sand silt, so subsidence will be completed in several months, and there will be no long-lasting subsidence.	◎
7	Convenience of discharge/landing works	Distance between berths for fishing vessels and Tuna Transshipment Building, and distance between Tuna Transshipment Building and refrigerating facility is rather long.	○	Distance between berths for fishing vessels and Tuna Transshipment Building, and distance between Tuna Transshipment Building and refrigerating facility will become shorter. Therefore, efficiency of transshipment operations will be good.	◎	Same as in Alternative B.	◎
8	Convenience and demand saturation ratio of the fishing preparation and rest quaywall	The conditions of refueling and re-supplying with drinking water etc. are affected by the number of vessels staying for rest. Ice supply will become inconvenient due to remote location from the Ice Preparation facility. The rest quaywall will be jointly used also by vessels engaged in preparations to fishing trips, therefore demand saturation ratio will be about 40%.	△	Refueling, re-supplying with drinking water and ice will become convenient. Specialized rest quay will be secured, and its demand saturation ration will be approximately 90%, which is a quite satisfactory indicator. However, with usage by foreign vessels being an uncertain factor, there remains a possibility that the facility may not operate effectively in the long run.	○	No problems with water supply are anticipated. Conditions of refueling and re-supplying with drinking water will be influenced by the number of vessels resting in the Port. The rest quaywall will be jointly used also by vessels engaged in preparations for their fishing trips, but resting boats will enjoy the advantage of secured sea berth for water supply. Demand saturation ratio – approximately 60%. Even taking into consideration the uncertain factor of usage by foreign longline vessels, the overall facility can be used quite effectively.	◎
9	Relocation of Marine Surveillance Office	Usage of existent Marine Surveillance Office can be continued; however, the Ofice will become rather remote from berths of surveiilance vessels.	◎	Relocation of Marine Surveiilance Office becomes necessary, because newly constructed berths for surveiilance vessels will be remote from existent berths, that are projected to be converted into catch disharge quay.	△	Same as in Alternative B.	△
10	Relocation of power generation barge	No relocation of power generating barge is required for projected site.	◎	Relocation of power generating barge becomes absolutely necessary.	△	Relocation of power generating barge is not required. However, slight change in barge's position and relocation of its anchors' position are necessary.	○
11	Convenience of inter-facility access conditions	Communication/access between existent and new facilities of Fishing Port will become extremly good.	◎	Access conditions between refrigerating facility, Tuna Transshipment Building and other newly constructed facilities will deteriorate to some degree.	△	Same as in Alternative B.	△
12	Period of construction works	More than 3 years	●	2-3 years	○	1-2 years	◎
13	Construction cost	220%	●	160%	○	100%	◎
	Overall evaluation	The alternative in question is most desireable from the standpoint of flexibility of future usage of Takatik Fishing Port. However, the conditions of foundation ground are extremely adverse, therefore this alternative cannot be recommended.	●	The alternative in question presents most ideal functional option. However, scope of quay wall extension is excessive, so there are doubts concering whether facilities can be operated efficiently after construction or not.	△	The alternative under question sufficiently secures function of catch discharge. It also makes possible future expansion according to Alternative B. This alternative is most optimal in present situation, as it makes it possibleto implement expansion in incremental steps.	◎

2-8) Crown height of quay wall

Top elevation of existing quay wall of Fishing Pot and Commercial Port is +2.1~2.4 m. Average new/full moon tide level (MHWS) for this Port is 1.22 m, and recorded past maximum tide level is 1.58 m. According to "Standard Design Methods for Constructions of Fishing Ports" in Japan (edition by All Japan Association of Fishing Ports), appropriate top elevation of quay wall at the Port under question should be +2.2 m, because the Port is used by fishing vessels of 17~125 GT, and because it is assumed that top elevation of quay should be 1.0 m above average new/full moon tide level. There is absolutely no contradiction between such value and actual top elevation of the existing quay wall, so it is envisaged to set value for top elevation of projected quay wall as +2.2 m.

2-9) Water depth in front of quay wall

The reconstruction Project for the Fishing Port in question is targeted on tuna longline fishing vessels of 17~125 t. Among these vessels, Micronesian vessels have draft in range of 1.4~2.0 m under full load. Respective figure for foreign fishing is 2.0~2.5 m. Therefore, for water depth in front of quay it is necessary to add to 2.5 m the value of reserve depth, which is prescribed for cases when sea bed foundation consists of extremely soft substance, namely 0.5 m (Source: "Standard Design Methods for Constructions of Fishing Ports"). Consequently, water depth in front of quay is planned as – 3.0 m.

2-10) Apron width

According to "Standard Design Methods for Fishing Port Facilities" (Japan Fishing Ports Association), apron width is set on basis of standards that are presented in Table 2.10.1. In the Port under question, forklifts and truck cranes are generally employed for unloading operations; vehicles are commonly used for other works as well. Therefore, the Project envisages apron width of 10 m.

Table 2.3.10: Apron width

Classification		Apron width (m)
Unloading/ landing quay	Carrying all catch to upper surface	3.0
	Direct transportation from apron by vehicles	10.0
Fishing preparations quay		10.0
Rest quay		6.0

2-11) Structure of quay wall

Three following alternatives were studied concerning structure of cross-section of quay constructions.

a) Alternative 1: Anchored steel pipe pile type wall with soil improvement at the rear of the wall (Fig. 2.3.3)

Under this option, design envisages that steel pipe sheets and anchor piles play the role of bearing construction. Paper drain will be provided for the whole area of foundation ground to the rear, in order to completely avoid residual subsidence after accomplishment of construction works.
The merit of the option is that it makes possible to avoid residual subsidence practically completely, regardless of change in soil properties and pressure of superstructure. Construction costs under this option are extremely expensive.

b) Alternative 2: Steel pipe pile type wharf (Figure 2.3.4)

This option envisages prevention of subsidence by employing wharf-type pile construction for the portion of quay apron. Paper drain will be provided for the whole area of foundation ground to the rear, in order to completely avoid residual subsidence after accomplishment of construction works.
Amount of construction cost heavily depends on the depth of pile supporting bed. There remains a problem of exact confirmation of supporting bed layer, because it cannot be resolved in full only using materials of geological survey that was executed.

c) Alternative 3: Anchored steel pipe pile type with replacement of foundation at the front (Figure 2.3.5)

This option suggests substitution of the sea bottom foundation in front and to the rear of the quaywall at width of 20 m and to the depth of DL=-5 m by good property soil, thereby making it possible to employ the usual steel sheet pile of IV-type. Due to such change of the sheet pile cross-section, it will become possible to substantially reduce the construction cost. For the section of quaywall apron, it is proposed to apply pre-load construction technique for the foundation improvement in order to prevent the consolidation settlement after the accomplishment of works. As for the foundation of the area located directly to the rear of the apron, it will be allocated for the open storage site, and no buildings or constructions are planned here; if some consolidation settlement occurs here in future (30~40 cm), it will be filled up by overlaying

the surface. In other words, comparatively simple means will be used for the recovery of functions of the storage site, and foundation improvement works are not planned here.

Comparison of the 3 alternatives described above demonstrates that technically all 3 proposals envisage sound structures, and from the practical point of view there is no difference between them. However, from the standpoint of the cost of construction works, the implementation of the 3rd Alternative can be substantially cheaper than in cases of the 1st and 2nd alternatives. Therefore, it is proposed to employ the 3rd Alternative of cross-section, which features good cost performance and is appropriate technically.

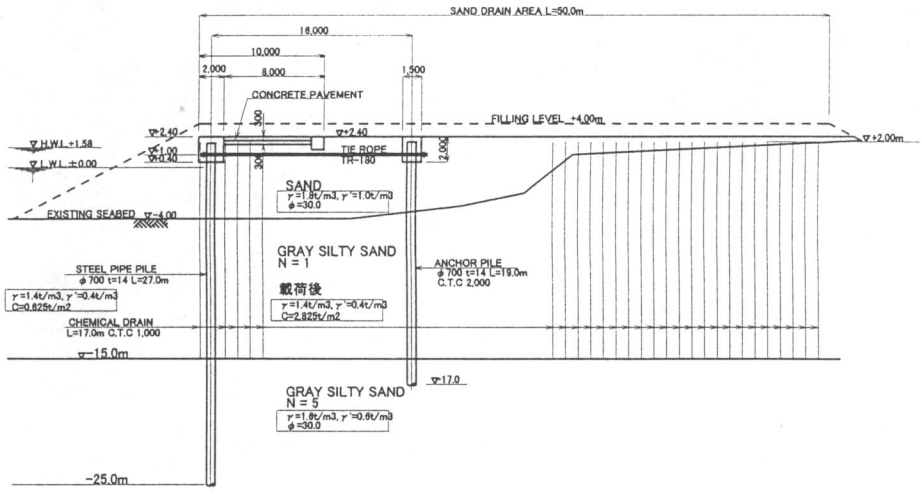


Fig. 2.3.3: Anchored steel pipe pile type wall with soil improvement at rear of the wall

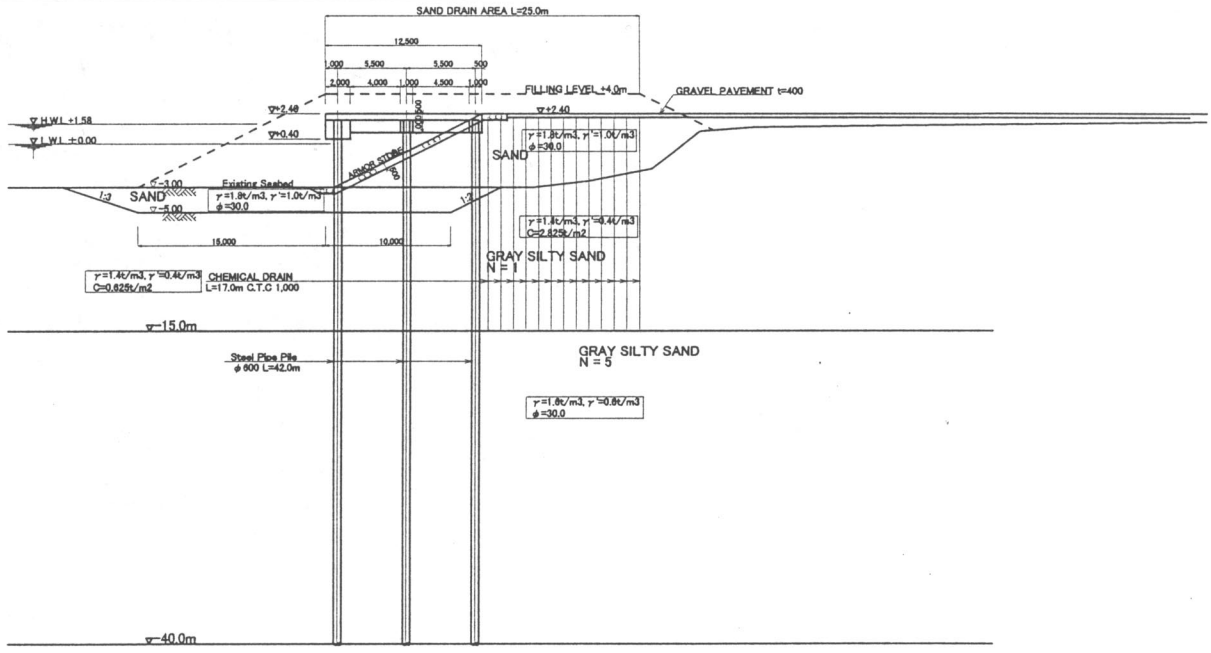


Fig. 2.3.4: Steel pipe pile type wharf

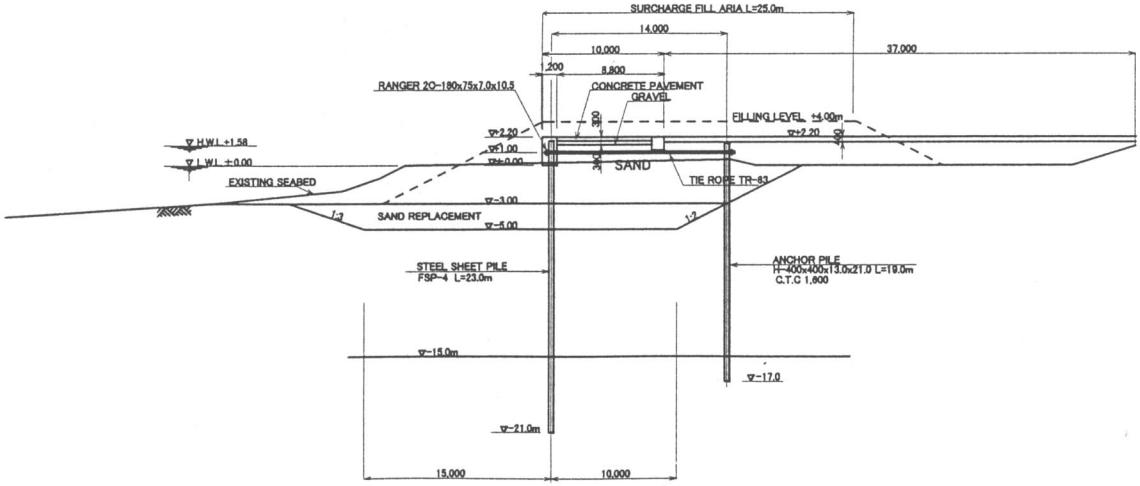


Fig. 2.3.5: Anchored steel pipe pile type with replacement of foundation at the front

(3) Buildings and Facilities

3-1) Tuna transshipment building

Fishing-related works that are executed in Takatik Port can be divided in large in two categories: ① transshipment to refrigerating ships of brine-frozen skipjack and tuna, that were brine-frozen on sweep-net fishing vessels; ② unloading and handling of ice-stored tuna by longline fishing vessels. As for category ① works, that handle frozen skipjack/tuna, both in cases of off-shore and at-sea transshipment , catch loading/unloading operations are executed with use of equipment/gear of sweep-net and refrigerating vessels, and there is no particular need in ground-based facilities. Besides, actual loading/unloading of frozen fish is executed at quay wall of CFC. Therefore, this Project especially envisages construction/equipping of facilities for handling ice-stored tuna by longline vessels.

Contents of operations executed under present conditions at tuna handling facility, existing related problems and proposed countermeasures are summarized in Table 3.3.11. Facilities' Project that corresponds to all respective operations is presented below.

a) Location of tuna transshipment building

The Project envisages locating Tuna Transshipment Building in proximity to EDA cold storage and ice making facility. This will make it possible to continue operation of the existing EDA chilled room as before, without construction of new chilled room. Further, in order to make transportation distance from the quay shorter, apron width in front of Tuna Transshipment Building is minimized in limits that do not obstruct passage of forklifts and other cargo handling machinery; its width is projected as 7~10 m, and is suited to current conditions of land site. Angle section of existing quay will be mainly used as catch receipt quay. Location of Tuna Transshipment Building provides for possibility of catch receipt from newly constructed quay as well, in times of peak operation. At present, Marine Surveillance Office, PPA Patrol Office, public lavatories and other small-size constructions are situated on route of would-be access way from new quay to Tuna Transshipment Building, but they will be relocated to the southern tip of new quay.

b) Catch receipt and transportation

It is projected, that receipt and transportation of catch from fishing vessels to Tuna Transshipment Building will be executed from 3 berths for fishing vessels, that are located in proximity to this facility. Catch will be transported directly from vessels to Tuna Transshipment Building using belt conveyor.

Table 3.3.11: Current conditions and problems at existing tuna transshipment facility and proposed countermeasures

Type of work	Contents of works / facilities and machinery used	Problems	Countermeasures
Unloading of catch from longline fishing vessels	Unloading from fishing vessels using truck cranes of EDA and placing catch into ice-water tanks of FRP, on quay.	• Quay line is remote from transshipment facility, therefore time and effort are required for transportation. • As no equipment is available for unloaded catch washing at existing quay, treatment is not executed properly prior to packing works. • Because of no emplacement for ice tank, there is deficit of time for chilling fish to due temperature before air freight transportation, in cases when temperature of vessels' holds is high.	• To construct Tuna Transshipment Building in proximity to quay line. • To execute close range transportation of catch by belt conveyor between quay and Transshipment Building. To use forklifts, as at present, in case of remote transportation • For preparatory treatment of catch before weighing and packing, to establish cold water supply facilities for fish washing, and outfit washing places inside Transshipment Building • To install ice tank for chilling fish. • To secure Transshipment Building with space that makes possible simultaneous work by at least 2 working gangs. • Packed and palletized fish will be stored in EDA chilled room, as at present. Therefore, new Tuna Transshipment Building will be built adjoining existing EDA to make handling more convenient.
Transportation of catch from quay line to Tuna transshipment facility	Using FRP water tanks instead of containers, transportation of catch to platform of EDA's ice-preparation facility.		
Loading / unloading works	Using EDA's platform as catch handling facility, sorting, appraisal, weighing, box packing/packaging and other works are executed.	• Existing platform is narrow (144 m2), and does not match requirements of peak load operations, because only one working gang can use it at a time. • Working place is a mere platform with no outside walls, and it does not make it possible to perform air conditioning to preserve products' quality and hygiene.	
Transportation / storage	Packaged and palletized catch is placed for temporary storage into chilled room of EDA (+5°C), and kept under temperature control until airfreight flight.		

As for receipt of catch in time of peak load, from places remote from Tuna Transshipment Building, it is projected that transportation will be performed as at present, using truck cranes, forklifts of EDA and FRP boxes.

c) Work flow inside the tuna transshipment building

The workflow inside the tuna transshipment building will be as follows:

① Washing of the fish using cold water
② Cooling of the fish in water-and-ice tanks
③ Sorting
④ Weighing
⑤ Evaluation of quality
⑥ Packing in jelly ice
⑦ Strapping
⑧ Loading on pallets
⑨ Transporting to chilled room (by the EDA's existing electric forklift trucks)

The work of (1) above will be done in the washing room, and that of (2)-(8) will be done in the sorting room, which will be air-conditioned to 20-25oC for the sake of maintaining the quality of the fish.

d) Fish Washing Room

The fish washing room will handle the catch of two vessels simultaneously, with 50% remaining in the room at the same time on the basis of 5 tons/vessel x 2 vessels = 10 tons. In that room will be installed a cold water tank (capacity of 20 tons of water at a temperature of 15-20oC) for the washing. The water will be cooled by cooling coil and distributed by pump with pressure tank to a water supply outlet installed in the room. The cooled water will also be supplied to the water-and-ice tanks in the tuna transshipment building. The coils for cooling the water and the air conditioning equipment will be installed in an outdoor equipment space. The cooling medium will be ammonia. On the basis of an average fish weight of 50 kg the necessary floor space of the washing room, including space for the cold water tank, etc., has been calculated as 9 m x 16 m = 144 m2. In order to keep the air in the room cool each of the receiving doors will be equipped with a sliding door and a plastic curtain.

e) Sorting Room

The sorting room will be given enough floor space to make possible work in it

by two groups at the same time. The number of workers in each group will be the same as presently, i.e. 6, and the sorting room will be provided with the following facilities and equipment:

① Water-and-ice tanks: 2 m (W) x 2.5 m (L) x 1.2 m (D) x 3 tanks/group x 2 groups = 6 tanks
For the ice supplied to the water-and-ice tanks use will be made of the EDA's cube ice mixed, if necessary, with the PFC's shell ice.
② Sorting work tables: 1 table/group x 2 groups = 2 tables
③ Weighing scales (water-resistant type, 120 kg): 1 set of scales/group x 2 groups = 2 sets of scales
④ Evaluation work tables: 1 table/group x 2 groups = 2 tables
⑤ Packing tables: 1 table/group x 2 groups = 2 tables
⑥ Roller conveyors: 1 conveyor/group x 2 groups = 2 conveyors
⑦ Banding machines: 1 machine/group x 2 groups = 2 machines

With installation of the above-mentioned equipment, the necessary floor space for the sorting room has been calculated as 16 m x 24.8 m = 236.8 m2. A part of the sorting room will also be used as a storage space for the packing materials and other lightweight materials.

f) Platform

Since it will no longer be possible to use the existing platform after the new tuna transshipment building is constructed, a platform will be installed next to the sorting room. In order to carry to the chilled room the packed tuna leaving the tuna transshipment building during the sorting work, roller conveyors and pallets will be laid and fork lift trucks will run on the platform. The platform will have a roof but no walls.

The layout plan is shown in Fig. 3.3.6.

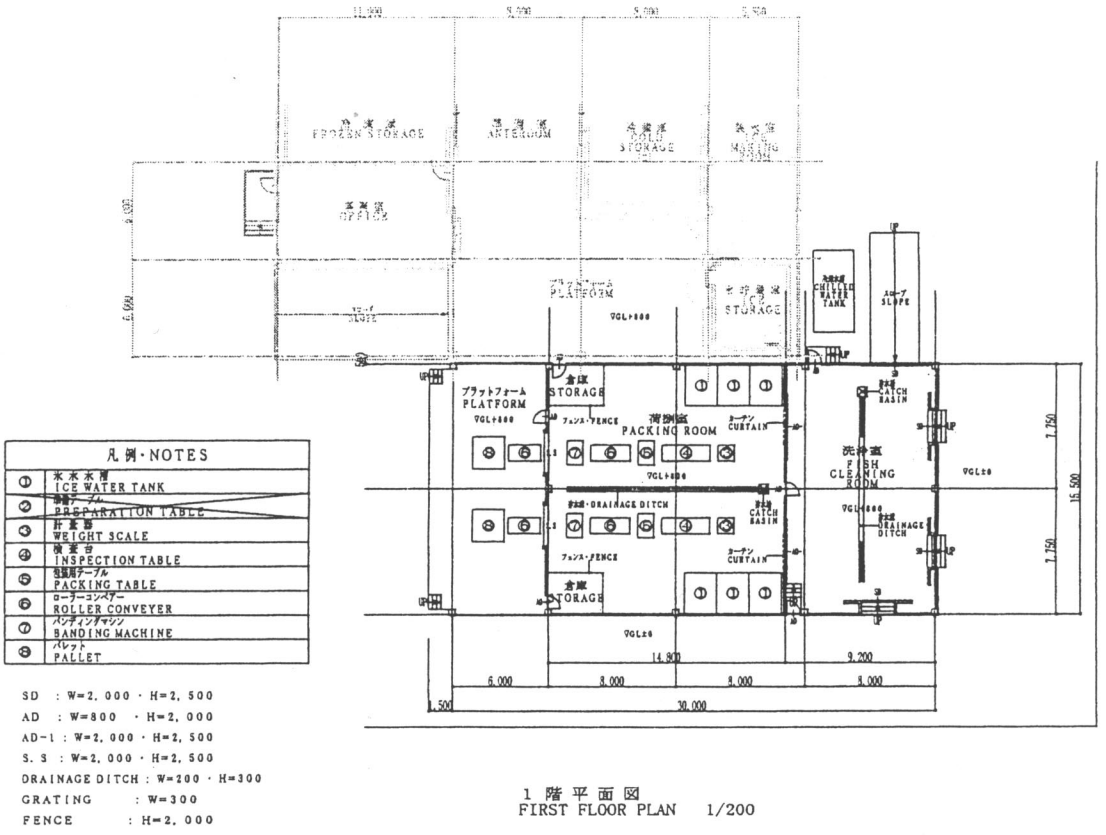


Figure 3.3.6 Layout Plan of the Tuna Transshipment Building

3-2) Fishing Gear Storehouse

This fishing gear storehouse is for the purpose of providing fishing gear storage space for the four Micronesian fishery companies engaged in longline fishery operations with the Port of Takatik as the home port of the vessels.

The storehouse will be used for keeping fishing gear such as the following:

① Main line nylon mono-filament: 500m coil x 50 packs
② Branch line nylon mono-filament: 200m coil x 100 packs
③ Floating line cremona twine: 200m coil x 50 packs
④ Used line for mending: 45m coil x 50 packs
⑤ Plastic floats: 50-80
⑥ Float lamps: 10-20
⑦ Radio buoys: 1-2
⑧ Batteries for float lamps and radio buoys: several
⑨ Branch line connecting clips: 300-500
⑩ Hooks, hook-splicing chips, swivels, etc. in partitioned boxes
⑪ Marking bamboo pole, luminous mark plates: 100-200 pcs

⑫ Rope-splicing spikes, other mending tools: 1 set
⑬ Fish butchering knives, tail-cutting scissors, fish-grippers, fish-hauling hooks, hand hooks, other fish processing gadgets: 1 set
⑭ Mooring ropes, other ropes for spare stock: several
⑮ Life-saving and other safety appliances/equipment for emergency replacement
⑯ Vessel deck gear (spare lamp bulbs, paint, deck brushes, carpenter tools,etc.): several
⑰ Spare parts for engine and machinery (valves, packing, piping material,grease, engine-room tools, etc: several
⑱ Miscellaneous items (work gloves, cotton waste, etc.): several

Since it is necessary to make shelves for orderly classification of the above articles between those for deck use and those for engine room use, in particular inspection items, spare parts and tools, it will be necessary to have about 15 m2 for fishing gear, 6 m2 each for engine room and deck items and about 3 m2 as space for placement of desks and chairs for storehouse personnel and shelves for keeping inventory ledgers, catalogs and manuals, and in addition to that about 30% of the total space will be needed for corridor space. Therefore the space of one partition will be 40 m^2.

3-3) Office of Fishing Port Administration

It is assumed that the management work of the Takatik Fishing Port will be accomplished by a total staff of five: a person in charge, an accountant, a technical staff member and two workers. Three of them can be considered to need office space. On the basis of a standard space requirement of 8.0 m2/person as workspace, that means a total requirement of about 24.0 m2. Besides that, it is considered that 10 m2 will be needed as multipurpose space for purposes such as discussions with users of the facility and commercial negotiations. Another 4 m2 for toilets and hot-water service space and 2 m2 for internal public announcement equipment have been added to that for a total space requirement of 40 m^2.

The ground plans and elevation of the fishing gear storeroom and the office of the fishing port administration are given in the Drawing No.6 of Basic Design.

3-4) Toilet and Shower Facilities

From the standpoint of preservation of water quality in the port, use by fishing vessel crews of on-board toilets, showers, clothes washing facilities, etc.

while anchored in the port is prohibited. That being the case, toilet and shower facilities for fishing vessel crews will be installed on land at a place that is easily accessible for them. The shower room will include a corner for simple clothes washing.

Is already indicated in the section on design of the mooring facilities, on a standard day the number of fishing vessels moored at the port is eleven Micronesian vessels and 25 Chinese vessels. Since the average number of crew members of the longline fishing vessels utilizing the port is 8, the number of persons a day that will make use of such facilities is 288 (36 x 8). On that basis it has been calculated that the following quantities of toilet and shower facilities will be needed:

For men	:	2 toilet stools, 3 urinals, 3 showers and 2 sinks
For women	:	2 toilet stools

The ground and elevation of the toilet and shower facility building are given in the Drawing No.7 of Basic Design.

3-5) Marine Surveillance Office

This building, which is located at present by the side of the Cold Storage Facility, is a two-story reinforced concrete construction with total floor area of 246 m^2. However, it will be removed in order to allow concentration of tuna unloading works from the fishing vessels in proximity to the existing Cold Storage Facility and newly built Tuna Transshipment Building. A new building for the Marine Surveillance Office will be erected at the southernmost tip of the newly constructed quaywall, and it will have exactly the same total floor area and structure, as the existing office.

The planimetric scheme of the new Marine Surveillance Office and its elevation view are presented in Figure 2.3.14.

3-6) PPA Guardsman Quarters. Toilet / Shower.

At present, this building is also located by the side of the existing Cold Storage Facility; its 1st floor is allocated for toilet and shower, and the 2nd floor is used for the PPA guardsman quarters. The 1st and the 2nd floor each have floor area of approximately 15 m^2. This building must be also removed, because of the necessity to construct a new Tuna Transshipment Building. Needs in toilet and shower facilities will be met by the new construction, while guardsman quarters will be constructed adjacent to the new fishing port Administration Office on Storage Building.

(4) Utilities

4-1) Water Supply Piping Plan

a) Design Conditions

① Quantity of water supply:

The water consumption of the longline fishing vessels utilizing the port is 3 m^3/vessels, and it takes less than 30 minutes to delivery that quantity:

$Q = 3\ m^3/30\ minutes \rightarrow 1.67 \times 10^{-3}\ m^3/s$

② Flow speed in pipe: V = 1 m/s (from water supply facility standards)

③ Flow rate at water supply points:

Two water supply points will be furnished in order to be able to supply water to all of the berths of the 100m-long quay. However, consideration will be given to the need to be able to make use of the piping as it then is even with addition of one supply point after future extension of the quay to a length of 200 m.

No. 1 point: $5.00 \times 10^{-3}\ m^3/s$
No. 2 point: $3.33 \times 10^{-3}\ m^3/s$
No. 2 point: $1.67 \times 10^{-3}\ m^3/s$

b) Calculation of Diameter of Water Supply Piping

Calculation formula: $\phi D = 2 \times \sqrt{Q/\upsilon \times \pi}$

Where: ϕD: the diameter of the piping,
Q: the quantity of water supply,
υ: the flow speed in the pipe,
π: the ratio of the circumference of a circle to its diameter

No. 1 point: $\phi = 0.0798 \rightarrow 75$ mm
No. 2 point: $\phi = 0.065 \rightarrow 65$ mm
No. 3 point: $\phi = 0.046 \rightarrow 50$ mm

The above calculation is based on consideration of simultaneous opening of the faucets.

c) Measurement of flow rate

Measurement of flow rate will be accomplished at each water supply point using a portable water meter (with diameter of 30 mm), the diameter of the water meter being determined on the basis of water supply facility standards.

4-2) Oil Supply Piping Plan

a) Design Conditions

① Quantity of oil supply:

The engine output of the fishing vessels that utilize the port is 400-600 hp, and, as shown in Table 1.2, the fishing expedition pattern for the Micronesian vessels is 13 days of operation per voyage. The oil consumption per vessels is calculated as follows:

Q = (fuel consumption rate)x(horsepower)x(hours used)x (1/specific gravity)x (number of days of voyage)

= 0.17 x (400 x 0.8 to 600 x 0.8) x 10 x 1000/860) x 13

= 8.223 to 12,335 liters/vessel

It is therefore assumed that necessary supply of oil for each vessel is 12 kl.

Assuming that it takes one hour to fill a vessel with that quantity:

Q = 12 kl/60 minutes --> 3.33 -3 m3/s

② Flow speed in pipe: V = 1 m/s (from thermal power generation manual)

③ Flow rate at oil supply points:

There are to be two oil supply points on the quay so as to make it possible to supply all of the berths along its 100 m length with oil. The piping for that purpose will be planned on the basis of the same considerations as for supply of water.

No. 1 = 0.1 m^3/s, No. 2 = 6.66 x 10^{-3} m^3/s,

No. 3 = 3.33 x10^{-3} m^3/s

b) Calculation of Diameter of Oil Supply Line

Calculation formula: $\phi D = 2 \times \sqrt{Q/\gamma \times \upsilon \times \pi}$

Where: ϕD: the pipe diameter

Q: the quantity of oil supplied

γ : the specific gravity, 0.86

υ : the flow speed in the pipe

π : the ratio of the circumference of a circle to its diameter

No. 1 $\phi D = 0.122 \rightarrow$ 125 mm

No. 2 $\phi D = 0.099 \rightarrow$ 100 mm

No. 3 $\phi D = 0.070 \rightarrow$ 65 mm

c) Responsibility for the Construction Work

Presently oil is supplied by pipeline directly from the neighboring Mobil Oil facility. Since we have been told that Mobil Oil will take direct charge of the oil supply pipeline construction work in connection with this project, too, in this project there will be construction of only concrete pits for the above-mentioned piping of the necessary diameters.

4-3） Ice Transportation Plan

We are told that with the existing PFC ice transportation system using compressed air it is possible to send ice a maximum distance of 150 m, but presently ice is supplied from the ice preparation facility only to a distance of 30-40 m where the fishing vessels are moored and the shore container is located. If the distance remains about the same as now, it is considered that although there may be some trouble from time to time, it will be possible to continue use of the existing system without carrying out any particular improvement work. If, however, the transportation distance gets longer, it will be necessary to consider simple transportation by fork lift truck in view of the possibility of occurrence of the kind of trouble described below.

① Increase in friction loss due to melting of the ice due to the outside air temperature and resultant increase in amount of water.
② Maintenance at the time of stops due to trouble with the compressed air transportation equipment (problems arise in ice elimination work)
③ Elimination and loss of ice in the compressed air transportation pipe at completion of the loading work.

a) Design Conditions

① Existing ice preparation capacity: 100 tons/day
② Existing ice storage capacity: 170 tons/day
③ Quantity of ice to be loaded:

The fishing vessels that are supplied with ice from the ice preparation facility are foreign fishing vessels, which, although having both a smaller catch per vessel and a smaller number of operating days per voyage than the Micronesian fishing vessels, still have a past record of sometimes catching as much as 5 tons a vessel a voyage. Taking that and what we have heard from PFC (10-15 tons/vessel/voyage in the days of the Tingfong company but reduction to 4-6 tons/vessel/voyage recently) into account, we have set the figure at 5-8 tons of ice/vessel/voyage.

b) Equipment Composition

Container for conveyance of ice:

2-ton (2.25 m3), 1.5 m (W) x 1.5 m (L) x 1.2 m (H)

Fork lift truck: 2-ton
Loading hopper.

c) Calculation of work timetable
Transportation distance: approx. 100 m
Traveling speed: approx. 10 km/h
Loading time: compressed air transportation capacity of 20 tons/h, therefore 2 tons divided by 20 tons/h = 6 minutes
Transportation time: Fork lift:
Setup: 2 minutes
One way: 100 m (10 x 1000)/60 = 167 m/minute, 100/167
= 0.6 → 1.0 minute
Round trip: 2 minutes
Change in direction: 2 minutes
Transportation time: time for transfer to hopper: 5 minutes
Time required for one round trip: 6 + 2 + 2 + 2 = 12 minutes
Quantity transported per hour: 60/12 = 5.0 times/h
5.0 x 2 tons/time = 10 tons > 5-8 tons

(5) Equipment to be procured

5-1) Tuna Transshipment Building
The following equipment is to be installed in the tuna transshipment building:

① Belt conveyors: 6m type, 6 units
② Cold water tank for washing water: water temperature 15-20oC; tank capacity 20 tons; water supply capacity 40 tons/day; with heat insulation layer and circulation pump in the tank.
③ Air conditioning equipment of sorting room and washing room: room temperature 20-25oC. Installation of the compressors, condensers and other equipment or the above-mentioned cold waters and air conditioning nearby the tuna transshipment building outside it. Use of ammonia as the cooling medium.
④ Pump equipment for distribution of washing water: 0.15 m3/minute; with pressure tank.
⑤ Weighing scales (water-resistant type, 120 kg): 2 units
⑥ Quality evaluation work table: 2 units
⑦ Packing work table: 2 units
⑩ Roller conveyors: 4 units
⑪ Banding machines: 2 units

5-2) Office of Fishing Port Administration

The following equipment will be installed in the Office of Fishing Port Administration:

① Public Address System (1 set)

To be used for giving instructions to the fishing vessels concerning berthing, movement, waiting, etc. from the Office.

② VHF radios (5 units)

To be used for liaison between the fishing vessels in the port, the Office of Fishing Port Administration and the patrol personnel. 5 units needed in all: 1 for the PPA headquarters, 1 for the Office of Fishing Port Administration, 1 for the Patrol Office and two for the fishing port patrol personnel (in all there are presently 8 port patrol personnel).

5-3) Ice Transportation System

Furnishing of the following equipment for a fork-lift-based transportation system instead of installing piping for transportation of the ice by compressed air:

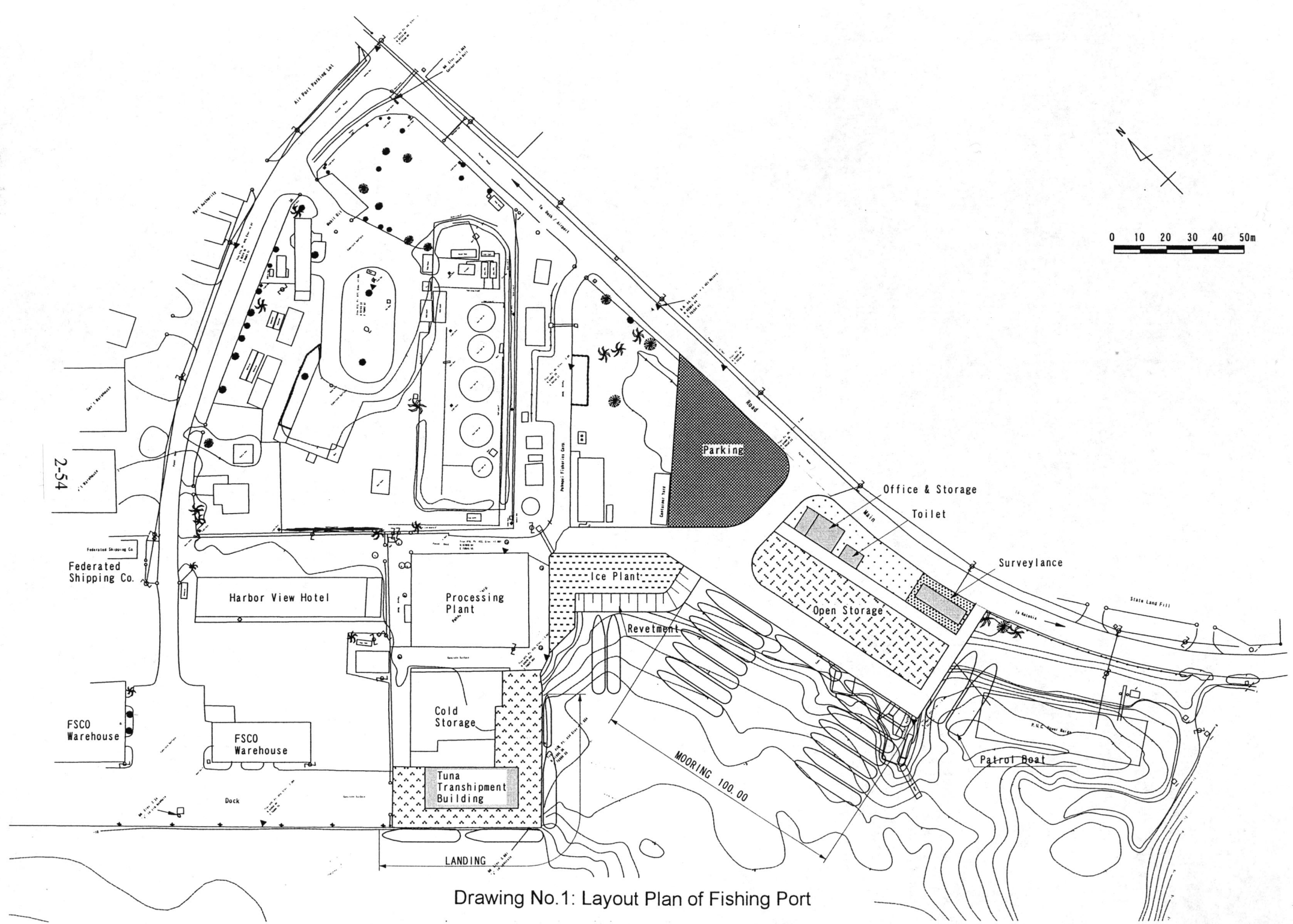
① Ice transportation container: 1.5 m (W) x 1.5 m (L) x 1.2 m (H), 2 units

② Fork lift: diesel drive, 3t load, 1 unit

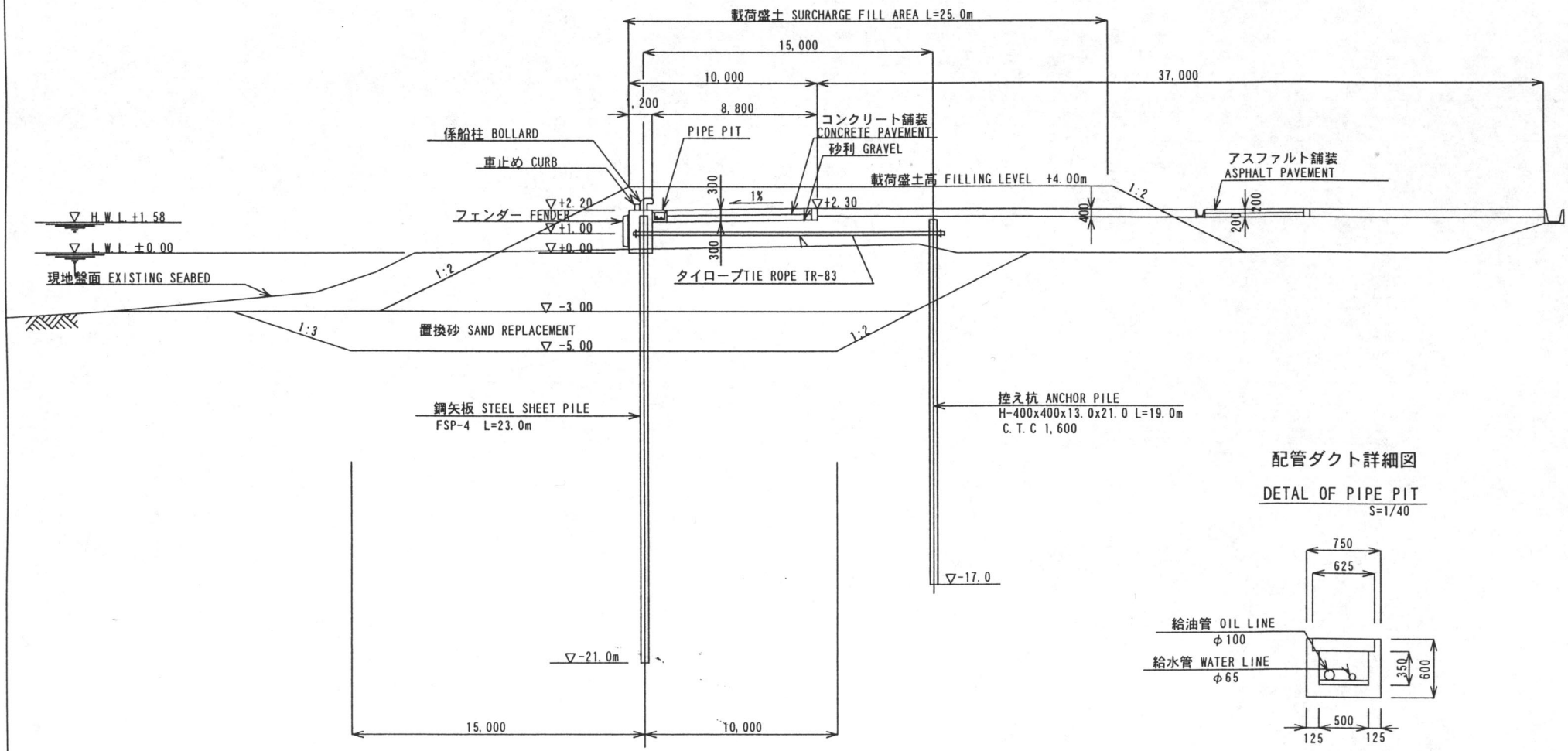
③ Loading hopper: 1 unit

2.3.4 Drawings of Basic Design

(1) Layout Plan of Fishing Port
(2) Typical Section of Quay Wall
(3) Layout Plan of Steel Sheet Pile of Quay Wall
(4) Ground Plan of Tuna Transshipment Building
(5) Elevation of Tuna Transshipment Building
(6) Ground Plan and Elevation Plan of Storehouse and Administration Office of Fishing Port
(7) Ground Plan and Elevation Plan of Public Toilets
(8) Ground Plan and Elevation of Marine Surveillance Office
(9) Layout Plan of Utility Facilities



Drawing No.1: Layout Plan of Fishing Port



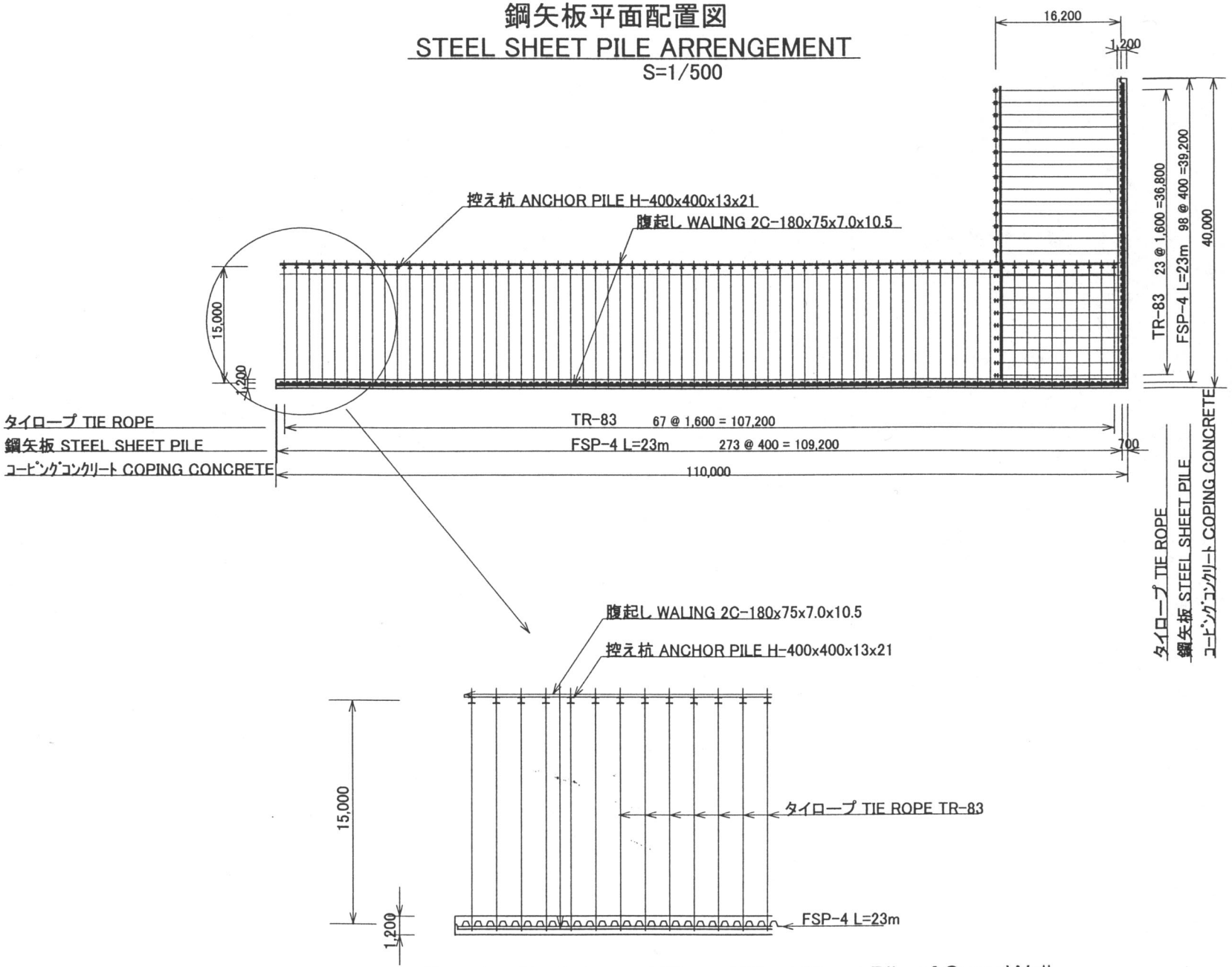
配管ダクト詳細図

DETAL OF PIPE PIT

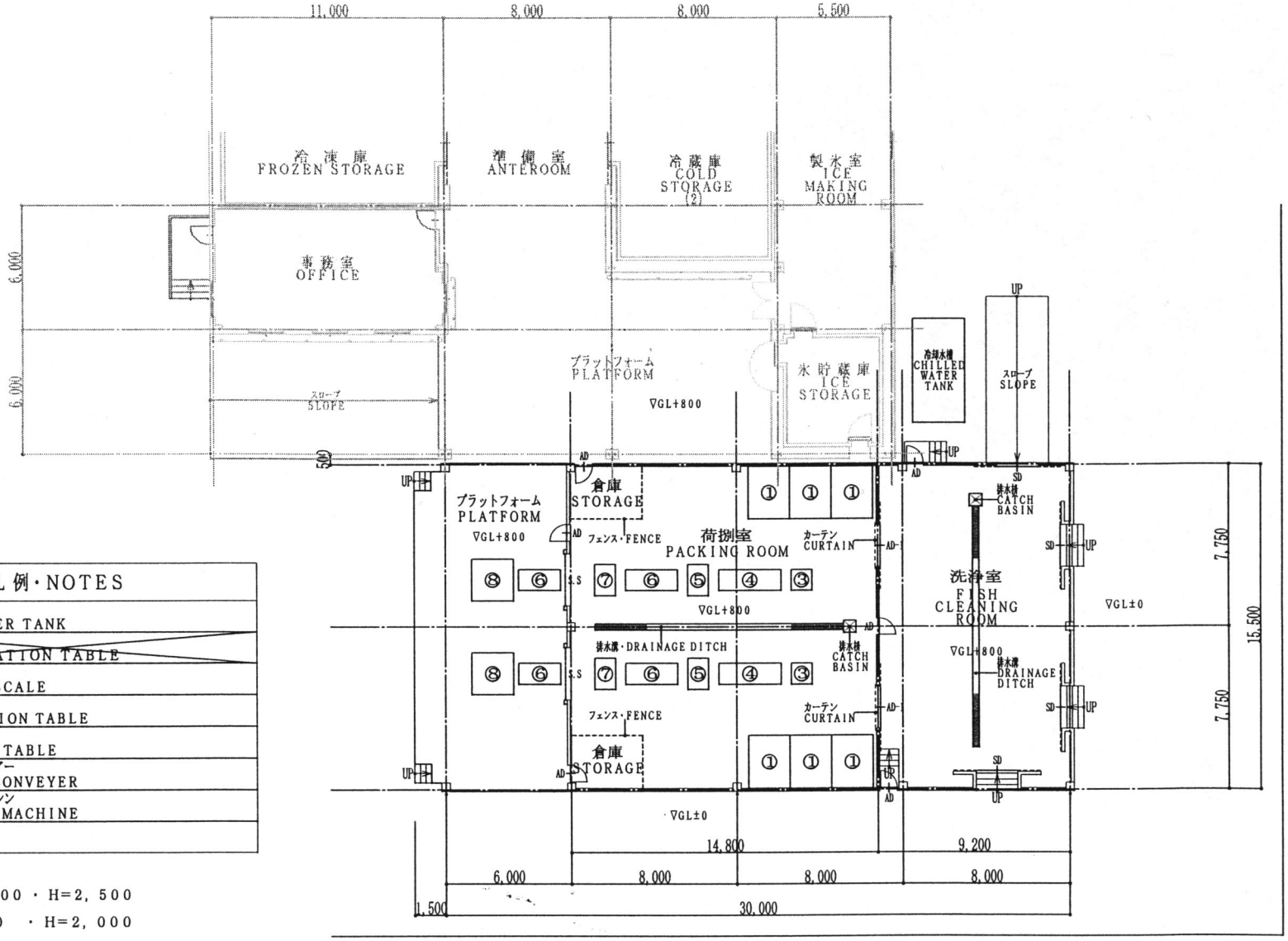
S=1/40

Drawing No.2: Typical Section of Quay Wall

鋼矢板平面配置図
STEEL SHEET PILE ARRENGEMENT
S=1/500



Drawing No.3: Layout Plan of Steel Sheet Pile of Quay Wall

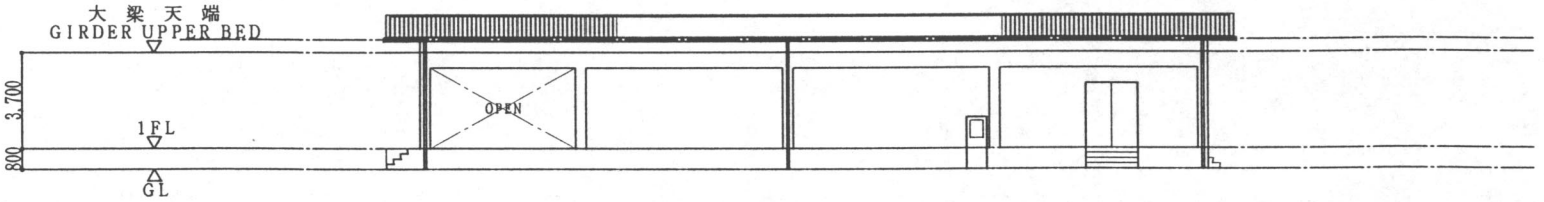


2-57

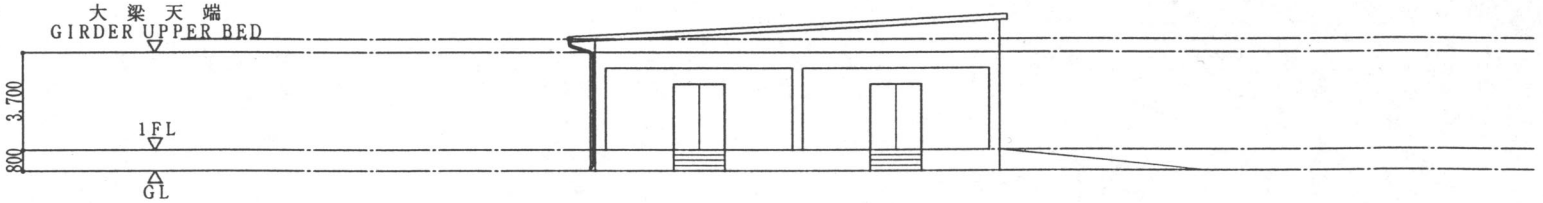
凡例・NOTES	
①	氷水水槽 ICE WATER TANK
②	~~準備テーブル~~ ~~PREPARATION TABLE~~
③	計量器 WEIGHT SCALE
④	検査台 INSPECTION TABLE
⑤	包装用テーブル PACKING TABLE
⑥	ローラーコンベアー ROLLER CONVEYER
⑦	バンディングマシン BANDING MACHINE
⑧	パレット PALLET

SD : W=2, 000 · H=2, 500
AD : W=800 · H=2, 000
AD-1 : W=2, 000 · H=2, 500
S. S : W=2, 000 · H=2, 500
DRAINAGE DITCH : W=200 · H=300
GRATING : W=300
FENCE : H=2, 000

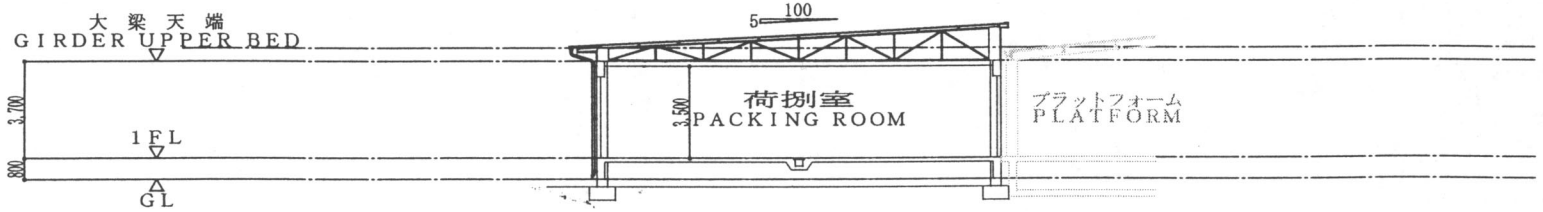
Drawing No.4: Ground Plan of Tuna Transshipment Building



南 側 立 面 図
SOUTH ELEVATION 1/200

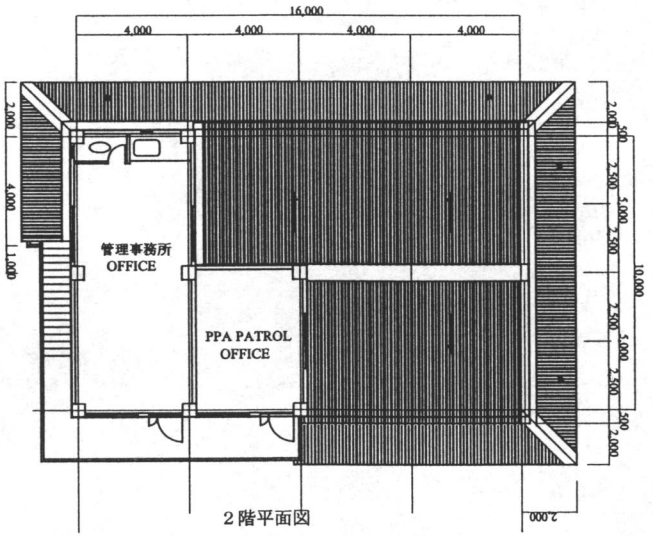


東 側 立 面 図
EAST ELEVATION 1/200



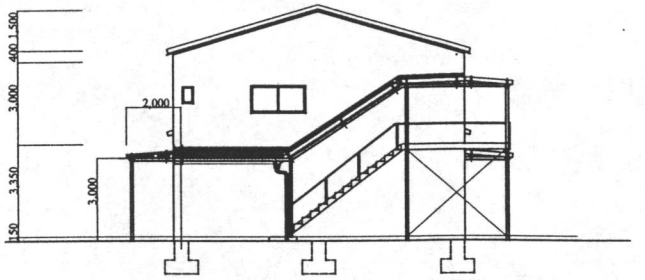
断 面 図
SECTION 1/200

Drawing No.5: Elevation of Tuna Transshipment Building



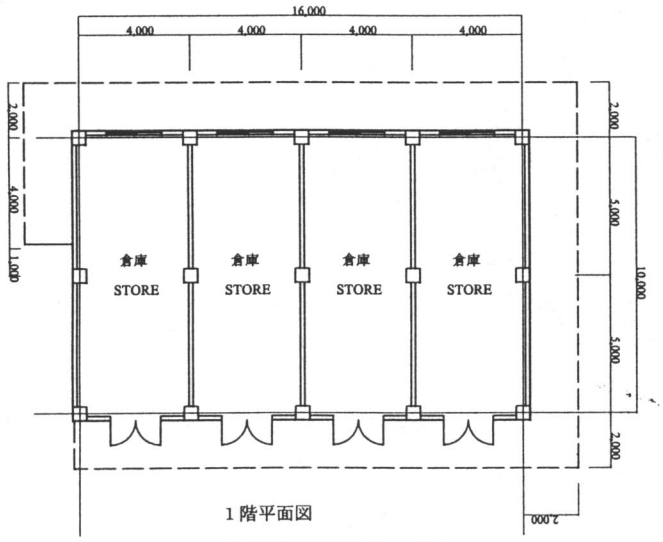
2階平面図

SECOND FLOOR PLAN 1/200



北側立面図

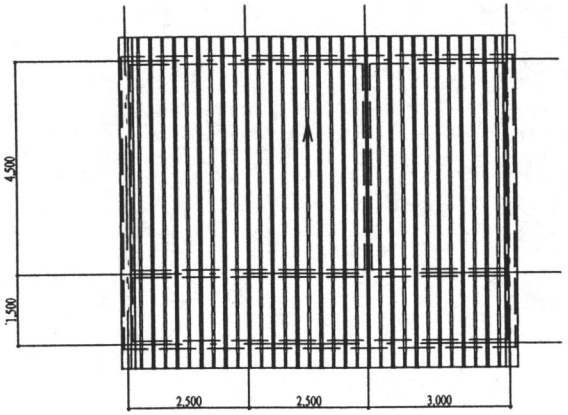
NORTH ELEVATION 1/200



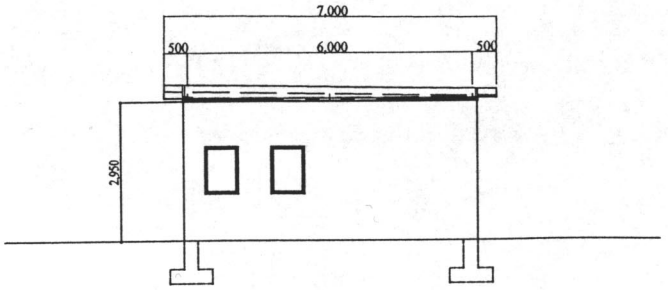
1階平面図

FIRST FLOOR PLAN 1/200

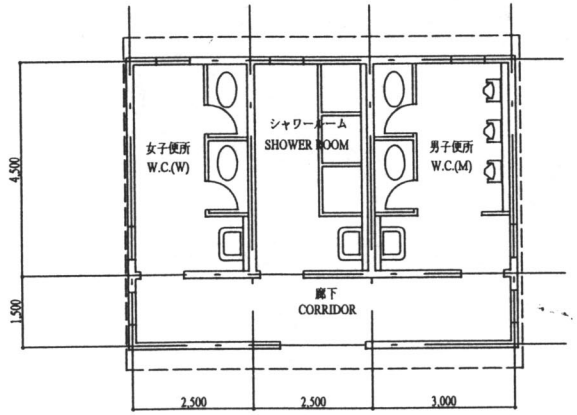
Drawing No.6: Ground Plan and Elevation Plan of Storehouse and Administration Office of Fishing Port



屋根伏図
ROOF PLAN 1/100

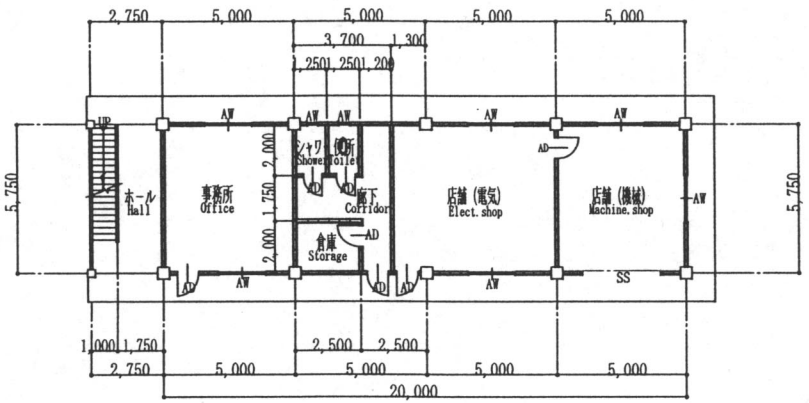


南側立面図
SOUTH ELEVATION 1/100

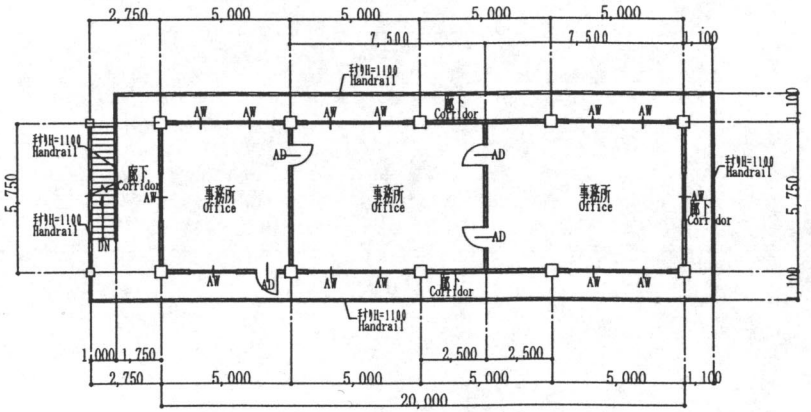


1階平面図
FIRST FLOOR PLAN 1/100

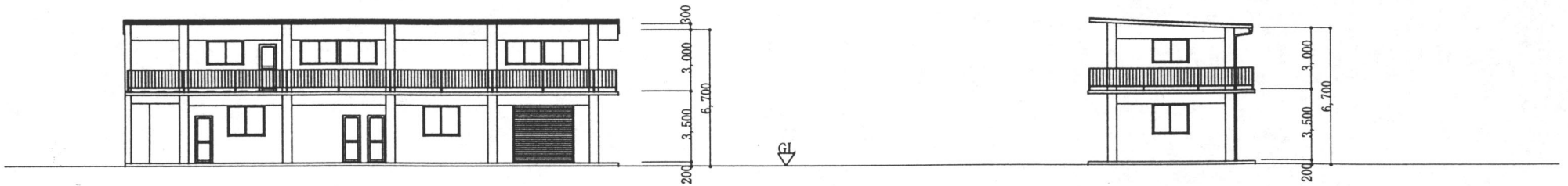
Drawing No.7: Ground Plan and Elevation Plan of Public Toilets



1階平面図 S=1:200
FIRST FLOOR PLAN



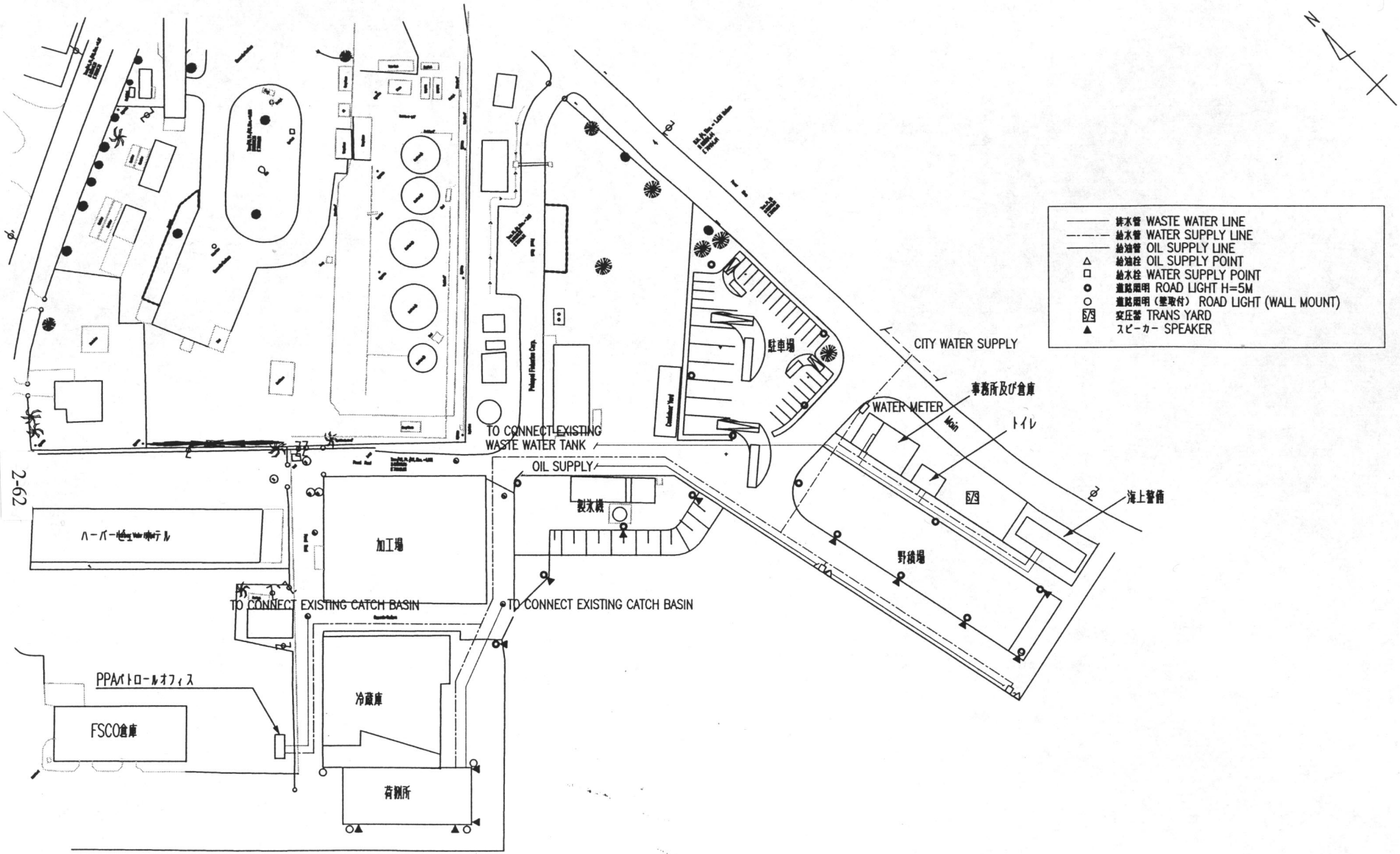
2階平面図 S=1:200
SECOND FLOOR PLAN



西立面図 S=1:200
WEST ELEVATION

南立面図 S=1:200
SOUTH ELEVATION

Drawing No.8: Ground Plan and Elevation of Marine Surveillance Office



Drawing No.9: Layout Plan of Utility Facilities

CHAPTER 3 IMPLEMENTATION PLAN

3-1 Implementation Plan

3-1-1 Implementation Concept

(1) Procurement Policies

This Project will be implemented according to the implementation scheme for the works under the Grant Aid from Japan, providing that the Japanese companies that have Japanese citizenship will conclude contracts for works related to this Project with the Government of the Federated States of Micronesia, concerning all design administration works, construction contracting works, and equipment procurement works, and will execute the said works upon obtaining the approval by the Ministry of Foreign Affairs of the Japanese Government. On the side of the Federated States of Micronesia, Pohnpei Port Authority (PPA) will be the executing institution for this Project.

For construction of facilities, it is planned also to employ local construction entrepreneur(s) as sub-contractor(s) or foreign-affiliated construction enterprise(s) with business branches in Micronesia. Though it is extremely difficult to obtain construction machinery and materials from local sources, it is planned to procure available resources locally to the extent of possible. Concerning the equipment and materials that cannot be procured from local sources, working expenditures will be calculated on the basis of the plan of procurement of all such items from Japan.

(2) Policies Concerning Implementation Working Period

The foundation ground of the whole area of the projected site, specifically, the upper layer of 15~20 m, is represented by soft soil with N value = 1~3. Therefore, if under this Project quaywall construction and yard landfill works are implemented at once, possibility of the consolidation settlement will occur. Consequently, it is projected to implement the Project with division into 2 phases.

Specifically, at the 1st Phase, ground foundation improvement works will be carried out in advance, and, additionally, the Tuna Transshipment Building,

which is the object of high urgency, will be erected. Concurrently, priority will be allocated to the construction of the Maritime Surveillance Building (because it will be necessary to remove the existing office building), construction of the Storehouse for the fishing gear of longline tuna fishing vessels, and to procurement of equipment and materials. Further, for preservation of water quality in the Port, Toilet and Showers for crewmen of fishing vessels will be newly constructed. These facilities will be located in the areas with no danger of ground subsidence, so their construction will have no relation to ground improvement works. Formation of land sites for these buildings is included in the 1st Phase of construction works, as civil engineering works.

At the 2nd Phase, together with construction of the fishing preparation and rest quay, substitute patrol boats berths will be constructed in order to convert the functions of the existing patrol boats' berths to the unloading quay. Thus, the arrangement of the basic functions of the Takatik Fishing Port will be accomplished. Thereupon, it is projected to undertake construction of roads, yard paving, and utilities.

The overview of Project components and the division of the 1st and 2nd Phase implementation are presented in Table 3.1.1.

Table 3.1.1: Scope of Works by Phases

Item	Quantity	Phase I	Phase II
1. Civil Works			
1.1 Subsoil Improvement	36,400m^3	○	
1.2 Yard Preparation for Buildings	1,600 m^2	○	
1.3 Quay Wall(Anchored Steel Sheet Pile Type)	Length:150m Crown Height: +2.2m, Water Depth: - 3.0m Apron Width:10m		○
1.4 Removal of Pre-loading Soil	16,200m^3		○
1.5 Revetment(Masonry)	500m^3		○
1.6 Pavement (Apron: Concrete, Road & Parking Lots: Asphalt, Other Area: Gravel)	7,000 m^2		○
2.Building Works			
2.1 Tuna Transshipment Building	465 m^2	○	
2.2 Storage & Office Building	240 m^2	○	
2.3 Public Toilet	48 m^2	○	
2.4 Surveillance Office Building	246 m^2	○	
3. Utilities			
3.1 Water Supply System	1 set	○	○
3.2 Waste Water Discharge System	1 set	○	
3.3 Lighting & Electricity System	1 set	○	○
4. Equipment			
4.1 Equipment for Transshipment Bldg.			
1)Belt conveyor	6 units、6m long each	○	
2)Weighing Machine	2 units	○	
3)Roller Conveyor	4 units	○	
4)Banding Machine	2 units	○	
5)Cold Water Tank	1 unit	○	
6) Air Conditioning Equipment	1 unit	○	
4.2 Ice Handling System			
1)Forklift Truck	1 units 、3t Diesel engine drive type	○	
2)Container for Ice Handling	2 boxes、2t	○	
3)Hopper	1 unit	○	
4.3 Communication Devices			
1)Public Address System	1 set	○	
2)VHF Radios	5 units	○	

3-1-2 Issues Concerning Implementation

(1) Considerations for Activities in the Fishing Port

In order to minimize obstructions, caused by construction works to operations of Fishing Port and to neighboring Commercial Port, and also to navigation of pleasure boats, it is necessary to pay proper attention during construction works period both to on-shore and marine zones. On shore, it is necessary to separate flows of vehicles that use existing port and harbor facilities and vehicles that service construction. For this purpose, regulations will be imposed so those construction-servicing vehicles would have direct access from existing roads to construction site and vise versa. On sea, it is necessary to separate and clearly define within the harbor areas designed for vessels' navigation and those that play the role of working area for construction-servicing vessels. It is also required to remove to alternative berths fishing vessels and patrol vessels that are based at present within the harbor.

(2) Relocation of Marine Surveillance Office and Patrol Office

For undertaking construction of Tuna Transshipment Building in the first financial year of the Project, it is necessary to relocate the existing Marine Surveillance Office and Patrol Office. At new place, construction of these offices will be performed as the responsibility of the Japanese side, but removal works should be executed as responsibility of Micronesian side.

(3) Removal of Power Generating Barge

At the southern tip of Project site a power-generating barge is moored, which is out of service at present. It is desirable to remove this barge to other place before undertaking construction works, if it is possible. If due to any reasons such removal is impossible by the time specified above, some change in barge position will be anyhow required, because it is absolutely necessary to relocate partly its anchors; it is also necessary in order to enable mooring of patrol vessels.

(4) Rain Protection during Construction

In comparison with Japan, amount of rainfall and number of rainy days are much bigger at Project construction site. Therefore, careful attention is required towards protective measures for sites designed for placing materials for foundation ground improvement works, for storage of cement, for mixing/placing/compacting of concrete, etc. Also, proper considerations

concerning operating rate should be taken into account when developing execution plan for works.

(5) Aggregate for Reinforced Concrete

In Micronesia, coral sand produced of crushed coral is generally used as aggregate for reinforced concrete. Coral sand is exposed for some time to rains so that saline matter is washed out, and is used after such treatment. However, it is difficult to expect sufficient quality control through such practice. In case coral sand is used in reinforced concrete, it brings forth alkali reaction of aggregate, accelerating thereby corrosion of steel bars and imposing long-term health of concrete structures to danger of deterioration. Due to this reason, only the coral sand washed by fresh water or the black sand made of basalt shall be used for all reinforced concrete structures in this Project.

3-1-3 Scope of Works

Outline of allocation of works between the two countries during implementation of the Project is specified in the following table.

Table 3.1.1 Allocation of Work Items of the Project

Item of responsibility	Responsibility of Japanese side	Responsibility of Micronesian side
Allocation of land site for construction of facilities under the Project		○
Fencing works around site for construction of facilities under the Project		○
Removal of power generation barge and relocation of anchors		○
Removal works for existing seawall, quay, and landing pier	○	
Civil engineering/construction works for Fishing Port facilities	○	
Land site reclamation/landfill works and foundation ground improvement works	○	
Dredging works at mooring berths within the harbor	○	
Construction works for buildings/facilities	○	
Removal of Marine Surveillance Office and Patrol Office		○
Construction of new Marine Surveillance Office and Patrol Office	○	
Construction works for incidental facilities (excluding: fuel piping)	○	
Construction works for fuel piping		○ (Private company)
Procurement/provision of equipment/machinery	○	

3-1-4 Construction Supervision

In this Project, in accordance with implementation procedures for Grant Aid Scheme of Japan, Japanese consultant will conclude contract on design execution and surveillance over construction works with Pohnpei Port Authority (PPA), which acts as implementing institution of Federated States of Micronesia, and after obtaining approval by the Government of Japan will execute the duties specified. In general, works by consultant will include the following:

(1) Design Works for Implementation

The consultant, on the basis of the results of this Basic Design Study, and also on the basis of the Exchange of Notes (E/N) will execute detailed design, prepare drawings and technical specifications that are necessary for calculations by participants of the tender on construction works and procurement of equipment. Consultant organization will also execute detailed investigation on calculation of working expenditures.

(2) Tender-Related Works

Consultant organization will discuss with the implementing institution of Micronesia the issue of selection of participants for the tender and of tender conducting methods, and will conduct the tender for and on behalf of the implementing institution. Tender-related works will include the following.

- Public notification about the tender
- Preliminary examination of applicants' qualifications
- Holding of explanatory meeting on tender documents
- Surveillance over tender procedures
- Examination of the results of tender

(3) Construction Works Administration

Consultant organization will execute administration concerning the following: whether or not construction works are executed properly; whether or not construction process is progressing according to the schedule; whether or not the equipment supplied are meeting stipulations of technical specifications, etc.

Through the construction period, consultant organization will appoint 1 engineer (professional rating: category 3, approximately) as its local representative, who will be residing at the site. Such representative will administer construction process and its quality, keep communication with participating institutions, when it is necessary, and execute explanations.

Besides, when it is necessary, professional engineers will be dispatched to the site during building construction works, constructions works for incidental facilities, and installation/erecting of equipment/machinery. When it is necessary, on spot visits will be made for performance testing and inspection of the equipment provided, and most efforts will be made for securing products' quality.

3-1-5 Procurement Plan

(1) Construction Equipment and Materials

Those materials for use in construction under the Project, which may be supplied from sources in Micronesia, shall be procured through local supplies. Sand, gravel, concrete blocks, wood building materials, cement, etc. may be supplied from sources within Micronesia; other equipment and materials will be procured, basically, from Japan.

Procurements from local sources:	Materials for landfill works, stone, cement, coarse/fine aggregate for concrete, wood building materials, fuel, lubricants
Procurements from Japan:	Reinforcing steel bars for concrete, constructional shaped steel materials, steel plate, equipment for buildings, other materials for interior/exterior finish works, rubber-made fenders, tie-rods, sand-protective sheets, form work materials, equipment for Tuna Transshipment Building, electrical equipment.

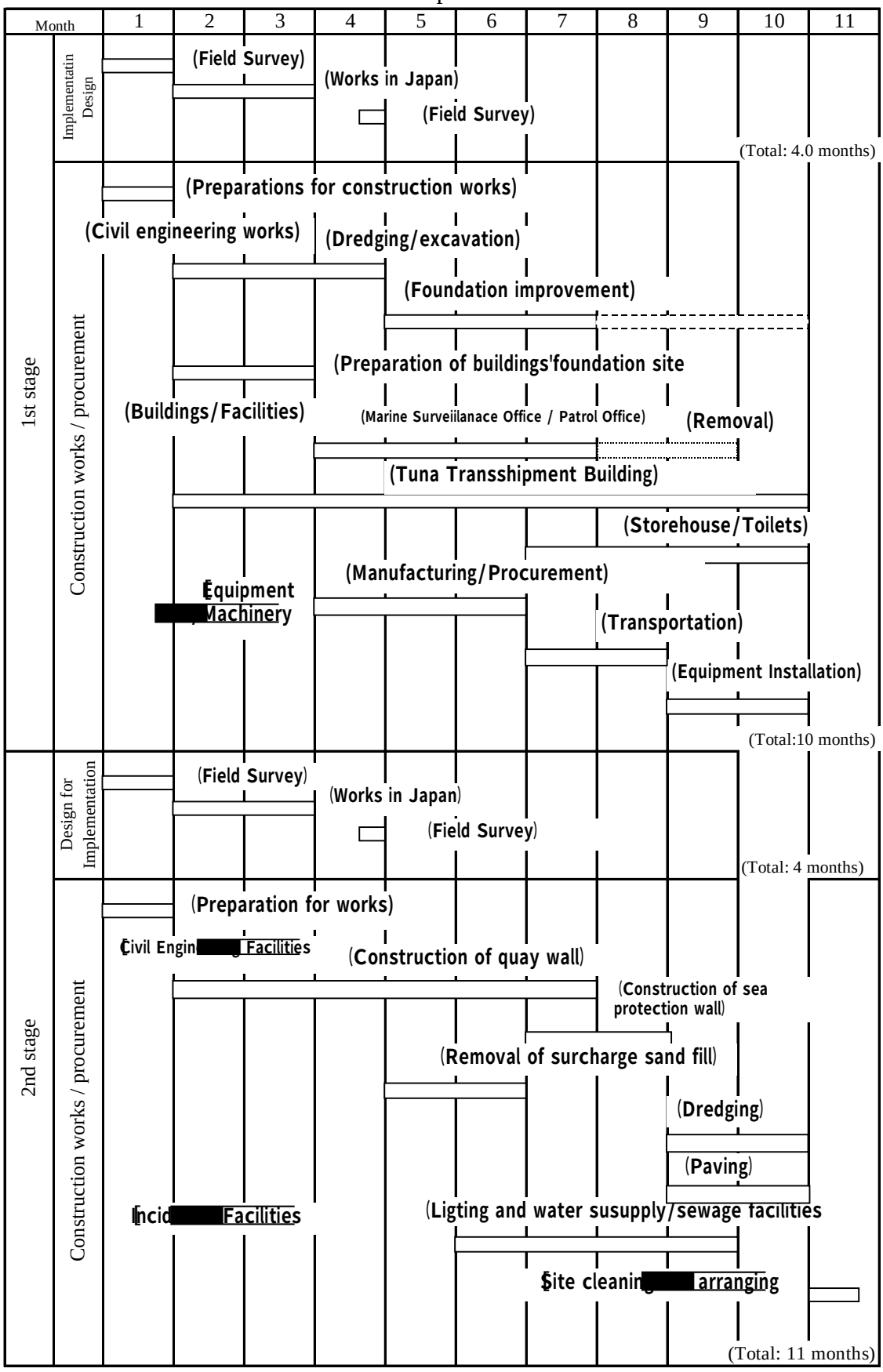
(2) Equipment/Machinery

Belt conveyors for Tuna Transshipment Building, pan scales, band-fastening devices, ice transportation containers, fork-lifts, public address system, VHF wireless radio devices for on-site communication, and other equipment / machinery will be completely procured from Japan.

3-1-6 Implementation Schedule

Implementation process referring to responsibilities of Japanese side under this Project is specified in Table 3.1.2.

Table 3.1.2 Implementation Schedule



3-1-7 Undertakings of the Government of Micronesia

It is envisaged that in case this Project is implemented according to Grant Aid System of Japan, the Government of Federated States of Micronesia will execute the following measures.

(1) Reservation of predetermined area for construction, landscape/planting works and other land improvement works after accomplishment of construction works.
(2) Obtaining of all necessary licenses/permissions for facilities' construction works.
(3) Conclusion of interbank agreement with bank located within Japan.
(4) Unshipping of imported equipment and materials onto Micronesian territory, paying custom/port clearance fees, prompt transportation within the country, tax-exemption measures
(5) Exemption of custom duties/tariffs, domestic taxes (including VAT), and of other charges/levies towards the Japanese citizens who enter the Federated States of Micronesia in order to purchase equipment and for execution of works on the basis of verified contracts.
(6) Obtaining permissions for entry and stay into Micronesia for Japanese citizens who enter the Federated States of Micronesia on the basis of verified contracts for execution of works.
(7) Proper and effective usage of facilities and equipment provided through Japanese grant aid.
(8) Undertaking the burden of all necessary expenditures for implementation of this Project outside the scope of Japanese grant aid.

3-2 Operation and Maintenance Plan

Maintenance and control of the facilities planned under this Project will be in charge of the Facility Construction Department of PPA, on the basis of the existing system. The calculation of a yearly maintenance and control expenditure for these facilities is specified in Table 3.2.1.

- Fishing Port civil engineering facilities, building and constructions, incidental facilities: under control and administration by the PPA Facility Construction Department
- Tuna Transshipment Building: a commissioned agency under PPA
- Provided equipment and materials: Management of the equipment and materials provided for the Tuna Transshipment Building (belt conveyors – 6 sets; weighing scales – 2 sets; roller conveyors – 4 sets; banding machine – 2 sets; and chilled water tank for washing – 1 unit) will be commissioned to an agency by PPA.
  Management of the equipment and materials provided for ice transportation (diesel 3 t forklift – 1 unit; ice transportation containers – 2 boxes; and ice loading chute – 1 set) will be commissioned to PFC by PPA. Equipment for local communication in the Port (public address system –1 set, VHF wireless devices – 5 units) will be placed in direct control of PPA.

Table3.2.1 Financial Plan of Operation and Maintenance

(Unit：US$1,000)

Income		Expenditure	
Item	Amount	Item	Amount
Port Charge	20.5	Personnel Expenses	170.1
Wharfage	128.8	Water Charge	16.0
Line Handling Charge	81.8	Fuel Charge	2.0
Navigation Aids Charge	16.4	Electricity Charge	22.2
Tuna Handling Charge	340.1	Maintenance Cost	
Income from Water selling	42.9	Buildings	20.0
Income from Ice Selling	9.4	Port Facilities	70.0
Storage Fee	11.4	Equipment	30.0
Miscellaneous	0	Depreciation Cost	280.0
		Miscellaneous	0
Total Income	651.3	Total Expenditure	610.3

In the above noted balance sheet, the income from the Tuna Transshipment Building, ice transportation equipment, and Storehouse rent charges (that constitute approximately 62%

of income) was evaluated with underestimation, in order to inflict no pressure on the financial management of the PPA, EDA and PFC (conditions for underestimation: 70% of the estimated amount of demand). However, even under such evaluation, the expenditure required for maintenance and control of the new facilities of the Fishing Port was deemed a feasible burden. The breakdown and explanation of each item of the estimate is as follows.

1) Port Charges

Number of ship calls 818 vessels/year × harbor charge (for vessels of 1,000 GRT or less) $25 = $20,450.-

2) Wharfages

818 vessels/year × 4.5 days/vessel × Wharfage (for vessel of 100ft or less) $25 = $20,450.-

3) Line Handling Charges

818 vessels/year × $100/vessels = $81,800.-

4) Navigation Aids Charges

818 vessels/year × $20/call = $16,360.-

5) Tuna Handling Charges

Tuna handling amount = 818 vessels/year × 3 t/vessel = 2,454 t/year
Current handling unit price (on the basis of EDA record of 1997) = $474,265 (200 t/month × 12 months) = $198/t
0.7 {2,454 t/year × $198/t} = $340,124.-

6) Water Selling Income

Amount of water supply to vessels = 818 vessels/year × 3 tm^3/vessel = 2,454 m^3/year
0.7 {2,454 t/year × $25/t} = $42,945.-

7) Ice Selling Income

Amount of ice supply to vessels = 818 vessels/year × 5 t/vessel = 4,090 t/year
0.7 {4,090 t/year × $3.30/t} = $9,448.-

8) Storehouse Rent Fees

Rent unit price = Storehouse and office building construction cost / number of years of service life / total area / coefficient of utilization = $393,000/25 years/ 220 m^2/ 0.7 = $102/$m^2$/year

Storehouse area × coefficient of utilization × rent unit price = 160m^2 × 0.7 × $102/$m^2$ = $11,424.-

9) Labor Cost

Tuna Transshipment Building workers 16 persons × 2 working gangs × 200 days/year × $14/day = $145,600.-/year
Office clerks 4 persons × 250 days/year × $24.5/day = $24,500.-/year

$145,600 + $24,500 = $170,100.-

10) Water Charges

Yearly amount of water usage = Tuna Transshipment Building 4,800m^3 + fishing vessels 2,454 m^3 + toilets etc. 1,648 m^3 = 8,902 m^3
8,902 m^3 / 3,79 × $1.80/gallon = $16.024.-

11) Fuel Charges

Yearly amount of fuel consumption = cargo handling machines 6,0001 + power generating machines 2,0001 = 8,0001
8,001 × $0.25/1 = $2,000.-

12) Electricity Charges

Yearly amount of electric power consumption = air conditioning and water cooling 87,600 kWh + lighting 39,450 kWh + others 11,390 kWh = 138,440 kWh
138,440 kWh × $0.16/kwh = $22,150.-

13) Maintenance and Control Expenditure for Building Facilities

Building facilities construction cost $2,000,000 × 1% = $20,000.-

14) Port and Harbor Civil Engineering Facilities Maintenance Cost

Port and harbor civil engineering facilities cost $7,000,000 × 1% = $70,000.-

15) Equipment and Materials Maintenance Cost

Equipment and materials procurement cost $600,000 × 5% = $30,000.-

16) Depreciation Expenses

Number of years of facilities' service life: civil engineering facilities = 50 years; building facilities = 25 years; equipment and materials = 10 years
$7,000,000 × 2%/year + $2,000,000 × 4%/year + $600,000 × 10% = $280,000.-

CHAPTER 4 PROJECT EVALUATION AND RECOMMENDATION

4-1 Project Effect

4-1-1 Project Effect

The implementation of this Project will result in following positive effects.

(1) Direct Effects

1-1) Improvement of the Longline Fishing Vessels Port Operation Efficiency

At present, though the Takatik Fishing Port has the quay wall only of 67m, the fishing vessels are compelled to surrender their berthing places to the big tanker that enters the port once in two weeks. Therefore, long line fishing vessels suffer limitations on entering the Port and on mooring operations, causing major obstacles for unloading of fresh tuna catch.

Under this Project, the existing 53 m berth for patrol boats adjoining the 67m quay of the Fishing Port will be functionally converted into the catch unloading quay for longline fishing vessels, and the quay wall for fishing vessels will be newly extended by 100 m. Consequently, the existing problems with tuna catch unloading, when waiting for unloading often takes from half a day to a day and a half, will be completely resolved. Further, the quay under the Project will be functionally operated being divided into the catch unloading zone, and fishing preparations / rest zone, resulting in improvement of fishing preparation time performance.

1-2) Alleviation of Congestion within the Port, and Improvement of Vessels' Traffic Safety

At present, the commercial quay of the Takatik Port represents the continuation of the fishing vessels' quay. The two quays have the length of 214 and 67m, respectively. However, because of the deficit of the fishing vessel's quay, many vessels are moored to the commercial quay, and they are compelled to leave temporary their berths and to stay at anchorage when a commercial ship enters the Port. Also, the fishing vessels moored to the fishing quay practice multiple mooring, occupying essential portion of the water within the Port, and creating

obstructions for the commercial ships that enter or leave the Port.

Due to this Project, mooring by the fishing vessels to the commercial quay will be practically eliminated; fishing vessels moored to the new fishing quay will be located beyond the waters used by commercial ships entering and leaving the Port. Therefore, the safety of ships' traffic within the Port will be significantly improved.

1-3) Fish Catch Freshness Increase

Tuna Transshipment Building will be deployed between the Cold Storage Building (constructed through the Japan Grant Aid for Marine Industries in FY 1984) and the catch unloading quay, so that fresh tuna unloading from the fishing vessels, that was so far sorted, weighed and packed off-doors, will be processed within the Tuna Transshipment Building, equipped with air-conditioning, in the following order: washing, sorting, weighing and packing. The catch will be kept until the cargo flight in the existing cold storage facility. Thereby, exports of clean tuna fish of enhanced freshness will become possible, with higher efficiency than so far.

(2) Indirect Effects

The Pohnpei State Government positions the effective usage of marine industries' resources to their maximum limits as the core for economic development. It invests not only the fish catching sector, but also transshipment and processing operations with use of land facilities, supply of fuel, foodstuffs, water etc. to the fishing vessels entering the Port. However, the workshop of the public corporation, which was established in order to promote air transportation of fresh tuna fish, to utilize disqualified tuna material efficiently, and to expand job opportunities, is not operating with profit, because of slow fish unloading and inefficient handling works. Also, the repercussion effect from these businesses on local economy is less than it was expected.

Improvement of the fishing quay and land facility environment due to this Project will contribute to the Micronesia fishing vessels' operation efficiency increase; increase of Port usage by foreign ships can be anticipated, and tuna exports increase may lead to increase in hard currency revenues, contributing thereby not only to Pohnpei State fishery industry, but also to the economic development of the State in general.

4-1-2 Verification of Propriety of the Project

The significance of the implementation of this Project through the Japanese Grant Aid is big, from the standpoints noted below. The Project can be assessed as having sufficient adequacy.

(1) As specified above, the Project will produce a broad direct positive effect upon many fields: people and organizations engaged in business of longline tuna fishing vessels under the Micronesian flag; users of the Commercial port; users of passenger ships etc. The indirect positive effect of the Project will include the economic development of the State in general.

(2) In the 5-year Program of National Development, the Federal Government of Micronesia assigned to the fishery industry the role of the most important locomotive industry for national development, and is executing measures for its promotion. The Government of Pohnpei State also set the objective of fishery industry development in the Complex Economic Development Program. The Project under consideration represents the plan of works for promotion of fishery industry, which constitutes the core of national development in the Federated States of Micronesia, and fully complies with the objectives of fishery development proclaimed by Pohnpei State.

(3) A positive promise was obtained concerning budgeting the share of works in responsibility of the Federated States of Micronesia; the system for implementation of the Project is sufficiently prepared from the standpoint of personnel, technological level, and funds.

(4) The site of the Project is located within the territory of the Port owned by Pohnpei Port Authority (PPA), the implementation institution of the Project. No problems concerning the evacuation of local population will occur on the projected site. During the Project execution, drainage and landfill works (amount of approximately 36,000 cubic meters) will be carried out for construction of the Fishing Port quaywall, and the permission for such works is already obtained by PPA from the Environmental Protection Authority (EPA), so no environment-related problems are anticipated.

The Project under consideration is projected for implementation with use of Grant Aid by Japan; therefore, the objectives of the Project, its beneficiaries, frameworks, working period, and the scope of the counterpart Government’s responsibilities were thoroughly checked for compliance with the Japanese System of Grant Aid, and deemed sufficiently

appropriate.

4-2 Technical Cooperation, Collaboration with Other Donors

(1) Technical Cooperation

Dispatching of following experts is suggested for improvement of management, control, and systematic aspects in the Takatik Fishing Port.

1-1) As it is specified in the Tasks noted below, together with the improvement of the Takatik Fishing Port it is important to utilize it efficiently, and to create there the fishing port environment that will be attractive for foreign fishing vessels. However, PPA does not possess experts in such activities. Therefore, it is suggested to dispatch a Japanese expert in port and harbor control to the Pohnpei Port Authority, for 1 year, in order to render assistance in urgent establishment of new management and control system.

1-2) In addition to the mentioned above, the establishment of a new entity is necessary in order to succeed in administration and management of the existing Cold Storage Facilities and newly constructed Tuna Transshipment Building. The existing cold storage facility is administered and managed by EDA, but, for the reason of the financial deficit in management, the State Government plans to put and end to the monopolistic management rights of the said organization, and to reallocate it to an entity capable of better management. For management and administration, it is suggested to dispatch to such newly established company one (1) Japanese expert, who can support this organization with economic and technological know-how and proficiency in marine product distribution and marine product processing, for the period of 1 year.

(2) Collaboration with Other Donors

At present, there are no plans by other donors concerning direct assistance to the Takatik Fishing Port improvement.

4-3 Recommendation

(1) Establishment of the Fishing Port Department in PPA

The length of the existing quay wall for longline tuna fishing vessels is only 67m; rules and requirements designed for the commercial port are applied as they are to the management and control of the Fishing Port activities. Under this Project, the total length of the Fishing Port berths will be extended to 220 m. Consequently, because differentiated approach is required towards management in the Fishing Port and in the Commercial Port, it is suggested to newly establish the Fishing Port Department in the PPA structure. Such Fishing Port Department will exercise control over the Fishing Port on the basis of new management and system regulations, for efficient usage of the Fishing Port facilities and smooth operation of the Fishing Port.

New management and system regulations established for the Fishing Port will concern the following:

1) Together with establishing new regulations for the Fishing Port berths' usage, new tariff system for fishing vessels will be set.
2) Enforcement of different inspections of fishing vessels entering and leaving the Port.
3) Coordination with the related authorities for speedy procedures concerning the fishing vessels entering and leaving the Port.
4) Control of quay berths' allowances, berth transfer after the accomplishment of cargo handling, and ships' traffic safety within the Port.
5) Laying down report regulations concerning fish catch unloading amount, amount of supply loading, etc., and enforcement of checking the situation by monitors.
6) Accumulation of data on fishing vessels, berths' occupancy ratio, cargo amount, cargo handling efficiency, etc. data analysis and control.
7) Improvement of service operations and rationalization of personnel allocation
8) Others

(2) Establishment of the New Structure to Administer New Tuna Transshipment Facility and Existing Cold Storage Facility

This Fishing Port incorporates a Cold Storage Facility, which was built in 1984 through the Japanese Grant Aid and which has been sufficiently maintained thereafter. However, the situation with financial management is extremely difficult there. Under this Project, for keeping tuna fish fresh and for hygienic improvement, a new building of the Tuna Transshipment Facility will be constructed in front of this Cold Storage Facility.

The existing Cold Storage Facility is owned and controlled by the EDA of the Pohnpei State; the new Tuna Transshipment Building will be owned by PPA, and it is projected that it will be operated by the third party on the basis of the contract reached with PPA.

The purpose of building the Tuna Transshipment Facility near the Cold Storage Facility is to perform handling of export-oriented tuna economically and efficiently. Therefore, the new Tuna Transshipment Facility and the existing Cold Storage Facility must be administered according to the same guidelines. Further, in order to provide the users with good services at cheap prices, and to efficiently keep the tuna fresh, it is necessary to establish a new administering body, the leader of which must be the manager well acquainted with commercial administration.

Therefore, the following is suggested. Firstly PPA, EDA and private companies establish a new company through equivalent equity participation. Then, the new company borrows the utilization rights on Cold Storage Facility and Tuna Transshipment Building from EDA and PPA. Finally, the new company starts administering the Cold Storage Facility and Tuna Transshipment Building.

(3) Demolition of the Quay Apron Fence

The territory behind the quay of the Takatik Port is leased by three companies, namely, Caroline Fishing Company (CFC), Federal Shipping Company (FSCO), and Economic Development Agency (EDA). Consequently, the zones used by different companies are separated by the fences that are located not only on the rear land portion, but also stretch up to the quay apron, causing inconvenience and being one of the reasons of Port operations' non-efficiency.

The total length of the Takatik Port quay is 337 m. To use effectively such limited space, and for sake of quay apron usage convenience, it is necessary to demolish

such fencing from the quay apron. This will add flexibility to allocation of berths for vessels and the quay, as a whole will be used at maximum capacity. Further, fence demolition will make net handling operations more convenient, and the traffic flow within the Port will become extremely smooth.

(4) Outfitting Oil Tanker Load Discharge Place in the Commercial Port

At present, the load discharge place for the tanker is located on the EDA (Fishing Port) site, near the border with FSCO (Commercial Port). Normally, the tanker calls the Port once a fortnight, and stays moored for 2 days at average. Therefore, the fishing vessels cannot use the unloading quay in front of EDA in such days, even if Commercial Port quay is vacant.

It may be acknowledged as normal that the tanker is assigned the priority rights on quay usage in comparison with fishing vessels, because its demurrage is extremely high. However, when the Fishing Port is congested, and the Commercial Port is empty, discharge of the oil tanker's load must be executed at the Commercial Port quay. However, because no oil discharge place is arranged at the Commercial Port quay, such type of operation is impossible at present.

An additional oil discharge place can be easily outfitted just by extending several pipes from the existing oil discharge place. On the other hand, speedy transshipment of tuna for exports is extremely important for the fishing vessels. Therefore, we suggest outfitting an additional oil discharge place in approximately 50 m to the North from the existing one, on the apron of the Commercial Port. Thereby, the tanker will be able to discharge the oil without creating obstructions at the Fishing Port quay, in days when Commercial Port quay is vacant, and the fishing vessels will be able to execute tuna catch unloading at the same time.

APPENDICES

I. Member List of the Study Team

I-1 Basic Design Study

(1)	Team Leader	Sadamitsu AKEDA Chief, System Analysis Section, Aqua Culture and Fishing Port Engineering Division, National Research Institute of Fisheries Engineering, Fisheries Agency
(2)	Project Coordinator	Toru SHIMODA Fourth Project Management Division, Grant Aid Management Department, Japan International Cooperation Agency
(3)	Chief Consultant/ Marine Engineering	Nobuaki NAGAO Pacific Consultants International
(4)	Civil Structure Planning	Masaaki GOSHIMA Pacific Consultants International
(5)	Fishery Resources and Marketing Planning	Osamu NARASAKI Pacific Consultants International
(6)	Fishery Facility Planning	Ryohei KAWANISHI Pacific Consultants International
(7)	Natural Condition Survey	Mitsuhiko HASEGAWA Pacific Consultants International
(8)	Construction Planning/ Cost Estimation	Masaki NIMIYA Pacific Consultants International

I-2 Draft Basic Design Explanation

(1)	Team Leader	Toshiyuki EZUKA Director, Fourth Project Management Division Grant Aid management Department, Japan International Cooperation Agency
(2)	Technical Advisor	Sadamitsu AKEDA Chief, System Analysis Section, Aqua Culture and Fishing Port Engineering Division, National Research Institute of Fisheries Engineering, Fisheries Agency
(3)	Project Coordinator	Ryutaro MUROTANI Fourth Project Management Division, Grant Aid Management Department, Japan International Cooperation Agency
(4)	Chief Consultant/ Marine Engineering	Nobuaki NAGAO Pacific Consultants International
(5)	Fishery Resources and Marketing Planning	Osamu NARASAKI Pacific Consultants International

II. Schedule of the Basic Design Study

II-1 Basic Design Study

July 28～29	Consultants Team's trip from Tokyo to Pohnpei
July 29	Courtesy visit to the Government of Federal States of Micronesia and Embassy of Japan at Kolonia
July 30	Meeting with Pohnpei Port Authority (PPA)
July 31	Site Investigation
July 30～August 1	Survey of Tidal Current; data and information Collection
August 2～4	Investigation of existing port facilities; data and information Collection
August 4～5	Akeda and Shimoda's trip from Tokyo to Pohnpei
August 6	Akeda, Shimoda and Nago have courtesy visit to Embassy of Japan at Kolonia, the Government of Federal States of Micronesia, the Government of Pohnpei State and PPA
August 5	Collection of subsoil conditions information; visit and hearing in the fisheries companies
August 6～8	Sediment sampling; tide observation; analysis of collected information
August 9～14	Meeting with PPA; investigation on weather and maritime conditions
August 12	Signing of Minutes of Discussion
August 12～13	Akeda and Shimoda's trip from Pohnpei to Tokyo, return to Japan
August 14～16	Investigations on implementation scheme of the Project, ability of management/operation and organization of maintenance
August 17	Meeting with PPA, confirmation on the undertaking of the Government of Micronesia
August 18	Nagao and Goshima visit to Embassy of Japan and report the result of the Study; have greeting to PPA
August 18～19	Move from Pohnpei to Chuk; site investigation of a fishing port constructed by Japan's Grant Aid
August 19～20	Trip from Chuk to Tokyo, return to Japan
August 17～25	Natural Condition Surveyor inspects the entrusted

	works of subsoil conditions survey
August 26～27	Natural Condition Surveyor's trip from Pohnpei to Tokyo, return to Japan

II-2 Draft Basic Design Explanation

October 19	Trip from Tokyo to Pohnpei
October 20	Courtesy visit to the Government of Federal States of Micronesia and Embassy of Japan at Kolonia
October 21	Meeting with PPA; courtesy visit to the Government of Pohnpei State
October 22	Meeting with the Board of PPA; Luncheon by PPA
October 23	Site investigation of a fishing port constructed by Japan's Grant Aid
October 24	Meeting of Study Team
October 25	Meeting with PPA
October 26	Signing of Minutes of Discussion; report the result of the Study to Embassy of Japan at Kolonia
October 27	Move from Pohnpei to Tokyo, return to Japan

III. List of Party Concerned in the Recipient Country

1. Department of Foreign Affairs, Federal States of Micronesia

Lorin Robert	Assistant Secretary
Jesse B. Marehalau	Ambassador, Embassy of the Federated States of Micronesia in Japan
Larry Raigetal	Deputy Assistant Secretary, Asian Affairs
Matt Maradol	

2. Pohnpei State Government

Del S. Pangelinan	Governor
Dan E. Perin	Economic Advisor
Michael Batty	Fisheries Advisor
James Movick	Advisor to Pohnpei State Government (Chairman at State Fisheries Policy Committee)

3. Pohnpei Port Authority（PPA）

Akillino H. Susaia	General Manager
Nelperson Etse	Seaport Manager（Basic Design Study）
Paul James	Seaport Manager （Draft Basic Design Explanation）
Danilo V. Dumantay	Comptroller
Zorro D. Donre	Assistant Seaport Manager
Daniel Isaac	Chief of Facility and Construction

4. Board of Pohnpei Port Authority

William Hawley	Chairman of the Board of PPA
Higinio Iniarte	Vice Chairman of the Board of PPA
John Sonden	Member of the Board
Sado Martin	Member of the Board

5. Economic Development Authority, Federal States of Micronesia

Ferdinando Pelep	Assistant Manager

6. Environmental Protection Agency, Federal States of Micronesia

Elden Hellan	Executive Officer, Pohnpei
Donna Scheuring	Consultant

IV. Minutes of Discussion

MINUTES OF DISCUSSIONS
ON THE BASIC DESIGN STUDY
ON THE PROJECT FOR IMPROVEMENT
OF TAKATIK FISHING PORT IN POHHNPEI STATE
IN THE FEDERATED STATES OF MICRONESIA

In response to a request from the Government of the Federated States of Micronesia(hereinafter referred to as "FSM"), the Government of Japan decided to conduct a Basic Design Study on the Project for Improvement of Takatik Fishing Port in Pohnpei State (hereinafter referred to as "the Project") and entrusted the study to the Japan International Cooperation Agency (hereinafter referred to as "JICA").

JICA sent to the Federated States of Micronesia the Basic Design Study Team (hereinafter referred to as "the Team"), which is headed by Sadamitsu Akeda, Head, System Analysis Section, Aquaculture and Fishing Port Engineering Division, National Research Institute of Fisheries Engineering, Fisheries Agency and is scheduled to stay in the country from August 5, 1999 to August 12, 1999.

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

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

Pohnpei, August 12, 1999

Mr. Sadamitsu Akeda
Leader
Basic Design Study Team
Japan International Cooperation Agency

Mr. Lorin Robert
Assistant Secretary
Department of Foreign Affairs
The Federated States of Micronesia

Mr. Akillino H. Susaia
General Manager
Pohnpei Port Authority

ATTACHMENT

1. Objective of the Project

The objective of the Project is to improve fishing activities at the Takatik Fishing Port through solving the current congestion faced by commercial fishing vessels.

2. Project Site

The project site is next to the existing port, shown in ANNEX-1.

3. Responsible and Implementing Agency

The Federated States of Micronesia is the Responsible Government. Pohnpei State Government through Pohnpei Port Authority is the Implementing Agency of the Project.

4. Items to be considered in the Project

After discussions with the Team, the items described in ANNEX-2 are considered as components subject to the study by the Team.

5. Japan's Grant Aid System

1) The Micronesian side understands the Japan's Grant Aid Scheme explained by the Team, as described in ANNEX-3.

2) The Micronesian side will take the necessary measures, as described in ANNEX-4, for smooth implementation of the Project, as a condition for the Japanese Grant Aid to be implemented.

6. Further Schedule of the Study

1) The consultants will proceed to further studies in Micronesia until August 19, 1999.

2) JICA will prepare the draft report in English and dispatch a mission in order to explain its contents around October, 1999.

3) In case that the contents of the report are accepted in principle by the Micronesian side, JICA will complete the final report and send it to the Government of FSM around February, 2000.

7. Other Relevant Issues

1) The Government of FSM will keep ownership of the facilities of the Project. However management of the Project facilities will be carried out by Pohnpei State Government through Pohnpei Port Authority.

2) Pohnpei Port Authority will represent the Micronesian side as the Implementing Agency of the Project and it will be responsible for coordination among other relevant agencies.

3) The Team will consider three options in regard to the design of quay wall. Pohnpei Port Authority expressed their preference for the straight line quay wall rather than rectangular shaped one as requested.

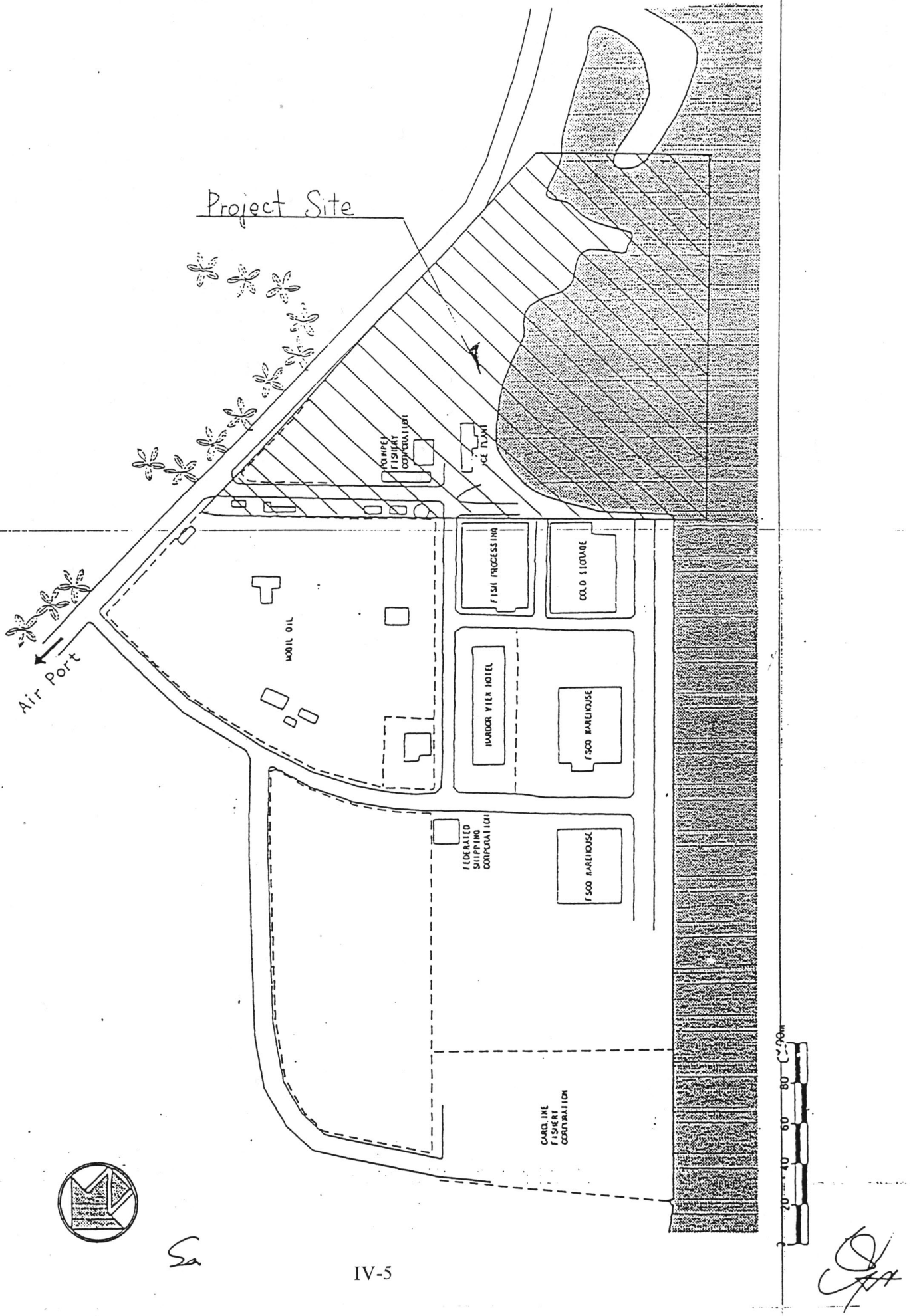
4) An environmental assessment will be required for the dredging and land-filling of the Project. Pohnpei Port Authority will carry out the Initial Assessment required by Pohnpei Environmental Impact Assessment Regulations and receive comments on it from the Pohnpei Environmental Protection Agency before the Exchange of Notes are signed by the both governments.

5) The Project may be divided into two phases according to the sub-soil condition and/or the construction schedule. In case that the reclaimed land has a possibility of settlement due to the poor sub-soil condition, a period technically necessary to avoid damages to the facilities will be allowed in between the two phases.

6) In case that the facilities of the Project become subject to privatization, their ownership must be kept by the Federated States of Micronesia Government and their functions must remain public. Before any procedure of their privatization, the Government of FSM is required to consult with the Embassy of Japan in this matter.

7) Pohnpei Port Authority is responsible for the recovery of the jetty currently used for small scale boats when its demolition becomes necessary for the Project.

ANNEX-1 PROJECT SITE



ANNEX-2 ITEMS TO BE CONSIDERED IN THE PROJECT

1. Quay Wall for Fishing and Surveillance Vessels
2. Apron Concrete Pavement
3. Tuna Transshipment Building
4. Fishing Gear Storage House
5. Ice Transportation Line
6. Fuel Line
7. Water Line
8. Access Road
9. Yard Area and Parking
10. Yard Lighting
11. Dredging and Reclamation

Details of the above components will be determined in the course of the analysis of the Project by the Team and provision of the items are still subject to change.

ANNEX-3 JAPAN'S GRANT AID SYSTEM

1. Grant Aid Procedures

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

Application (Request made by a recipient country)
Study (Basic Design Study conducted by JICA)
Appraisal & Approval (Appraisal by the Government of Japan and Approval by the Japanese Cabinet)
Determination of Implementation (The Notes exchanged between the Governments of Japan and the recipient country)

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

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

Thirdly, the Government of Japan appraises the project so as to see whether or not it is suitable for the Grant Aid, basing on the Basic Design Study report prepared by JICA, and then it is submitted to the Cabinet for approval.

Fourthly, once the project is approved by the Cabinet, its implementation is officially determined by signing the Exchange of Notes between the Governments of Japan and of the recipient country.

Finally, in the course of implementation of the project, JICA will take charge of expediting the execution of the project by assisting the recipient country in such matters as preparing tenders, contracts and so on.

2. Basic Design Study

1) Contents of the Study

The aim of the Basic Design Study, conducted by JICA on the requested project, is to provide basic documents necessary for the appraisal of the project by the Government of Japan. The contents of the study are as follows:

a) to confirm the background, objectives and benefits of the project and also institutional capacity of the agencies concerned of the recipient country necessary for the project implementation;

b) to evaluate the appropriateness of the project from the technical, social and economic points of view;
c) to confirm items agreed on by both parties concerning the basic concept of the project;
d) to prepare a basic design of the project; and,
e) to estimate costs of the project.

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

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

2) Selection of Consultants

For the smooth implementation of the study, JICA selects a consultant among those who registered at JICA by evaluating competitive proposals submitted by those consultants. The selected consultant carries out the Basic Design Study and prepares a report based on the terms of reference made by JICA.

At the beginning of the implementation, after the Exchange of Notes, JICA recommends the same consultant who participates in the Basic Design Study to the recipient country for the services of Detailed Design and construction supervision of the project in order to maintain the technical consistency between the Basic Design and the Detailed Design.

3. Japan's Grant Aid Scheme

1) What is the Grant Aid?

The Grant Aid Program provides a recipient country with non-reimbursable funds to procure the facilities, equipment and services (engineering services and transportation of the products, etc.) for economic and social development of the country under principles in accordance with the relevant laws and

regulations of Japan. Grant Aid is not supplied through the donation of materials as such.

2) Exchange of Notes (E/N)

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

3) Period

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

4) Purchase of Products and Services

Under the Grant Aid, in principle, Japanese products and services including transport or those of the recipient country are to be purchased. When the two Governments deem it necessary, the Grant Aid may be used for the purchase of the products or services of a third country. However, the prime contractors, namely consulting, contracting or procurement firms, are limited to "Japanese nationals". (The term "Japanese nationals" means persons of Japanese nationality or Japanese corporations controlled by persons of Japanese nationality.)

5) Necessity of Verification

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

6) Undertakings required to the Government of the recipient country

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

(i) to secure land necessary for the site of the project prior to commencement of the construction;

Sa.

(ii) to provide facilities for distribution of electricity, water supply and drainage and other incidental facilities outside the site;

(iii) to ensure tax exemption and to facilitate prompt execution for unloading, customs clearance at the ports of disembarkation and internal transportation of the products purchased under the Grant Aid;

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

(v) to accord Japanese nationals whose services may be required in connection with the supply of the products and services under the Verified Contracts, such as facilities as may be necessary for their entry into the recipient country and stay therein for the performance of their works.

7) Proper Use

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

8) Re-export

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

9) Banking Arrangement (B/A)

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

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

ANNEX-4 UNDERTAKINGS REQUIERED OF THE GOVERNMENT OF FSM

In addition to the undertakings mentioned in the section 3. 6) of ANNEX-3, following necessary measures shall be taken by the Government of FSM on condition that the Grant Aid by the Government of Japan is extended to the Project.

1. to remove all vessels in the project site by the commencement of the Project;

2. to acquire anchorage areas for fishing and surveillance vessels outside the project site during the Project;

3. to ensure fishing activities do not affect the construction during the Project;

4. to take necessary measures to maintain the supply of ice, water and fuel to fishing vessels during the construction of the Project;

5. to provide general furniture such as desks and tables necessary for the Project;

6. to construct necessary gates and fences in and around the site;

7. to secure a temporary construction yard during the construction of the Project;

8. to carry out the Initial Assessment required by Pohnpei Environmental Impact Assessment Regulations and to receive comments on it from the Pohnpei Environmental Protection Agency before the Exchange of Notes are signed by the both governments;

9. to bear commissions to a Japanese bank for its banking services based upon the Banking Arrangement, namely the advising commission of the "Authorization to Pay" and other payment commissions;

10. to provide necessary permissions, licenses and other authorizations for implementing the Project, if necessary; and,

11. to bear all the expenses, other than those to be borne by the Grant Aid, necessary for construction of the facilities.

Pohnpei Port Authority

P.O. Box 1150
Dekehtik Island, Pohnpei State
Federated States of Micronesia FM 96941
Phone: (691) 320-2793/2682　Fax: (691) 320-2798

Office of the General Manager

In order to improve and provide quality management and operation of the fisheries dock, the following equipment are needed for the new Harbor Patrol Office which will be constructed at the Fisheries Dock:

1. Computer	2 each
2. Printer	1 each
3. Software	
4. Golf Cart	1 each
5. PA System	1 each
6. VHF Radios	5 each

Justification:

a. Computers and Printers: These computers will be used to store/collect all data/statistics pertaining to the operation of the fisheries dock. These office equipment will facilitate processing of statistical data. PPA wants to computerize all of its port operations including the analysis of data. All statistics such as tuna catch per tonnage, ice, bunkering, vessel calls, etc. will be stored and computerized.

b. Golf Cart: This will enable the Harbor Patrol Officers to patrol the dock facilities from one end to the other end in a more timely and organized manner. Pohnpei rains a lot, so the cart will be very useful for the patrolling of the fisheries dock facilities.

c. Public Address (PA) System: This will enable the Harbor Patrol Officers to communicate to vessels shifting or making any movement or vessels waiting in line to get provisions.

d. VHF Radios: These radios will be used for patrolling on the dock premises to monitor incoming calls from any vessels and between the port control office and the harbor patrol officers.

e. Software: As mentioned in item (a), we prefer a working software similar to the PORTCAM, which we are now using for data analysis and processing. The software requested herein should be more user friendly and include updated features for data analysis, processing of billing statements and monitoring of vessels at the fisheries dock.

It is recommended that these equipment be incorporated into the foreign aid package so that the port control office proposed on top of the storage building can be successfully utilized. In order to provide safe and efficient operation of the fisheries dock, the equipment requested herein are needed and should be considered along with the other categories of the grant.

Respectfully submitted,

Akillino H. Susaia
General Manager

MINUTES OF DISCUSSIONS
ON THE BASIC DESIGN STUDY ON THE PROJECT FOR
IMPROVEMENT OF TAKATIK FISHING PORT IN POHNPEI STATE
IN THE FEDERATED STATES OF MICRONESIA
(EXPLANATION ON DRAFT REPORT)

In August 1999, the Japan International Cooperation Agency (hereinafter referred to as "JICA") dispatched a Basic Design Study Team on the Project for Improvement of Takatik Fishing Port in Pohnpei State (hereinafter referred to as "the Project") to the Federated States of Micronesia (hereinafter referred to as "FSM"), and through discussions, field surveys, and technical examination of the results in Japan, JICA prepared the draft report of the study.

In order to deliberate with the Government of FSM on the components of the draft report, JICA sent to FSM a Draft Report Explanation Team (hereinafter referred to as "the Draft Team"), which was headed by Toshiyuki Ezuka, Director, Fourth Project Management Division, Grant Aid Management Department, JICA and was scheduled to stay in the country from October 19, 1999 to October 27, 1999.

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

Pohnpei, October 26, 1999

Mr. Toshiyuki Ezuka
Leader,
Draft Report Explanation Team,
Japan International Cooperation Agency
(Japan)

Mr. Lorin Robert
Assistant Secretary
Department of Foreign Affairs
The Federated States of Micronesia

Mr. Akillino H. Susaia
General Manager
Pohnpei Port Authority

ATTACHMENT

1. Components of the draft report

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

2. Japan's Grant Aid System

The Micronesian side understands the Japan's Grant Aid Scheme and the necessary measures to be taken by the Government of FSM as described in ANNEX.

3. Further Schedule of the Study

JICA will complete the final report in accordance with the confirmed items and send it to the Government of FSM by March, 2000.

4. Other Relevant Issues

(1) The Micronesian side agreed to carry out the Initial Environmental Assessment required by Pohnpei Environmental Impact Assessment Regulations and to inform the comments on it from the Pohnpei Environmental Protection Agency to the Japanese side by the end of November, 1999.

(2) The Government of FSM agreed to inform the Japanese side by December, 1999 about the management and operation of the facilities which will be provided by the Project.

(3) In addition to the undertakings described in ANNEX, the following measures shall be undertaken by the Government of FSM on condition the Project is implemented:

a. to remove the power generation barge moored at the southern tip of the site to other place in order to enable mooring of patrol vessels after completion of the Project;

b. to remove existing Marine Surveillance Office and Patrol Office at their own responsibilities. New Marine Surveillance Office and Patrol Office will be constructed in the Project;

c. to remove all vessels in the project site by the commencement of the Project;

d. to acquire anchorage areas for fishing and surveillance vessels outside the project site during the Project;

e. to ensure fishing activities do not affect the construction during the Project;

f. to take necessary measures to maintain the supply of ice, water, and fuel to fishing vessels during the construction of the Project;

g. to provide general furniture such as desks and tables necessary for the Project;

h. to construct necessary gates and fences in and around the site; and,

i. to secure a temporary construction yard during the construction of the Project.

ANNEX

Japan's Grant Aid Scheme

1. Exchange of Notes (E/N)
The Japan's Grant Aid is extended in accordance with the Exchange of Notes by both Governments, in which the objectives of the Project, period of execution, conditions and amount of the Grant etc. are confirmed.

2. Period
"The period of the Grant Aid" means one Japanese fiscal year for which the Cabinet approves the Project. Within the fiscal year, all procedure such as Exchange of Notes, concluding a contract with (a) consulting firm(s) and (a) contractor(s) and a final payment to them must be completed.

3. Purchase of Products and Services
Under the Grant, in principle, products and services of origins of Japan or the recipient country are to be purchased.
When the two Governments deem it necessary, the Grant may be used for the purchase of products or services of a third country origin.
However the prime contractors, namely, consulting, contractor and procurement firms, are limited to "Japanese nationals". (The term "Japanese nationals" means Japanese physical persons or Japanese juridical persons controlled by Japanese physical persons.)

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

5. Undertakings required to the Government of the recipient country
In the implementation of the Grant Aid, the recipient country is required to undertake necessary measures such as the following:

a) to secure land necessary for the sites of the project and to clear and level the land prior to commencement of the construction work,

b) to provide facilities for distribution of electricity, water supply and drainage and other incidental facilities in and around the sites,

c) to secure buildings prior to the installation work in case the Project is providing equipment,

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

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

f) to accord Japanese nationals whose services may be required in connection with the supply of the products and services under the Verified Contracts, such facilities as may be necessary for their entry into the recipient country and stay therein for the performance of their work,

g) to bear commissions to a Japanese bank for its banking services based upon the Banking Arrangement, namely the advising commission of the "Authorization to Pay" and other payment commission,

h) to provide necessary permissions, licenses and other authorizations for implementing the Project, if necessary, and,

i) to bear all the expenses, other than those to be borne by the Grant Aid, necessary for construction of the facilities.

(7) Proper Use

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

(8) Re-export

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

(9) Banking Arrangement (B/A)

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

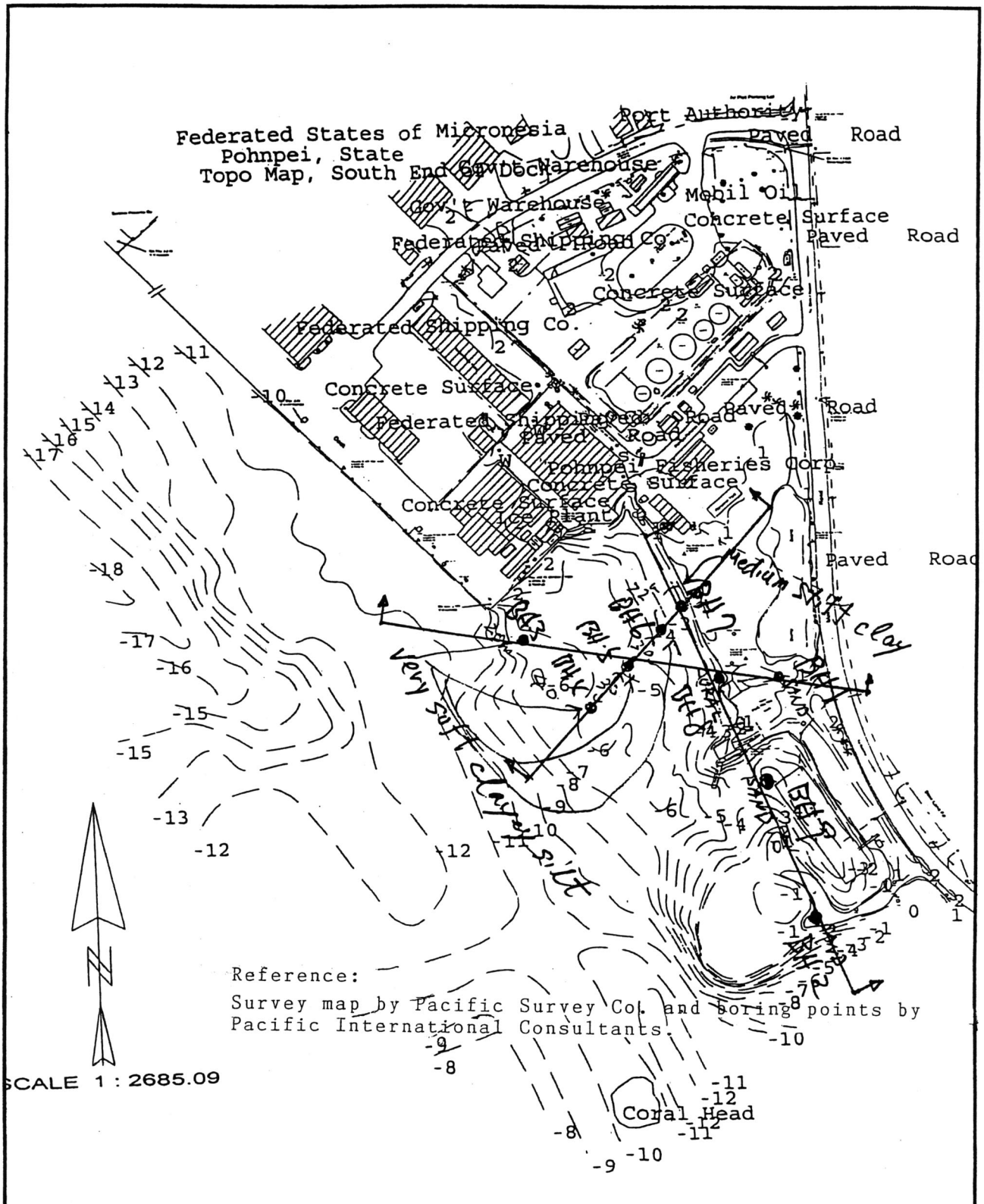
designated authority under the contracts verified.

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

V. Collected Information

No.	Name of material	Organization	Date	Form	Pages
1	Fisheries				
1. 1	Micronesian Maritime Authority 1996 Annual Report	MMA	1996	Original	
2	Technical Information				
2. 1	Report Soil Investigation Pohnpei Air Terminal Building	Geo-engineering & Testing, Inc.	9 Jan. 1986	Copy	30
2. 2	Field density Test Report, North dock extension, Takatik, Pohnpei	Geo-engineering & Testing, Inc.	16, Feb. 1994	Copy	1
2. 3	compressive test results on cylindrical conc. specimen	Geo-engineering & Testing, Inc.	9, Feb. 1994	Copy	1
2. 4	Labo. test report, Basalt coarse aggregate	Geo-engineering & Testing, Inc.	1-Oct-92	Copy	1
2. 5	Labo. test report, Base course material	Geo-engineering & Testing, Inc.	1-Oct-92	Copy	1
2. 6	Labo. test report, Fill Material	Geo-engineering & Testing, Inc.	1-Oct-92	Copy	1
2. 7	Labo. test report, Beach sand	Geo-engineering & Testing, Inc.	1-Oct-92	Copy	1
2. 8	Geophysical detection basement under runway in Pohnpei international airport	Keyan Zheng	Feb. 14, 1996	Copy	5
2. 9	(DWG)Topo Map, South end of dock, S=1/500	Pacific Survey Co.		Origaina l	1
2. 10	(DWG) Pohnpei International Airport layout Plan	Office of the Construction Management and Property Maintenance, Pohnpei State Government	4-6-'92	blue print	1
3	Port Statistics				
3. 1	Pohnpei Port Authority, Seaport Rules and Regulations	PPA	July 21,1995	Original	47
3. 2	Current information, Pohnpei	Port Guides Ltd.	1998	copy	1
3. 3	Power rates, Water rates			copy	1
3. 4	Port Operation data	PPA		FD	1
4	Natural Conditions				
4. 1	High and low water predictions for Pohnpei, May to Dec. 1999	Univ. of Hawaii, USA		Copy	8
4. 2	Preliminary Loacl Climatological data, Pohnpei Nov. 1997 to Apr. 1999	WSO Pohnpei, FSM		Copy	35
4. 3	Local Climatological Data, Annual Summary with comparative data, Pohnpei, 1995 to 1997	Dep. Of commerce, USA		copy	3
4. 4	World Tide 1997-1998, Tide prediction software, South Pacific			FD	1
4. 5	Local Climatological Data, Observations at 3-hourly intervals, July 1996-June 1999	Dep. Of commerce, USA		FD	3
5	Maps/Chart				
5. 1	Topo. map of the Island of Ponape (North Half), scale 1:25,000	Dept. of Interior, USA	1983	copy	1
5. 2	Admiralty chart 981, Senyavin Islands, Pohnpei Harbor	Admiralty, London	1997		1
6	Letter/Memorandum				
6.1	Pohnpei Runway, State-National leadership conference, November 9-10, 1998	signed by 5 delegations		copy	1
	Common Information				
1	A Guide to Pohnpei (in Japanese)	Embassy of japan	1998		
2	Federal States of Micronesia	Ministry of Foreign Affairs	1999		
3	Introduction of federal States of Micronesia	Embassy of Japan	1999		

VI. 土質条件調査結果



GEO-ENGINEERING & TESTING, INC.	BORING TEST LOCATION PLAN	PLATE
Geotechnical & Material Testing Engineers	TAKATIK FISHING PORT IMPROVEMENT	1
Job No. 464.01 Appr. [illegible] Date 12/03/99	Pohnpei FSM	

LABORATORY TESTS	BLOWS/FT. (BLOWS/30CM)	MOISTURE CONTENT (%)	DRY DENSITY	DEPTH (M)	SAMPLE SYMBOL	EQUIPMENT 9.84 cm Dia. ROTARY WASH ELEVATION DATE: 08/07/99
				0		GREY GRAVELLY SAND (SP) - medium dense, moist, with boulders @ .20 m (fill) water level at .75 m, 1:30 PM, 8/11/99
SA	9			2.5		DARK GREY BASALT BOULDERS (GP) - loose, moist (fill) DARK GREY SAND (SP) - loose, saturated, with some coral and shell fragments
	1					DARK GREY SILTY SAND (SM) - very loose, saturated, with coral finger and shell fragments
	1			5.0		
	1					
SA	3					
	1			7.5		GREY SILTY SANDY CORAL GRAVEL (GM) - very loose, saturated
	1					
	1/.45m			10.0		
	1/.45					
	1/.30m					GREY SILTY SAND (SM) - very loose, saturated, with some coral and shell fragments
	2			12.5		
SA	3					
	3			15.0		loose from 16 m.
	3					
	4					
	21			17.5		GREY SILTY SANDY CORAL GRAVEL (GM) - medium dense, saturated
	8					GREY SILTY SAND (SM) - loose, saturated, with some coral and shell fragments
SA	6			20.0		

GEO-ENGINEERING & TESTING, INC.
Geotechnical & Material Testing Engineers

Job No. 464.01 Appr. [illegible] Date 12/03/99

LOG OF BORING 1

TAKATIK FISHING PORT IMPROVEMENT

Pohnpei FSM

PLATE 2

EQUIPMENT 9.84 cm Dia. ROTARY WASH

ELEVATION - - DATE: 08/02/99

LABORATORY TESTS	BLOWS/FT. (BLOWS/30CM)	MOISTURE CONTENT (%)	DRY DENSITY (kg/m3)	DEPTH (M)	SAMPLE SYMBOL	
				0		GREY SILTY SANDY CORAL GRAVEL (GM) - medium dense, moist (fill)
						water level at .50 m, 8:15 AM, 8/16/99
						GREY CORAL BOULDERS (GP) - loose, moist
						saturated from .5 m.
	1			2.5		DARK GREY SILTY SANDY CORAL GRAVEL (GM) -
	3					very loose, saturated
	1					
				5.0		DARK GREY SANDY SILT (ML) - very soft,
SA	1	75.8	913			saturated, with some coral gravel
PI = 9						
LL = 41	1					
				7.5		
	1					
SA	1	64.4	977			
PI = 5						
LL = 36	1			10.0		DARK GREY SILTY FINE SAND (SM) - very loose,
						saturated, with some shell fragments
	1					
	1					
				12.5		
	1					
	1					
SA	1	66.9	977	15.0		
PI = 5						
LL = 35	1					
	1					
				17.5		
	1					
	9					DARK GREY SANDY SILT (ML) - stiff, saturated,
	2			20.0		with some coral gravel
						soft at 20 m.

GEO-ENGINEERING & TESTING, INC.
Geotechnical & Material Testing Engineers

Job No. 464.01 Appr. VJ Date 10/15/99

LOG OF BORING 2

TAKATIK FISHING PORT IMPROVEMENT

Pohnpei FSM

PLATE 3

LABORATORY TESTS	BLOWS/FT. (BLOWS/30CM)	MOISTURE CONTENT (%)	DRY DENSITY (kg/m3)	DEPTH (M)	SAMPLE SYMBOL	EQUIPMENT 9.84 cm Dia. ROTARY WASH ELEVATION -- DATE: 08/18/99
SA PI = 14 LL = 49	1	92.2	769	0		(Drilled from sea bottom at 6.80 m. deep) DARK GREY CLAYEY SILT (ML) - very soft, saturated
	1			2.5		
SA PI = 6 LL = 43 CONSOL	1	100	769	5.0		
	1			7.5		
SA PI = 5 LL = 29	3	43.3	1265	10.0		slightly sandy from 12 m.
	2			12.5		
	2					
SA PI = 6 LL = 26	3	37.3	1378	15.0		
	3					GREY SILTY FINE SAND (SM) - loose, saturated
	3			17.5		
	4					
				20.0		

GEO-ENGINEERING & TESTING, INC.
Geotechnical & Material Testing Engineers

Job No. 464.01 Appr. VJ Date 10/15/99

LOG OF BORING 3
TAKATIK FISHING PORT IMPROVEMENT
Pohnpei FSM

PLATE 4

EQUIPMENT 9.84 cm Dia. ROTARY WASH

ELEVATION -- DATE: 08/20/99

LABORATORY TESTS	BLOWS/FT. (BLOWS/30CM)	MOISTURE CONTENT (%)	DRY DENSITY (kg/m3)	DEPTH (M)	SAMPLE SYMBOL
	1/.45m			0	
	1				
	1				
	1			2.5	
SA PI = 9 LL = 40 UC = 18.2	1	58.1	737		
				5.0	
SA PI = 15 LL = 43 UC = 10.8	1	87.4	769		
				7.5	
SA PI = 13 LL = 44 UC = 4	1	74.1	817		
				10.0	
SA PI = 5 LL = 32 UC = 12.8 CONSOL	1	42.5	1346		
				12.5	
	3			15.0	
SA	2			17.5	
				20.0	

(Drilled from sea bottom at 6.50 m. deep)
DARK GREY CLAYEY SILT (ML) - very soft, saturated

with some coral and shell fragments from 3 m.

grey, gravelly sandy from 16 m.

GEO-ENGINEERING & TESTING, INC.
Geotechnical & Material Testing Engineers

Job No. 464.01 Appr. VT Date 10/15/99

LOG OF BORING 4
TAKATIK FISHING PORT IMPROVEMENT
Pohnpei FSM

PLATE 5

LABORATORY TESTS	BLOWS/FT. (BLOWS/30CM)	MOISTURE CONTENT (%)	DRY DENSITY	DEPTH (M)	SAMPLE SYMBOL	EQUIPMENT 9.84 cm Dia. ROTARY WASH ELEVATION DATE: 08/22/99
	1/.45m			0		(Drilled from sea bottom at 5.50 m. deep) DARK GREY CLAYEY SILT (ML) - very soft, saturated, with abundant coral fragments
	1			2.5		
	2			5.0		LIGHT GREY SILTY SANDY CORAL GRAVEL (GM) - very loose, saturated
	1			7.5		
				10.0		
				12.5		
				15.0		
				17.5		
				20.0		

GEO-ENGINEERING & TESTING, INC.
Geotechnical & Material Testing Engineers

Job No. 464.01 Appr. [illegible] Date 12/03/99

LOG OF BORING 5
TAKATIK FISHING PORT IMPROVEMENT
Pohnpei FSM

PLATE 6

EQUIPMENT 9.84 cm Dia. ROTARY WASH

ELEVATION -- DATE: 08/22/99

LABORATORY TESTS	BLOWS/FT. (BLOWS/30CM)	MOISTURE CONTENT (%)	DRY DENSITY (kg/m3)	DEPTH (M)	SAMPLE SYMBOL
	2			0	
	1/.30m			2.5	
				5.0	
SA UC = 31.1	/.15	73.0	865		
				7.5	
SA PI = 9 LL = 42 UC = 9.1 CONSOL	1	86.7	849	10.0	
SA PI = 7 LL = 41 UC = 21.6	/.15	63.7	897	12.5	
	1/.30m			15.0	
	1/.20m			17.5	
	1			20.0	

(Drilled from sea bottom at 4.00 m. deep)
GREY SILTY FINE SAND (SM) - very loose, saturated

DARK GREY-BLACK CLAYEY SILT (ML) - very soft, saturated

dark grey at 6 m.

GEO-ENGINEERING & TESTING, INC.
Geotechnical & Material Testing Engineers

Job No. 464.01 Appr. VJ Date 10/15/99

LOG OF BORING 6
TAKATIK FISHING PORT IMPROVEMENT
Pohnpei FSM

PLATE 7

LABORATORY TESTS	BLOWS/FT. (BLOWS/30CM)	MOISTURE CONTENT (%)	DRY DENSITY (kg/m3)	DEPTH (M)	SAMPLE SYMBOL
				0	
	2			2.5	
SA PI = 6 LL = 47 UC = 7.0	2	104.6	705	5.0	
SA PI = 8 LL = 41 UC = 9.9	2	70.4	929	7.5	
SA PI = 6 LL = 41 UC = 8.2	2	81.6	865	10.0	
				12.5	
				15.0	
				17.5	
				20.0	

EQUIPMENT 9.84 cm Dia. ROTARY WASH

ELEVATION -- DATE: 08/23/99

(Drilled from sea bottom at 1.60 m. deep)
DARK GREY-BLACK CLAYEY SILT (ML) - very soft, saturated

GEO-ENGINEERING & TESTING, INC.
Geotechnical & Material Testing Engineers

Job No. 464.01 Appr. Date 10/15/99

LOG OF BORING 7
TAKATIK FISHING PORT IMPROVEMENT
Pohnpei FSM

PLATE 8

LABORATORY TESTS	BLOWS/FT. (BLOWS/30CM)	MOISTURE CONTENT (%)	DRY DENSITY	DEPTH (M)	SAMPLE SYMBOL	EQUIPMENT 9.84 cm Dia. ROTARY WASH ELEVATION -- DATE: 08/24/99
	3			0		(Drilled from sea bottom at 2.50 m. deep) DARK GREY SILTY FINE SAND (SM) - very loose, saturated, with some coral fragments
	1/.25m			2.5		(Drilling stopped @ 4:00 PM due to coral fragments caving-in)
				5.0		
				7.5		
				10.0		
				12.5		
				15.0		
				17.5		
				20.0		

GEO-ENGINEERING & TESTING, INC.
Geotechnical & Material Testing Engineers

Job No. 464.01 Appr. [illegible] Date 12/03/99

LOG OF BORING 8
TAKATIK FISHING PORT IMPROVEMENT
Pohnpei FSM

PLATE 9

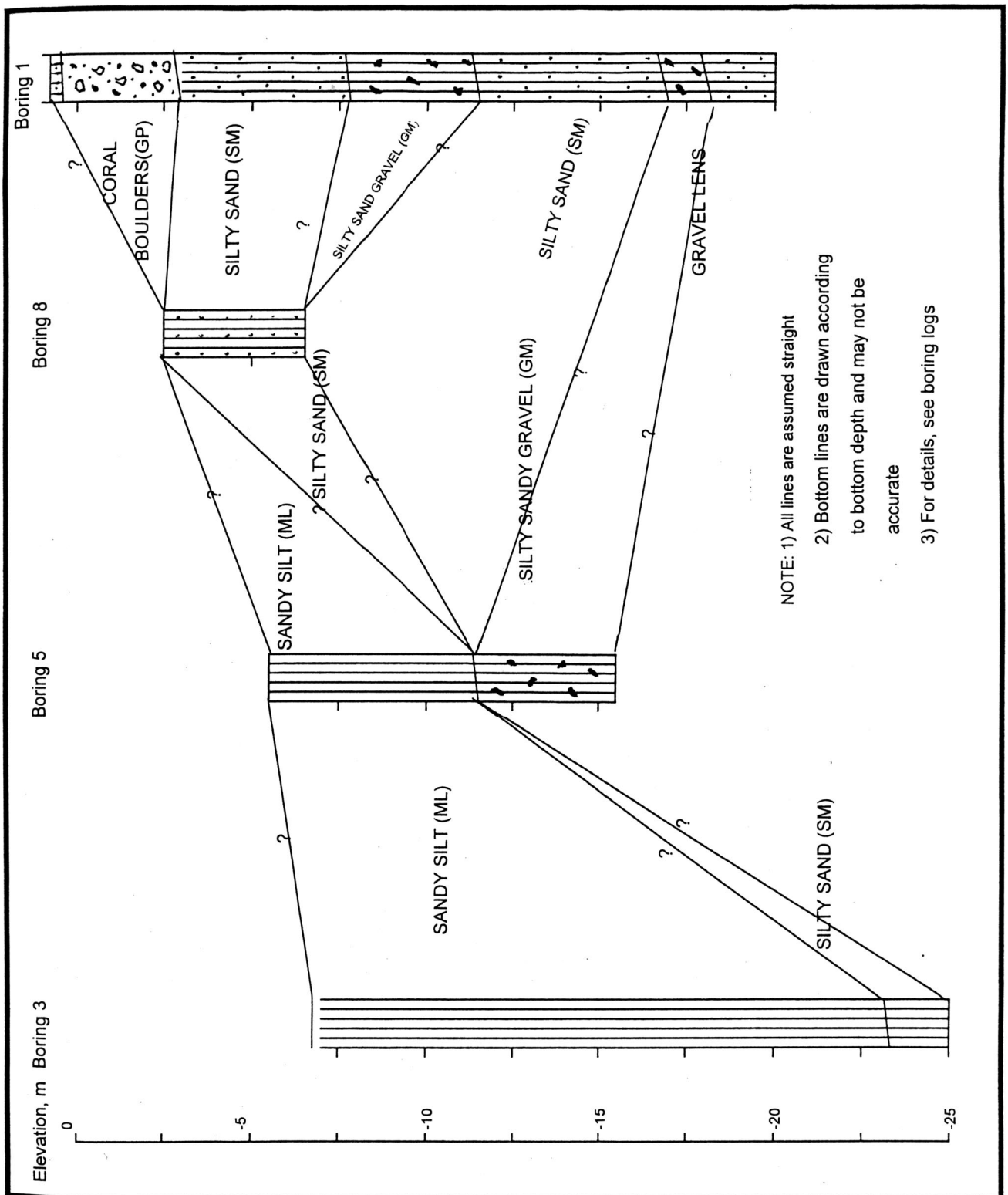
LABORATORY TESTS	BLOWS/FT. (BLOWS/30CM)	MOISTURE CONTENT (%)	DRY DENSITY	DEPTH (M)	SAMPLE SYMBOL	EQUIPMENT 9.84 cm Dia. ROTARY WASH ELEVATION -- DATE: 08/27/99
	6			0		(Drilled from sea bottom at 4.50 m. deep) GREY SILTY SANDY CORAL GRAVEL (GM) - loose, saturated
SA	3			2.5		GREY GRAVELLY SILTY SAND (SM) - very loose, saturated
SA	2			5.0		less gravelly from 6 m.
SA	5			7.5		
				10.0		
				12.5		
				15.0		
				17.5		
				20.0		

GEO-ENGINEERING & TESTING, INC.
Geotechnical & Material Testing Engineers

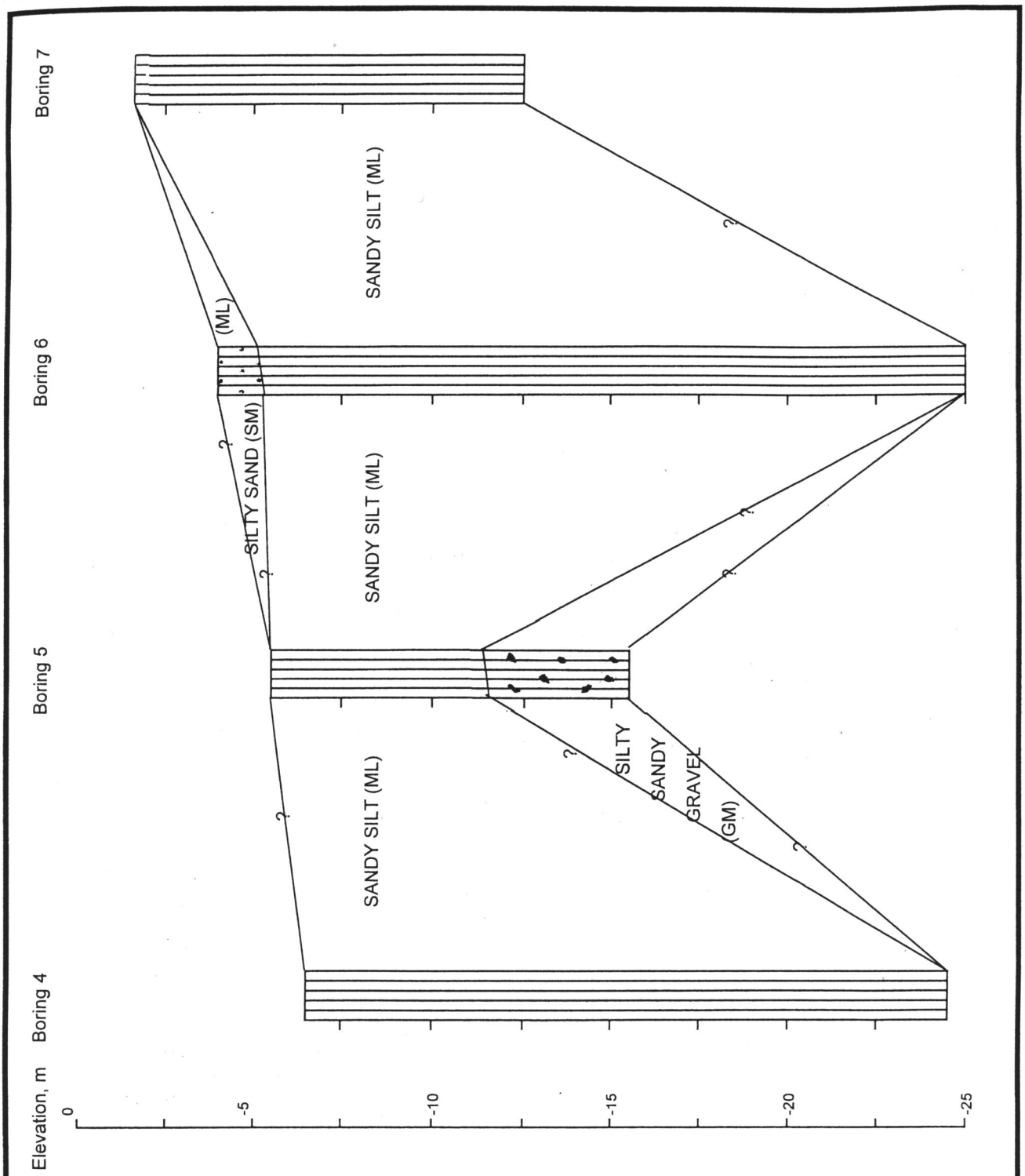
Job No. 464.01 Appr. [signature] Date 12/03/99

LOG OF BORING 9
TAKATIK FISHING PORT IMPROVEMENT
Pohnpei FSM

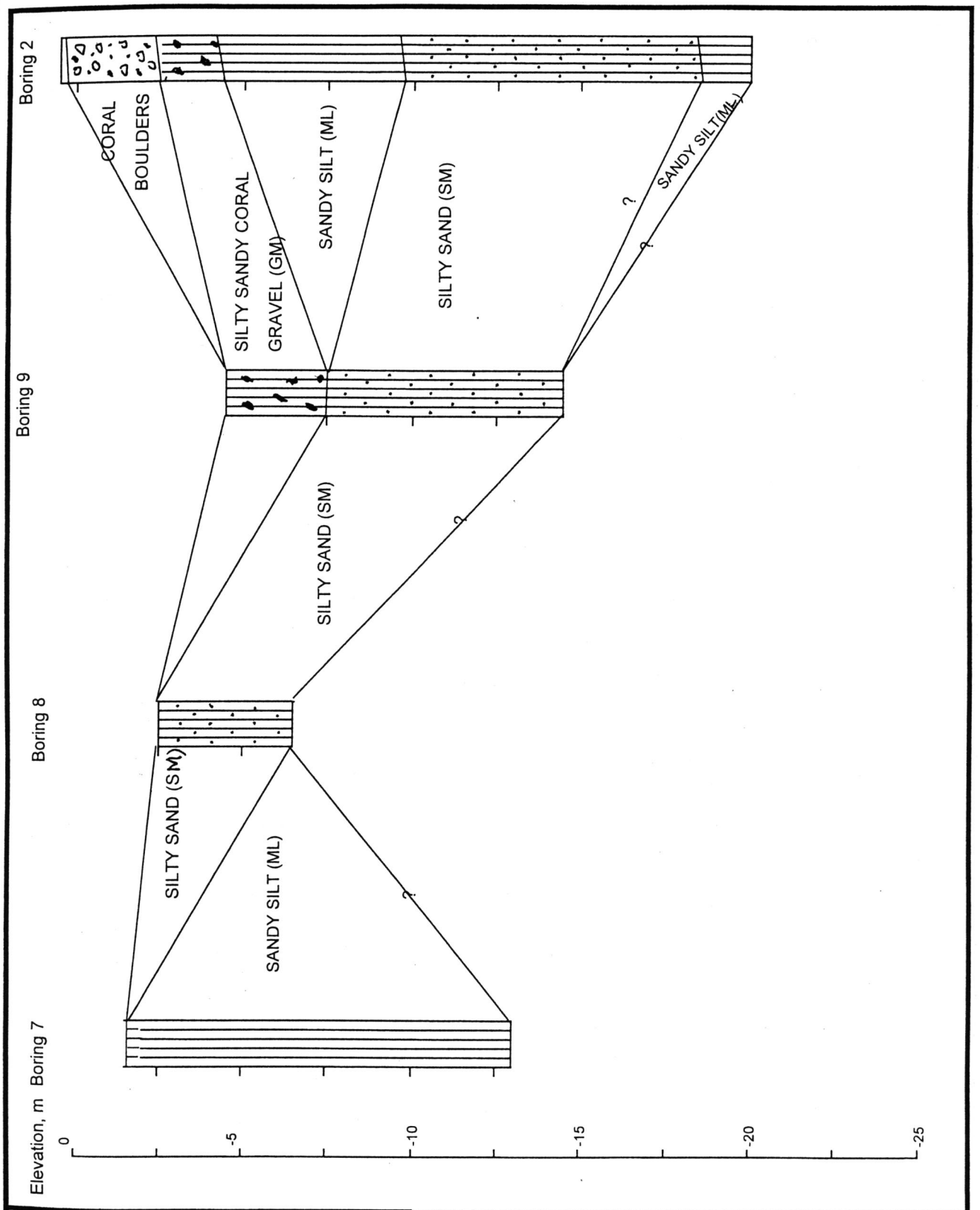
PLATE
10



GEO-ENGINEERING & TESTING, INC. *Geotechnical & Material Testing Engineers*	**SUBSURFACE SOIL PROFILE**	PLATE
	TAKATIK FISHING PORT FACILITY	**49**
Job No. 464.01 Appr. [illegible] Date 12/03/99	Pohnpei FSM	



GEO-ENGINEERING & TESTING, INC.	SUBSURFACE SOIL PROFILE	PLATE
Geotechnical & Material Testing Engineers	TAKATIK FISHING PORT FACILITY	50
Job No. Appr. VJ Date 12/3/99	Pohnpei FSM	



GEO-ENGINEERING & TESTING, INC. *Geotechnical & Material Testing Engineers* 12/03/99	**SUBSURFACE SOIL PROFILE**	PLATE
Job No. 464.01 Appr. [illegible] Date 12/3/99	**TAKATIK FISHING PORT FACILITY** POHN PE FSM	51

APPENDIX A

INITIAL ASSESSMENT ENVIRONMENTAL CHECKLIST

Environmental Impacts

1. EARTH. Will the proposed project result in:

	YES	NO	MAYBE
A. Destruction, covering or modification of any unique geologic or physical features?		✓	
B. Creation of steep slopes or other unstable earth conditions?		✓	
C. Any potential for increased wind or water erosion of soils, either on or off the site?		✓	
D. Changes in the channel of a stream or the bed of the ocean?	✓		
E. Exposure of people or property to geological hazards such as land-slides, ground failure, or similar hazards?		✓	

2. AIR. Will the proposed project result in:

	YES	NO	MAYBE
A. Substantial air emissions or deterioration of existing air quality?		✓	
B. Creation of objectionable odors?		✓	

3. WATER. Will the proposed project result in:

	YES	NO	MAYBE
A. Changes in currents, or the course or direction of water movements, in marine or fresh waters?		✓	

B. Changes in absorption rates, drainage patterns, or the amount of surface runoff? ____ ✓ ____

C. Alterations to the course or flow of flood waters? ____ ✓ ____

D. Discharge into surface waters or any alteration of surface water quality including but not limited to temperature, dissolved oxygen, bacteria, or turbidity? ____ ✓ ____

E. Contamination of ground waters or wells, from salt water intrusion or surface activities? ____ ✓ ____

F. Changes in the quantity of ground waters, through direct additions o withdrawal, or through interception of an aquifer by cuts or excavation? ____ ✓ ____

G. Substantial reduction in the amount or quality of water otherwise available for public water supplies? ____ ✓ ____

H. Exposure of people or property to water related hazards such as flooding or tidal waves? ____ ✓ ____

4. PLANT LIFE. Will the proposed project result in:

A. Destruction of any upland or mangrove forest communities?: ____ ✓ ____

B. Destruction of other important plant communities, such as sea grasses or plants having potential commercial value? ____ ✓ ____

C. Reduction of the numbers of any

	unique, rare or endangered plant species?	____	✓	____
D.	Introduction of new species of plants into an area, or resultant barrier to the normal replenishment of existing species?	____	✓	____
E.	Reduction in acreage of any agricultural crop?	____	✓	____

5. ANIMAL LIFE. Will the proposed project result in:

A.	Destruction of any coral reef areas?	____	✓	____
B.	Reduction of the numbers of any unique, rare or endangered animal species?	____	✓	____
C.	Introduction of new animal species into an area, or result in a barrier to the migration or movement of animals?	____	✓	____
D.	Substantial deterioration of fish or wildlife habitat?	____	✓	____

6. NOISE. Will the proposed project result in:

A.	Increase in existing noise levels or exposure of people to severe noise levels?	____	✓	____

7. LAND USE. Will the proposed project result in:

A.	Substantial alteration of the present or planned land use of an area?	____	____	✓

8. NATURAL RESOURCES Will the proposed project result in:

A. A noticeable increase in the rate of use of any natural resources? ____ ✓ ____

B. Substantial depletion of any non-renewable natural resources? ____ ✓ ____

9. RISK OF UPSET. Will the proposed project result in:

A. A risk of an explosion or the release of hazardous substances including but not limited to oil, pesticides, chemicals, or radiation, in the event of an accident or upset conditions? ____ ____ ✓

B. Possible interference with an emergency response plan? ____ ✓ ____

10. POPULATION. Will the proposed project result in:

A. Relocation or altered distribution, density, or growth rate of the human population of an area? ____ ✓ ____

11. HOUSING. Will the proposed project result in:

A. Changes in existing housing or create a demand for additional housing? ____ ✓ ____

12. TRANSPORTATION. Will the proposed project result in:

A. Generation of substantial additional vehicular movement? ____ ✓ ____

B. Substantial impact on roads and existing transportation systems? ____ ✓ ____

C. Alteration to present patterns of movement of people and/or goods? ____ ✓ ____

13. PUBLIC SERVICES. Will the proposed project result in or affect the need for new

or altered services in the following areas:

A.	Police or fire protection?		✓	
B.	Schools?		✓	
C.	Parks or other recreational facilities?		✓	
D.	Hospital?		✓	
E.	Other government services?		✓	

14. UTILITIES. Will the proposed project result in the need for new systems, or substantial changes in the following:

A.	Power?		✓	
B.	Communications?		✓	
C.	Water?		✓	
D.	Sewage disposal?		✓	
E.	Solid waste disposal?		✓	

15. HUMAN HEALTH. Will the proposed project result in:

A.	Creation of any health hazard or potential health hazard?		✓	
B.	Improvement of human health?		✓	

16. AESTHETICS. Will the proposed project result in:

A.	Obstruction of any scenic vista?		✓	

17. RECREATION. Will the proposed project result in:

A.	Changes in the quality or amount of existing recreational opportunities?		✓	