No.

BASIC DESIGN STUDY REPORT
ON
THE PROJECT FOR REDEVELOPMENT
OF
FISHERIES LAMI JETTY
IN
THE REPUBLIC OF THE FIJI ISLANDS

JANUARY 2005

JAPAN INTERNATIONAL COOPERATION AGENCY
OVERSEAS AGRO-FISHERIES CONSULTANTS CO., LTD.

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PREFACE

In response to a request from the Government of the Republic of the Fiji Islands, the Government of Japan decided to conduct a basic design study on the Project for Redevelopment of Fisheries Lami Jetty and entrusted the study to the Japan International Cooperation Agency (JICA).

JICA sent to Fiji a study team from 27th day of July to 30th day of August, 2004.

The team held discussions with the officials concerned of the Government of Fiji, and conducted a field study at the study area. After team returned to Japan, further studies were made. Then, a mission was sent to Fiji 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 Republic of the Fiji Islands for their close cooperation extended to the team.

January, 2005

Seiji Kojima
Vice President
Japan International Cooperation Agency

January, 2005

LETTER OF TRANSMITTAL

We are pleased to submit to you the basic design study report on the Project for Redevelopment of Fisheries Lami Jetty in the Republic of the Fiji Islands.

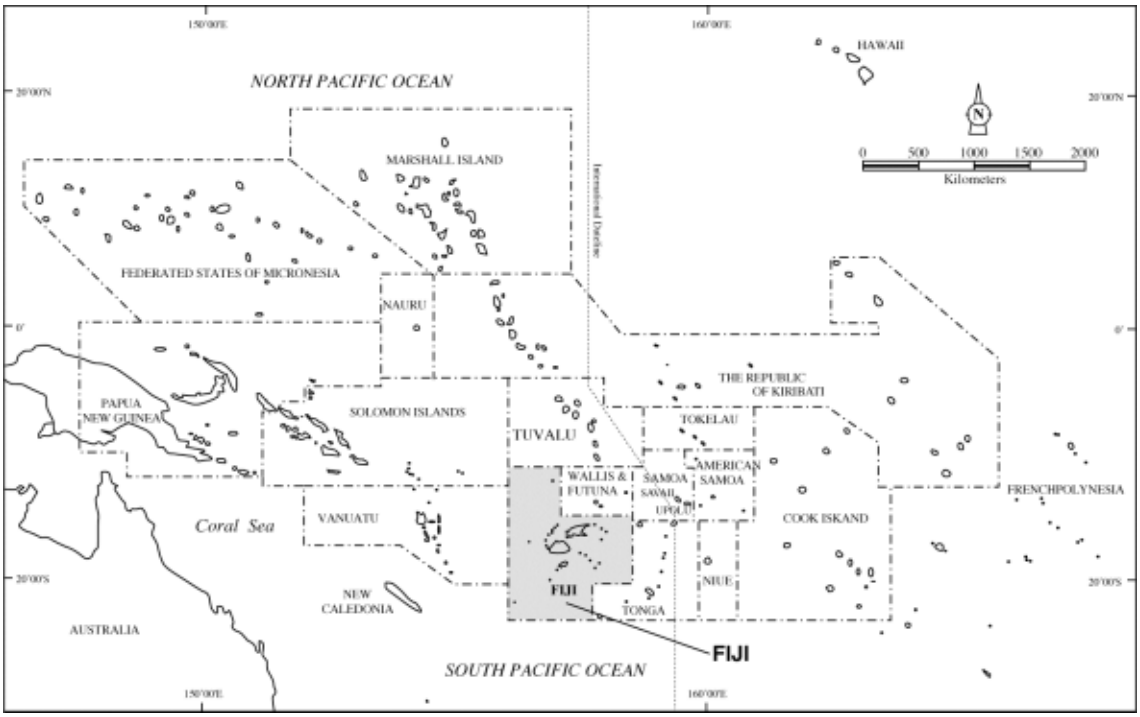
This study was conducted by Overseas Agro-Fisheries Consultants Co., Ltd., under a contract to JICA, during the period from July, 2004 to January, 2005. In conducting the study, we have examined the feasibility and rationale of the project with due to consideration to the present situation of Fiji and formulated the most appropriate basic design for the project under Japan's grant aid scheme.

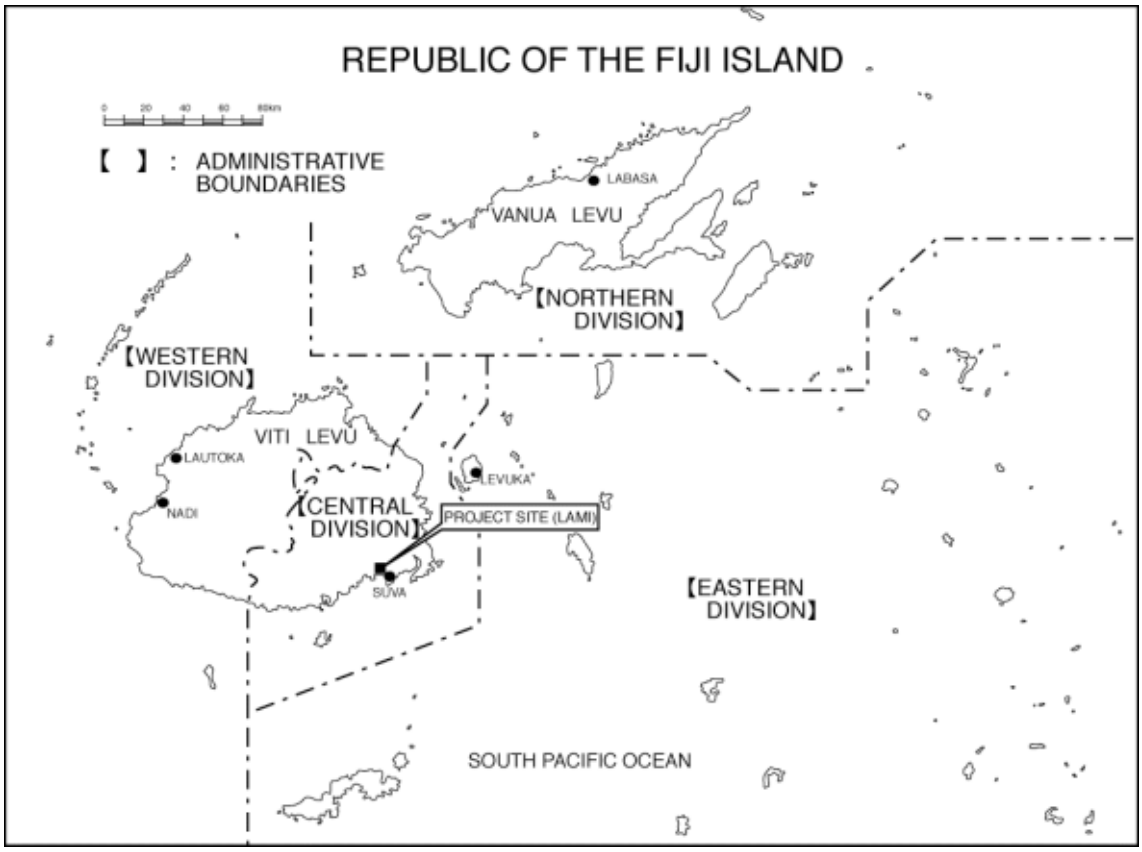
Finally, we hope that this report will contribute to further promotion of the project.

Very truly yours,

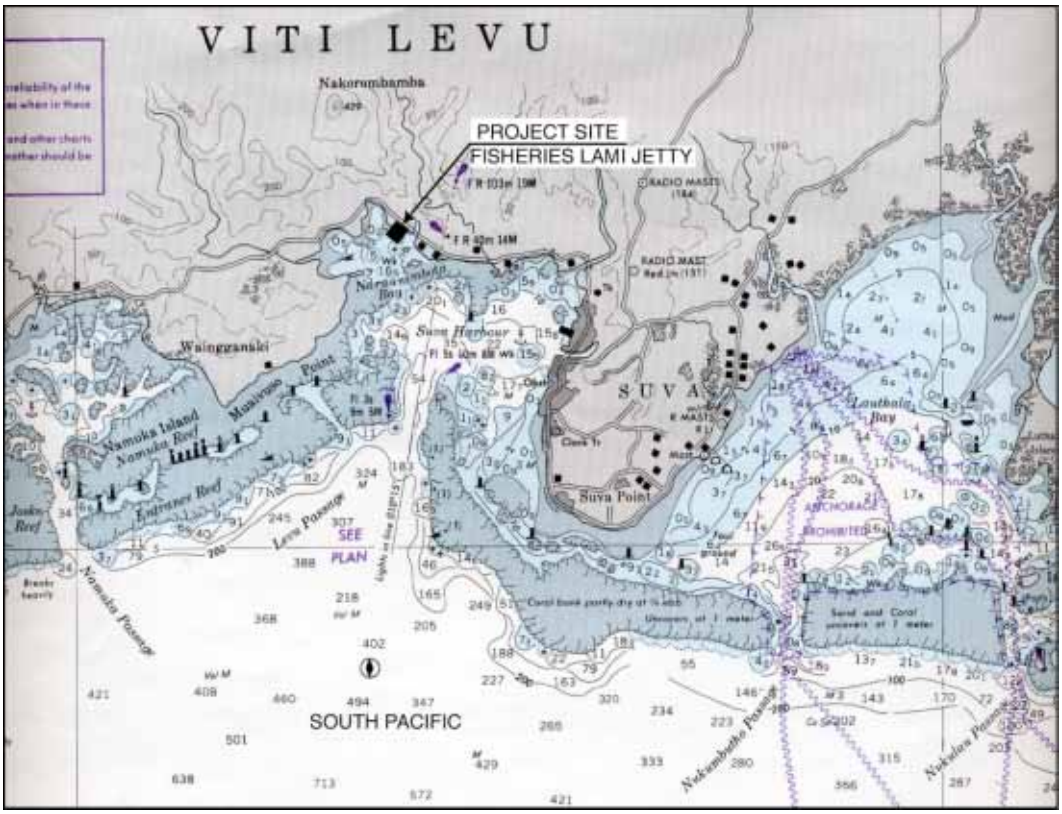
Nobuo Itoi
Project Manager,
Basic design study team on the Project for
Redevelopment of Fisheries Lami Jetty
Overseas Agro-Fisheries Consultants Co., Ltd

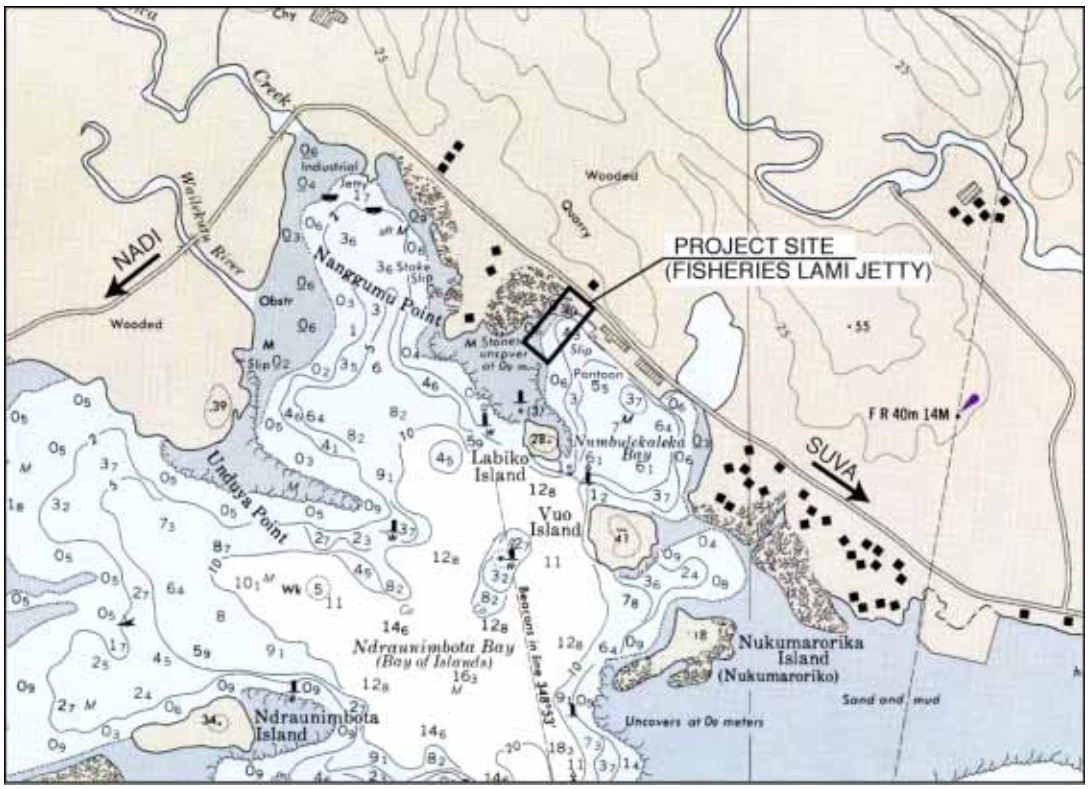
LOCATION MAP





PROJECT SITE






ANTICIPATED PERSPECTIVE FISHERIES LAMI JETTY

LIST OF FIGURES AND TABLES

ABBREVIATIONS

Abbreviation	Idiom	Original Name
A/P	English	Authorization of Pay
AS	English	Australia Standard
ASTM	English	American Society of Testing and material
BOD	English	Biochemical Oxygen Demand
CEO	English	Chief Executive Officer
CDL	English	Chart Datum Level
DWS	English	Deep Water Snapper
EEZ	English	Exclusive Economic Zone
EIA	English	Environment Impact Assessment
E/N	English	Exchange of Notes
FAD	English	Fish Aggregated Device
FAO	English	Food and Agriculture Organization of the United Nation
F.G.D.	English	FIJI Geodetic Datum
FL	English	Floor level
FRP	English	Fiberglass Reinforced Plastic
FEA	English	Fiji Electrical Authority
GDP	English	Gross Domestic Product
GL	English	Ground Level
HHWL	English	Highest High Water Level
HWL	English	High Water Level
IDA	English	*Inside Demarcated Area*
JICA	English	Japan International Cooperation Agency
LFT	English	*Lami Fish Terminal*
LLWL	English	Lowest Low Water Level
LWL	English	Low Water Level
MSL	English	Mean Sea Level
NBCF	English	National Building Code for Fiji
NZS	English	New Zealand Standard
ODA	English	*Outside Demarcated Area*
PWD	English	Public Works Department
RC	English	Reinforced Concrete
SMB	German	Sverdrup, Munk, Bretschneider
SOPAC	English	South Pacific Applied Geo-science Commission
TAC	English	Total Allowable Catch
USAID	English	The United States Agency for International Development
USP	English	University of South Pacific
VAT	English	Value Added Tax

Note: Italics indicate proper nouns in Fiji.

SUMMARY

SUMMARY

Fiji, located in the center of southwest Pacific Ocean, is an island nation composed of 332 islands with a total land area of 18,333 km^2 (approximately the same area as Shikoku in Japan). The two islands of Viti Levu (10,429 km^2) and Vanua Levu (5,556 km^2) account for approximately 90% of the national land area. Fiji has a population of 854,000 people (as of 2000), and its capital city Suva (77,000) is located in the southeast of Viti Levu, while the international airport is located in Nadi in the northwest of the same island.

Both the main islands were formed by volcanoes, and both are dominated by mountains ranging over 1,000 m in the central parts, and have restricted flatland. Climate is tropical marine climate and trade winds are prevalent in the southeast. Accordingly, the southeastern sides of the islands have a lot of rain, with rainfall in the capital Suva high at 3,000 mm per year, whereas the southwestern sides are arid zones. The rainy season lasts from November to March, during which time cyclones strike the islands. Annual average temperatures vary within a narrow range from 20~30℃, and the climate is relatively pleasant thanks to the effects of the trade winds.

The traditional industries of Fiji have been sugar and copra, which is the raw material for coconut oil; however, the raw copra industry has been in decline since 1980 due to the fall in international prices and deterioration of palm trees. Tourism development, utilizing the rich natural environment, has been carried out since around 1960, however, since tourism and also the sugar industry are prone to external factors such as world economic trends, price trends and weather, etc. as well as internal factors such as political changes and labor disputes and so on, these sectors have constituted a weak industrial base for supporting the country. In order to overcome this weakness, after Fiji secured independence in 1970, it has worked to boost productivity of farm products and fisheries products, etc. intended for internal consumption, promote the processing and export of primary products such as fisheries products, timber and woodchips, etc., and also promote the apparel industry through offering preferential tax measures based on export-oriented economic policy. However, since economic activities in Fiji are still prone to the effects of natural disasters such as cyclones and drought, the economic base remains fragile.

Industrial breakdown of gross national product in 2001 was F$ 2,201.6 million (US$ 950 million), with the commercial sector including tourism accounting for F$ 395.5 million (US$ 170.4 million) (18.0%), manufacturing including apparel manufacture for F$ 330.1 (US$ 142.4 million) (15.0%), agriculture, forestry and fisheries including sugar production and fisheries for F$ 326.9 million (US$ 140.1 million) (14.8%), transportation and telecommunications for F$ 279.1 million (US$ 120.4 million) (12.7%), finance and insurance for F$ 237.7 (US$ 102.6 million) (10.8%), electricity, water and gas for F$ 93.1 million (US$ 40.2 million) (4.2%), construction for F$ 87.9 million (US$ 37.9

million) (4.0%), mining for F$ 52.0 million (US$ 22.4 million) (2.4%), and others for F$ 399.3 million (US$ 172.3 million) (18.1%). The trade balance has shown a constant deficit ever since independence. In 2002, total exports (FOB) were F$ 1,065.7 million (US$ 459.8 million) and total imports (FOB) were F$ 1,658.9 million (US$ 815.8 million), so the trade balance showed a deficit of F$ 593.2 million (US$ 256.0 million).

Per capita national income in Fiji is US$ 2,360 (2003, according to the World Bank), which is higher compared with other developing countries. However, tourism facilities, processing plants for primary products such as sugar, fisheries products and timber, etc., apparel manufacturing plants and modern service sectors and so on are concentrated into cities, and income disparities are growing between these urban areas, where the currency-based economy is well established, and rural villages and remote islands, where the traditional subsistence economy still remains. Moreover, in view of the increasingly conspicuous disparity in wealth between salaried workers and subsistence workers and unemployed people in rural areas, the major socioeconomic issues facing Fiji are 1) mitigation of income differentials, 2) alleviation of poverty, and 3) reduction of the external trade deficit.

Concerning development plans for the fisheries sector, the Ministry of Fisheries and Forests has formulated the Development Plan to the National Vision (MP & S, 2003-2006). In this, the vision of offshore fisheries development is to have a sustainable and profitable industry harvesting at or near the total allowable catch (TAC), fully owned by Fijians, employing the maximum number of Fijians, with maximum retained value in the country. At the same time, concerning development of small-scale offshore fisheries in coastal waters, the Deep Water Snapper Project (DWS Project) and Small Scale Tuna Development Project (FAD Project) have been prepared with a view to encouraging artisanal fishermen to convert to offshore fisheries, in order to prevent excessive catching and depletion of fisheries resources in coastal waters.

The fisheries sector in Fiji accounts for 2.9% of GDP, provides employment for 5,857 workers (3,720 in the industrial fishery, 2,137 in the artisanal fishery), and generates 19,029 tons of production (13,226 tons in the industrial fishery, 5,803 tons in the artisanal fishery). In addition, subsistence fisheries account for production of 18,600 tons. Exports of fisheries products, which consist of F$ 104,200,000 (US$ 44,962,300) from offshore fisheries and F$ 19,640,000 (US$ 8,474,660) from coastal fisheries, make this the third highest foreign currency earning sector for Fiji behind garments and sugar. Moreover, artisanal fisheries catches intended for the domestic market amount to F$ 27,906,446 (US$ 12,041,631), thereby making this an important industry in terms of both employment and stable food supply to the domestic market.

However, Suva Harbour, which acts as the base of operations for offshore fishing boats, does not have well developed fishing port facilities. Whereas the number of offshore fishing boats in 1990 was 6, this had

increased to 111 by 2003. As a result, congestion levels reached almost 200% at Muaiwalu wharf, which is the only mooring facility intended for exclusive use by fishing boats in Suva Harbour, and this made it urgently necessary to construct fisheries infrastructure in Suva Harbour. Furthermore, jetty facilities at Fisheries Lami Jetty (constructed in 1994) are too small and lack safety due to deterioration; and there is a strong need for redevelopment and expansion of this facility in order to support the policy of converting some artisanal fishery operations to offshore fishing.

It was against such a background that the Fiji Ministry of Fisheries and Forestry compiled the Project for Redevelopment of Fisheries Lami Jetty in Suva Harbour, which is the main center of offshore and coastal artisinal fisheries activities in Fiji, and issued a request to the Government of Japan regarding implementation of the project.

In response to the request, the Government of Japan decided to implement the Basic Design Survey and JICA dispatched the Study Team to Fiji as follows:

Basic Design Survey : July 27 ~ August 30, 2004
Basic Design Outline Explanation : October 26 ~ November 6, 2004

In the Study, via site surveys and analysis in Japan, survey and analysis were carried out concerning the Project background, contents, natural conditions, operation and maintenance setup and building situation, etc. As a result, it was confirmed that the Project is intrinsically linked to superior development plans in Fiji and is necessary for promoting development of the sector. As the scope of cooperation by the Government of Japan in the Project, 1) construction of fishing boat mooring facilities, administration office, public toilets, watchman's hut and incidental facilities, and 2) supply of workshop equipment, were deemed to be appropriate, and basic design comprising the contents outlined below was implemented.

Incidentally, concerning the floating jetty in front of Lami Fish Terminal that was included in the request, it was agreed with the Fiji side to omit this from the aid contents for the following reasons: 1) the Fiji government is unable to secure the said site as government-owned land, and 2) even if the requested floating jetty were constructed at the said site, there is no possibility that it would be utilized as a public facility. Furthermore, the requested refueling facilities at Fisheries Lami Jetty were also omitted from the target aid because the Fiji side indicated that these were unnecessary due to the fact that private refueling facilities already exist in Suva Harbour at Walu Bay, and the Study Team confirmed this.

Facilities:

Facilities Category	Facilities	Contents
Civil engineering facilities	Jetty	Structure: steel pile jetty with concrete floor plates and anti-corrosive coating (pile diameter ϕ 600 mm, pile length 20.5~22.5 m) Scale: length 60 m, standard width 10 m, total jetty area 792 m^2 Mooring jetty: (protruding L section 7 m x 12 m, small jetty 12 m x 9 m, 1 each)
	Jetty connection (Apron and Revetment)	Structure: steel pile jetty with concrete floor plates and anti-corrosive coating (pile diameter ϕ 600 mm, pile length 20.5 m), cellular block revetment + concrete crossing plates Scale: width 10.0 m x length [(4.27 m + 7.00 m) ÷2] x 1 section, area 56.35m^2 width 13.0 m x length [(4.00 m + 7.85 m) ÷2] x 1 section, area 77.03m^2 Small boat mooring stairs (1): stair width 1 m, stair length 3.5 m
Building facilities	Administration block (total area 285 m^2)	Workshop, office, storeroom, toilet, ice plant and ice storage Superstructure: steel structure - partially two-stories Roof: corrugated steel sheet with thermal insulation material Exterior walls: metal cladding wall
	Public toilets (total area 45 m^2)	Male toilet: closet bowls, urinals, washbasins (2 each), shower faucets (3) Female toilet: closet bowl, washbasin (1 each), shower faucet (1) Superstructure: reinforced concrete block single story structure Roof: corrugated steel sheet with thermal insulation material Exterior walls: concrete block + mortar plastering + paint finish
	Watchman's hut (total area 4 m^2)	Guard room: wood structure with bed Superstructure: reinforced concrete block single story structure Roof: corrugated steel sheet with thermal insulation material Exterior walls: concrete block + mortar plastering + paint finish
	Landscaping facilities	Septic tanks + infiltration layer, motorway paving 363 m^2, sidewalk paving 103 m^2
	Electrical equipment	Receiving panel, 415/220 V, 200 KVA transformer, distribution panel, lighting sockets
	Plumbing facilities	Ice-making machine, toilet water supply and drainage, jetty water supply
	Special equipment	Ice-making machine 4 tons/day, assembled panel ice storage: 30m^3

Equipment:

Equipment	Quantity	Specifications	Purpose of Use
Electric tools	1 set	Insulated handle	Fishing Boat
Bench drill	1	Maximum drill bit 13 mm x capacity 190 W	Ditto
Power drill	1	Maximum drill bit 13 mm x capacity 520 W	Ditto
Double-end grinder	1	Grinding stone diameter 205 mm x capacity 620 W	Ditto
High-pressure washing machine	1	Water spraying capacity: 1,000 l/hour x motor: 1.5 kW	Ditto
Workbench	1	Dimensions: 1,800 W x 700 D x 735 mm H	Ditto
Tool storage wagon	1	Wagon table dimensions: 580 W x 450 mm D	Ditto
Clamp meter	1	Portable type, digital display	Ditto
Tester	1	Portable type, digital display	Ditto
Insulation resistance tester	1	Portable type, digital display	Ditto
Tachometer	1	Display measurement range: 60~50,000 rpm	Ditto
Vice	1	Attachment socket: 150 mm	Ditto
Drill bit set	1 set	Material: HSS steel	Ditto
Spare grinding stone	1 set	Grinding stone diameter: 205 mm (can cut stainless steel)	Ditto
Electric welder	1 set	Rated input: 10.7 kVA, output: 150 A	Ditto
Gas welder	1 set	With gas pressure adjuster	Ditto

In the event where the Project is implemented under Japan's Grant Aid, it will require 13.5 months for implementation, that is 4.5 months for detailed design, 9.0 months for construction, and 3.0 months for procurement of equipment. The rough Project cost is estimated as 589 million yen (577 million yen to be raised by the Japan side and 12 million yen by the Fiji side).

Following completion of the Project facilities construction works, the necessary costs for operating and maintaining the facilities shall be paid from the budget of the Technical Service Section of the Fisheries Department Lami headquarters, in the same way as with the existing facility. Concerning the management of charges collected from facility users, the Fisheries Department has set up trust fund accounts for 8 project facilities including the existing jetty and adopts an independent budgeting system for maintenance, development and repair costs, and it plans to apply the same trust fund account system to the Project facilities too. When establishing a trust fund account, approval and authorization is obtained from the chief executive officer (CEO) of the Ministry of Fisheries and Forests for projects that entail generation of revenue in line with the project activities. The Accounting and Administration Department of the Ministry implements an audit of the account every month, and if the account balance falls below F$ 3,000 at the end of the month, withdrawals are suspended and verification and recommendations are conducted with respect to expenditure. Basically speaking, the personnel expenses of Ministry of Fisheries and Forests personnel needed in the implementation of projects, as well as utilities costs for electricity and water supply in offices, etc. are paid from the government budget (general expenditure). This system also allows for project costs such as maintenance expenses and survey expenses, etc. including personnel costs for special purposes.

Accordingly, in the Project, water tariffs and electricity charges collected from fishing boats shall not be put into the trust fund account but paid instead to the Fisheries Department. Meanwhile, other jetty charges and revenue from ice sales shall be put into the trust fund account. According to the estimation of the operating balance, revenue is F$ 137,160.00 and expenditure is F$ 121,307.45. Therefore, since the balance is positive at +F$ 15,852.55 even assuming the independent accounting system, there shouldn't be any problems concerning the operation and maintenance of the overall planned jetty facilities.

Since Project implementation can be expected to impart the following effects, it is deemed to be appropriate and significant for the Project to be implemented under the Grant Aid Scheme of the Government of Japan.

Implementation of the Project can be expected to realize the following effects regarding fisheries activities by the following beneficiaries: 100 or more fishing boats and 1,110 crewmembers engaged in offshore fisheries based in Suva Harbour, 68 fisheries companies and 2,600 employees engaged in offshore fisheries and coastal fisheries, and approximately 300 artisinal fishermen and 780 crewmembers living in the central and eastern districts.

Direct effects:

- Increase in the number of offshore fishing boats utilizing Fisheries Lami Jetty (which currently only has mooring functions), and as a result, mitigation of congestion at Muaiwalu wharf located approximately 3 km to the east (average utilization rate will be reduced from 200% to 150%);
- Improvement in work efficiency in the landing of catches and transportation to fisheries companies located in Suva and Lami (increased catches at Fisheries Lami Jetty)
- Improvement in the operating environment for fishing boats converting to offshore fisheries (more fishing boats and ice sales, and fishing boat repair assistance at Fisheries Lami Jetty);
- Support for artisanal fishermen based around Suva (more fishing boats and ice sales, and fishing boat repair assistance at Fisheries Lami Jetty)

Indirect effects:

- Contribution to increased exports of fisheries products as well as maintenance and development of fisheries as a foreign currency earning sector;
- Contribution to promotion of conversion from artisinal to offshore fisheries and employment of workers in the fisheries exporting sector; and
- Contribution to the sustainable utilization of fisheries resources in coastal areas.

The following recommendations are made regarding the smooth and effective implementation of the Project.

Exchange of opinions with facility users and local stakeholders:

Prior to implementation of the Project, the Fisheries Department aims to implement an environmental impact assessment, in which it will explain the objectives, contents, effects and benefits, etc. of the Project to local stakeholders, operators and residents, etc. In doing this, it aims to secure understanding and consent for the Project and build relations of mutual trust with a view to realizing the smooth and efficient utilization of the Project facilities.

To ensure that the facilities are operated and managed in an orderly manner, based on the opinions and requests obtained in the above efforts, the Fisheries Department will need to promptly compile rules (including minor regulations and punitive regulations) concerning use of Lami Jetty facilities by completion of the Project facilities, and ensure the thorough understanding and upholding of the regulations with particular emphasis given to explaining to users the need for environmental consideration regarding nearby hotels, business operators and residents, etc.

Fair and appropriate operation of jetty facilities:

Concerning public fishing port facilities, the Fisheries Department has operated and maintained Lautoka fishing port, which targets mainly fishing boats of 10~12 m and fisheries workers engaged in artisinal fisheries, since 1988. However, in the case of Fisheries Lami Jetty in the Project, utilization by a diverse range of fishing boats and fisheries personnel is planned, for example, offshore fishing boats measuring up to 26.5 m, offshore fishing boats converted from artisinal fishing boats measuring between 10~16 m, and local fishing boats of 7 m or less. Accordingly, in order to provide fair and effective administrative support to such a wide range of fishing boats and fisheries personnel, it is desirable for the Fisheries Department to prescribe the work contents, responsibilities and mutual communication setups of staff and establish an adequate control setup that entails the sure collection and receipt of facilities charges.

Preparation of an annual report:

It is desirable that the Fisheries Department prepares an annual report describing the management and utilization status and income/expenditure balance, etc. of the Fisheries Lami Jetty facilities, and aims for a high level of operating benefits by building and improving on a smooth and even more efficient management system for the facilities. Moreover, the said annual report should be submitted to the Ministry of Fisheries and Forests so that the ministry can confirm the fair and appropriate operation of the facilities and offer pertinent advice and guidance to the Fisheries

Department when corrections and improvements are deemed necessary. Furthermore, it is desirable that the Ministry of Fisheries and Forests submit the said report to the JICA office in Fiji and report on the achievements of Japan's Grant Aid in the country.

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2. Study schedule
3. List of Parties Concerned in the Recipient Country
4. Minutes of Discussions
5. Cost Estimation Borne by the Recipient Country
6. References

CHAPTER 1 BACKGROUND OF THE PROJECT

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In an effort to realize economic independent and development following the establishment of independence, Fiji has adopted the following priority targets in development plans: 1) breakaway from monoculture based around the sugar industry, which has formed the basis of the country's economy since the start of the 20th Century, 2) promotion of tourism, manufacturing (apparel), fisheries and forestry, 3) acquisition of foreign currency, 4) expansion of employment opportunities, and 5) increase in food self-sufficiency. The value of fisheries exports comes third between exports of sugar and garments; moreover, because there is still room for additional development of offshore migratory fish such as tuna and bonito, coastal migratory fish and deep water snappers, etc., fisheries are regarded as a key industry with high potential for growth.

Concerning development plans for the fisheries sector, the Ministry of Fisheries and Forests has formulated the Development Plan to the National Vision (MP & S, 2003-2006). In this, the vision of offshore fisheries development is to have a sustainable and profitable industry harvesting at or near the total allowable catch (TAC), fully owned by Fijians, employing the maximum number of Fijians, with maximum retained value in the country. At the same time, concerning development of small-scale offshore fisheries in coastal waters, the Deep Water Snapper Project (DWS Project) and Small Scale Tuna Development Project (FAD Project) have been compiled with a view to encouraging artisanal fishermen to convert to offshore fisheries, in order to prevent excessive catching and depletion of fisheries resources in coastal waters. Moreover, in coastal areas including inland waters, where approximately 90% of the rural population live, approximately 6,600 tons/year of fisheries products worth some FJ$ 27,000,000 (2003) are supplied for domestic consumption in the artisinal fishery, while 18,000 tons/year[1] (2002) (Fisheries Department Annual Report 2002) are produced for home consumption. This shows the importance of the role that the fisheries sector in Fiji has played in securing foreign currency and providing a source of nutrition in the country. Particularly concerning primary products, development of the sugar industry, which started more than 100 years ago, has almost finished and no more increases in sugar production can be expected in future; however, there is still room to develop fisheries resources in offshore waters and this sector is looked to as an industry with high growth potential building on the sustainability of fisheries resources that the government is aiming for.

However, Suva Harbour, which acts as the base of operations for offshore fishing boats, does not have well developed fishing port facilities. Whereas the number of offshore fishing boats in 1990 was 6, this had increased to 111 by 2003. As a result, congestion levels reached almost 200% at Muaiwalu wharf, which is the only mooring facility intended for exclusive use by fishing boats in Suva Harbour, and this made it urgently necessary to construct fisheries infrastructure in Suva Harbour. Furthermore, jetty facilities at Fisheries Lami Jetty (constructed in 1994) are too small and lack safety due to

deterioration; and there is a strong need for redevelopment and expansion of this facility in order to support the policy of converting some artisanal fishery operations to offshore fishing.

Against this background, in order to resolve the said problems arising from the lack of development of fishing port facilities in Suva Harbour, the Fiji government compiled the Project for Redevelopment of Fisheries Lami Jetty aimed at rebuilding the existing Fisheries jetty facilities to enable mooring by offshore fishing boats, and securing functions enabling the terminal to act as a base for converted offshore fishing boats and artisanal fishing boats operating in the Suva area as well as survey and training vessels belonging to the Fisheries Department. By doing this, the said project intends to contribute to the national objectives of securing foreign currency and creating employment opportunities through offshore fisheries development, as well as realizing stable supply of fisheries products to the domestic market and stabilization and improvement of fishermen's incomes through the management and development of sustainable fisheries in coastal waters. And, the Fijian government issued a request to the Government of Japan for grant aid regarding the components of facilities construction and equipment supply for Fisheries Lami Jetty as shown in Table 1-1 and facilities construction in front of Lami Fish Terminal as shown in Table 1-2.

Contents of the request:

Table 1-1 Fisheries Lami Jetty

	Requested Items	Contents of the Request
1	Construction of floating jetty	Renovation of the existing jetty, which is too small and unsafe due to deterioration of the wood structure, and construction of an offshore fishing boat mooring jetty and mooring facilities for local artisinal fishing boats and boats belonging to the Fisheries Department, in order to alleviate congestion arising from the underdevelopment of fishing port facilities in Suva Harbour. (Total length 20 m, width 10 m) x 5 units + (connecting bridge and barge)
2	Expansion of apron	Renovation and construction in line with the above expansion of jetty facilities. Length 10 m
3	Construction of workshop	Construction of repair and maintenance facilities in order to make up for the lack of such facilities in Suva Harbour and Lami district and to enhance safety of fishing boats, and construction of public hygiene facilities for jetty users and an administration office for managing the jetty facilities. (Including repair yard, parts store, public toilets and office building)
4	Installation of ice-making machine and ice store	Replacement of the existing ice plant, which is deteriorated and has declining capacity, in order to supply ice to local artisinal fishing boats and converted offshore fishing boats that currently have trouble acquiring ice.
5	Installation of power supply equipment	Installation of land power supply equipment as a measure to stop noise from generators on moored fishing boats.
6	Installation of refueling equipment	Construction of equipment for supplying fuel to fishing boats preparing for fishing trips.
7	Supply of workshop equipment	Overhead crane, lathe, self-standing drill, bench drill, portable drill, grinder, hydraulic press, electric welder (including generator), gas welder, high-pressure washing machine, air compressor and tools, floor jack, workbench, tool set, multi tester, tachometer, micrometer, calipers, electric equipment cleaner, pipe bending machine, vice, tool rack, electric tools, manual tools, painting tools

Source: The request

Table 1-2 Front of Lami Fish Terminal

	Requested Items	Contents of the Request
1	Construction of floating jetty	Construction of an offshore fishing boat mooring jetty, in order to alleviate congestion arising from the underdevelopment of fishing port facilities in Suva Harbour. (Total length 20 m, width 10 m) x 3 units + (connecting bridge and barge)

CHAPTER 2 CONTENTS OF THE PROJECT

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2-1 Basic Concept of the Project

(1) Overall Goal and Project Objectives

In the Strategic Development Plan (SDP 2003-2005[1)]), the Government of Fiji has outlined reduction of economic gap between urban and rural areas and alleviation of poverty as important issues. In particular, the government is promoting development with emphasis attached to employment creation, infrastructure development of roads, water supplies and power supply, and improvement of schools and medical and health care facilities in rural communities including remote islands.

Concerning development plans for the fisheries sector, the Ministry of Fisheries and Forests Development Plan to the National Vision, 2003-2006 (MP & S [2)]) has been formulated. In this, the vision of offshore fisheries development is to have a sustainable and profitable industry harvesting at or near the total allowable catch (TAC), fully owned by Fijians, employing the maximum number of Fijians, with maximum retained value in the country. At the same time, concerning development of small-scale offshore fisheries in coastal waters, the Deep Water Snapper Project (DWS Project) and Small Scale Tuna Development Project (FAD Project) have been compiled with a view to encouraging artisanal fishermen to convert to offshore fisheries, in order to prevent excessive catching and depletion of fisheries resources in coastal waters.

The fisheries sector in Fiji accounts for 2.9% of GDP, provides employment for 5,857 workers (3,720 in the industrial fishery, 2,137 in the artisanal fishery), and generates 19,029 tons of production (13,226 tons in the industrial fishery, 5,803 tons in the artisanal fishery). In addition, subsistence fisheries account for production of 18,600 tons. Exports of fisheries products, which consist of F$ 104,200,000 from offshore fisheries and F$ 19,640,000 from coastal fisheries, make this the third highest foreign currency earning sector for Fiji behind sugar and garments. Moreover, artisanal fisheries catches intended for the domestic market amount to F$ 27,906,446, thereby making this an important industry in terms of both employment and stable food supply to the domestic market.

However, Suva Harbour, which acts as the base of operations for more than 100 offshore fishing vessels, does not have well developed fishing port facilities; in particular, Muaiwalu Jetty, which is intended for exclusive use by fishing vessels, is faced with constant congestion and a utilization rate of almost 200%. Accordingly, it is urgently necessary to construct fisheries

1) STRATEGIC DEVELOPMENT PLAN 2003-2005, "Rebuilding Confidence for Stability and Growth for a Peaceful, Prosperous Fiji"
2) MINISTRY POLICIES AND STRATEGIES:2003-2006

infrastructure in Suva Harbour including Lami Bay (Ndraunimbota Bay). Furthermore, jetty facilities at Fisheries Lami Jetty (constructed in 1994) are too small and lack safety due to deterioration; and there is a strong need for redevelopment of this facility in order to support the policy of converting some artisanal fishery operations to offshore fishing.

In order to resolve the said problems arising from the lack of development of fishing port facilities in Suva Harbour, the Project for Redevelopment of Fisheries Lami Jetty aims to rebuild the existing Fisheries jetty facilities to enable mooring by offshore fishing vessels, and to secure functions enabling the terminal to act as a base for converted offshore fishing vessels and artisanal fishing vessels operating in the Suva area as well as survey and training vessels belonging to the Fisheries Department. By doing this, the said project intends to contribute to the national objectives of securing foreign currency and creating employment opportunities through offshore fisheries development, as well as realizing stable supply of fisheries products to the domestic market and the stabilization and improvement of fishermen's incomes through the management and development of sustainable fisheries in coastal waters.

(2) Cooperation Project

In order to achieve the above objectives, the Project intends to construct fishing vessel mooring facilities at the Fisheries Lami Jetty in Ndraunimbota Bay, as well as a workshop and administration office, ice plant, shore power supply station, water supply facility, public toilets and watchman's hut. In doing this, the Project will offer support to offshore fishery activities by the government and artisanal fishery activities in the Suva area, and also assist the fisheries management, research and extension system of the Fisheries Department.

It is anticipated that the Project will bring forth the following improvements:

The following effects can be anticipated as a result of Project implementation:

① Increase in the number of offshore fishing boats utilizing Fisheries Lami Jetty (which currently only has mooring functions), and as a result, mitigation of congestion at Muaiwalu wharf located approximately 3 km to the east (average utilization rate will be reduced from 200% to 150%)

② Improvement in work efficiency in the landing of catches and transportation to fisheries companies located in Suva and Lami (increased catches at Fisheries Lami Jetty)

③ Improvement in operating efficiency of fisheries companies engaged in the offshore fishery (increased landing volume of the catches at Fisheries Lami Jetty)

④ Increase in the number of offshore fishing vessels using the Fisheries Lami Jetty

⑤ Improvement in the operating environment for fishing vessels converting to offshore fisheries (more fishing vessels and ice sales at Fisheries Lami Jetty); and

⑥ Support for artisanal fishermen based around Suva.

The project components cover construction of the following facilities and procurement of the following equipment:

Facilities:

1) Jetty and apron
2) Administration office and workshop
3) Power station and water supply equipment
4) Ice plant
5) Watchman's hut
6) Auxiliary facilities (site paving, parking spaces, others)
7) Demolition and removal of the existing apron

Equipment:

1) Bench drill machine and portable drill machine
2) Grinder
3) Electric welder
4) Gas welder
5) High pressure cleaner
6) Work bench
7) Tool Cabinet (for Hand tools)
8) Multi-tester
9) Tachometer (rev counter)
10) Vice
11) Electric tools
12) Hand tools

2-2 Basic Design of the Requested Japanese Assistance

2-2-1 Design Policy

(1) Basic Concept

The facilities and equipment targeted in the Project shall be examined item by item for necessity according to the Fisheries Lami Jetty Redevelopment Project compiled by the Fiji side, to ensure that the contents comply with the requirements of Japan's Grant Aid Scheme.

1) Jetty Facilities:

[1] Necessity in Offshore Fisheries Development

Out of 111 fishing vessels engaged in offshore fisheries (longline fishing vessels, demersal fishing vessels and pole-and-line fishing vessels), 102 excluding the 9 fishing vessels belonging to The Fiji Fish Marketing Group Ltd. are only able to use Muaiwalu Jetty for mooring, landing, servicing and provisioning in the Suva Harbour area. However, whereas Muaiwalu Jetty only has sufficient total berth length to moor 8 fishing vessels (assuming vessels in the 25 m class), every day somewhere between 15-22 vessels use the facility.

Problems in port entry:

Many offshore fishing vessels return to port early in the morning and land their catches before noon (average work time between 3-4 hours), and crewmembers rest up or go home in the afternoon. Meanwhile, fisheries companies carry in their fish catches to the work area during the morning and perform cleaning, processing, packing and shipping, etc. in the afternoon. Accordingly, the companies arrange trucks to coincide with port entry by fishing vessels, hire part-time workers to carry out work in the afternoon, and reserve aircraft services to export products the following day. However, due to congestion, on average vessels must wait some time for the jetty to become free once every 2 days, and vessels are unable to land their catches during the morning once every 4 days. In such cases, this interferes with all work preparations, the afternoon activities and the following day's air shipments, etc. As a result, waiting times by fishing vessels trying to enter the port, as well as delays in landing work are major problems.

Problems in leaving port:

Fishing vessels going out to sea usually finish loading supplies such as food, fuel, water and ice, etc. and also bait during the morning of the day following port entry, and then leave port late at night that day. The departure time is determined upon taking into account the time required to reach the intended fishing grounds and to start fishing at daybreak the next day or the day after. However, at the Fisheries Jetty, since priority is given to landing work by arriving fishing vessels, fishing vessels are sometimes unable to leave port on time because they have to make way for vessels waiting to land or they have to wait their turn to load water and refuel, etc. Furthermore, since fishing vessels need to move to offshore anchorages while they are waiting for shipping inspections or during repair work, it is difficult to perform smooth and efficient operations.

Meanwhile, concerning the needs and demand for the Fisheries Lami Jetty, there are a number of fisheries processing factories in Lami area close to the jetty, and it is also thought that fisheries companies in Walu Bay some 6 km from the Project site have high needs for the requested jetty providing that there is no waiting time and mooring fees are reasonable. Accordingly, the enhancement of offshore fishing vessel mooring functions at Fisheries Lami Jetty can be expected to have a certain effect in terms of mitigating congestion at Muaiwalu Jetty, which is currently the only mooring facility in Suva Harbour. Furthermore, whereas offshore fishing vessels pay a simple jetty fee of F$ 20.00 per day for using the Fisheries Lami Jetty, they have to pay the same fees as general commercial vessels and freight and passenger vessels as stipulated in the Port and Harbor regulations when using Muaiwalu Jetty. Moreover, these fees consist of the mooring charge of F$ 28.80 per day, a basic rate of F$ 10.45, an environment charge of F$ 4.00 and a landing charge of F$ 3.73 per ton. Considering these high costs, the priority and need for development of the Fisheries Lami Jetty is deemed to be high.

[2] Necessity for projects to promote conversion from artisanal fisheries to offshore fisheries

The government has implemented projects aiming to promote conversion from artisanal fisheries to offshore fisheries, for example, the DWS and FAD projects, since the latter part of the 1980s. These projects aim to prevent excessive catching and depletion in the regenerative capacity of fisheries resources around coastal reefs, which are the main fishing grounds in the artisanal fishery, by shifting emphasis to and promoting the phased development of offshore fisheries, which offer abundant reserves of untouched fish resources.

The existing Fisheries Lami Jetty was constructed under USAID funding in 1994 against the background of the said projects to promote conversion to offshore fisheries. However, since this jetty was constructed to handle FAO 28 feet and 33 feet fishing vessels built by the Fisheries Department as well as demersal fishing vessels measuring around 12~16 m, the overall size of the jetty is too small and it does not possess the functions to let fishing vessels land their catches or make servicing for fishing trips. Moreover, since the jetty is made of wood and is 10 years old, advancing deterioration means that it is increasingly unsafe.

In spite of its limitations, the existing Fisheries Lami Jetty is the only mooring facility in the Suva Harbour area that can be used by small and medium-scale fishing vessels such as converted offshore fishing vessels, small-size wooden fishing vessels and outboard engine fishing vessels, etc. In view of this situation, there is considered to be a

high need for development of jetty facilities (including workshop, administrative office, public toilets, ice plant and store, shore power station and water supply equipment) through implementation of the Project.

[3] Need for a base of operations for Fisheries Department survey and training vessels

The Fisheries Department has assigned 26 survey and training vessels and activities support vessels throughout Fiji, and these vessels are engaged in instructing and spreading fisheries technologies, surveying and monitoring fisheries activities, surveying fisheries resources, and also conducting culture experiments and survey activities on shellfish, seaweeds and pearls, etc.

The Fisheries Lami Jetty also acts as a base of operations for these vessels. In particular, since it is the home port of the 3 main vessels i.e. the Tui Ni Wasavula survey and training vessel that is procured under Japan's Grant Aid in 1980, the Gonedau (the first survey vessel), and the Uluqua fisheries activities support vessel, this heightens the need to develop the facilities and secure better mooring functions.

2) Workshop, Administration Office and Public Toilets

The dearth of fishing vessel maintenance facilities in the Suva Harbour area means that fishing vessels are constantly waiting for repairs. In particular, there are hardly any small-scale repair facilities, private sector or government-owned, that cater to small and medium-size fishing vessels. Meanwhile, since the Project site has restricted land and water area, it is not possible to build offshore mooring facilities capable of anchoring fishing vessels for long periods; whereas long-term anchorage at the jetty itself would only further hinder landing operations and fishing trip preparations by other vessels. Accordingly, the workshop needs to be a small-scale facility for working on small and medium-scale offshore fishing vessels and should be equipped with sufficient equipment to carry out simple repairs. As for the equipment contents, it is considered necessary and appropriate to equip the workshop with repair instruments and tools capable of performing adjustments to and maintenance on fishing gear, fish catching devices, engines, inboard electric instruments, distribution panels and wiring, etc. in a short time.

The administration office is considered indispensable for administering the jetty facilities, collecting fees, managing the production and sale of ice, operating and managing the workshop, managing water and electricity supply, and managing the public toilets. The public toilets are thought to be necessary as public facilities since it is estimated that somewhere between 50-70 jetty users, fishing vessel crewmembers, loading and unloading personnel and carrying personnel will require toilet facilities every day. Besides, the toilets

will prove effective in improving the sanitary environment and preventing spread of odor in the area around the Project site.

3) Ice Plant and Ice Storage

Longline fishing vessels, which account for most of the offshore fishing vessels, are owned by or are contracted exclusively to fisheries companies. Therefore, these vessels are able to receive the ice they need on fishing trips either from their companies or major ice-making companies. The aggregate ice manufacturing capacity of the 8 ice making companies in Suva and Lami districts is 100 tons or more per day, however, during the 2 months of the fishing season (particularly around July and August), ice shortages occur, and many fishing vessels including the longline variety are unable to leave port because they have no ice on especially busy days.

Meanwhile, small and medium fishing vessels (demersal fish and purse seine fishing vessels) that have converted to offshore fishing (outside the reef), and artisanal fishing vessels engaged in FAD fishing around Suva City only purchase small amounts of ice and find it difficult to procure the ice they need because the fisheries companies and ice making companies mentioned above give priority to longline fishing vessels that purchase in larger quantities. For this reason, in the Project, it is considered necessary to construct ice making facilities targeting small and medium-scale fishing vessels that have difficulty procuring ice. These facilities shall not, however, target Fiji Registered offshore fishing vessels and longline fishing vessels.

4) Shore Power Station

Many fishing vessels need to operate generators in order to supply power onboard when moored. Meanwhile, since a hotel is located next to the Project site, it is necessary to limit noise by generators. Accordingly, it is considered necessary to install shore power supply facilities on land in order to supply power to fishing vessels without them having to operate their inboard generators.

5) Water Station

Water supply facilities are fundamental support facilities for fishing vessels. The water station in the Project will need to supply water for fishing trips by all fishing vessels using the Fisheries Lami Jetty.

6) Watchman's Hut

The existing jetty entrance is open from 08.00 to 17.00 from Mondays to Fridays, while the rest of the time the gate is closed and locked with a watchman on duty during the night. However, in the event where the Project facilities are constructed, since more vehicles, workers and fishermen, etc. will use the site than at present, it will be necessary to control entry to the facilities. It is deemed necessary to construct a watchman's hut near the entrance to the site so that security personnel can guard the facilities and uphold the peace.

(2) Concept with Respect to Natural Conditions

1) Jetty Facilities

In order to avoid causing alteration to sea currents in waters around the existing jetty, the existing coastline and position and scale of the existing structure as it juts out to sea shall basically be retained; moreover, there shall be no dredging of the sea bottom in consideration of impact on the local ecosystem including surrounding waters.

2) Shore Facilities

- Since the Project site is surrounded by sea on 3 sides and is open to salt-bearing and moist trade winds blowing from the east, ample consideration shall be given to salt damage when conducting design and tide-proof building materials and auxiliary equipment shall be adopted.

- Since the Project site was formed by banking soil on a silt layer potentially prone to consolidation settlement, the allowable bearing capacity of the ground is not necessarily sufficient. Moreover, since the site is located in an area of seismic activity, care shall be taken to achieve structural stability by making buildings as light as possible.

- Topographically speaking, the Project site is sheltered from outer sea waves and winds and has never experienced any natural disasters. However, since Fiji is frequently hit by typhoons, which often cause major damage, ample attention shall be shown with respect to the design wind velocity.

- Concerning environmental impact assessment, the Ministry of Fisheries and Forests will follow the proper procedures upon applying to the Environment Department and implementing public hearings, etc. The consultant will furnish information necessary for the implementation of environmental impact assessment to the Ministry of Fisheries and Forests or Environment Department and offer support to ensure that the Project is implemented without hitch.

(3) Concept Regarding Social Conditions and Environment

1) The Project site is situated on a pleasant and tranquil area of water including the expansive waterfront of a hotel on the east side. The protruding part of the existing Fisheries Jetty leans somewhat to the hotel side, however, the position of the existing protrusion shall be planned as the permissible borderline for the construction of structures.

2) The land part of the Project site consists of a municipal park on the east side and a designated forest conservation district to the west. Accordingly, ample consideration shall be given to the landscape and noise generation when constructing the Project facilities.

3) The waters on the east side of the Project site are designated by the Fiji Islands Maritime Safety Administration for the hotel to moor pleasure boats, etc. Accordingly, in addition to paying attention to the mooring of work vessels during the works, the works shall be planned with care taken not to generate or disperse pollutants. Also, treatment of wastewater generated in the Project facilities shall be planned in accordance with facilities structural criteria in Fiji.

4) Since Fiji exercises controls on the use of gases containing substances that damage the ozone layer, the ice plant shall be designed in conformance with the local Act on Ozone Depleting Substances, and environmentally friendly refrigerant shall be used.

(4) Concept Regarding Construction Situation, etc.

1) Locally produced construction materials in Fiji are limited to cement, sand, aggregate and timber, etc, whereas items such as reinforcing bars, steel frame and plywood, etc. are imported from surrounding countries. The Project facilities shall be designed with methods and materials that fully take the schedule limitations imposed by these conditions into account.

2) Many skilled workers in Fiji are indigenous and do not possess high technical levels. Accordingly, proper care will need to be shown in managing the execution of works requiring high levels of precision, for example, metal roofs and wall materials, openings and wooden fittings, etc.

3) Prior to the construction of facilities, since it is necessary to receive inspections by the Port Department and Housing Department in the detailed design stage, these shall be incorporated into the schedule plan.

(5) Concept Regarding Operating and Maintenance Capacity of the Implementing Agency

1) The Project aims to support offshore fisheries, promote conversion from coastal to offshore fisheries, support and encourage artisanal fisheries in the Suva area, and support activities by fishing vessels belonging to the Fisheries Department. Accordingly, facilities shall be designed in a manner suitable for use by these types of fishing vessels.

2) The Project will be managed from an independent account with balance maintained between income and expenditure. Accordingly, it is necessary to plan and select facilities and equipment that will keep maintenance costs to a minimum.

3) Concerning tariffs that arise in line with Project implementation, the Fisheries Department shall carry the burden by budgeting for the corresponding amount of taxes to be paid to the Ministry of Finance in advance. As for value added tax, construction contractors first pay this to the government and receive a rebate later, however, it will be necessary to finalize specific procedures with related officials by the time the Project is implemented.

(6) Concept Regarding Setting of Facilities and Equipment Grades

1) Since the jetty will be used by unspecified numbers of fisheries personnel, it shall be designed with good sturdiness, durability, resistance to dirtying and with easy cleaning and maintenance.

2) Since the workshop, ice plant and ice storage will use metal fittings, refrigerant and lubricating oil, etc., finishing materials shall be selected with consideration given to shock resistance, abrasion resistance and chemicals resistance, etc.

3) Concerning the public toilets, colors and materials make dirt conspicuous and are easy to clean shall be selected to raise sanitary awareness among users.

4) Since equipment for the workshop, ice plant and ice storage are not manufactured in Fiji, the necessary items shall be procured in Japan or third countries.

(7) Concept Regarding Works Schedule

1) Since the Project site has limited space and the layout of buildings is congested, and since it is planned to transport construction materials overland, the works schedule shall be planned with ample consideration given to coordination of the carrying-in and temporary storage of construction materials and the building works.

2) Some construction materials and special items of equipment will be procured from overseas. Accordingly, ample time will need to be allowed for procurement when setting the works schedule.

(8) Concept Regarding the Scale of Facilities and Equipment

・ Basic Conditions for Setting Scale

As is indicated in Table 2-8, port facilities are located in six places in Suva Harbour, i.e. King's Wharf, Princess Wharf, Narayan Jetty, Muaiwalu Wharf, Fisheries Lami Jetty, and Lami Fish Terminal. Of these, fishing boats operating in Fijian waters are able to use facilities at the four sites of Narayan Jetty, Muaiwalu Wharf, Fisheries Lami Jetty and Lami Fish Terminal. Accordingly, the scale of facilities is calculated by adopting base units from the numbers, types and sizes of fishing boats that were surveyed at Fisheries Lami Jetty, Lami Fish Terminal, Muaiwalu Wharf and Narayan Jetty (having a quayside length of 183 m and water depth of 10 m, this is intended for domestic route ferries and passenger vessels and only allows fishing boats to moor when there is open space). Also, when calculating the scale of facilities, consideration shall be given to the mode of operation by type of fishing boat, quantities of landed catches, contents of work on jetties, vehicles using jetties, contents of work by related fisheries companies, and statistics for 2003~2004 from the Fisheries Department and the Maritime and Port Department.

1) Outline of Fisheries Activities

① Fisheries activities and workers

Fisheries activities in Fiji are divided into 4 categories, namely subsistence fishery, artisinal fishery, industrial fishery and aquaculture, and the Fisheries Department manages all 4 areas. Industrial fishing, which is mainly practiced in grounds stretching from inner waters to outer sea, includes large-scale industrial fisheries by large domestic and foreign fishing boats that supply fish to tuna and bonito canning plants, and, since 1990 in the Suva Harbour area, small-scale offshore fisheries by medium offshore fishing boats and companies exporting fresh tuna and deep water snapper. The artisinal fishery, which is mainly practiced in inner waters, constitutes a small-scale commercial fishery targeting the domestic market and plays an important part in supplying fish for human consumption and creating employment opportunities in the regions. In recent years, more and more small-scale fisheries companies are exporting sea slug, seashells and aquarium fish, etc. to overseas markets. Fishing boats mainly consist of 8~10 m wooden fishing boats constructed under assistance from the Fisheries Department. Subsistence fisheries are practiced in regional coastal areas and remote islands for home consumption, although any excess

catches are commercially sold. Fishing boats are either wooden rowing boats or FRP outboard engine boats measuring 3~6 m.

Under the fisheries administration system in Fiji, fisheries are divided into offshore fisheries and inshore fisheries as shown in Table 2-2 according to the operating waters (fishing grounds) based on Fijian fisheries law, fishing boat registration, operating certificate and registered items by type of fisheries company.

68 fisheries companies engaged in the offshore fishery and coastal fishery are registered with the Fisheries Department. Of these, 26 companies sell fish caught in offshore waters for export and on the domestic market, 25 companies sell fish caught in coastal waters for export and on the domestic market, while 17 companies are only concerned with domestic market sales.

Table 2-1 Number of Fisheries Companies and Workers Engaged in the Industrial Fishery (2003)

	Offshore Fishery	Coastal Fishery	Other, Coastal Fishery	Total
Scope of operations	Export and domestic sale	Export and domestic sale	Domestic sale only	
Number of companies	28	25	17	68
Number of employees (regular)	*(1,020)	988	(Not ready)	2,008
Number of employees (seasonal/part-time)	(306)	296	None	602
Offshore fishing vessel crewmembers	1,110	(Coastal fishermen)	(Coastal fishermen)	1,110
Industrial fishermen	2,436	1,284	0	3,720

Source: Fisheries Department (*: total for just 17 companies that supplied data)
The number of seasonal workers was estimated as 30% of the number of regular employees, while the number of offshore fishing vessel crewmembers was calculated as an average of 10 crew x 111 vessels.

Table 2-2 Relationship Between Fiji's Sea Area and Fisheries Administrative Divisions and Fisheries Development Plans

<table>
<tr><td></td><td colspan="5">Fiji Fisheries Zone (all waters belonging to Fiji)</td></tr>
<tr><td>Sea area:
1,145,000 km^2</td><td colspan="2">Internal water:
18,272 km^2</td><td>Archipelagic water:
130,450 km^2</td><td>Territorial Sea:
45,000 km^2</td><td>200 mile EEZ
(Exclusive Economic Zone)</td></tr>
<tr><td>Type of fishery</td><td colspan="2">Artisanal fishery:
permit required,
Subsistence fishery:
no permit required</td><td colspan="3">Industrial (commercial) fishery</td></tr>
<tr><td colspan="6"></td></tr>
<tr><td rowspan="2">Fisheries administrative division</td><td colspan="2">Coastal fishery</td><td colspan="3">Offshore fishery</td></tr>
<tr><td colspan="2">Waters in which indigenous Fijians have fishing rights</td><td colspan="2"></td><td></td></tr>
<tr><td>Coastal fishery license</td><td>IDA permit</td><td>ODA permit</td><td colspan="2"></td><td></td></tr>
<tr><td>Registered coastal fishing vessels</td><td colspan="2">(Registration is necessary)</td><td colspan="2"></td><td></td></tr>
<tr><td colspan="6"></td></tr>
<tr><td colspan="3" rowspan="2">Offshore fishery (entry) permit:
(Fishing vessel needs to be registered)</td><td colspan="3">Waters where Fiji Registered fishing vessels (C1) are allowed to operate</td></tr>
<tr><td colspan="2"></td><td>Waters where foreign fishing vessels (C2) can operate</td></tr>
<tr><td>Fisheries development plans</td><td colspan="2">・ Regional Fisheries Service Center
・ Coastal Fishery Development
・ Promotion of sea slug and button shell exports
・ Guidance on post-harvest processing (PH)</td><td colspan="3">Offshore Fisheries Development</td></tr>
<tr><td colspan="2"></td><td>(DWS)
Development Project
(FAD)
Development Project</td><td colspan="2"></td></tr>
</table>

Table 2-3 Categories and Operating Areas of Offshore Fishing Vessels

Category	Nationality (registered port)	Fiji Sea Area Fishing Permit	Operating Base (Landing Site)
C1: Category 1	Fiji	Yes (Archipelagic water + territorial sea + EEZ)	Within Fiji
C2: Category 2	Foreign	Yes (Territorial water + external EEZ only)	Within Fiji
C3: Category 3	Foreign	No (operate outside of Fiji's fishing waters)	Within Fiji
C4: Category 4	Foreign	No (operate outside of Fiji's fishing waters)	Transferred outside of Fiji

② Number of operating fishing vessels and landed quantities

a. Table 2-4 shows the number of offshore fishing vessels that are based in Suva Harbour.

Table 2-4 Breakdown of Offshore Fishing Vessels (2003)

Category	Longline Fishing Vessels		Pole and line	Demersal fishing vessel (DWS)	Total	
Nationality	Fiji (C1)	Foreign (C2)	C1	C1	C1	C2
Number of vessels	51	50	1	9	61	50
Total	101		1	9	111	

Source: Fisheries Department

b. Main landing sites, landed quantities and destinations of fish caught by longline fishing vessels in the offshore fishery

The landed quantity of tuna and other fish caught by the 101 longline fishing vessels engaged in the offshore fishery amounted to 11,932 tons in 2003. The landing sites, landed quantities and destinations of these catches are indicated below. Concerning the breakdown of destinations, almost the same ratio of catches went to Muaiwalu Jetty and LFT (Fiji Fish).

Table 2-5 Main Landing Sites, Landed Quantities and Destinations of Tuna

Landing Site	Muaiwalu Jetty		LFT (Fiji Fish)		Private Shipbuilder's Wharf		Total
Landed quantity(t/%)	8,114	68.0%	3,806	31.9%	12	0.1%	11,932
Monthly average landed quantity (t)	676		234				

Main destination	Export markets			Domestic market		Domestic canneries		Total
Marketed quantity (t/%)	3,958		33.2%	4,855	40.7%	3,119	26.1%	11,932
Export destination	USA	Japan	Other					
Exported quanity by destination	2,279	654	1,025					
Exported ratio by destination	57.6	16.5	25.9					

Source: Fisheries Department

c. Landed quantity (waters inside Fiji's EEZ) (produced and marketed quantities of fisheries products)

Landed quantities of fisheries products caught in Fiji Waters are shown below.

Table 2-6 Trends on Landed Quantities of Fisheries Products (1994~2003)

Unit: tons

Year		1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Subsistence fishery		16,800	17,000	17,200	17,400	17,600	17,800	18,000	18,200	18,400	18,600
Coastal fishery		7,315	7,369	6,725	6,170	6,812	7,136	7,026	6,969	6,872	5,803
Public market	Fish	593	589	568	618	482	647	687	522	621	639
	Other	1,441	1,538	1,469	1,506	1,659	1,704	1,745	1,705	1,726	1,195
Out of market	Fish	4,200	4,106	4,007	3,193	3,701	3,784	3,623	3,689	3,419	2,780
	Other	1,081	1,136	681	853	970	1,001	971	1,053	1,106	1,189
Offshore fishery		14,900	14,100	13,900	13,750	15,281	12,290	16,377	7,178	12,474	13,226
Total		39,015	38,469	37,825	37,320	39,694	37,227	41,403	32,347	37,745	37,629

Source: Fisheries Department (tuna exports indicate landed quantities from Fiji Waters).
Note: The yearly increase in subsistence fishery production is assumed to be 200 tons following the fact-finding survey that was implemented in 1980.

d. Table 2-7 shows the number of fishing vessels and fishermen engaged in the coastal fishery in all Fiji.

Table 2-7 Fishing Vessels and Fishermen Engaged in the Coastal Fishery

	Number of Fishing Vessels (Permits)		Number of Permitted Fishermen (Permits)	Fishing Vessel Crewmembers (fishing vessels on the left)
Fisheries zone	IDA	ODA		
Central zone	187	0	187	517
East zone	45	62	107	262
West zone	328	11	296	794
North zone	202	60	262	564
Total	762	133	852	2,137

Source: Fisheries Department

2) Basis of the Request for Jetty Facilities

Suva Harbour contains the 6 port facilities indicated below. Of these, [5] Fisheries Lami Jetty was constructed under USAID funding as a wooden floating jetty in 1994 with the objective of promoting the offshore fishery, which was started from the latter half of the 1980s. Around that time, since offshore fishing vessels mainly consisted of small pole-and-line and bottom fish fishing vessels measuring between 10~15 m, the jetty was designed as a small-scale structure. However, because these vessels were gradually superseded by medium and large-scale longline fishing vessels of between 16~30 m or more, the jetty gradually lost its usefulness as an offshore fishing vessel mooring facility. Moreover, because the jetty is no longer safe due to deterioration of the wooden structure, it can no longer even be used by 10~16 m fishing vessels that have switched to offshore fishing or outboard motor vessels of less than 10 m engaged in artisinal fishing. Of the other

port facilities, only Muaiwalu Jetty (facility number [4]) permits use by general fishing vessels not owned by Fiji Fish Group Ltd. (C1, C2). Narayan wharf, which is intended for domestic vessels, also allows use by fishing vessels, however, because it gives priority to other vessels before fishing vessels, it can only be used when there is open space at the wharf and there is no guarantee that offshore fishing vessels can use it at all times. Accordingly, Muaiwalu Jetty is the only port facility currently open to offshore fishing vessels, and since this must be used by more than 100 such vessels, the resulting congestion hinders smooth landing and fishing trip preparation work.

Table 2-8 Port Facilities in Suva Harbour

No.	[1]	[2]	[3]	[4]	[5]	[6]
Name	Kings wharf	Princess wharf	Narayan Wharf	Muaiwalu Jetty	Fisheries Lami Jetty	LFT Jetty
Place	Suva Harbour east Kings Wharf	Suva Harbour east Kings Wharf	Suva Harbour east Muaiwalu district	Suva Harbour east Muaiwalu district	Suva Harbour northwest Lami district	Suva Harbour northwest Lami district
Type of port	Foreign trade	Foreign trade	Domestic trade	Domestic trade	Domestic trade	Domestic trade
Jurisdiction / control	Maritime and Port Department / ditto	Maritime and Port Department / ditto	PT Co. (state-run) Port Terminal Co.	Maritime and Port Department / Muaiwalu Branch Office	Fisheries Department / ditto	Private fisheries companies / ditto
Scale (m)	Total mooring length:492 Water depth: 11	154 6	183 10	140+11(3~:	120+16 2~3	140+92 3
Types of using vessels	Freighter, passenger vessel, marine vessel, training vessel	Fishing vessels (C3, C4), reloading, supply	Domestic freighters, ferries	Fishing vessels (C1, C2)	Fishing vessels (C1, C2)	Fishing vessels (C1, C2)
State of use	Rather crowded	Very crowded	Crowded	Very crowded	Crowded with long-term moored vessels	Exclusive use by 1 company / normal
Average number of fishing vessels using per month	Included in [2]	33.3	10.3	99.6 vessels September 2003 – August 2004)		(40 vessels) Hearing findings
Remarks	For exclusive use by foreign vessels	For exclusive use by foreign vessels			No loading / unloading functions	(Exclusive vessels only)

Note) In addition to the above, 2 fishing vessels were confirmed to be using a wharf exclusively used by a shipbuilding company. Incidentally, the number of fishing vessels using each facility refers to the number of times that a vessel docks at and departs from the facility concerned.

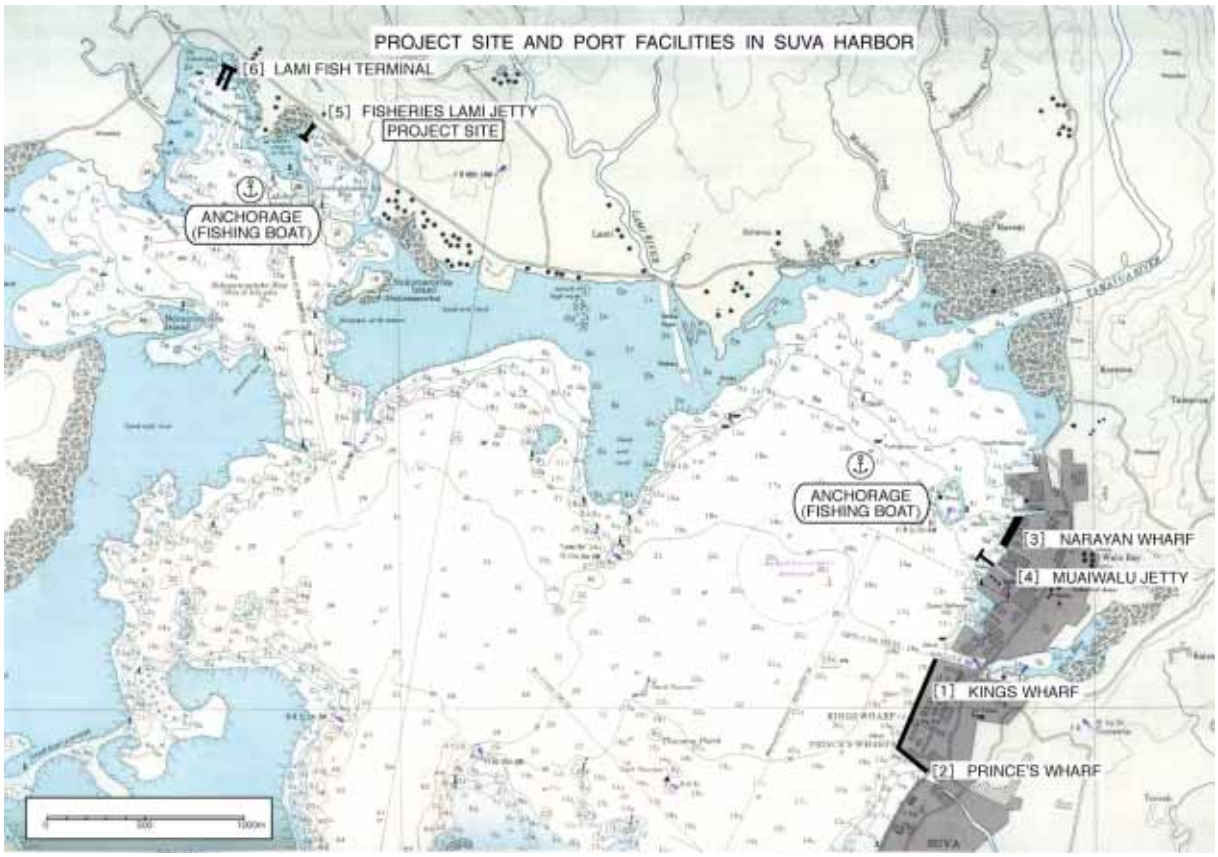


Figure 2-1 Map of Port Facilities in Suva Harbour

Verification 1: Status of use (congestion) at port facilities in Suva Harbour

Out of the above 6 facilities, survey of status of use was carried out at 5 not including Kings wharf.

[2] Number of fishing vessel using Princess wharf

Table 2-9 Average Number of Using Fishing Vessels in the Past 3 Years
(C3 and C4: fishing vessels operating outside of Fiji Waters)

Year	Number of Using Fishing Vessels (year)	Number of Using Fishing Vessels (month)	(Gross Registered Tonnage) Annual Total	(Gross Registered Tonnage) Average/1 vessel
2001	256 vessels	21.3 vessels	90,887 GRT	355 GRT
2002	375 vessels	31.3 vessels	113,710 GRT	303 GRT
2003	585 vessels	48.8 vessels	185,983 GRT	318 GRT
2004	233 vessels	38.8 vessels	71,204 GRT	306 GRT
Average	414 vessels	33.3 vessels	115,446 GRT	319 GRT

Source: Maritime and Port Authority (2004 indicates data for half the year from January to June), GRT: Gross Registered Tonnage

◆ Average mooring time per vessel in 2003 = 151 hours (6 days 7 hours)

[3] Status of use at Narayan Wharf

Narayan Wharf is the only port facility that can be used by freight vessels, ferries and freight and cargo-passenger vessels, etc. operating on domestic routes in Fiji. Normally, it is used as a base for roll-on roll-off ferries with gross tonnage of 3,000 tons.

Table 2-10 Annual Use of Narayan Wharf (2003)

Type of vessel	Using Number (year)	Using Number (monthly average)	(Gross Registered Tonnage) Average/1 vessel	Average Mooring Time / 1 Vessel
RORO vessel (large ferry)	216 vessels	18 vessels	3,002 tons	24 hours (1.0 day)
General freight vessel	459 vessels	38 vessels	268 tons	113 hours (4.7 days)
Fishing vessel	92 vessels	8 vessels	120 tons	35 hours (1.5 days)
Total	767 vessels	64 vessels		

Source: Port Terminal Co.

Many of the fishing vessels that use Narayan wharf have no mooring space at Muaiwalu Jetty. These are C1 and C2 fishing vessels, which are sent from Muaiwalu Jetty when there is vacant space at Narayan wharf and mooring by regular ships is not scheduled.

Table 2-11 Average Number of Using Fishing Vessels in the Past 3 Years

Year	Using Number (year)	Using Number (month)
2001	101 vessels	8.4 vessels
2002	107 vessels	8.9 vessels
2003	92 vessels	7.7 vessels
2004 (January-June)	128 vessels	21.3 vessels
Average	123 vessels	10.3 vessels

Source: Maritime and Port Department

- Average mooring time per vessel in 2003 = 3,187 ÷ 93 vessels = 34 hours (1 day 10 hours)
- Average gross registered tonnage per vessel in 2003 = 11,070 ÷ 93 vessels = 119 GRT

[4] Status of use at Muaiwalu Jetty

The following contents were confirmed and verified concerning use of Muaiwalu Jetty by Fiji Fishing Vessel C1 and C2 offshore fishing vessels (excluding those belonging to Fiji Fish).

Table 2-12 Annual Use of Muaiwalu Jetty (2001 ~ June 2004)

Year	Using Number (year)	Using Number (monthly average)	Gross Registered Tonnage	(Gross Registered Tonnage) Average/1 vessel	Annual Total Mooring Time	Average Mooring Time / 1 Vessel
2001	710	59	63,915	90	25,562	36
2002	1,036	86	118,164	114	29,118	28
2003	998	83	95,915	96	29,940	30
*2004	480	80	54,656	114	17,567	37
Average	921	77	95,043	103		

Source: Totaled data from the Maritime and Port Authority (excluding medium and long-term moored vessels).
*) 2004 indicates data for half the year from January to June.

Table 2-13 Annual Status of Use of Muaiwalu Jetty (September 2003 ~ August 2004)

Year	2003				2004								Total
Month	9	10	11	12	1	2	3	4	5	6	7	*8	
Number of using fishing vessels	106	91	96	82	96	100	112	85	100	109	114	103	1,194
Daily average	3.5	3.0	3.2	2.6	3.1	3.6	3.6	2.8	3.2	3.6	3.7	4.0	3.3

Source: Maritime and Port Authority (control ledger) * August 2004 indicates data from the 1st to the 27th.

Table 2-14 Number and Landed Quantities of Fishing Vessels Landing Catches at Muaiwalu Jetty

	2004							
Month	1	2	3	4	5	6	7	Average
Landing frequency (vessels)	38	47	34	30	46	64	48	44
Landed quantity (tons)	349	415	245	295	322	560	440	375

Source: Maritime and Port Authority (control ledger): However, since landed quantities are based on self-declarations, the actual figure is approximately 20-30% higher.
Other purposes of mooring apart from landing fish include preparing for fishing trips (fuel and water supply, etc.), repairs, superstructure repair and waiting for inspections, etc.

Table 2-15 Mooring Situation at Muaiwalu Jetty (July 31 ~ August 13, 2004)

Month/Day		Mooring Number (vessels)			Wharf Use Rate
		A.M	P.M	Average	Assuming mooring length 30m ×8(vessels)= use rate of 100%
July 31	Sat	15	15	15.0	188 %
August 1	Sun	21	18	19.5	244 %
2	Mon	20	22	21.0	263 %
3	Tue	22	20	21.0	263 %
4	Wed	19	18	18.5	231 %
5	Thu	13	14	13.5	169 %
6	Fri	9	10	9.5	119 %
7	Sat	11	10	10.5	131 %
8	Sun	12	12	12.0	150 %
9	Mon	17	18	17.5	219 %
10	Tue	17	18	17.5	219 %
11	Wed	16	13	14.5	181 %
12	Thu	14	13	13.5	169 %
13	Fri	9	11	10.0	125 %
Average		15.4	15.1	15.3	191 %

Source: Monitoring survey

Table 2-16 Number of Fishing Vessels Entering Port to Muaiwalu Jetty
(August 1 ~ August 27, 2004)

Day	1	2	3	4	5	6	7	8	9	10	11	12	13	14	
Vessels	(7)	(10)	1	4	1	0	2	2	(7)	1	(7)	0	4	(7)	
Day	15	16	17	18	19	20	21	22	23	24	25	26	27		Total
Vessels	2	(7)	(6)	5	1	1	5	4	3	5	2	1	2		103 vessels

Source: Maritime and Port Authority (control ledger)

- ◆ Breakdown of 103 vessels: Fiji Fishing Vessel C1 vessels: 53, foreign C2 vessels: 50)
- ◆ (): Number of days where vessels had to wait to land catches = days when 6 or more vessels entered port (7 days out of 27)
- ◆ Number of days where vessels were moved to make way for landing vessels = days when 4 or more vessels entered port (13 days out of 27)

Table 2-17 Average Mooring Time at Muaiwalu Jetty (vessels entering port in July 2004: 102)

(Hours/vessel)

Time	Less than 4 h	4-24 h -1 day	25-48 h -2 days	49-72 h -3 days	73-96 -4 days	97 h – 1 4 days or more	More than 1 week	
Number of vessels	4	15	50	21	6	4	2	102
(%)	3.9 %	14.7 %	49.0 %	20.6 %	5.9 %	3.9 %	2.0 %	100 %

Source: Maritime and Port Authority (control ledger) (however, 4 vessels less than 4 hours and 2 vessels more than 1 week are excluded).

[5] Status of use of the Fisheries Lami Jetty

Fisheries Lami Jetty, which belongs to the Fisheries Department, cannot currently be used for work apart from long-term mooring. Accordingly, it is used to moor 8 private fishing vessels as well as 1~3 vessels belonging to the Fisheries Department. The jetty has few vacant berths, so hardly any offshore fishing vessels operating in nearby waters and small fishing boats operated by local fishermen can use the jetty. In addition, local fishermen use outboard engine vessels and dumb barges for fishing and miscellaneous purposes.

In the Project, it is planned to move these long-term moored fishing vessels to designated offshore anchorage prior to the construction works.

Table 2-18 Status of Use of Fisheries Lami Jetty

Month/Day		Onboard engine vessels of 10 m or more			Outboard motor vessels and dumb barges
		A.M	P.M	Average	Morning and afternoon average
July 31	Sat	9	9	9.0	5
August 1	Sun	11	11	11.0	6
2	Mon	12	12	12.0	6
3	Tue	12	12	12.0	4
4	Wed	11	11	11.0	6
5	Thu	11	11	11.0	5
6	Fri	11	10	10.5	8
7	Sat	11	12	11.5	5
8	Sun	12	11	11.5	5
9	Mon	11	10	11.5	5
10	Tue	11	11	11.0	6
11	Wed	11	11	11.0	5
12	Thu	11	10	10.5	4
13	Fri	11	11	11.0	5
Average			12	11.5	

Source: Monitoring survey

[6] Status of use of the LFT Jetty

The floating jetty at Lami Fish Terminal is exclusively used by fishing vessels that belong to private fisheries companies or group companies. It is not usually congested, although incoming vessels sometimes want to moor at the same time, however, this hardly hinders the landing of catches at all.

Table 2-19 Status of Use of the LFT Jetty

Month/Day		Fishing vessels of 16 m or more			Jetty use rate (2 floating jetties)
		A.M	P.M	Average	Calculate assuming mooring jetty 23 m×10(vessels)=100%
July 31	Sat	9	11	10.0	100 %
August 1	Sun	10	10	10.0	100 %
2	Mon	10	11	10.5	105 %
3	Tue	8	7	7.5	75 %
4	Wed	5	7	6.5	65 %
5	Thu	6	6	6.5	65 %
6	Fri	6	6	6.0	60 %
7	Sat	8	9	8.5	85 %
8	Sun	11	11	11.0	110 %
9	Mon	14	14	14.0	140 %
10	Tue	18	15	16.5	165 %
11	Wed	16	14	15.0	150 %
12	Thu	11	11	11.0	110 %
13	Fri	12	11	11.0	110 %
Average		10.3	10.2	10.3	103 %

Source: Monitoring survey

3) Basis for Calculation of Scale of Jetty Facilities

・ Basic conditions of scale calculation

The requested jetty is planned as 5 steel floating jetties of 20 m long and 10 m wide connected together in a T-shape. However, the tip of the jetty encroaches waters on the east side that are prohibited for vessel mooring by the Fiji Maritime Safety Authority, whereas waters on the west side are shallow at between 1~2 m. In other words, the scale of the requested jetty is not suited to safe approach and mooring by fishing vessels. Accordingly, when determining the scale of the Project jetty, consideration shall be give to the restricted water area and depth of the project site, the number of fishing vessels and congestion mitigation effect at Muaiwalu Jetty, as well as the vision for offshore fishery development envisaged by the Government of Fiji. Moreover, it shall be assumed that Fiji offshore fishing vessels, converted offshore fishing vessels, and fishing vessels owned by the Fisheries Department use the jetty.

① Offshore fishing vessels

The number of fishing vessels operating within the EEZ of Fiji is 111, consisting of 58 vessels of Fiji registered fishing vessels and 53 of foreign fishing vessesl (2003). Leaving aside 9 fishing vessels of registered in Fiji that belong to Fiji Fish Group Ltd.,

the remaining 102 vessels use Muaiwalu Jetty, which as a result experiences serious congestion of around 200%. Out of the 102 fishing vessels that use Muaiwalu Jetty, 49 vessels (58 – 9) or 48% of the total are of registered in Fiji.

In order to alleviate the 200% congestion of Muaiwalu Jetty, it would be ideal to limit use of the Project jetty to the 49 fishing vessels registered in Fiji, which account for approximately 48% of all offshore fishing vessels in the area. However, because the usable water area here is limited to approximately 2,000 m^2 (approximately 25 m across from east to west and 80 m lengthways from north to south) and the water depth is shallow at between 2.0~4.2 m, it is impossible to set a jetty scale that can cater to 49 vessels.

Accordingly, the scale of the jetty shall be set to cater for 27 fishing vessels (26% of the total) of Fiji registered fishing vessel that measure no more than 26.5 m (design draft 3.72 m = loaded displacement 3.23 m + depth allowance 0.5 m), since this is the length of vessel that can safely enter the water area of 4.2 m maximum depth in the fully loaded state.

Table 2-20 Breakdown of Nationality and Scale of Offshore Fishing Vessels Using Muaiwalu Jetty

Used jetty	Muaiwalu Jetty		Total
Nationality	Registered in Fiji	Foreign	
Total length: L<26.5m	27	29	56
Total length: 26.5m<L	22	24	46
	49	53	102

Source: Fisheries Department (2003)

Meanwhile, 22 fishing vessels registered in Fiji measuring more than 26.5 m operate in Suva Harbour. Depending on the state of congestion at Muaiwalu Jetty, it is forecast that large fishing vessels such as these may moor at the Project jetty without conforming to the design concept and control standards of the Project.

Accordingly, in the Project, the scale of berths shall be set taking into account safety of large fishing vessels (more than 26.5 m) regarding water depth at the Project site and prevention of damage resulting from docking stress and towing force greater than the jetty design strength.

Table 2-21 Breakdown of Offshore Fishing Vessels Targeted by the Jetty

	Type by length (L)	Total length(m)	Gross Registered Tonnage	Category
1	C I: 10.0<L<12.5m	10.98	28.20	DWS
2		10.98	15.00	DWS
3		12.07	12.16	DWS
4	C II: 12.5<L<16.5	13.00	32.46	DWS
5		13.14	33.00	DWS
6		13.70	40.00	DWS
7		14.00	19.90	DWS
8		14.00	19.99	Longline
9		14.20	28.00	DWS
10		15.00	44.00	Longline
11		16.20	31.07	DWS
12	C III A: 16.5<L<22.5	20.83	50.59	Longline
13		21.30	48.00	Longline
14		22.40	120.00	Longline
15	C III B: 22.5<L<26.5	22.86	107.00	Longline
16		24.25	74.69	Longline
17		24.52	83.42	Longline
18		24.53	59.50	Longline
19		24.97	65.00	Longline
20		25.02	59.52	Longline
21		25.04	59.00	Longline
22		25.20	75.00	Longline
23		25.20	74.00	Longline
24		25.86	130.00	Longline
25		25.95	102.00	Longline
26		26.00	113.00	Longline
27		26.00	113.00	Longline

DWS: 9 deep water snapper fishing vessels include 6 that receive guidance and support under the DWS Project. Gross registered tonnage (GRT) in Fiji = International gross tonnage.

② Small offshore fishing vessels

Out of the fishing vessels that have converted to offshore fisheries upon receiving instruction and support under the FAD Project, the following vessels in Central and East Division that are based in Suva:

- 28 feet FAO fishing vessels : 15 vessels
- 33 feet FAO fishing vessels : 4 vessels
- Outboard engine fishing vessels : 6 vessels

Total : 25 vessels

③ Vessels owned by the Fisheries Department (Tui Ni Wasabula, Gonedau, Uluqa)

Table 2-22 Breakdown of Vessels Owned by the Fisheries Department

Vessel Name	Total Length (m)	Total Width (m)	Draft (m)	Total Tonnage (m)	Year Built	Material
TUI NI WASABULA	17.50	3.88	2.10	28	1980	FRP
ULIQA	14.63	3.35	1.82	30	1974	Ferro cement
GONEDAU	15.85	3.40	1.70	54	1968	Wood

Note) Since the Tui Ni Wasabula is not an operating vessel, it is included in the CII category (12.5 < L < 16.5).

Table 2-23 shows a breakdown of the fishing vessels targeted by the new jetty according to vessel length and field of activity.

Table 2-23 Breakdown of Fishing Vessels Targeted by the Jetty

Category by Length (L) (Unit: m)	Offshore Fishing Vessel		Small Offshore Fishing Vessel		Fisheries Department Vessels	Total (vessels)
	Longline	DWS	FAO type	Outboard engine type		
L<7.0				6		6
Small fishing boat 7.0<L<10.0			15			15
C I : 10.0<L<12.5		3	4			7
C II : 12.5<L<16.5	2	6			(3)	(3)+8
C IIIA : 16.5<L<22.5	3					3
C IIIB : 22.5<L<26.5	13					13
	18	9	19	6	(3)	(3)+52

Note) Since the Fisheries Department vessels are not operating vessels, they are shown as (3).

・ Determination of Jetty Scale and Grade

① Category by vessel length

The jetty scale is set upon broadly dividing the targeted fishing vessels, including the vessels owned by the Fisheries Department, into 5 categories according to vessel length and form of operations. Concerning small outboard engine fishing vessels measuring 7.0 m or less, these are omitted from the basis for calculation of the required number of berths; instead, a mooring and landing area for small-size vessels shall be planned at beside of the apron on the Project site.

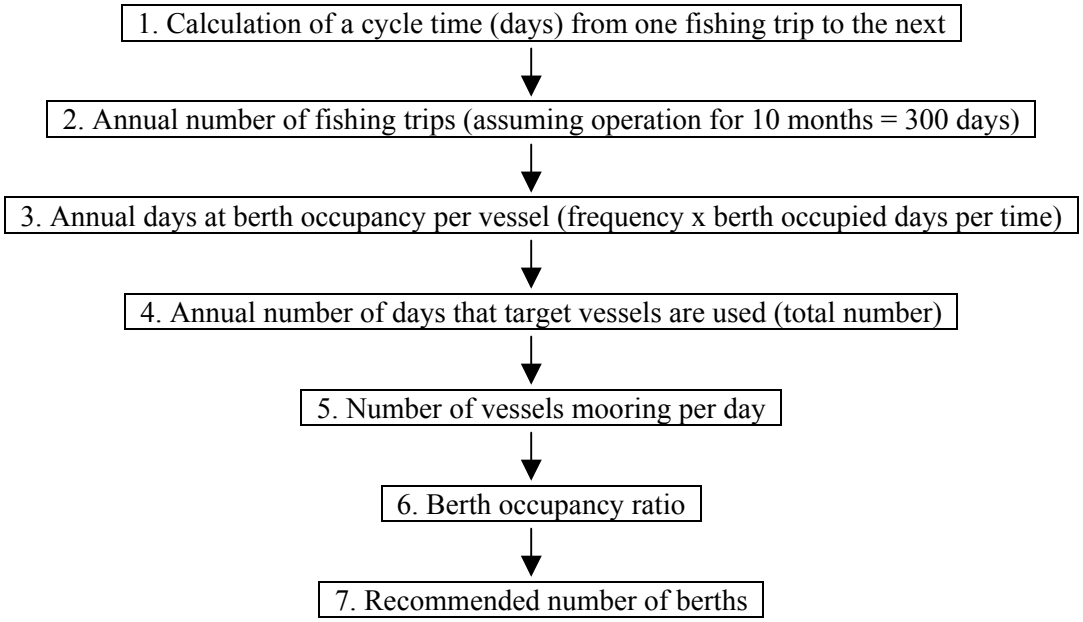
Small fishing boat : Small fishing boats of total length 8.0 m ~ 9.9 m
Category CI : Small fishing boats of total length 10.0 m ~ 12.4 m
Category CII : Small offshore fishing vessels registered in Fiji + Fisheries Department vessels of total length 12.5 m ~ 16.4 m
Category CIII A : Offshore fishing vessels registered in Fiji of total length 16.5 m ~ 22.4 m

Category CIII B : Offshore fishing vessels registered in Fiji of total length 22.5 m ~ 26.5 m

② Determination of the recommended number of berths

a. Procedure for calculating the number of berths

The number of berths is calculated according to the following procedure:



b. Handling of Class II Fisheries Department Vessels

Since the Class II vessels owned by the Fisheries Department are used for purposes apart from fishing such as fisheries dissemination, training, resource surveying and culture surveying, etc., they are normally moored at the Project jetty where the Fisheries Department offices are located. Therefore, mooring space shall be secured for these 3 vessels based in Lami.

c. Berth occupancy ratio

Fishing vessels incur economic loss when they are unable to conduct work at landing times or fishing trip preparation times due to berths being occupied by other vessels. If the number of berths is less than the daily number of mooring vessels in the above procedure, the number of moored days will increase. In the procedure prescribed in the United Nations manual for port development in developing countries, the daily number of mooring vessels is assumed to be the number of berths, and the berth occupancy ratio obtained by division from this is taken as the recommended number of berths.

In the Project, the recommended number of berths shall be calculated based on the United Nations standard for port development.

Table 2-24 Necessary Berth Occupancy Ratio (%) as Stipulated in the United Nations Port Development Standard

Number of berths in line group	Recommended berth occupancy (percentage)
1 or less	40%
1~2	50%
2~3	55%
3~4	60%
4~5	65%
5~10	70%

d. Determination of the number of berths

The following table shows the recommended number of berths calculated according to the above procedure.

Table 2-25 Calculation of the Recommended Number of Berths

Procedure	Item	Unit	Small Fishing Vessel	Class I	Class II	Class III A	Class III B
	Size of Fishing vessel (overall length)	m	8-10	10-12	12-16.5	16.5-22.5	22.5-26.5
1	Leave port – fishing – back in port	Day	2	3	7 (1 week)	14 (2 weeks)	17.5 (14+21)/2
2	Fish landing and preparation of trip	Day	0.2	0.3	0.5	1	1.0
3	Work standby C×② ③'=⑪ / (⑫+⑬) ③'<1→C=0 ③'>1→C=0.5	Day	0.1 1.1 0.5	0 0.6 0	0.25 1.5 0.5	0 0.3 0	0.5 2.1 0.5
4	Cycle time	Day	2.3	3.3	7.75	15	19
5	Annual fishing trips (300 days operation)	Times	130	90	38	20	16
6	Berth occupied days (per year) per vessel	Day	39	27	29	20	24
7	Target number of vessels	Vessel	15	7	8	3	13
8	Total number of berth occupied days	Vessel -day	585	189	232	60	312
9	Occupied vessels per day	Berth	1.6	0.6	0.6	0.2	0.9
10	Occupancy ratio of the target berths	%	50%	50%	40%	40%	40%
11	Recommended number of berths	Berth	3.2	1.1	1.5	0.4	2.1
12	Working berths	Berth	2	2	1	1	1
13	Standby berths	Berth	1	0	III-A	0	0
14	Idling berths	Berth	2	1	0	0	0

e. Dimensions of berths

Design water depth and berth length of the mooring jetty shall be determined appropriately so that the target fishing vessels can use the jetty safely and smoothly. Berth length is obtained by combining the length (in case of alongside mooring) or width (in case of head-on mooring) of the target fishing vessels with an allowance necessary for mooring.

Berth length = Vessel length (total length) + allowance length
= Vessel width + allowance width

Allowance length and allowance width should be determined appropriately in consideration of the status of use of the jetty and the fishing vessels maneuvering concerned. Here, the following values are adopted as targets. (Incidentally, since fish stores situate usually in the center of vessels, vessels are moored in breadth of the jetty when fish-landing).

① Allowance length = 0.15 L (L ; vessel length)
② Allowance width = 0.5 B (B ; vessel width)

Accordingly, the necessary berth length according to each Category of fishing vessel is calculated by the following procedure.

⑤ Others, FAO 28 feet, 33 feet, less than 12 m (Small fishing boats)
④ Berth length required for 12.5 m fishing vessels is 12.5 x 1.15 = 14.375 ≒ 15 m (Class I)
③ Berth length required for 16.5 m fishing vessels is 16.5 x 1.15 = 18.975 ≒ 19 m (Class II)
② Berth length required for 22.5 m fishing vessels is 22.5 x 1.15 = 25.875 ≒ 26 m (Class III A)
① Berth length required for 26.5 m fishing vessels is 26.5 x 1.15 = 30.475 ≒ 30 m (Class III B)

Table 2-26 Berth Length of Berths by Categorys

Item	Unit	Small Fishing Vessel	Class I	Class II	Class III A	Class III B
Mooring in breadth						
Overall length by Category (L)	m	10.0	12.5	16.5	22.5	26.0
Allowance length (0.15 L)	m	1.5	1.9	2.5	3.4	3.9
Berth length	**m**	**12**	**15**	**19**	**26**	**30**
Mooring in lengthwise						
Fishing vessel width (B)	m	2.4	2.4	3.8	4.5	4.9
Allowance width (0.5B)	m	1.2	1.1	1.9		
Berth length (width)	**m**	**3.6**	**3.6**	**5.7**		
Water depth in front of berth	m	1.5	1.5	2.2	3.5	3.5

③ Channel and Basin

The depth of navigation channel and basin shall be determined by adding an appropriate keel clearance to full draft expected of the target fishing vessels with consideration given to the degree of roll and trim caused by waves, winds and tides, etc. Design depth of mooring basin shall be determined appropriately so that the target fishing vessels can use the facility safely and smoothly.

The design depth is obtained by adding some allowance to the full load draft of the largest target fishing vessel, and the scale of fishing vessels that can be moored is set.

Design depth of the mooring jetty = Draft of largest fishing vessel + water depth allowance

The Project jetty will be constructed almost due south from the shore connection. Considering that length is restricted on the south side and it will be necessary to turn vehicles on the protruding part, the jetty shall be planned as a T-shape or L-shape. An I-shaped jetty can also be considered, but the final shape shall be decided when planning the layout of necessary berths.

It is more economical to utilize both sides of the jetty for mooring. Moreover, securing navigation channel and basin at the natural depth without carrying out any dredging at all is a prerequisite for the Project.

Fishing vessels enter and leave the port from the east side of the jetty, where sufficient water depth can be obtained. Water area at the west side of the jetty protrusion is

shallow, and to utilize both sides of the jetty, it is a premise condition to secure the depth of navigation channel and basin. The west and south sides of the jetty shall be used for mooring small-size vessels, Class I and Class II fishing vessels.

Navigation channel and basin at the west side of the jetty (for Class I and small fishing boats)

Channel depth	CDL –1.5 m
Channel width	15 m (2.4 x 6 = 14.4 m ≒ 15 m)

(Channel width is adopted as 6 times the width of Class I fishing vessels).

Navigation channel and basin at the east side of the jetty (for Class III fishing vessels)

Depth of mooring basin	CDL –3.5 m
Width of mooring basin	8 m (4.9 + 4.9 x 0.5 = 7.35 m)
Maneuvering basin	CDL –3.5 m depth D = 53 m circling depth

Jetty south side: mooring basin for Class II fishing vessels

Depth of mooring basin	-2.2 m
Width of mooring basin	6 m (3.8 x 1.5 = 5.7 m)

Jetty west side: mooring basin for Class I and small fishing boats

Depth of mooring basin	CDL –1.5 m (applicable to all target fishing vessels)
Turning basin	CDL –1.5 m depth D = 25 m circle

④ Examination of jetty width

The amount of fish-landing by fishing vessels is between 5-10 tons by Class II vessels and 15-20 tons by Class III vessels. The caught fish are transported from the landing area in refrigerated trucks arranged by the vessel owners or purchasing fisheries companies. Many of these trucks have a loaded weight of between 4-8 tons. Moreover, similar size trucks are used in ice loading and bait loading work, etc. Between 2-4 hours are needed in order to load a truck.

In consideration of the above facts, jetty width of approximately 10 m shall be secured to give trucks enough room to work and to pass by each other on the jetty, and buffer stops shall be installed on either side.

Moreover, since trucks with a loaded weight of 4-8 tons have a total length of 7-8 m, in cases where enough room to turn is secured on the jetty, width of at least 16 m will be required. In this case, since the jetty will be too large to obtain an economical effect,

the jetty shall be designed as an L-shape at its tip to allow trucks to change direction by cutting back.

・ Ice Plant

① Operating modes and ice demand of target fishing vessels

The operating modes of fishing vessels engaged in offshore fisheries are broadly classified as follows according to the scale of the vessel.

Table 2-27 Operating Cycles and Ice Demand of Offshore Fishing Vessels

	Total Length	Moored	Port – Fishing Grounds	Catching	Fishing Grounds - Port	Days per Cycle	Ice/Cycle
Offshore longline fishing vessel	26.5m or more	2	2	18-22	2	24-30	15-20.0 t/vessel
	26.5− 16.5m	2	2	14	2	20	10.0 t/vessel
	16.5m or less	2	1.5	5	1.5	10	6.0 t/vessel
Offshore DWS fishing vessel	16.5m− 12.5m	1	1	5	1	8	3.0 t/vessel
	12.5m or less	1	1	3	1	6	0.5 t/vessel
28/33 feet	10− 11m	0.5	0.5	2	0.5	3.5	0.3 t/vessel
FAD outboard engine	6~7m	(1)				Day trip (1)	0.1 t/vessel

Note) Many fishing vessels measuring more than 26 m or between 16-26 m are equipped with frozen fish stores and brine tanks, but they still use ice for fresh fish.

Offshore longline fishing vessels use a lot of ice (between 6 and 20 tons) per fishing trip. However, since vessels can purchase ice in bulk from ice plants owned by fisheries companies or from large ice making companies in Suva, the Project ice plant shall not target these vessels.

On the other hand, many deep water snapper fishing vessels and vessels that have converted to offshore fishing do not have tie-ups with fisheries companies, nor do they bind contracts to sell their catches to particular companies. As a result, these vessels find difficulty in obtaining the ice they need for fishing. Accordingly, the Project ice plant shall cater to the 9 offshore DWS fishing vessels, 19 FAO 28/33 feet fishing vessels and 6 FAD outboard engine fishing vessels that will use the Fisheries Department Lami jetty and are based in Suva. Capacity of the ice plant shall be calculated based on this assumption.

Table 2-28 Basis for Calculating Ice Demand (Fishing Vessels Currently Based in Suva)

Target fishing vessel	Number of Vessels	Fishing Trips per Month	Ice/Trip	Demand/ Month	Demand/Year (10 months)
Offshore DWS fishing vessel	6	3	3.0 t	54.0 t	540 t
Offshore DWS, less than 12.5 m	3	4	0.5 t	6.0 t	60 t
28/33 feet vessel	19	4	0.3 t	22.8 t	228 t
FAD outboard engine vessel	6	20	0.1 t	12.0 t	120 t
Total				94.8 t	948 t

◆ Ice plant operating days = 260 days per year (5 days per week: approximately 71%)
◆ Required capacity of ice plant: 948 tons/year ÷ 260 days = 3.6 tons/day ≒ 4.0 tons/day

・ Buildings on Land

Building facilities in the Project consist of three buildings, namely the administration block (including workshop, office, store, toilets, ice plant and ice storage), public toilets and watchman's hut. Other building facilities included in the design are the landscaping and auxiliary facilities.

- The scale of the administration block shall be set in consideration of the 4 employees (jetty master, ice plant attendant, engineers, handyman), watchman, Fisheries Department Lami Headquarters workshop engineers and refrigeraion engineers that will be engaged in work based on the staffing plan necessary for managing and operating the Project facilities. The workshop shall be designed to implement small-scale and short-term repairs on small-scale fishing vessels.

- The scale of the public toilets shall be set assuming that somewhere between 50-70 jetty users consisting of fishing vessel crewmembers, loading and unloading personnel and distribution personnel will use the toilets every day.

- The existing jetty entrance is open from 08.00 to 17.00 from Mondays to Fridays, while the rest of the time the gate is closed and locked and a watchman is on duty at nighttime. However, in the event where the Project facilities are constructed, since more vehicles, workers and fishermen, etc. will use the site than at present, it will be necessary to control entry to the facilities and guard against entry by suspicious persons. It is necessary to construct a watchman's hut near the entrance to the site and assign a permanent watchman. Since it is planned to assign a permanent watchman during daytime, nighttime and on holidays, the hut shall include a guard post and rest room.

2-2-2 Basic Plan（Construction Plan/Equipment Plan）

(1) Overall Facility Layout Plan

The objective of the Project is to construct a jetty in Lami area in order to relieve offshore fishing vessels of the congestion for fishing activities in the Suva Bay. The jetty will also be used as a berthing and repair base for converted offshore fishing vessels that previously operated in coastal waters in Central and East Divisions, as well as the operating base for survey and training vessels owned by the Fisheries Department. Accordingly, the necessary number of berths shall be set according to the type and size of each fishing vessel, and the optimum layout of facilities for fish-landing, making fishing trip services and administering the overall jetty facilities shall be planned. Incidentally, concerning the floating jetty in front of Lami Fish Terminal that was included in the request, it was agreed with the Fijian side to exclude this from the Project for the following reasons: 1) the Fijian government is unable to secure and prepare the necessary area as a government-owned site, and 2) even if the requested floating jetty were constructed, it is unlikely that it would be used as a public facility. Furthermore, concerning the requested refueling facilities at Fisheries Lami Jetty, the Fijian side intimated that these were not required because similar private sector facilities already exist at Walu Bay in Suva Harbour, and the Study Team also confirmed that they were not necessary. Accordingly, the refueling facilities were also removed from the Project components.

(2) Civil Facilities Plan

1) Overall Plan

① Effective utilization of restricted site

Upon giving full consideration to the relationship with the limited Project water area, water depth, access lanes for fishing vessels, moorage, traffic lines for landing catches and fishing gears, as well as the impact on the adjacent hotel and the private fishermen's association that conducts commercial activities, a structural and layout plan that enables each facility to function effectively shall be adopted.

② Consideration to neighboring parties

The Project water area is a pleasant and tranquil area of water that incorporates the expansive waterline of the hotel on the east side. The protruding part of the existing wooden jetty leans somewhat to the hotel side, however, the layout of facilities will need to be planned so that the position of the existing protrusion is the permissible borderline for the construction of structures.

③ Consideration of natural conditions on the sea bottom

Because of a narrow area and shallow depth (2.0~3.0 m) around the jetty, its use will be limited to both Fiji Registered fishing vessels and overall length of the vessels less than 26.5 m (full load draft approximately 3.4 m). Moreover, since 10 m wooden fishing vessels and outboard engine vessels measuring less than 7.0 m will use the jetty, the facilities shall be planned an appropriate zoning and the scale and specifications shall be designed upon considering the different modes of use of each fishing vessel.

④ Preservation of waterfront and sea bottom

The Project site was dredged once before in 1977, however, it soon became to sediment by siltation once again. Moreover, since dredging activities have an impact on the sea bottom ecosystem, no dredging work shall be carried out in the Project.

⑤ Securing of priority mooring space for Fisheries Department vessels

To help ensure the Fisheries Department takes the initiative in managing and operating the Project jetty, it is recommended to secure mooring berth for the Department's vessels. Also, facilities planning shall take into account the mooring of survey and training vessels that are necessary for conducting statistical fishery surveys, fisheries dissemination and training activities, etc.

⑥ Environmental consideration in the fisheries development plan

Refueling activities that could lead to contamination of the sea surface shall not be implemented. As a measure to prevent noise impact on the adjoining hotel by onboard generators, land power supply equipment shall be installed. Also, space shall be secured to install waste receptacles to appropriately deal with waste generated in the jetty facility.

⑦ Cost effectiveness from efficient facilities scale and layout planning

By using both sides of the jetty, sharing standby berths between Class II and III fishing vessels and so forth, efficient use of the facilities is realized through providing multiple functions while at the same time paying attention to safety.

⑧ Facilities planning and design to satisfy the Fisheries Department and users

Information obtained in discussions with the Fisheries Department and hearings and interviews with vessel owners, crewmembers and vessel suppliers, etc. have been effectively reflected in the planning and design of facilities layout.

2) Component of Civil Facilities

Civil facilities are composed of the apron and jetty. The apron links the existing seawall with the jetty.

① Apron

The existing apron shall be demolished and replaced with a new structure. Reinforced concrete slab shall be placed on an abutment constructed on the existing seawall side and on a beam of the new jetty.

② Jetty structure

Mooring structures for fishing vessels are commonly categorized into two types; namely, fixed type structures such as gravity type wharves, plank type wharves, jetties, cascade system wharves, etc., and floating type structures (floating jetty). Of these, gravity type wharves, plank type wharves and cascade system wharves would have an impact on the surrounding water body and coastline shape because they entail landfilling the water body. Moreover, since the seabed of the Project water body consists of soft strata, these types of structures are not suitable here. Accordingly, comparative examination was carried out on the jetty type pier (pile jetty) and floating type pier (floating jetty) as the pier types that entail minimal environmental impact and are suitable to soft seabed. As a result, as is indicated in Table 2-29, the reinforced concrete platform jetty structure with direct pile foundations shall be adopted since this structure is superior in terms of functional criteria, execution conditions, maintenance and economy.

Table 2-29 Comparison of Jetty Structure Types

Item	Pile Jetty	Floating Jetty
Functional criteria:	○	×
- Workability and stability - Vehicle access	Good workability and stability Easy	Poor stability in face of tilt, waver and sway Difficult
Execution criteria:	○	△
- Suitability to restricted site and water area	Possible	Difficult
- Construction schedule	Normal	At least 1.5 times longer than the pile type jetty
Maintenance:	○	×
- Maintenance cost and tasks	Cheap, easy	Expensive, difficult
Economy:	○	△
- Construction cost (index)	100	130
Overall assessment	○	×

3) Scale of jetty

Table 2-30 shows the scale of jetty required for the targeted fishing vessels.

Table 2-30 Dimensions of Jetty with Respect to Target Fishing Vessels

Category	Target Fishing Vessel (Design Values)				Fishing Vessel	Berth Length				Position		
Vessel length	Overall Length	Width	Gross Tonnage	Draft	Quantity	Docking	Berth Length	Quantity	Total Length	Position	Symbol	
m	m	m	GT	m	number		m	berth	m			
22.5~26.5	26.0	4.9	70	3.5	13	Alongside	30	1	30	East	E-1	Work
16.5~22.5	22.5	4.5	50	3.5	3	Alongside	26	1	26	East	E-2	Work
12.5~16.5	16.5	3.8	20	2.2	8	Alongside	19	1	19	South	S-1	Work
14.5~17.5	16.5	3.4	20	2.1	3	Head-on	3.7	2	7.4	West	Moorage	FD mooring
10.0~12.5	12.5	2.4	10	1.5	7	Alongside	15	1	15	West	W-3	Work
10.0~12.5	12.5	2.4	10	1.5	(7)	Alongside	12	1	12	West	W-4	Jetty work
10.0~12.5	12.5	2.4	10	1.5	(7)	Head-on	3.6	1	3.6	West	Moorage	Mooring
8.0~10.0	9.0	2.4	10	1.5	15	Alongside	12	1	12	West	W-5	Jetty work
8.0~10.0	9.0	2.4	10	1.5	(15)	Alongside	9	1	9	West	W-2	Work
8.0~10.0	9.0	2.4	10	1.5	(15)	Alongside	12	1	12	West	W-1	Moorage
8.0~10.0	9.0	2.4	10	1.5	(15)	Head-on	3.6	2	7.2	West	Moorage	Moorage

Note) The Fisheries Department fishing vessels will moor at E-2 or S-1 at times of work, however, when staying at mooring pool, they will approach and moor with empty load conditions.

4) Jetty layout plan

At Fisheries Lami Jetty, the necessary number of berths corresponding to each type of fishing vessel shall be set, and the layout plan shall be compiled in a manner that satisfies the required functions for fish-landing and preparation for fishing trips. Attention shall be paid to the following items when compiling the layout plan:

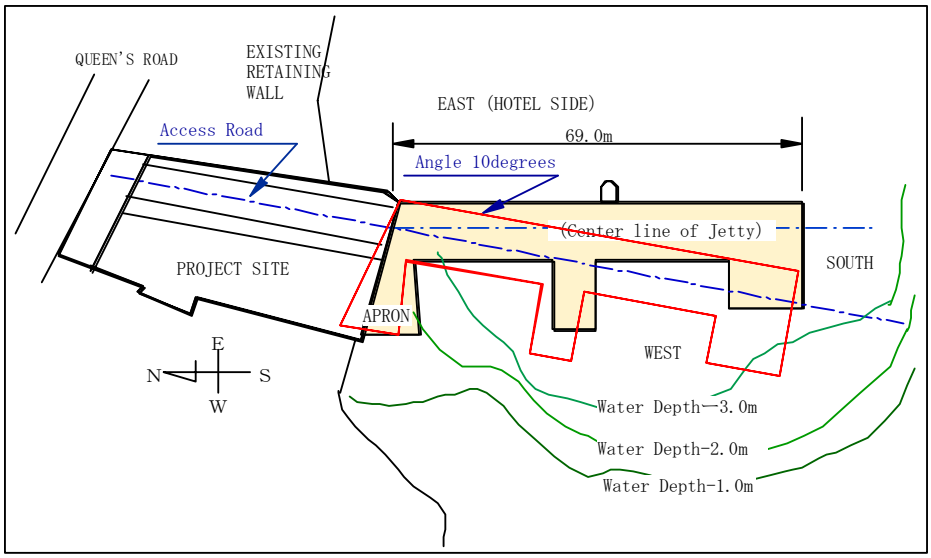


Figure 2-2 Layout Plan of Jetty

- Consideration of neighboring residents,
- Preservation of the waterfront and bathymetry,
- Securing of priority mooring space for Fisheries Department vessels, and
- Environmental consideration.

① To enable the speedy fish-landing and loading of ice & bait onto vessels, the system of driving transportation vehicles directly onto the jetty shall be adopted. A conveyor system is also an option, however, the approach of allowing direct access to vehicles shall be adopted because it offers higher transportation efficiency and enables lower maintenance cost.

② It is more efficient to use both sides of the jetty for mooring. If the jetty is planned at the middle of the extension of the access road connecting the main road to the jetty, even small and medium fishing vessels (C1, C2) will not be able to use the west side where the water is shallow. Meanwhile, in order to secure the necessary water area and depth on both sides, compared to the existing floating jetty inclination of approximately 15 degrees, the the tip of the jetty will come right up to the mooring prohibited area on the hotel side. Therefore, in order to secure the necessary water area and depth to allow use of the west side of the jetty, and in consideration of impact on the hotel, the jetty shall be tilted to the east by approximately 10 degrees from the intersection with the seawall.

③ Depth of CDL-4.0 m in the Project water area can be secured over the section from 20 m to 90 m from the apron connection. Further offshore from this point, the seabed becomes shallower around Labiko Island. Compared to the berth length of Class III fishing vessels that will moor on the east side, work space on the west side will be insufficient for Class I vessels and below (assuming breadth berthing). Therefore, a finger jetty shall be planned at midway along the jetty on the west side. Also, to secure moorage for the Fisheries Department vessels and small-size fishing vessels, a mooring pool shall be planned between the finger jetty and apron.

④ Due to the narrowness of the strait between Labiko and Vuo islands and the constrained area of the Project water area, it is dangerous for fishing vessels measuring exceeding 26 m in overall length to pass the strait with the full load draft. Accordingly, to prohibit that fishing vessels exceeding 26 m moor the jetty, a jut to restrict the length of mooring vessels shall be attached to the east side. Moreover, in order to supply water and power to the fishing vessels moored at east berths, utilities boxes shall be provided on the jut.

⑤ Jetty width shall be set at 5 m per side or 10 m in total, obtained by adding 0.5 m on each side for mooring posts and projection from truck rear wheels when parked to 4.5 m on each side for truck diagonal parking including the width of the buffer stop. The protruding end section shall be 12 m wide to enable vehicles turning. As for the finger jetty on the west side, this shall be 7 m wide to accommodate a single traffic lane.

Figure 2-3 shows the resulting layout of berths based on the above examination.

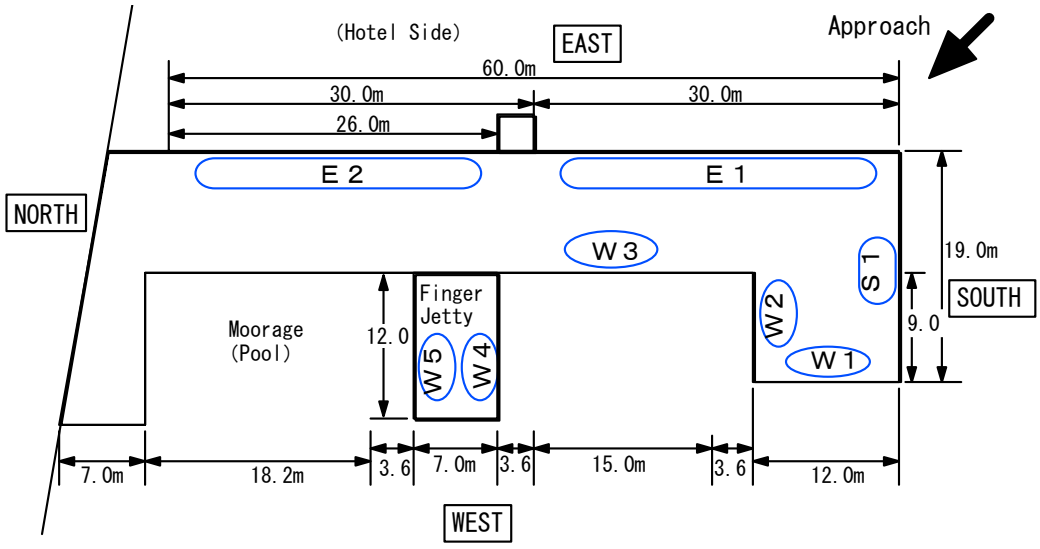


Figure 2-3 Layout of Berths

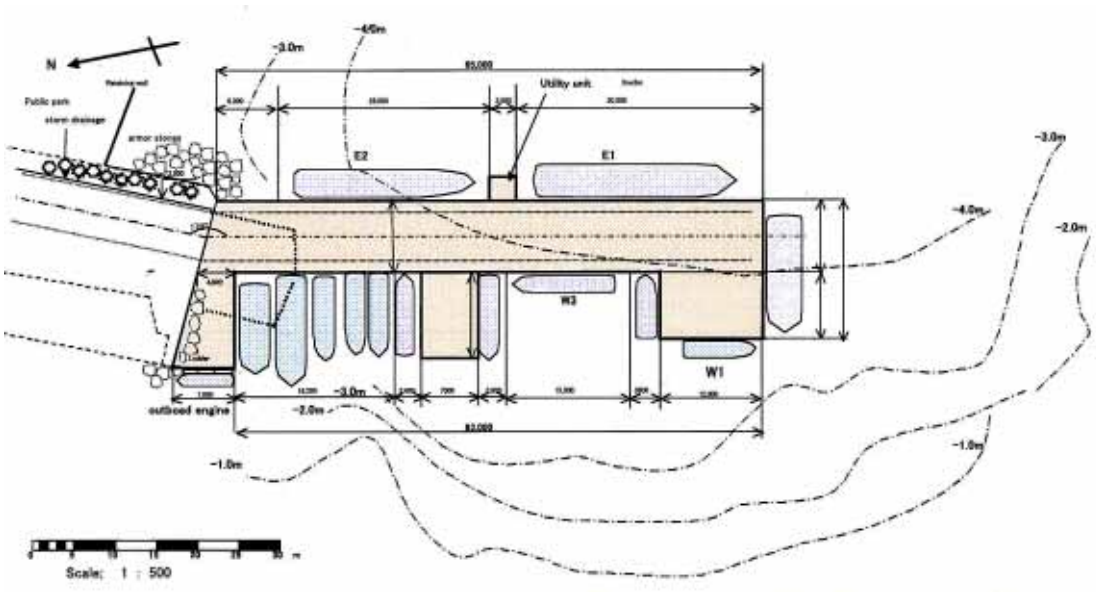


Figure 2-4 Layout Plan of the Jetty

5) Shipping lanes and moorage

The Project water body shall contain shipping lanes and moorage, however, dredging shall not be carried out. Moreover, since port and entry and exit at nighttime shall be prohibited, no new water facilities such as navigation aids, etc. shall be installed.

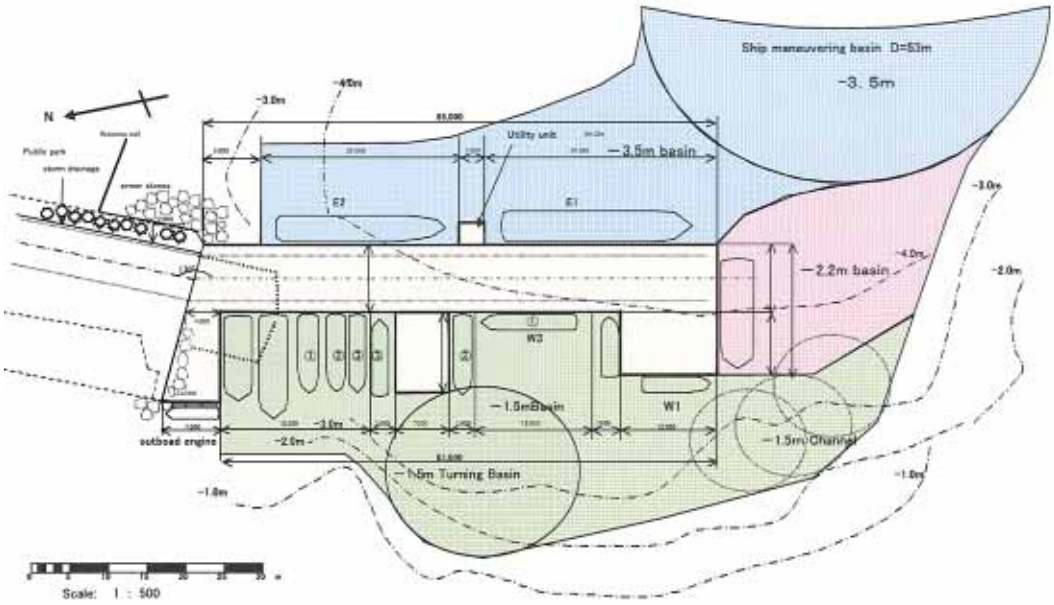


Figure 2-5 Project Waters Utilization Plan

6) Design Criteria

Design criteria: since Fiji does not have its own technical standards and design criteria for harbors and fishing ports, the following Japanese standards shall be applied:

1. Manual for planning fishing port and fishing ground facilities (supervised by the Fisheries Agency, 2003)
2. Standard design method for fishing port structures
3. Design guide for fishing port structures
4. Design guidelines and sample computations for fishing port bulwarks and berths
5. Technical standards and commentary for port facilities

① Design criteria regarding natural conditions

Design wind velocity

V = 35 m/s : Maximum wind velocity with recurrence interval of 30 years

Design wave height

W1/3 = 0.3 m : 1/3 significant wave height with recurrence interval of 30 years

Design tidal level

High water level springs	(HWLS)	CDL+1.60 m
High water level neaps	(HWLN)	CDL+1.40 m
Mean sea level	(MSL)	CDL+0.96 m
Low water level neaps	(LWLN)	CDL+0.50 m
Low water level springs	(LWLS)	CDL+0.30 m
Datum Level		CDL±0.00 m

Design abnormal water level

Design abnormal water level CDL+2.0 m

Including surf beat, barometric pressure fluctuation, seiche, storm surge

Other oceanographic conditions

Current conditions	:	Maximum current 0.3 m/sec
		Current direction: all directions
Bottom sediment	:	Sandy soil; 40% sandy soil with no rock outcrops
Seawater density	:	1.03
Tsunami	:	No records; not considered

Soil conditions

Soil exploration was carried out at 2 points, namely the protruding tip (BH No. 1) and middle part (BH No. 2) of the existing floating jetty. The soil profile and characteristics is as follows.

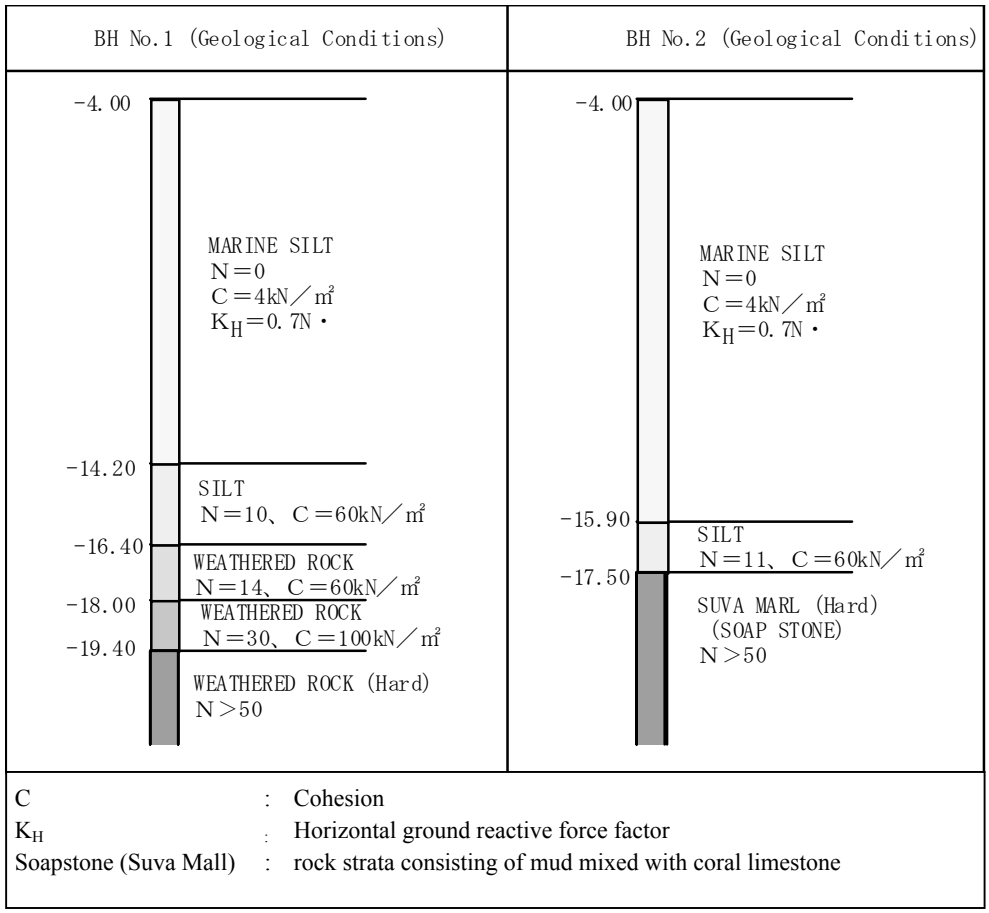


Figure 2-6　Geotechnical Conditions

Seismic intensity

Design seismic coefficient ： 0.15

② Layout and dimensions

Jetty crown height

Main jetty: apron: protruding jut	CDL+2.5 m
Middle finger jetty	CDL+2.2 m
Traverse gradient	I = 0.50%

Design water depth

Geological conditions: assume the seabed to be CDL-4.0 m over the whole area

Design load

Surcharge	ordinary	uniform load	10 KN/m^2
Live load	Vehicle load		T-15 load

Required safety factor

Safety factor of pile foundation bearing power

Long-term	Ordinary conditions		2.5
Short-term	During an earthquake	Bearing piles	1.5
		Friction piles	2.0

Allowable displacement

Allowable horizontal displacement of the jetty shall be less than 10 cm.

Jetty width

General section	B = 10.0 m
Protruding jut	B = 12.0 m
Finger jetty	B = 7.0 m

Vessel type conditions

Vessel model	Target Berth	Gross tonnage	Berthing velocity	Tractive force
16.5-26 m	E1, E2, S1	70 GT	0.35 m/s	50 kN
8-16.5 m	W1~W5, finger jetty	10 GT	0.50 m/s	30 kN

Note: Gross tonnage = Japan Gross Tonnage (JGRT) (Registered tonnage)
JGRT = Fiji Gross Registered Tonnage (0.6 + Fiji GRT ÷ 10000)

Ex: Fishing vessel with Fiji GRT of 100 tons = 100 (0.6 + 100 ÷ 10000) = 100 (0.6 + 0.1) = 61 tons

③ Fenders

Fenders shall be selected according to the type of fishing vessel, i.e. 70 GT or 10 GT. Moreover, the interval between fender beams shall be the same as that adopted in the longitudinal arrangement of foundation piles.

Installed height of fenders:

Length of fenders	L = 1,000 mm
Installed height of fenders	CDL +0.60 m ~ CDL +1.60 m

Fenders shall be selected as shown in the following table.

Table 2-31 Selection of Fenders

Vessel model／GT	Virtual weight kN	Docking speed m/s	Effective docking energy KJ	Fender Selection		
				Rubber characteristics	Reactive force kN	Absorbed energy
16.5m or more 70GT	4,172	0.35	13.0	CV2	184	15.3
16.5m or more 10GT	405	0.5	5.2	CV1	132	6.62

④ Bitts and mooring rings

Bitts and mooring rings shall be arranged in the manner shown in Table 2-32 according to the size of target fishing vessels.

Table 2-32 Selection of Bitts and Mooring Rings

Target Vessel	Traction at normal times		Target berth	Target water depth	Category	Interval
70GT	50GT or more	50kN	E1, E2, S1	3m or less	Mooring post	7.5m
10GT	10~50GT	30kN	W2~W4	3m or less	Mooring post	5.0m
5GT	Less than 10GT	10kN	W1, pool		Mooring ring	4m

⑤ Examination of steel pipe piles

The maximum horizontal external force exerted on the east side of the jetty at E1 and E2 was sought assuming that two 70GT boats moor simultaneously at the two block ends (block length 30 m). Based on this, the steel pipe pile stress was sought and the steel pipe piles were selected.

Calculation criteria:

Lateral ground reaction force coefficient Kh = 0.9N/cm^3
Horizontal force (fender beam reaction force) H = 202.4 x 2 = 405 kN
Top load Wq=10.0 kN/m^2
Superstructure tare Wd=19.0 kN/m^2
Design water depth DL-4.0m
Pile top height DL+1.65m(tip under beam)

Results:

a. Steel pipe pile size

Comparison was conducted between ϕ 500mm and ϕ 600mm t = 12mm. In the case of ϕ 500mm, since the pile head of piles 11 and 12 lacked stress intensity at DL-0.2 m, ϕ 600mm was selected.

b. Tip bearing capacity Ru=2,649kN, N=31.25, Ra=Ru/F=1,059＞445.6

c. Pile head buried depth L=711mm ⇒ 750m

Input data	
Corrosion rates of S.P.P	3mm
Coefficient of lateral subgrade reaction	Kh=0.9N/cm^3
Horizontal force (fender beam reaction force)	H=405kN
Surcharge	Wq=10.0kN/m^2
Dead load	Wd=19.0kN/m^2
Design depth	CDL-4.0m
Level of pile top	CDL+1.65m (Tip under beam)

Output data

① size of SPP
Comparison was conducted between ϕ 500mm,t=14mm and ϕ 600mm t=12mm. In the case of ϕ 500mm, the pile head lacked stress intensity at CDL-0.2 m.
ϕ 600mm was settled on. Pile displacement 4.5 cm

② Tip bearing capacity Ru=2,649kN
N=31.25, Ra=Ru/F=1,059＞445.6

③ Pile head buried depth
L=711mm, 750m

7) Design of reinforced concrete members

Design was carried out based on stability calculation on the jetty as well as the Design Handbook for Fishing Port and Fishing Ground Facilities (National Association of Fishing Ports and Fishing Grounds) and Concrete Standards (Design) (Japan Society of Civil Engineers) concerning the major cross-sectional dimensions, reinforcing bar diameter and necessary quantity of reinforced concrete members consisting of horizontal beams (normal rake beams), vertical beams (normal parallel direction beams), floor plates and fender beams. The results of examination are given below.

① Design criteria of members

Concrete allowable compression stress	σ ca = 9.000 (N/mm^2)
Reinforcing steel allowable tensile stress	σ sa = 176.000 (N/mm^2)
Shearing allowable stress	τ ca = 2.000 (N/mm^2)
Modulus ratio	n = 15.00

② Stability calculation

Table 2-33 shows the results of stability calculation on the jetty.

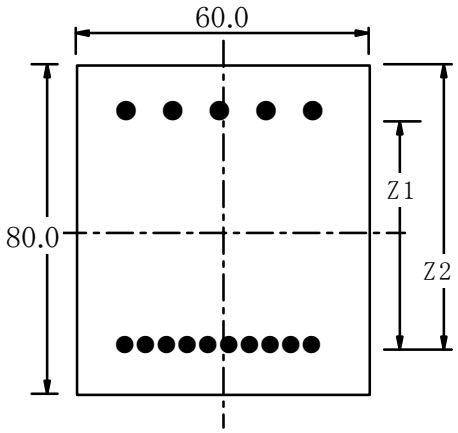
Table 2-33 Jetty Stability Calculation Results

Main Item	Sub Item	Unit		Traverse Beam	Longitudinal Beam	Slab	Fender panel
Design cross-sectional shape	Member width	B	cm	60.0	90.0	100.0	100.0
	Member height	N	cm	80.0	60.0	30.0	40.0
	Effective height	D	cm	65.0	50	20.0	30.0
	Reinforcement content (tensile side, main)	Ast	cm^2	38.71	30.97	7.94	25.79
	Ditto (Compression side main)	Asc	cm^2	25.34	30.97	7.94	25.79
	Ditto (Lateral side)	Ass	cm^2	0.00	0.00	0.00	0.00
	Ditto, (Total)	Asg	cm^2	64.05	61.94	15.89	51.57
	Minimum area of reinforcement	As min	cm^2	7.80	9.00	4.00	6.00
Design stress resultant	Bending moment	M	kN*m	370.2	199.10	18.7	111.30
	Axial force (+: compression)	N	kN	0.00	0.00	0.00	-13.90
	Shearing force	Q	kN	0.00	0.00	0.00	202.40
	Load eccentricity	E	c m	∞	∞	∞	-790.719
	Resistance moment	Mr	kN*m	384.28	237.5	27.89	114.63
Stress calculation and checking	Stress occurrence state	Compression and tension					
	Concrete compressive stress	σ c	< σ ca	6.838 9.000 OK	4.898 9.000 OK	3.704 9.000 OK	6.948 9.000 OK
	Reinforcement tensile stress	σ s	< σ sa	169.522 176.000 OK	147.542 176.000 OK	118.009 176.000 OK	170.966 176.000 OK
	Mean shearing stress	τ	< τ ca	—	—	—	0.675 2.000 OK
Reinforcing bar Arrangement	Upper	Diameter	mm	25	22	16	19
		Bars	Bar	5	8	4	9
	Lower	Diameter	mm	22	22	16	19
		Bars	Bar	10	8	4	9
Reinforcement content	Sectional unit reinforcement content		cm^2	64.045	61.936	15.888	51.570
	Sectional area		m^2	0.48	0.56	0.3	0.4
	Reinforcement content per 1 m^3		kg/m^3	105	87	42	102

a. Beams

The results of rough examination on normal rake beams and normal parallel direction beams are shown below.

Results of cross-sectional examination with respect to a maximum bending moment of370.2 kN m^2:



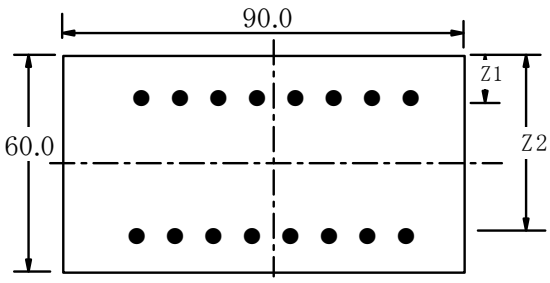
Breadth b = 60.0 cm
Height h = 80.0 cm

Bar arrangement:

	Zi (cm)	Diameter (mm)	No.	Section (cm2)
Z1	10.0	25	5	25.335
Z2	65.0	22	10	38.710
Total				64.045

Zi: Distance from top of beam.

Results of cross-sectional examination with respect to a maximum bending moment of 199.1 kN m^2:



Breadth b = 90.0 cm
Height h = 60.0 cm

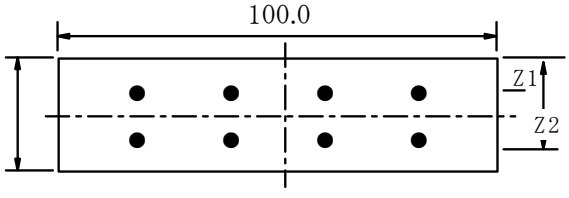
Bar arrangement:

	Zi (cm)	Diameter (mm)	No.	Section (cm2)
Z1	10.0	22	8	30.968
Z2	50.0	22	8	30.968
Total				61.936

Zi: Distance from top of beam.

b. Floor plates

Concerning floor plates in the part measuring 4 m x 4 m, the reinforcing bar arrangement was calculated upon seeking the bending moment assuming plates with four fixed sides. Design load is highest in the case of live load + dead load, and the maximum bending moment is 18.7 kN/m^2. The results of conducting cross-sectional checking are as follows.



Breadth b = 100.0 cm
Height h = 30.0 cm

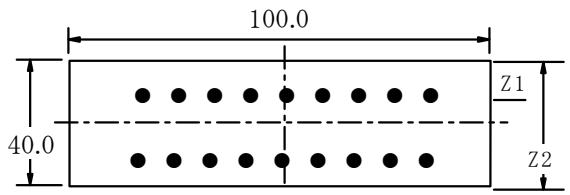
Bar arrangement:

	Zi (cm)	Diameter (mm)	No.	Section (cm2)
Z1	10.0	16	4	7.944
Z2	20.0	16	4	7.944
Total				15.880

Zi: Distance from top of beam.

c. Fender attachment plates

Cross-sectional force under lower beams caused by the reactive force and tare of V-250H fenders was calculated and cross-sectional checking was conducted. The results of cross-sectional checking are indicated below.



Breadth b = 100.0 cm
Height h = 40.0 cm

Bar arrangement:

	Zi(cm)	Diameter(mm)	No.	Section (cm2)
Z1	10.0	19	9	25.785
Z2	30.0	19	9	25.785
Total				51.270

Zi: Distance from top of beam.

(3) Building Facilities Plan

1) Facilities Layout Plan

The Project site is designated as a civic area in the city planning master plan and, although there are no restrictions concerning the purposes of use of buildings, the site is adjoined by a resort hotel on the southeast side and a forest protection district containing mangroves on the northwest side. Accordingly, the facilities layout plan will need to give ample consideration to landscape and noise. The area of land that can be used for buildings has frontage of approximately 22 m on the entrance side and measures a further 26 m on the jetty side and 40 m in terms of depth. In view of these site conditions, the Project buildings shall be constructed along the southwestern axis, which is the normal line of the access road of the landing jetty. As for the breakdown of buildings, in consideration of maintenance and ventilation, the public toilets shall be built as a separate block, while the remaining rooms shall be integrated into the administration block.

Concerning the room layout, the ice storage and workshop shall be located on the jetty side close to the sea, while other rooms on the ground floor shall be the meter control room, for controlling the power incoming panel, switchboard and water supply facilities, and the staff locker room. On the first floor, the administration section including the office and storeroom shall be located with the ice-making machine room. As for the public toilets, since a ground infiltration-type septic tank will be adopted as the sewage treatment method, the toilets shall be located as far away from the sea as possible in order to prevent ocean pollution.

2) Building Plan

① Floor plan

Considering that the building site is long and thin in shape, it shall be divided into basic grids of 5 m x 6 m, and buildings shall be designed in modules corresponding to the standard specifications of products to expedite the procurement and application of materials.

Room areas have been set in the following manner.

a. Workshop

Due to the effects of moist easterly trade winds, the area around Suva City including Lami has frequent rainy days, making it difficult to carry out minor outdoor maintenance work on fishing vessels and thereby hindering the operation of vessels. In view of these circumstances, a workshop for implementing minor maintenance work indoors shall be established, and this shall also combine a machine shop for implementing basic cutting and welding jobs linked to vessel maintenance. Moreover, since the workshop supervisor will conduct administrative work too, an office shall be attached to the workshop.

Since the workshop will carry out repairs on long members from vessel bodies, a work area of 5 m x 6 m = 30 m^2 will be required taking into account a safety margin. Attention will need to be given to ventilation because electric welding, gas welding and coating work, etc. will be carried out. The machine shop area will contain stationary equipment like a bench drill machine and grinder and also portable machine such as the electric welder and gas welder, etc. Since it is planned to carry out minor cutting and general metal work on small members in the machine shop and the bench drill machine and grinder will mainly be used to perform these tasks, work bench and tool shelves shall be arranged against the walls in order to secure a working area of 5 m x 3 m = 15 m^2. The office shall be used by the workshop supervisor to carry out administrative tasks and control measurement tools. Assuming the office will contain a desk and document shelves, it will require an area of 15 m^2. Figure 2-7 shows the resulting overall layout of the workshop.

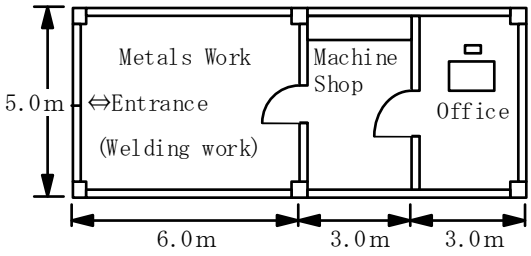


Figure 2-7 Workshop Plan

b. Ice plant and ice storage

Required volume of the ice storage shall be calculated on consideration the ice making machine operation plan and the supply and demand balance of ice. Moreover, since ice will also need to be provided to fishing vessels on Saturdays and Sundays and there will be days of heavy demand when weather recovers following stoppages for bad weather, storage capacity of 12 tons or 3 days production shall be secured. Assuming that 4 tons of ice is made per day, this is enough ice for 1 weekday plus 2 days for Saturday and Sunday. Concerning dimensions of the ice storage, outer dimensions of 4.5 m x 3.6 m will be required. Moreover, since the ice storage will need to be surrounded by thermal insulation panels of at least 0.6 m for fabrication workspace, an area of 5 m x 6 m will be required. The ice-making machine room on the second floor will need to contain a compressor, condenser and maintenance workspace; accordingly, the required area will be roughly the same as the ice storage on the first floor. Moreover, in order to make maintenance easier and limit the impact of noise on the adjoining office, the entrance to the ice-making machine room shall be connected to the administration .

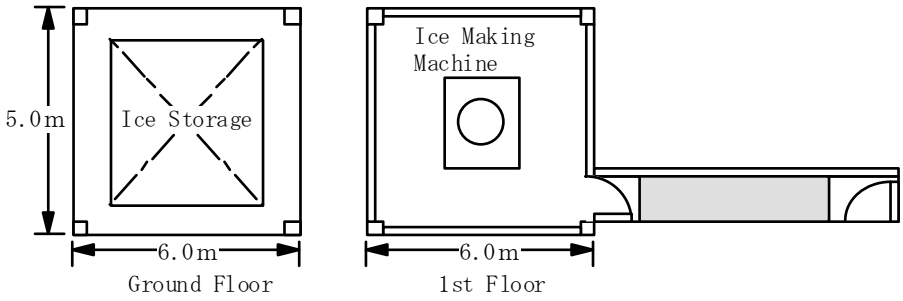


Figure 2-8 Plan of Ice storage and Ice-making Machine Room

c. Power receiving and distribution room and water meter room

In addition to receiving normal power, the power receiving and distribution room shall supply shore power to operate refrigerators onboard moored vessels. Since fishing vessel refrigerators use 3-phase 220 V power, it will be necessary to supply this upon stepping down mains power from 415 V to 220 V by means of transformers. Transformer capacity shall be 150 kW for 22-26 m fishing vessels (average 50 kW x 3 vessels = 150 kW) and 60 kW for medium-size 16-22 m fishing vessels (20 kW x 3 vessels = 60 kW), and oil-filled self-cooling transformers shall be adopted. Since the transformer dimensions are 0.8 m x 1.0 m, assuming surrounding space of around 0.8 m for ventilation and cooling, frontage of approximately 3.0 m will be required. This room shall also contain a power receiving panel and electric power board for supplying power to moored fishing vessels.

Meanwhile, concerning water supply, since it will be necessary to manage supply separately according to the jetty, ice-making machine and general supply (office, toilets etc.) in order to make tariff collection easier, it has been decided to install a water meter booth.

d. Staff changing room

A changing room has been provided for the office and workshop staff. Standing lockers will be installed for around 10 staff and employees, and wooden shelves and a wooden long bench for sitting will also be provided. As for area, 11.4 m^2 will be secured as shown in Figure 2-9.

e. Toilet and shower room

A toilet and shower room for Fisheries Department staff will be provided next to the changing room. This will allow personnel to wash off body sweat in the very hot temperatures as well as grease from work. As for area, 11.4 m^2 will be secured as shown in Figure 2-9.

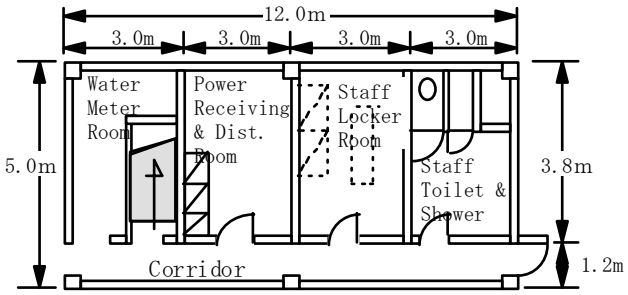


Figure 2-9 Power Receiving and Distribution Room, Water Meter Room, Locker Room, and Staff Toilet and Shower Room

f. Office and waiting room

The port master and his assistant shall conduct clerical work in this room. Since the office will collect mooring charges from medium-size fishing vessels each time they come in and also sell ice tickets, it will need a counter with glass window and a waiting room for users in front of the counter.

Concerning the required area of the office, the jetty master and assistant shall be permanently assigned there, while ice-making machine maintenance personnel and workshop engineers shall also utilize the space. Moreover, the office will be used to hold brief meetings as well as receive guests. In view of the above, office space of 5 m x 6 m = 30 m^2 shall be secured for permanent staff of 2 and short-term use by 2~3 engineers. The waiting room shall contain chairs for users to sit down on while waiting. The resulting layout is illustrated below.

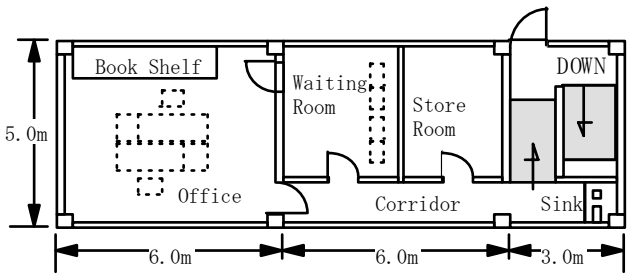


Figure 2-10 Office, Waiting Room and Storeroom

g. Storeroom

A storeroom shall be provided to hold resources concerning activities and sales, books and ledgers and building maintenance supplies, etc. Since it will be necessary to store at least 10 year's records, judging from the volume of related

documents such as jetty usage records, ice sales records, water supply and power supply records, facilities use invoices and receipts, etc., storeroom area of 12 m^2 will be required.

h. Sink

As a corner for preparing hot water for food and drinks by staff and users, a basic sink shall be installed together with a utensil storage area and hanging shelves.

i. Public toilets

It is expected that fishermen (utilizing the facilities), fish carriers and other general users will use the public toilets. Judging from the number of fishing vessels using the jetty, it is estimated around 70 people will use the toilets per day at most, however, since workers will only use the toilets during quiet times between landing and fishing trip preparation work and when the workshop is not busy, use of the toilets and showers will be concentrated into short periods. Accordingly, concerning the quantity of sanitary fixtures, assuming the toilet serves an office of non-concentrated use according to the sanitary fixture quantity calculation sheets of the Architectural Institute of Japan, 2 urinals, 2 wash basins and 2 closet bowls will be needed for male.

As for the showers, the length of time used will be 2~3 times longer than toilet time, however, since it is expected the number of users will be around half the number of toilet users, and it is thought there will be no problem if the number of booths is around 1.5 times the number of sanitary fixtures, 3 booths shall be installed. Therefore, the number of sanitary fixtures shall be planned as 2 urinals, 2 closet bowls, 2 wash basins and 3 showers. A women's toilet shall also be planned, however, this shall be kept to the minimum scale.

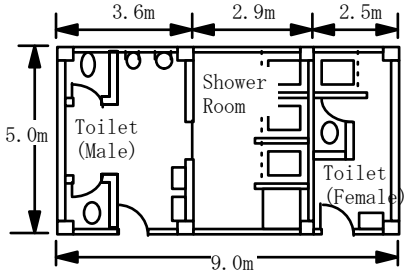


Figure 2-11 Public Toilets

j. Watchman's hut

This room shall be used for work by the facility watchman and as a waiting room. Since there will be watchmen guarding the facility for 24 hours in two 12-hour shifts, a bed for resting shall be installed next to the Watchman's office room.

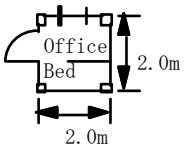


Figure 2-12 Plan of the Watchman's Hut

3) Area Calculation Results for Each Room

Table 2-34 shows the results of calculating area for each room.

Table 2-34 Room Area Calculation Results

Room	Area (m^2)	Area Breakdown
Workshop	30.00	Workspace: 30.0m^2
Machine shop	15.00	Machine shop: 10.8m^2 Worktable and tool shelf: 0.7mx6.0m=4.2m^2
Workshop office	15.00	Work by 1 staff: 2.5m^2x1 person=2.5m^2 Desk, chair, shelf: 12.5m^2
Ice storage	30.00	Ice storage 4.5mx3.6mx2.8m(=h): 16.2m^2 Maintenance work space and space for work in front of the ice storage: 11.8m^2
Water meter room (under the stairs) + power receiving and distribution room)	11.4 11.4	Water meters, 3 lines (ice-making/fishing vessels/facilities) Electric meters, 3 lines (ice-making/fishing vessels/facilities) Step-down transformer: 1
Locker room, Staff toilet and Shower room	22.8	Lockers: 15, closet bowl: 1, shower booth: 1
Office Waiting room	30.0 11.4	Work by 2 staff: 5m^2x2 persons =10m^2 Bookshelf receiving counter and safe: 10 m^2 Reception area: 11.4 m^2, workspace, etc: 10.0 m^2
Sink	1.2	Sink 1,500x600,workbench, hanging shelf
Storeroom	11.4	Documents shelf
Public toilets	45.0	Male: closet bowls: 2, urinal: 2, wash basins: 2, cleaning utensils store, shower booths: 3 Female: closet bowl: 1, shower booth: 1, wash basins 1
Watchman's hut	4.0	Control booth, rest booth

4) Cross-sectional plan

① Design GL/FL

Design GL shall be planned as the existing jetty level + 300 mm. Since the upper surface of the existing jetty is almost flat and it can be expected that goods will be carried onto the Project site ground by cart, etc. Moreover, sufficient ground level shall be secured to keep wave splash off during high waters and rough weather and to avoid inundation at times of torrential rain.

② Cross section and floor height

The administration block shall be designed as a two-story building with a partial section of just one floor. In order to secure an effective under-beam height for the ice storage of at least 3.0 m, the first floor shall be designed as 4.0 m. Since the height of the concrete foundation of the existing building is lower than the design foundation height, this shall be effectively used as the foundation for the new building. The first floor office shall be given the same height as the ice making machine room on the same floor. The public toilets and watchman's hut are designed as a single story block.

③ Elevation plan

It is necessary to have deeply protruding eaves in order to prevent rain from blowing in and to offer protection against strong sunlight during the dry season. The corridor on the ground floor shall be designed with walls rather than as an open space in order to keep rain out and to protect the entrance to the meter control room. Moreover, in consideration of appearance as seen from the jetty, landscape as seen from adjoining land and the distant view as seen from the coastline of the recreation zone planned in the future, the height of eaves and roofs shall be unified in order to create a sense of unity in the facilities overall.

5) Finishing Plan

① Exterior finishing

Table 2-35 Exterior Finishing Table

Exterior Finishing			
Building	Finishing		
Administration block	Roof	:	steel frame structure, aluminum-zinc alloy corrugated steel sheet with thermal insulation material
	Exterior walls	:	metal exterior wall and block + mortar plastering + AE paint underneath beams
	Windows	:	glass louvered aluminum window; steel parts: zinc plating and marine paint; office : aluminum sash
	Exterior fittings	:	steel doors with marine paint
	Painting	:	marine paint on all iron parts
	External floor finish	:	slab concrete + steel trowel finish
Public Toilets	Roof	:	wood truss, aluminum-zinc alloy corrugated steel sheet with thermal insulation material
	Exterior walls	:	block + mortar coating + AE paint
	Windows	:	aluminum louver + glass (film sheet); steel parts: zinc plating and marine paint
	Exterior fittings	:	steel doors with zinc plating and marine paint
	Coating	:	marine paint on all iron parts
	External floor finish	:	slab concrete + trowel-applied hardener
Watchman's Hut	Roof	:	wood frame, aluminum-zinc alloy corrugated steel sheet with thermal insulation material
	Exterior walls	:	block + mortar plastering + AE paint
	Windows	:	glass louvered aluminum window; lattice: zinc plating and marine paint
	Exterior fittings	:	steel doors with marine paint
	Painting	:	marine paint on all iron parts
Septic tank	Concrete, septic tank + underground soak pit		
Outside floor	Access road	:	concrete paving; sidewalk: trowel-applied concrete

② Interior finishing

Table 2-36 Interior Finishing Table

	Room	Floor	Walls	Ceiling
Admin-istration Block	Ice storage	Concrete + trowel-applied urethane non-slip finish (excluding foundations)		Exposed deck plate
	Workshop, machines shop	Concrete + Steel trowel finish	Spandrel wall: block and mortar plastering Upper part: exposed exterior wall	Exposed deck plate
	Workshop office	Concrete + Steel trowel finish	Spandrel wall: block and mortar plastering Upper part: exposed exterior wall	Exposed deck plate
	Power receiving and distribution room, water meter room	Concrete + Steel trowel finish	Block, mortar, AE finish	Exposed deck plate
	Locker room	PVC tile on concrete	Concrete block, mortar, AE finish	Cement board + AE painting
	Staff toilet and shower	Ceramic tiles on concrete	Ceramic tile on Concrete block	Cement board + AE painting
	Ground Floor corridor	Concrete + Steel trowel finish	Block, mortar, spray-on finish	Cement board + AE painting
	Office	PVC sheet on concrete	Cement board, AE finish	Cement board + AE painting
	Sink	PVC sheet	Mortar, VP finish, LGS cement board	Cement board + AE painting
	Ice-making room	Concrete + Steel trowel finish	Exterior wall exposed substrate	Exposed roof structure
	Waiting room	PVC sheet on concrete	LGS substrate, cement board, AE painting	Cement board + AE painting
	Storeroom	Concrete + trowel-applied lengthways PVC sheet	LGS substrate, cement board, AE painting	Cement board + AE painting
	1st Floor corridor	Concrete + trowel-applied lengthways PVC sheet	LGS substrate, cement board, AE painting	Cement board + AE painting
	Outdoor Balcony	Deck plate	Handrail: marine paint	
Public toilets	Toilets (men's) (women's)	Ceramic tiles on concrete	Ceramic tile on Concrete block	Exposed roof structure
	Shower room	Ceramic tiles on concrete	Ceramic tile on Concrete block	Exposed roofi structure
Watchman's hut	Guard room	Concrete + Steel trowel finish	Concrete block, mortar, AE finish	Cement board + AE painting
	Bed	Concrete + Steel trowel finish (Wooden bed)	Concrete block, mortar, AE finish	Cement board + AE painting

6) Structural Plan

① Design conditions regarding natural conditions

When conducting the basic design for the Project, natural conditions shall be taken from the meteorological observatories at Laucala Bay and Suva (data from 1942~2001), while design standards concerning natural conditions shall be applied according to the National Building Code for Fiji (NBCF). As for items not covered by the NBCF, the Australia Standard (AS Standard), New Zealand Standard (NZ Standard) and Japanese standards shall be complied with.

Table 2-37 Natural Conditions

	Item	Design Value		Remarks
Natural Conditions	Maximum wind velocity	70m/s (According to NBCF B1.2)		According to NBCF B1.2 However, according to data for 1979~1999 from Laucala Bay and Suva observatories, maximum momentary wind velocity of 91m/s has been recorded.
	Seismic load	NZS4203 (According to NZ Standard) Medium Risk Zone 6		NBCF B1.2 (b) Zone NO6 zone factor 0.6 or more
	Humidity	Mean humidity: Maximum humidity (mean): Minimum humidity (mean):	80.8% 83.2% (April) 78.3% (October)	According to data for 1942~2001 from Laucala Bay and Suva observatories
	Rainfall	Annual total mean rainfall: Monthly maximum mean rainfall: Daily maximum rainfall:	2,992mm 1,116mm (April) 347mm (November)	According to data for 1942~2001 from Laucala Bay and Suva observatories
	Temperature	Maximum temperature: Minimum temperature: Daily mean maximum temperature: Daily mean minimum temperature:	35.0℃(March) 12.3℃(July) 30.4℃(January) 21.0℃(September)	
	Monthly average Sunlight time	Monthly mean maximum: Monthly maximum: Minimum:	187hs (January) 281hs (January) 35hs (August)	Recorded in March Recorded in August

Note: The above data are taken according to data for 1942~2001 from Laucala Bay and Suva observatories

② Structural type

The type of structure of buildings is selected according to scale, construction period, construction schedule and economy, etc. In the Project, the administration block, which will be constructed on the site of the materials stock area and work yard for the civil engineering works, shall be a steel structure, while the public toilets and watchman's hut shall be a concrete block structure.

a. Due to the restricted area of the Project site, in the event where the building frame of the administration block were built as a RC concrete structure, available space would be filled up by the site office and storage area for steel pipe piles needed in the civil engineering works, so it would not be possible to secure sufficient work space for the building works.

b. In the case where RC concrete works were implemented, since it would be necessary to install formwork and implement concrete placing, etc. on site, the resulting noise could have an adverse impact on the environment in the immediate area.

c. In the case where RC concrete works were adopted, since the works period would inevitably be extended, it would be difficult to implement works at the same time as civil engineering works within the implementation period of Japan's grant aid.

d. Existing structure consist of steel frame structures. In the event where RC concrete structures were adopted, since the resulting increase in the weight of buildings could lead to consolidation settlement, it would be necessary to adopt pile structures or mat foundations, thereby causing costs to rise.

Table 2-38 Comparison of Structural Types for the Administration Block

	RC Concrete Structure	Steel Frame Structure
Workability throughout the overall construction works	×	○
Impact on local environment	△	○
Impact on construction works period	△	○
Impact on construction cost	△	○

However, regarding the adoption of steel structures, it will be necessary to select appropriate materials and finishing in consideration of resistance to tides and corrosion in intricate areas especially.

③ Applicable code and design standards to facilities

a. Applicable code and permission

The National Building Code for Fiji shall be applied. Fiji established a code preparation committee after the country was struck by cyclones in 1983 and 1985, and the said code was introduced from 1990.

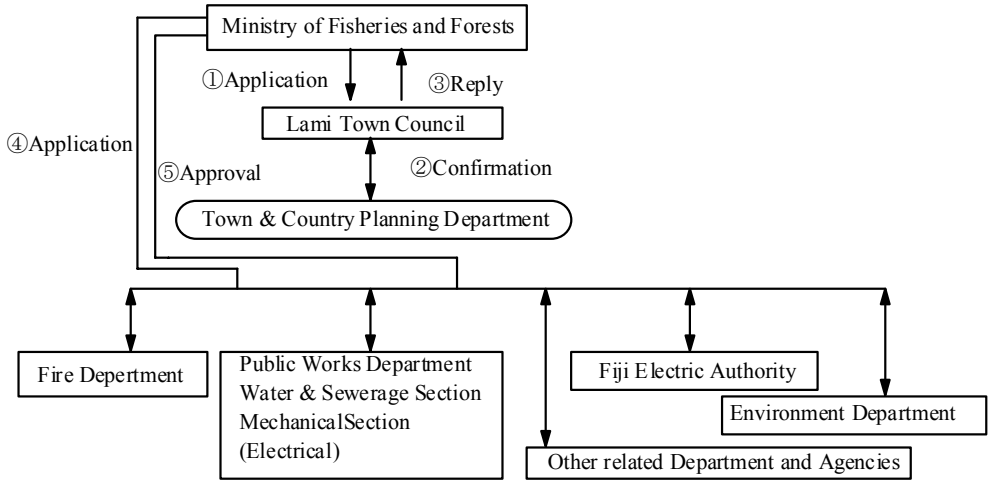
The main purpose of this code lies in the establishment of building structural standards and standards for fire disaster prevention facilities and facilities for leading healthy and pleasant lifestyles. Technical standards are compiled based on design standards and related codes in Australia (AS Standard, ASTM) and New Zealand (NZ Standard).

The main contents of standards for public facilities and community housing applied in the Project are as follows

A : General items
B : Structure
NC : Fire control standards
ND : Evacuation in the event of fire
NE : Fire control equipment
NF : Standards concerning health and convenience
(plumbing and sanitary equipment standards)
NG : Others, standards for flame using areas, chimneys and fuel storage areas

- Permission

When application for building permission is made, the Department of Fisheries and Forests applies to the Lami Town Council, which in turn consigns review to the Department of Town and Country Planning. The Department of Town and Country Planning confirms plumbing equipment, drainage equipment and electrical equipment with the Fire Department and Public Works Department, and also checks with the Fiji Electrical Authority and Environment Department. The main flow of a typical confirmation application procedure is as follows.



Since the Project targets a government facility, general application is not applied, however, technical review is the same as that applied to private sector facilities. Accordingly, during detailed design work stage, the Department of Fisheries and Forests, accepting advice from the consultant, shall apply for building permission to the Lami Town Council and obtain building permission during the review of tender documents.

④ Design standards for building and electrical equipment

a. Building design standards and structural design standards

Fiji does not have its own building design standards. The National Building Code contains a certain degree of codified standards regarding design, however, most design standards are applied based on reference to design standards in Australia (AS Standard, ASTM Standard) and New Zealand (NZ Standard). Therefore, the Project facilities shall be designed to secure equivalent performance to the following technical standards and criteria based on design standards contained in the AS Standard, ASTM Standard, NZ Standard and Japanese standards.

b. Electric equipment design standards

The Fiji Electrical Authority (FEA) is in charge of electrical infrastructure and equipment. Basic code is established in accordance with the ASTM. The electrical equipment department of the PWD reviews application documents concerning electrical equipment in cases where received power capacity is less than 300 KVA. In such cases, the review targets the specifications of underground lines laid from FEA high-voltage lines (11 KV overhead line along the front road) to the site and the project contents.

c. Mechanical plumbing and sanitary design standards

Fiji does not have codified standards regarding plumbing and sanitary equipment. Public water supply undergoes technical review at the PWD. When the PWD lays public waterworks facilities, it basically applies Australian design standards, however, it does not possess any codified standards concerning plumbing and sanitary equipment inside facilities. The PWD reviews the technical contents of design drawings when confirmation applications are made. In the Project, although there are no design standards for plumbing and sanitary equipment and no wastewater discharge standards to follow, these items shall be planned based on Japanese or WHO standards upon giving consideration to the local environment.

d. Ice-making machine design standards

Design standards for the ice-making machine shall conform to the abovementioned design standards for mechanical plumbing and sanitary equipment. Regarding refrigerant, restrictions on use are imposed by DOS (Ozone Depleting Substance) regulations. The refrigerant currently in use in Fiji are R-12, R-22, R-134a, R-502, R-507 and R-717, etc. Of these, concerning refrigerant apart from R-134a, R-507 and R-717, which have a zero ozone depletion factor, . Moreover, if using or importing R-22, it is necessary to apply for an ODS handler permit issued by the Fiji government. A permit is also required to important such substances. Private sector companies in Fiji already use newly developed refrigerant such as R-134a, R-507 and R-717, etc. In particular, R-507 is used in the numerous Australian freezers and ice making machines in Fiji. Moreover, since this is easy to acquire and presents no technical problems, R-507 shall be adopted as the refrigerant for the ice making machine in the Project.

In addition to AS Standards, AST Standards and NZ Standards, the National Building Code applies the following Japanese standards regarding design:

1. Building works common specifications (supervised by the Minister of Land, Infrastructure and Development Secretariat, Building and Repairs Department): Building and Repairs Association
2. Electrical equipment works common specifications (supervised by the Minister of Land, Infrastructure and Development Secretariat, Building and Repairs Department): Building and Repairs Association
3. Society of Heating, Air-conditioning and Sanitary Engineers of Japan HASS010: Society of Heating, Air-conditioning and Sanitary Engineers of Japan
4. Architectural Institute of Japan common specifications: Architectural Institute of Japan
5. Building Equipment Anti-Seismic Design and Execution Guidelines: Building Center of Japan

⑤ Structural design criteria

a. Structural conditions

Structural design conditions and specifications shall be set in the manner shown in Table 2-39.

Table 2-39 Structural Conditions

	Item		Design Value	Remarks
1	Bearing capacity of soil		5 t/m^2: current aboveground part	The project site is reclaimed land on a silt layer. Since the existing facilities have stood for more than 20 years and settlement is thought to have stopped, 5 t/m^2 is adopted at the design value.
2	Wind pressure		2360N/m^2	According to Fiji standards
3	Live load		300N/m^2	According to the Japanese building standard law
4	Concrete	Slump	Foundation/foundation beam : 15cm or less Pillars/beams: 18cm or less	
		Concrete strength	Blind concrete: 15N/m^2 Slab concrete: 21N/m^2 Frame concrete: 24N/m^2	
		Salt content	Target value: 0.04%wt or less	NaCl conversion
		Cement	Ordinary Portland cement	Equivalent to Class 32.5JIS Foundation parts inundated at high tide
5	Reinforcing steel		SD295A (D13-D16) SD345 (D19 or more)	According to ASTM or NZS
6	Structural type		Steel frame structure, CB structure	
7	Foundation type		Concrete continuous footing	The foundation bottom level shall be planned not to exceed GL-0.7. (Level at high tide GL = -0.7Level at tip of jetty GL = ±0)

b. Structural specifications and standards

The National Building Code for Fiji prescribes the following standards regarding seismic load (c) and wind load (d), but contains no structural design standards. Therefore, the Project facilities shall be designed to secure equivalent performance to the following technical standards and criteria based on Japanese standards.

1. Japan Industrial Standards (JIS):
   Japanese Standards Association
2. Building works common specifications (supervised by the Minister of Land, Infrastructure and Development Secretariat, Building and Repairs Department):
   Building and Repairs Association
3. Architectural Institute of Japan common specifications:
   Architectural Institute of Japan
4. Building Equipment Anti-Seismic Design and Execution Guidelines:
   Building Center of Japan
5. Road paving manual:
   Japan Road Paving Association
6. Soil quality test method:
   Japan Soil Engineering Association

c. Seismic load

Seismic load (primary design base theater coefficient) is calculated in the manner shown below:

C = Ch(T,1)×Sp×R×Z×Ls

C: Lateral force coefficient

Ch (T,1)=0.8: Basic Seismic hazard acceleration coefficient

(T=0.3sec, international soil sites)

Sp = 0.67: Structural performance factor

R = 2.0: Risk Factor

(safety factor in earthquake. Increased from the Fiji standard = 1.3)

Z =0.9: Zone Factor (Increased from the Fiji Standard = 0.6)

Ls =1/6: Limit state factor (for serviceability)

From the above calculation results: C=0.107 → C=0.15

d. Wind load

Wind load is calculated in the manner shown below:

Design wind velocity: Vz=V×M(z,cat)×Ms×Mt×Mi

V = 57m/sec Basic wind speed

M(z,cat) V= 1.00 Terrain and structure height multiplier

Ms = 1.0 Shielding multiplier (no shielding)

Mt = 1.0 Topographic multiplier (flat land)

Mi = 1.1 Structure importance multiplier (structural type-separate coefficient)

Based on the above, Vz = 62.7m/sec. Therefore, design wind load is as follows:

Qz =0.6×Vz2=2360N/m^2

7) Main Equipment Plan

① Target number of users

In computing the scale of equipment, the average number of facility users per day shall be assumed as follows:

a.	Fishermen	70 people	Operating rate 50% = 35.0 people
b.	Administration office	2 people	Operating rate 100% = 2.0 people
c.	Workshop staff	2 people	Operating rate 100% = 2.0 people
d.	Ice machine maintenance staff	2 people	Operating rate 100% = 2.0 people
e.	Watchmen	2 people	Operating rate 100% = 2.0 people
	Total	43 people	

② Calculation of necessary water supply

Ice-making machine	(4 t/day)	4.5 m^3/day	
Toilets, showers	43 people/day x 60 l/person/day	= 2.5 m^3/day	
Offshore fishing vessels	(16~26 m)		
	0.7 vessels/day x 10000 l/vessel	= 7.0 m^3/day	
Offshore fishing vessels	(12~16 m)		
	0.7 vessels/day x 3000 l/vessel	= 2.0 m^3/day	
Cleaning, etc.		0.5 m^3/day	
Total		16.5 m^3/day	→17.0 m^3/day

Based on the above calculation, the average design water supply will be 17 m^3/day.

③ Specifications of main water supply equipment

Service pipe	:	main pipe 150 ϕ Water pressure 1.5 kgf/cm^2 or more
Service pipe inside the Project site	:	buried PVC lined steel pipe
Service pipe inside buildings	:	PVC pipe
Service pipe on jetty	:	PVC 50 ϕ exposed pipe

④ Main plumbing and sanitary equipment specifications

Fiji has no regulations concerning wastewater discharge standards, however, the PWD reviews and controls wastewater treatment methods when building confirmation applications are submitted. In the Project, PWD standard underground infiltration and septic tanks shall be installed on the Project site, and wastewater shall be treated by infiltrating underground via a crushed stone soak pit. Considering that the number of users will vary from day to day, a certain allowance shall be added to the average generated amount of wastewater (2.5 m^3/day).

The specifications of main plumbing and sanitary equipment are as follows:

Septic tank	:	2.29m x1.52 mx1.8m (H)+1.37m x1.52 mx1.8m (H) (2 tanks) Sedimentation septic tank made of concrete
Soak pit	:	underground soak pit
Drainage pipe	:	PVC, 100 ϕ , 200 ϕ
Water meter	:	3 meters (building water meter, ice-making machine water meter, fishing vessel water meter)

Showers and sanitary appliances : shower fittings set, mirrors, western toilet appliances: manual flush type

⑤ Main cooling and ventilation equipment plan

Natural ventilation shall basically be adopted, however, the Project site has many rainy days and high humidity, cooling and ventilation equipment shall be installed in the minimum necessary rooms. Maintenance shall be carried out on an individual case-by-case basis whenever breakdowns occur.

The rooms that require air conditioning and ventilation are as follows.

Table 2-40 Air Conditioning Method in Each Room

Block	Floor	Rom	Air Conditioning Type	Remarks
Administration block	Grd.	Staff toilet and shower room	Exhaust fan	Simultaneous with lighting
		Workshop	Exhaust fan	
		Power receiving and distribution room	Exhaust fan	
		Locker room	Ceiling fan	
		Workshop office	Ceiling fan	
	1st	Office	Wall-mounted air conditioner	
Watchman's hut	Grd.	Guardroom	Wall-mounted fan	

8) Main Electrical Equipment Plan

① Main electrical equipment specifications

a. Inside buildings

Step-down transformer : 3-phase, input 415 V ~ output 220 V (for supplying power to fishing vessels)
Underground pipes : FEP pipe, buried depth GL-900 mm or more (cable conduit)
Wiring material : CV cable
Lighting appliances : Each room, fluorescent lights 40 W
Outdoor lights and lights in direct contact with outside air: spot light type (waterproof and salt-proof specifications)
Sockets : Local type (British 3-pin type)
Panels : Power receiving panel, distribution panel, etc.

Electric measuring meters : 3 meters
(building W/H meter, ice-making machine W/H meter, fishing vessel W/H meter)

b. On jetty

3-phase connection terminal board: for driving refrigerators on fishing vessels (3 places)

② Required electricity supply (lighting, light electric appliances)

Lighting, sockets and other light electric appliances in the facilities are as follows. Lighting that is exposed to or in contact with the outside shall have anti-corrosive specifications.

Table 2-41 Single Phase Electric Equipment Installation Sheet

	Room	Ceiling Fan	Exhaust Fan	Lighting	Sockets	AC
Administration block	Ice storage			2	2	
	Workshop		1	6	8	
	Workshop office	1		2	4	
	Water meter room			1	2	
	Power receiving and distribution room		1	1	2	
	Staff toilet and shower room		1	1	1	
	Locker room	1		2	1	
	Stairwell			1		
	1F corridor			2	1	
	Office			6	8	2
	Ice-making machine room			6	1	
	Waiting room			1	2	
	Storeroom			1	1	
	Sink				1	
	1F corridor			2	1	
Public toilets	Men’s			3	1	
	Women’s			1	1	
Watchman’s hut		Wall 1		1	1	
Landscaping	Outside the administration block and watchman’s hut			2		
	Total	3	3	41	38	2

Table 2-42 3-phase Electric Equipment Installation Sheet

Room	Motor (Kw)	Quantity	Total (Kw)
Ice-making machine	30	1	30
For supplying power to fishing vessels	50×3+20×3	6 places	210
Total		1	240

9) Landscaping Plan

① Site access road and sidewalk

The site access road shall be constructed to link the main road to the jetty over a distance of approximately 40 m. Since 4~8 ton refrigerator trucks will move in both directions along the road, the access road width shall be planned as 3.5 m according to the minimum width (roadway + shoulder) based on road structural examples. Moreover, a parking strip of 3.0 m shall be planned for refrigerator trucks awaiting work. The sidewalk shall be planned as 2.5 m wide to allow passage by 2 people. In consideration of the limited area of the sidewalk and the difficulty in procuring asphalt in Fiji, concrete paving shall be adopted. Concerning the cross-sectional composition of the road, since the roadway part has already been compacted by passing vehicles, a design CBR of at least 4 can be anticipated from the roadbed. Accordingly, adjusted crushed stone of 25 cm and cement concrete of 20 cm shall be planned on top of this.

② Rain Water Drainage

Rain Water Drainage shall be planned to remove storm water from the main road and access road. Since storm water will flow from the main road into the site according to the gradient plan, a traverse drainage channel shall be built into the access road to remove this. Concerning the remaining surface drainage, a longitudinal gradient in drainage channel shall be applied running from the access road to the jetty side to collect and waste rain water on one side (along side walk) of the access road and directly drain it into the sea.

③ Outside lighting

As security lighting, floodlights facing the site access road and jetty shall be installed under the eaves of the administration block to illuminate the overall premises.

10) Other Facilities

① Waste treatment plan

The Project facilities will discharge office waste as well as metal scraps and waste oil, etc. from the workshop. Since only minor amounts are involved, in order to have a

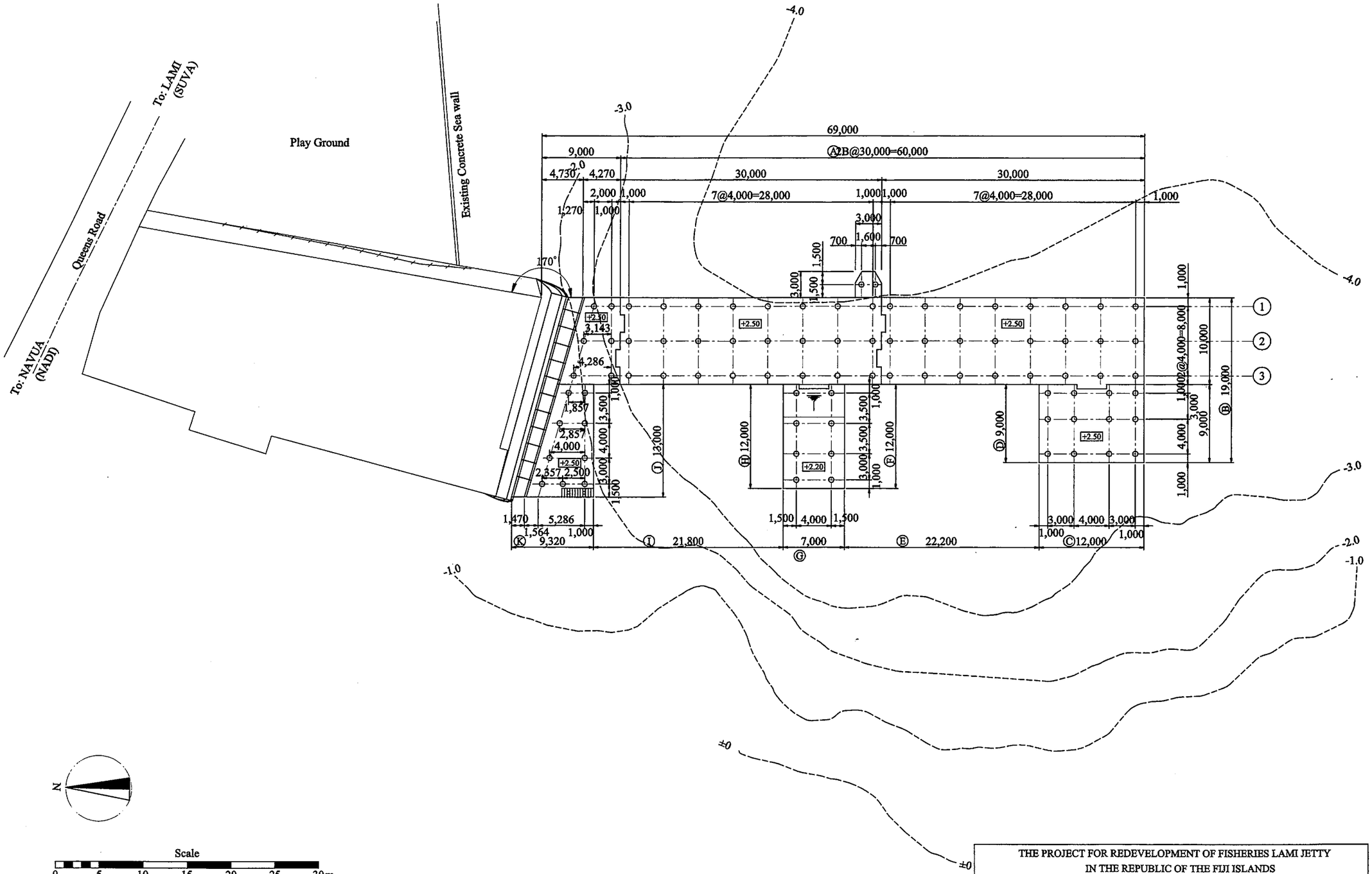
collection operator collect and treat the said items, the facilities owner shall be required to install special waste collection containers. These shall be placed at the connection between the access road and jetty.

② Fire extinguisher

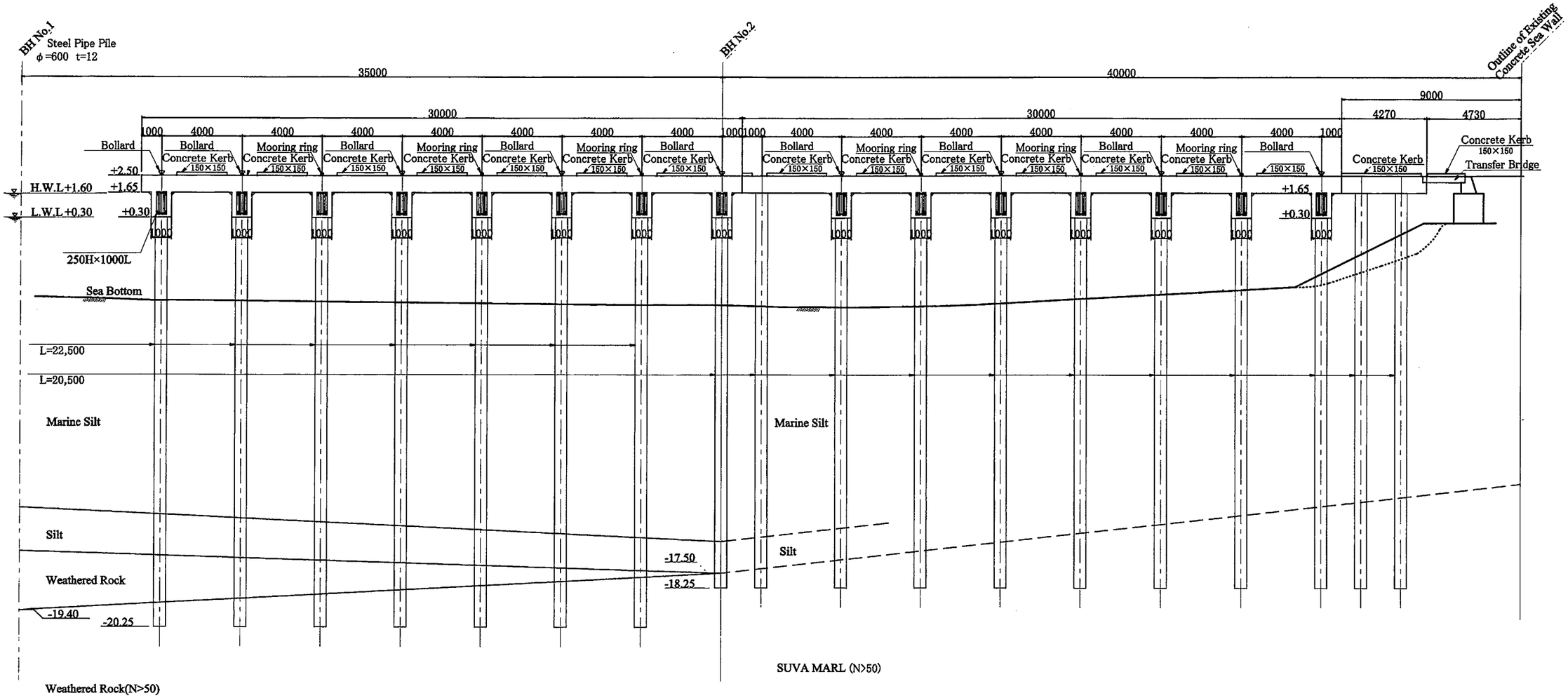
One fire hydrant directly connected to the water main (ϕ 150 mm) alongside the road shall be installed on the site. Also, small fire extinguishers shall be installed at the refrigerant's expense in the workshop and ice-making machine room. Fire extinguishers shall be installed close to the waste collection boxes.

2-2-3 Basic Design Drawing

C01 JETTY PLAN (JETTY BLOCK STEEL PIPE LAYOUT)
C02 FRONT ELEVATION OF JETTY
C03 TYPICAL SECTION OF THE JETTY
C04 BOLLARD, MOORING RING, FENDER & CONCRETE CURB LAYOUT PLAN
C05 WATER SUPPLY PIPE & ELECTRIC CONDUIT PIPE SYSTEM PLAN
A01 SITE PLAN
A02 GROUND FLOOR PLAN (ADMINISTRATION BLOCK)
A03 FIRST FLOOR PLAN (ADMINISTRATION BLOCK)
A04 EAST SIDE AND SOUTH SIDE ELEVATION (ADMINISTRATION BLOCK)
A05 WEST SIDE AND NORTH SIDE ELEVATION (ADMINISTRATION BLOCK)
A06 SECTIONS (ADMINISTRATION BLOCK)
A07 FLOOR PLAN, ELEVATIONS AND SECTIONS
(PUBLIC TOILETS AND WATCHMAN'S HUT)

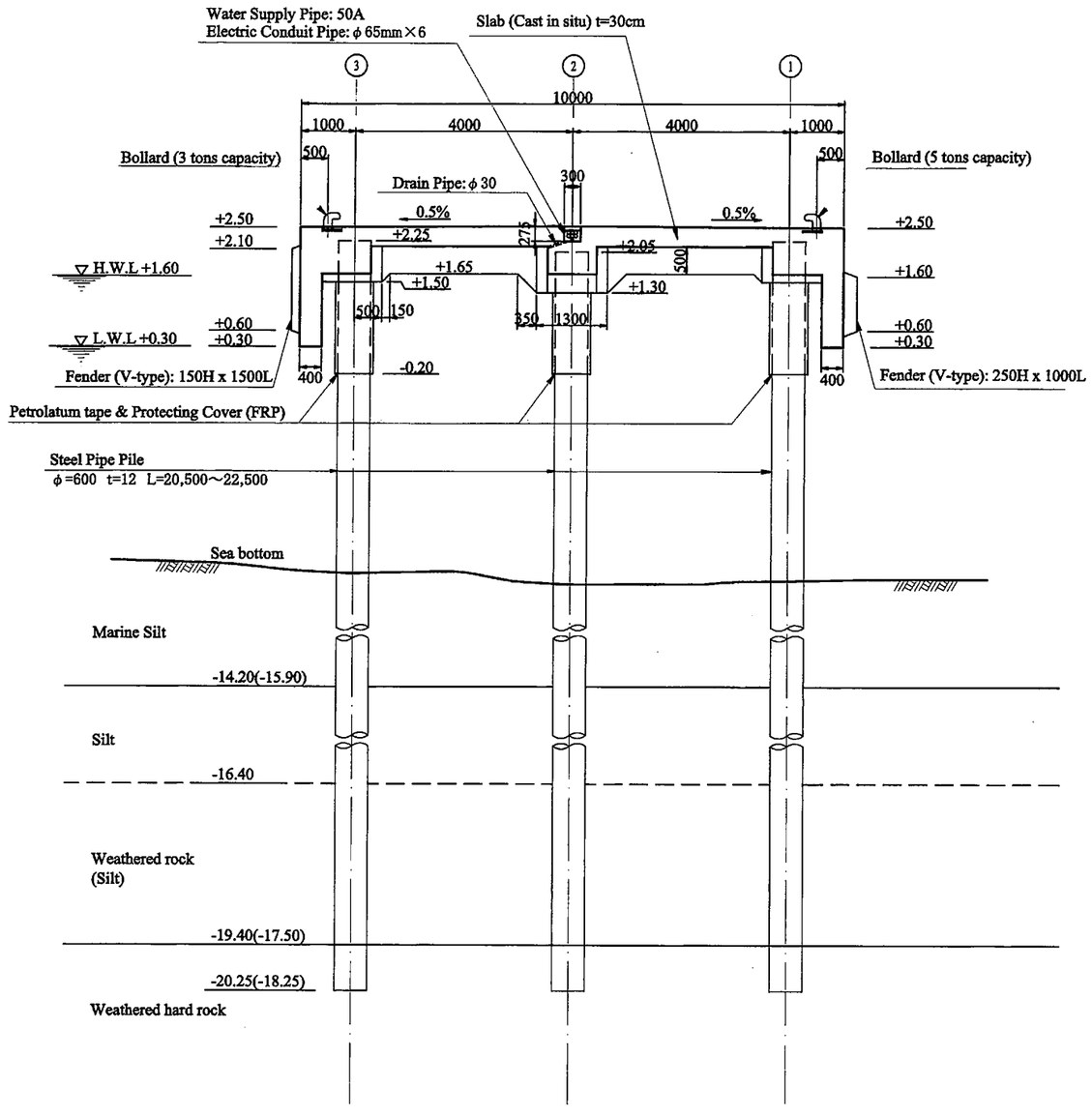


THE PROJECT FOR REDEVELOPMENT OF FISHERIES LAMI JETTY IN THE REPUBLIC OF THE FIJI ISLANDS		
JETTY PLAN (JETTY BLOCK & STEEL PIPE PILE LAYOUT)	SCALE : 1/400	DWG NO. C-01
	DATE : JANUARY, 2005	

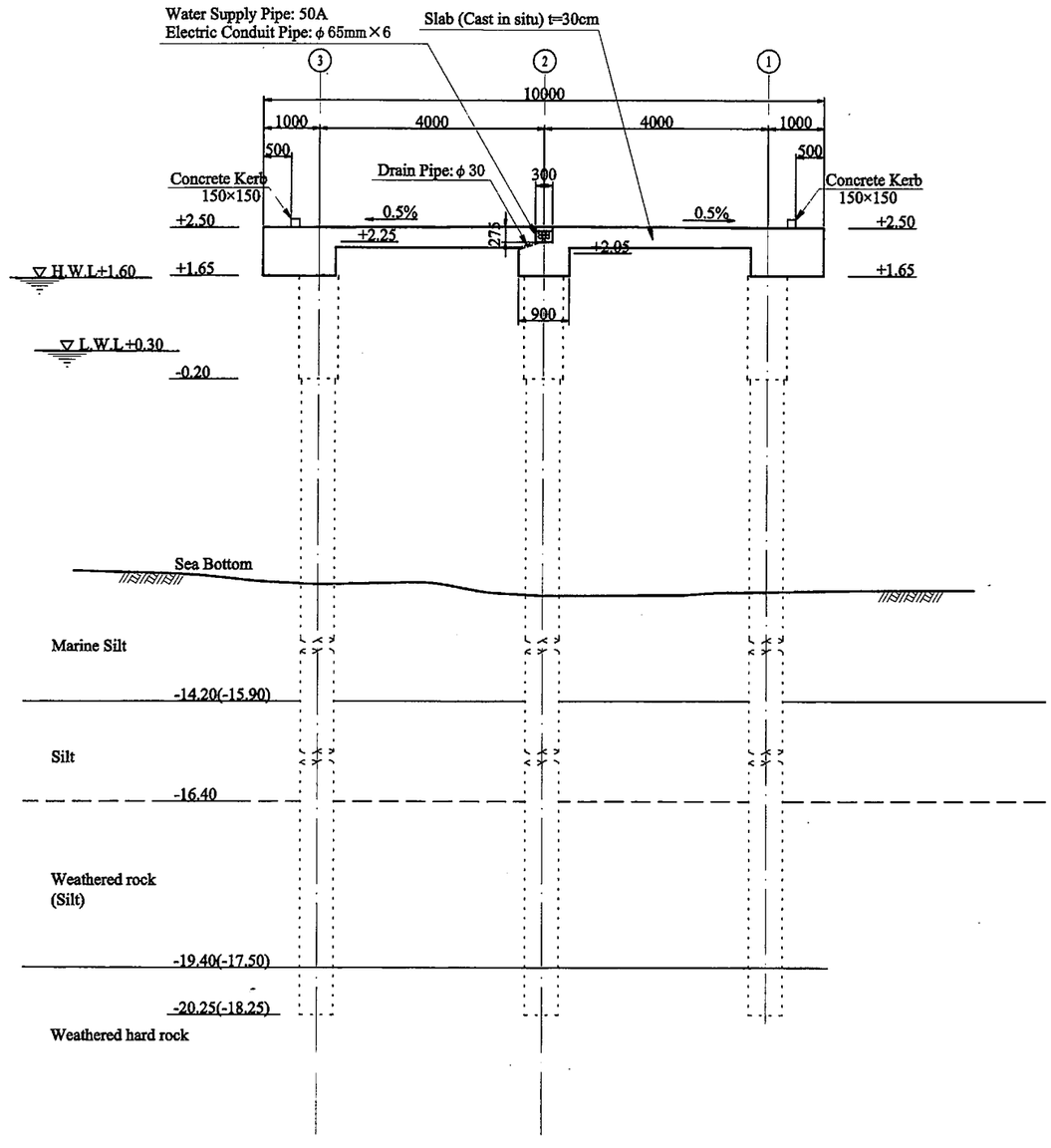


Scale
0 1 2 3 4 5 6 7 8 9 10m

THE PROJECT FOR REDEVELOPMENT OF FISHERIES LAMI JETTY IN THE REPUBLIC OF THE FIJI ISLANDS		
FRONT ELEVATION OF JETTY	SCALE : 1/200	DWG NO. C-02
	DATE : JANUARY, 2005	



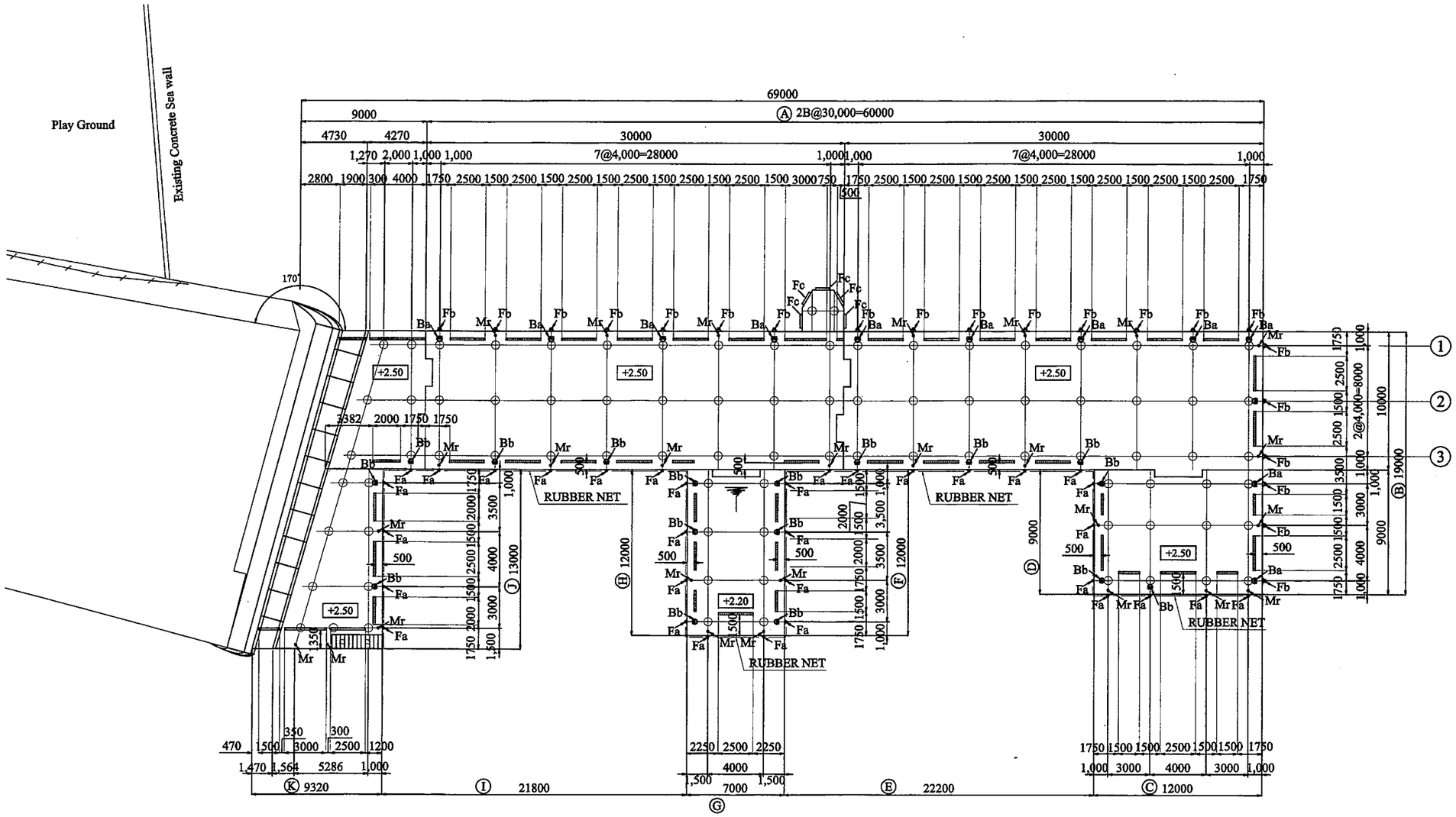
TYPICAL SECTION IN THE PILE & FENDER ROW



TYPICAL SECTION IN THE INTERMEDIATE

0 1 2 3m

THE PROJECT FOR REDEVELOPMENT OF FISHERIES LAMI JETTY IN THE REPUBLIC OF THE FIJI ISLANDS		
TYPICAL SECTION OF THE JETTY	SCALE: 1/100	DWG NO. C-03
	DATE: JANUARY, 2005	



LEGEND

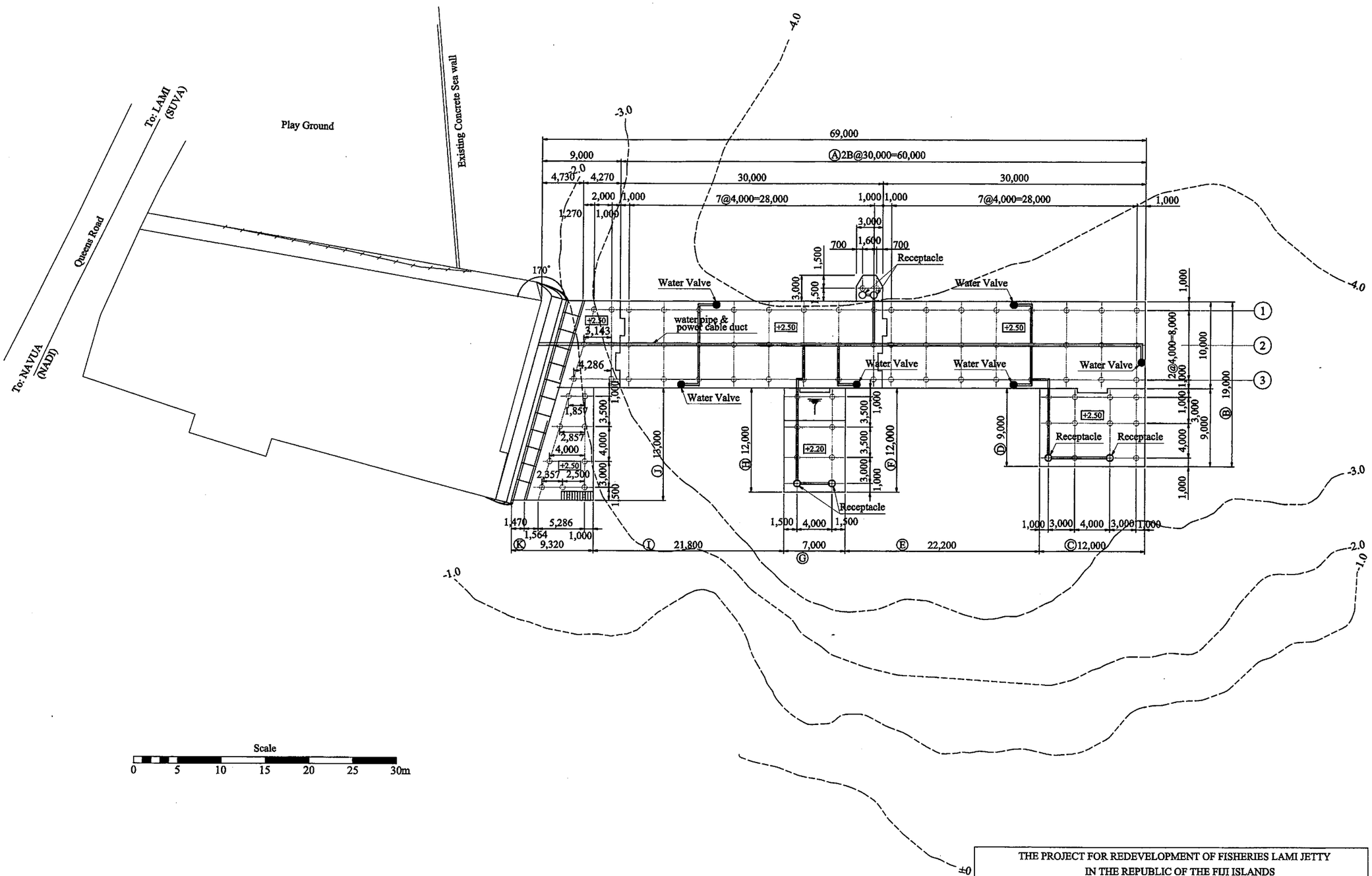
Ba: BOLLARD (5 tons Capacity)
Bb: BOLLARD (3 tons Capacity)
Mr: MOORING RING (1 ton Capacity)

Fa: FENDER (V-Type) 150H x 1500L
Fb: FENDER (V-Type) 250H x 1000L
Fc: FENDER (V-Type) 150H x 1000L

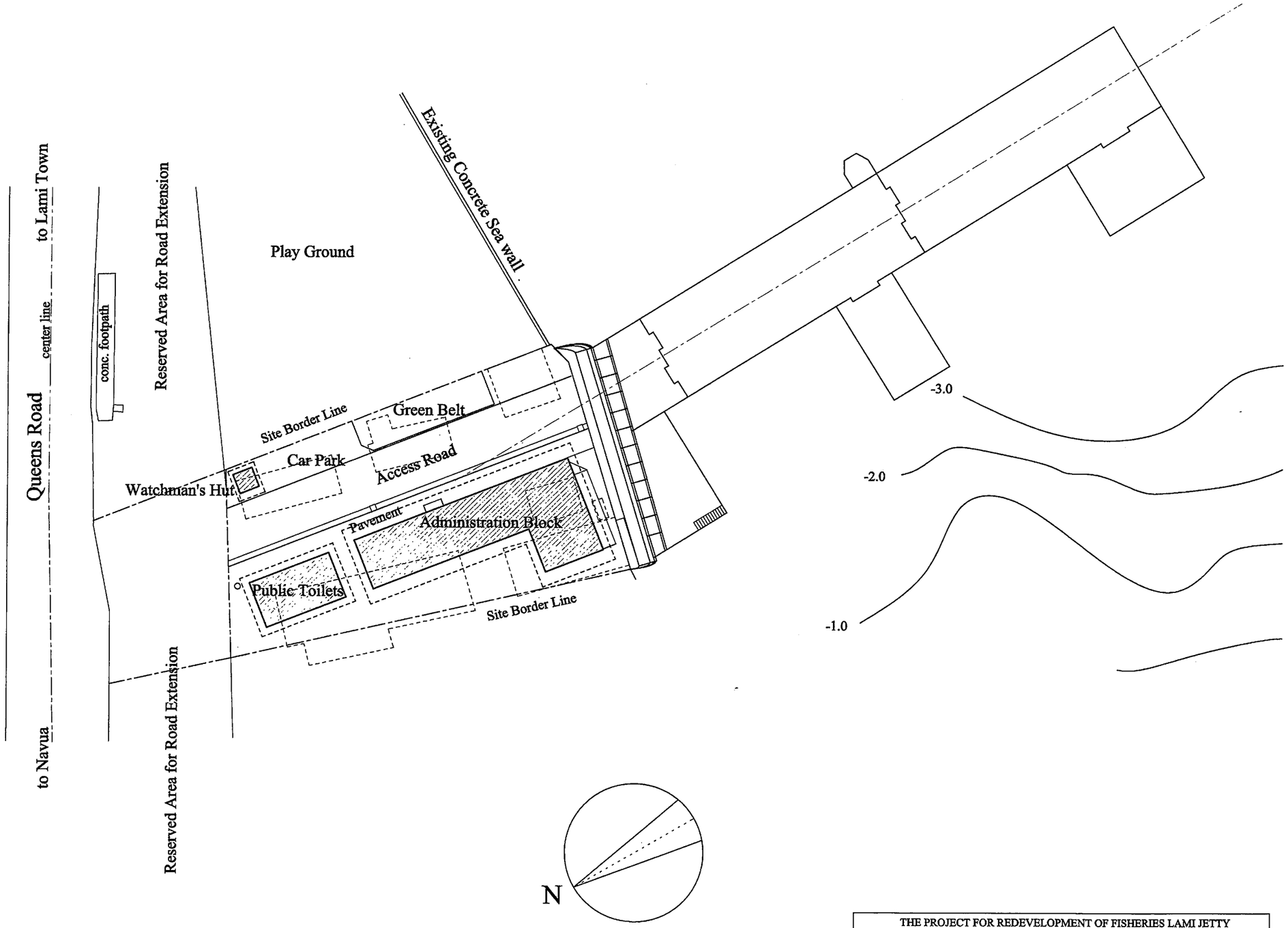
: CONCRETE CURB

Scale
0 5 10 15 20 25 30m

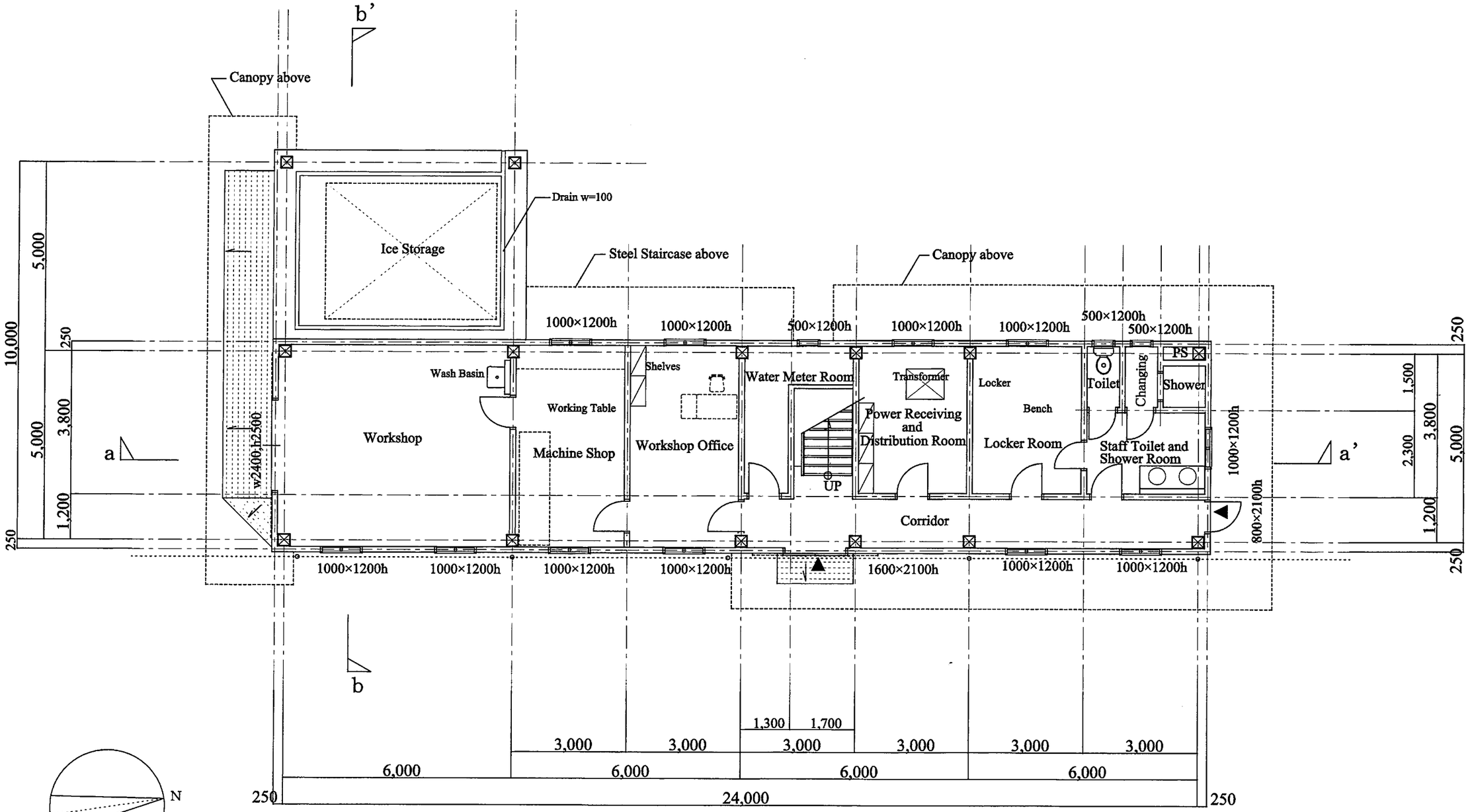
THE PROJECT FOR REDEVELOPMENT OF FISHERIES LAMI JETTY IN THE REPUBLIC OF THE FIJI ISLANDS		
BOLLARD, MOORING RING, FENDER & CONCRETE CURB LAYOUT PLAN	SCALE: 1/300	DWG NO. C-04
	DATE: JANUARY, 2005	



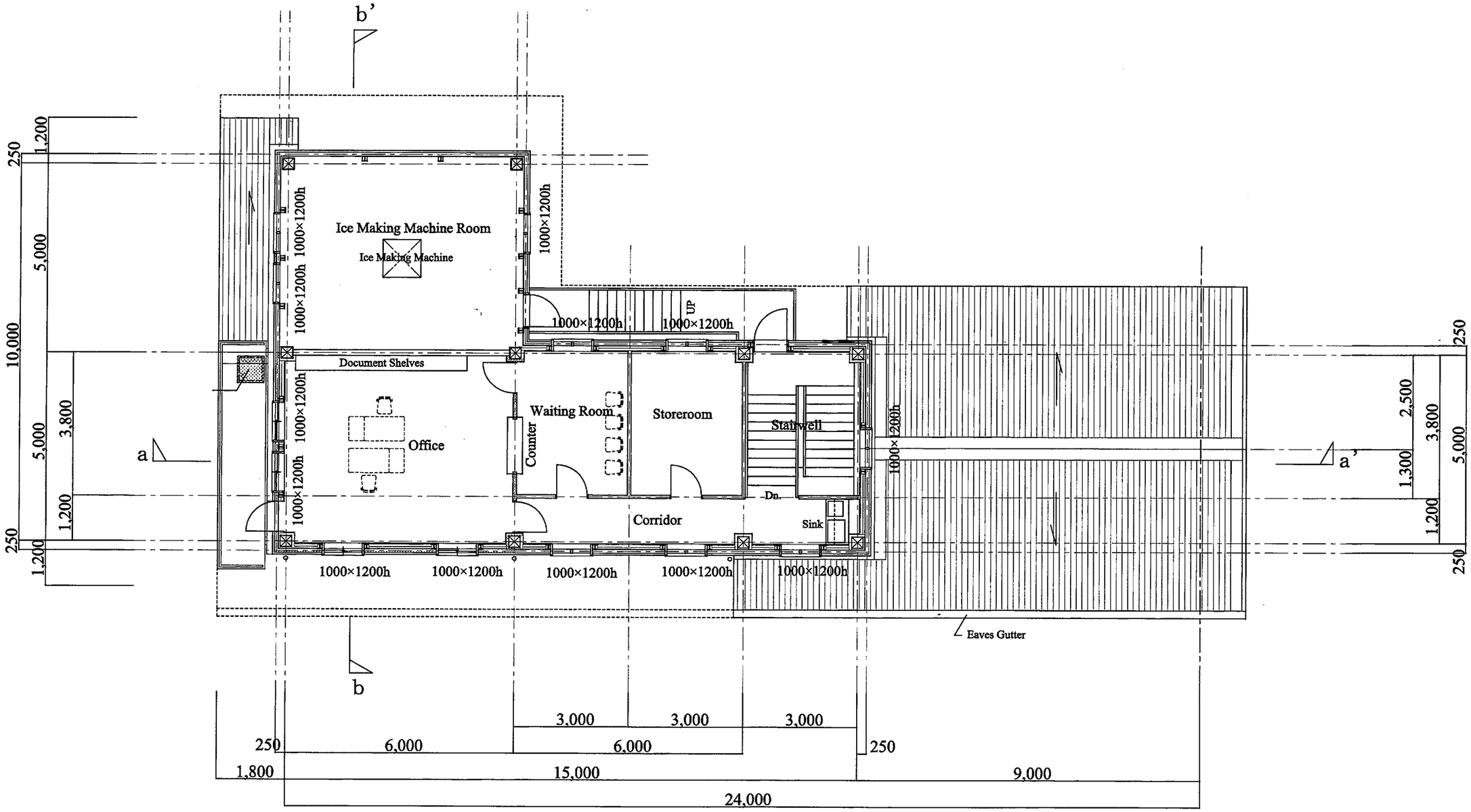
THE PROJECT FOR REDEVELOPMENT OF FISHERIES LAMI JETTY IN THE REPUBLIC OF THE FIJI ISLANDS		
WATER SUPPLY PIPE & ELECTRIC CONDUIT PIPE SYSTEM PLAN	SCALE : 1/400 DATE : JANUARY, 2005	DWG NO. C-05



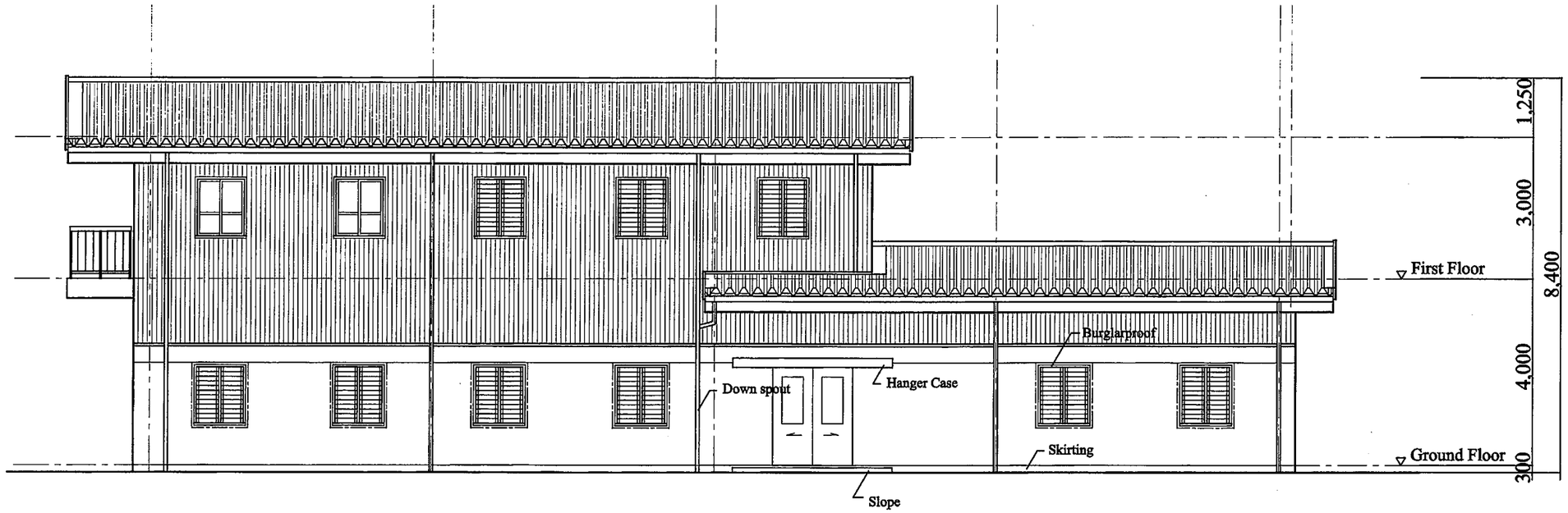
THE PROJECT FOR REDEVELOPMENT OF FISHERIES LAMI JETTY IN THE REPUBLIC OF THE FIJI ISLANDS		
SITE PLAN	SCALE : 1/400	DWG NO. A-01
	DATE : JANUARY, 2005	



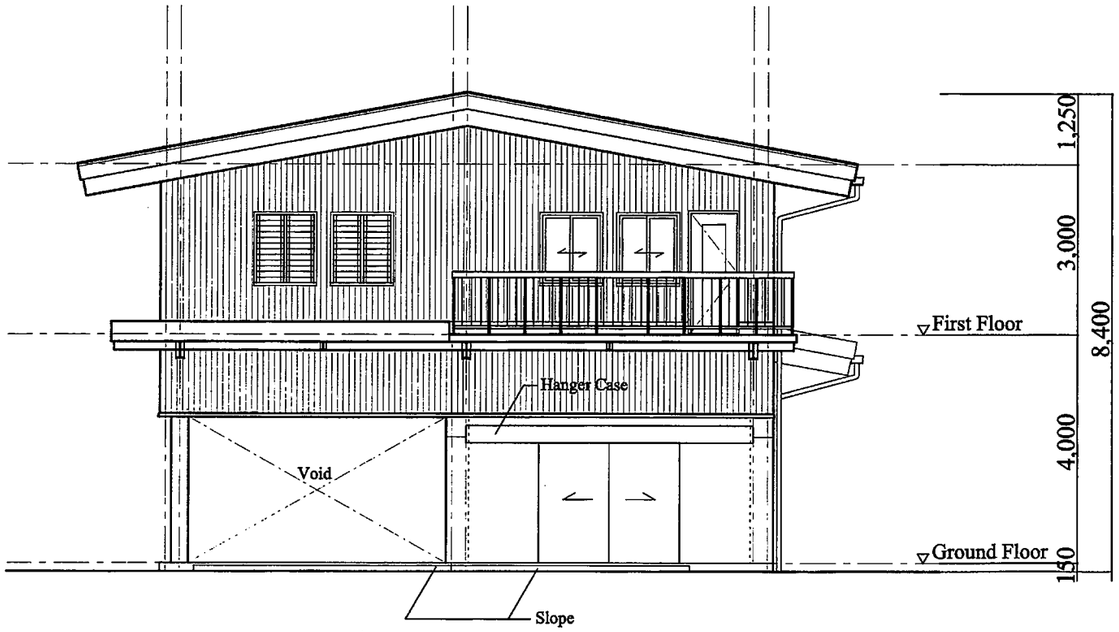
THE PROJECT FOR REDEVELOPMENT OF FISHERIES LAMI JETTY IN THE REPUBLIC OF THE FIJI ISLANDS		
GROUND FLOOR PLAN (ADMINISTRATION BLOCK)	SCALE : 1/100	DWG NO. A-02
	DATE : JANUARY, 2005	



THE PROJECT FOR REDEVELOPMENT OF FISHERIES LAMI JETTY IN THE REPUBLIC OF THE FIJI ISLANDS		
FIRST FLOOR PLAN (ADMINISTRATION BLOCK)	SCALE : 1/100	DWG NO. A-03
	DATE : JANUARY, 2005	

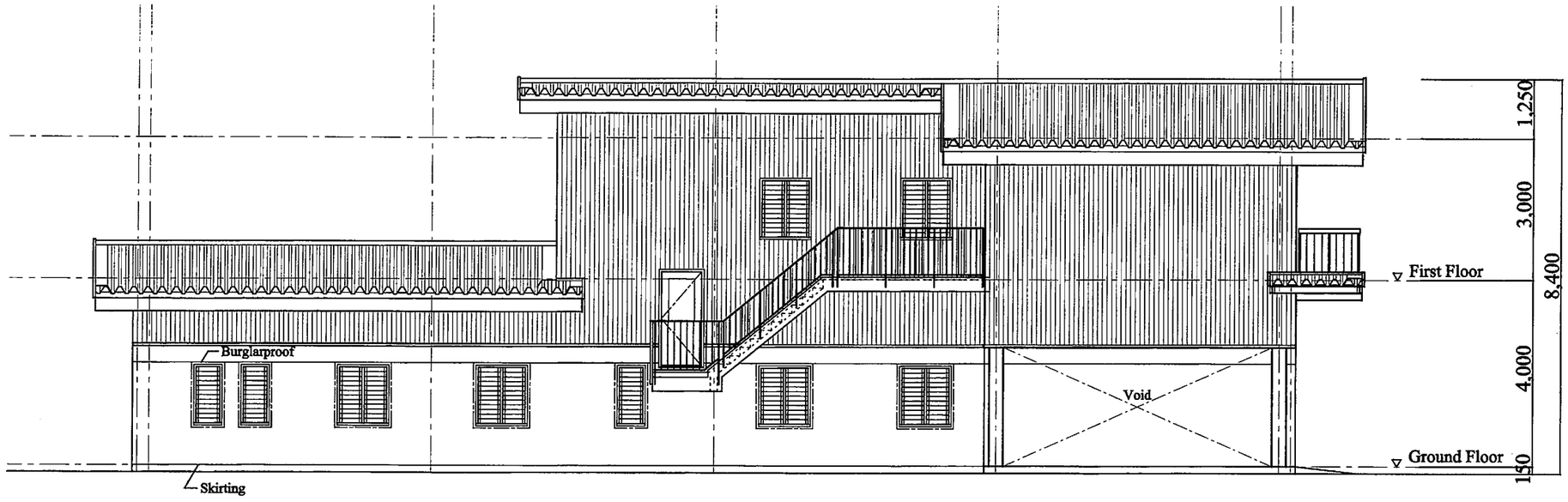


EAST SIDE ELEVATION

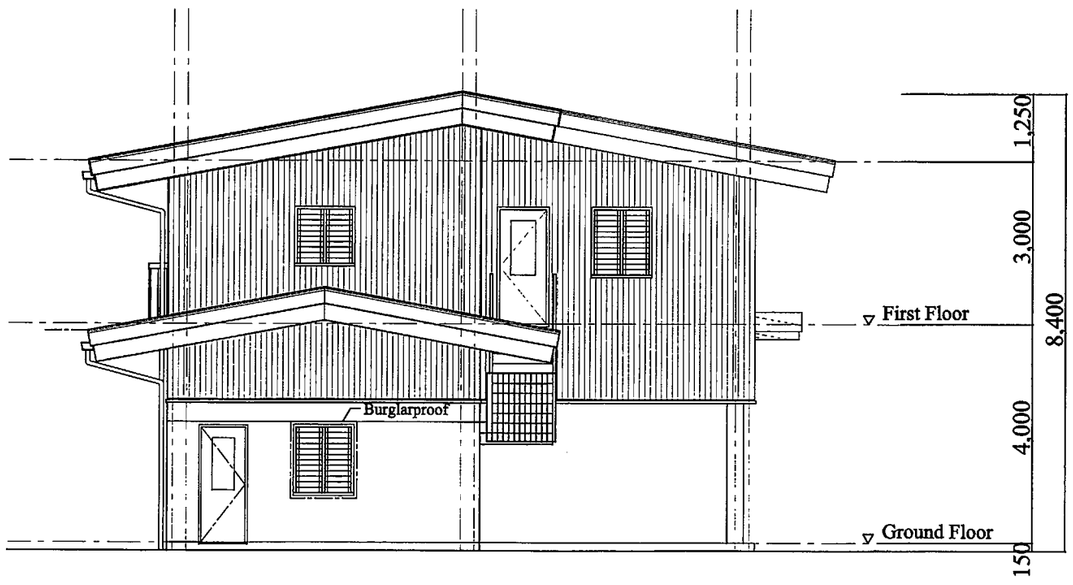


SOUTH SIDE ELEVATION

THE PROJECT FOR REDEVELOPMENT OF FISHERIES LAMI JETTY IN THE REPUBLIC OF THE FIJI ISLANDS		
EAST SIDE AND SOUTH SIDE ELEVATION (ADMINISTRATION BLOCK)	SCALE : 1/100	DWG NO. A-04
	DATE : JANUARY, 2005	

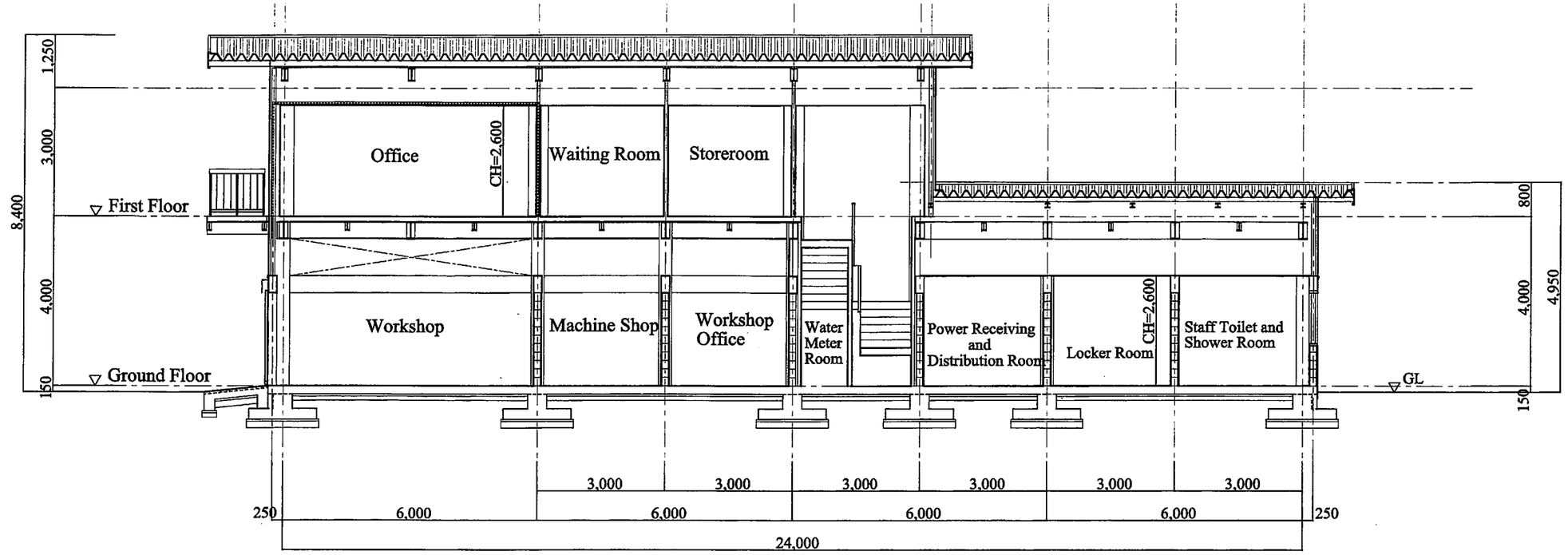


WEST SIDE ELEVATION

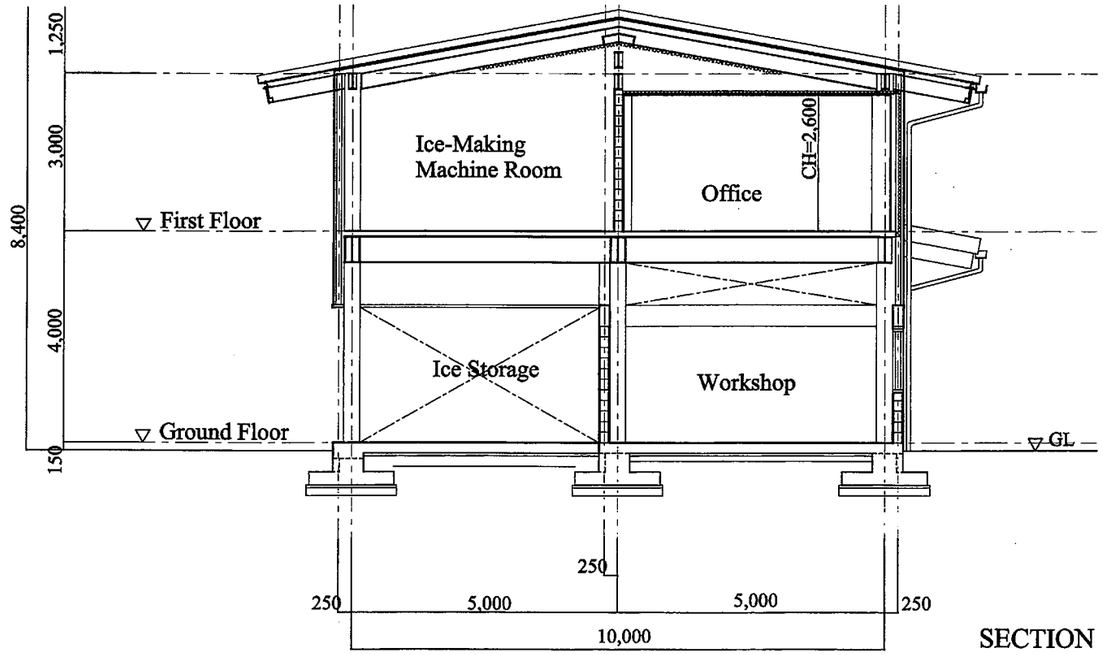


NORTH SIDE ELEVATION

THE PROJECT FOR REDEVELOPMENT OF FISHERIES LAMI JETTY IN THE REPUBLIC OF THE FIJI ISLANDS		
WEST SIDE AND NORTH SIDE ELEVATION (ADMINISTRATION BLOCK)	SCALE : 1/100	DWG NO. A-05
	DATE : JANUARY, 2005	

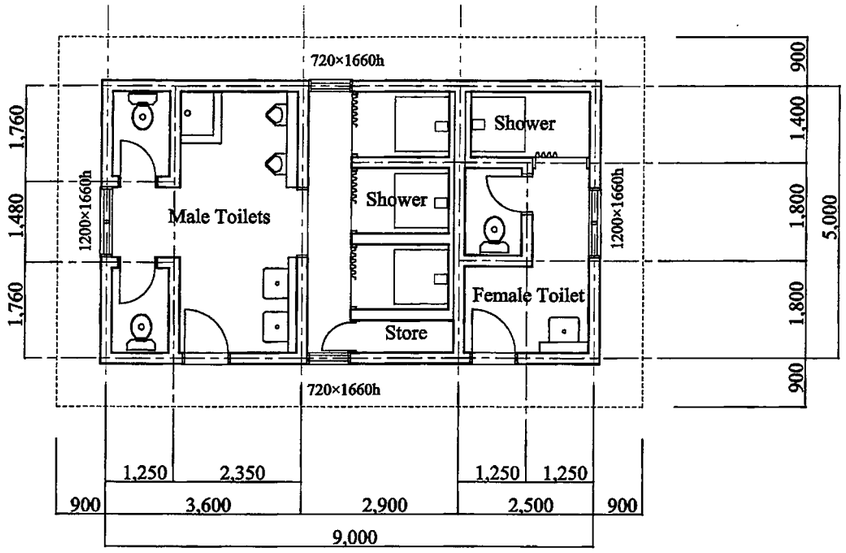


SECTION a - a' S=1/100

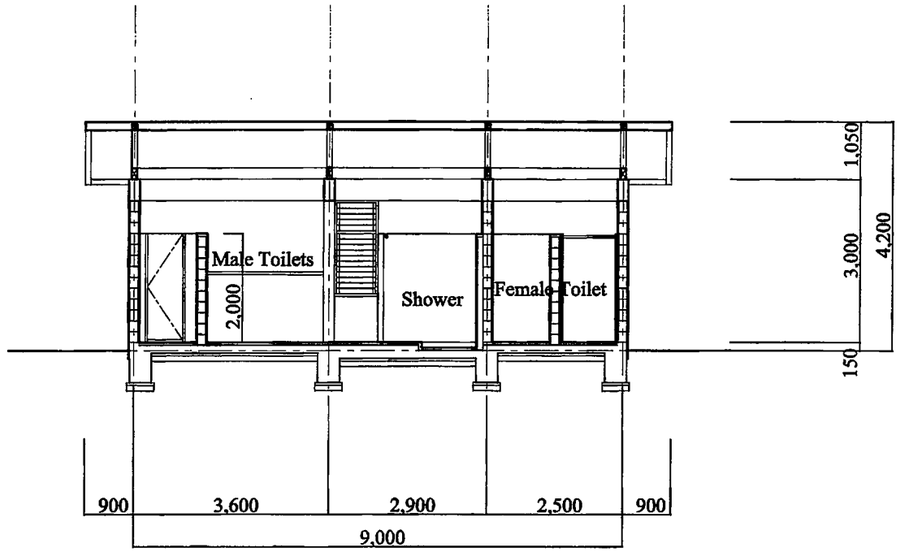


SECTION b - b' S=1/100

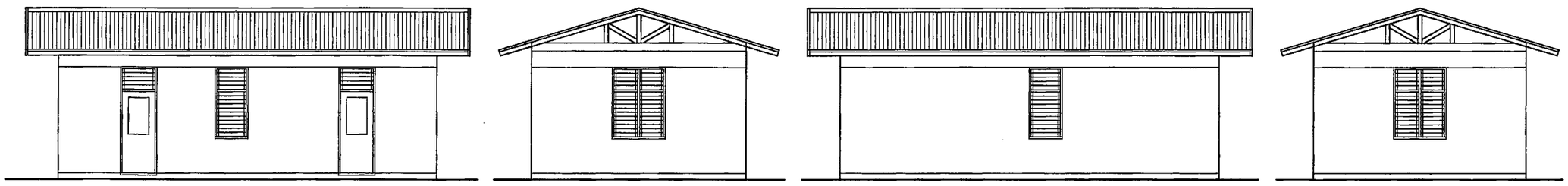
THE PROJECT FOR REDEVELOPMENT OF FISHERIES LAMI JETTY IN THE REPUBLIC OF THE FIJI ISLANDS		
SECTIONS (ADMINISTRATION BLOCK)	SCALE : 1/100	DWG NO. A-06
	DATE : JANUARY, 2005	



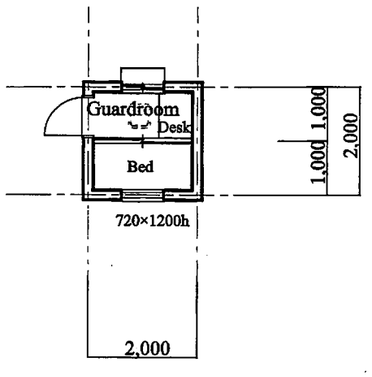
PUBLIC TOILETS FLOOR PLAN



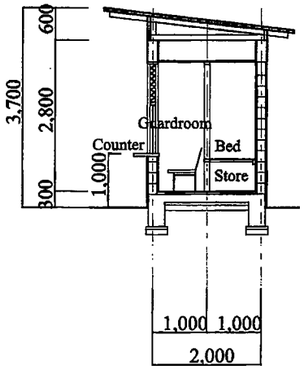
PUBLIC TOILETS SECTION



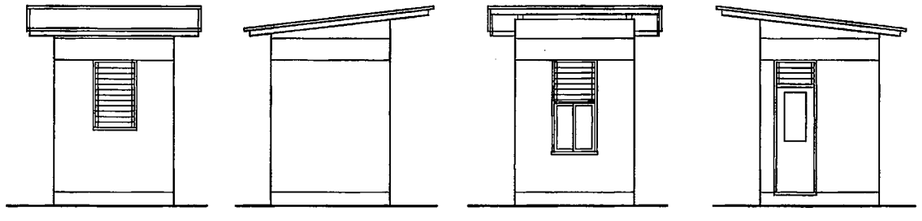
PUBLIC TOILETS ELEVATION



WATCHMAN'S HUT FLOOR PLAN



WATCHMAN'S HUT SECTION



WATCHMAN'S HUT ELEVATION

THE PROJECT FOR REDEVELOPMENT OF FISHERIES LAMI JETTY IN THE REPUBLIC OF THE FIJI ISLANDS		
FLOOR PLAN, ELEVATIONS AND SECTIONS (PUBLIC TOILETS AND WATCHMAN'S HUT)	SCALE: 1/100 DATE: JANUARY, 2005	DWG NO. A-07

2-2-4 Implementation Plan

2-2-4-1 Implementation Policy

The project shall be implemented under the Grant Aid Scheme of the Government of Japan. Accordingly, in light of the need to complete the works within the specified period, the works shall be implemented under appropriate execution criteria and consultant supervision upon formulating an appropriate plan of construction methods, equipment and materials supply plan, and works schedule. Construction shall be implemented based on the following basic concept:

a. The Project is a facilities construction project that intends to redevelop the Lami Fisheries Jetty. Since the fishing vessels and Fisheries Department vessels based at the jetty will continue to use related facilities and nearby waters during the works period, safety measures shall be taken to avoid hindrance of these activities.

b. Since the works will take place in a tranquil environment, take care not to exert an impact on the local living environment. Moreover, since the Project site is a coastal area, care shall be taken not to affect the natural environment of the sea with construction wastewater, etc.

c. Close contact shall be maintained with related persons in the recipient country during all stages of the works and attention shall be paid not to create any gaps or misunderstandings in implementing procedures.

d. As the technical capability level of local construction technicians is not necessarily high and procurement of workvessels and special machines is difficult, carefully evaluate situations and plan to realize the utmost potential from construction conditions in the neighboring area.

e. Since Fiji is an island state in the South Pacific Ocean, it imports many of its construction materials from nearby advanced nations. Moreover, in consideration of the limited size of the local construction market, attention shall be paid to local ordering and transportation conditions when recruiting engineers and technicians and procuring construction equipment and materials.

f. When selecting equipment and materials, full attention shall be paid towards ease of operation, durability, ease of maintenance, and ease of procuring expendables, etc. upon considering that Fiji belongs to the Oceania economic bloc led by Australia and New Zealand.

g. Concerning works implementation and labor supervision, because Fiji includes many pious Christian Fijians and Hindu Indians, and citizens have deep respect for traditional customs, ample attention shall be paid to the local customs, tradition and culture.

(1) Concept with respect to utilization of local contractors and dispatch of engineers

In Fiji there are around 40 construction companies of varying size, but most of these are small-scale enterprises and not many of them are capable of implementing large-scale construction works. On the other hand, local corporations that have head offices in Australia and/or New Zealand are large concerns that have high technical levels. Accordingly, it is considered practical to select the Project contractors from these locally based enterprises.

Fiji has a system of registering and authorizing operators with the Ministry of Public Works, and some operators are recognized to be competent (past record, capital, technical capability, etc.) under this; however, such operators are mainly concerned with renovation works and small-scale construction. Moreover, since few companies have experience of marine civil engineering works, it will not be possible to comply with the quality and schedule requirements without dispatching skilled technicians and conducting proper execution supervision. Accordingly, although there is no problem in selecting local labor dispatch companies, care will need to be taken when selecting local firms as works contractors.

In view of these conditions, although the basic policy is to employ local construction companies and laborers to the extent possible, it is planned to dispatch Japanese technicians or third country technicians for special construction works such as steel-framing and ice-making equipment installation, which need to be implemented economically and rationally.

(2) Implementation setup in the recipient country

The Fiji side has entrusted this project to the Ministry of Fisheries and Forests, and the Ministry is in charge of preparation for conclusion of E/N, arrangements with banks, consultant agreement and works contract, implementation of procedures with related government agencies, and review and approval of the contents of the implementation plan. The Ministry shall also be responsible for necessary implementing tariff exemption procedures with domestic agencies concerning the receiving of construction materials and Project equipment, and it shall also conduct an environmental impact assessment as well as coordinating affairs and offering advice to aid the smooth implementation of the works.

2-2-4-2 Implementation Conditions

a. During the construction period, since the fishing vessels and Fisheries Department vessels based at the jetty will continue to use related landing facilities, ample attention shall be paid towards securing safety in the surrounding water body during the works. In particular, it will be necessary to prohibit entry by unauthorized persons to the navigation lanes of workvessels. On land, the temporary installation plan, construction methods plan and schedule plan, etc. shall be carefully compiled upon carefully considering traffic lines for works vehicles and operators, etc.

b. As the Project site of the premises for this project does not provide sufficient space for construction, it is necessary to carefully plan the use of temporary space for storage of construction materials, equipment and machines. Construction must be planned carefully and processes supervised so as not to disturb traffic and the activities of local people.

2-2-4-3 Scope of Works

In the event where the Project is implemented under the Grant Aid Scheme of the Government of Japan, the scope of works to be implemented by both countries shall be as follows:

<Matters to be borne by the Fiji side>

a. Installation of perimeter fencing, gate, entrance paving and fire hydrant, etc. on the Project site.

b. Extension of water, electricity and telephone lines, etc. to the construction site.

c. Acquisition of licenses necessary in Fiji for building works, etc. in the Project

d. Speedy exemption of taxes and customs clearance procedures necessary in Fiji for the implementation of building works and equipment installation in the Project

e. Removal of existing structures (floating jetty, ice-making equipment, electricity poles, office, site of the former refueling station, deteriorated equipment).

f. Purchase of furniture, fixtures, fire extinguishers and waste collection boxes, etc.

g. Securing of temporary moorage for fishing vessels during the construction works period.

<Matters to be borne by the Japanese side>

a. Provision of consultant services such as detailed design, auxiliary bidding operations and execution supervision.

b. Procurement of all the materials and equipment as well as labor necessary for the construction of facilities mentioned in the Basic Design Report

c. Marine and overland transportation of imported equipment and materials required for construction of facilities mentioned in the Basic Design Report, and payment of export insurance expenses on imported equipment and materials.

d. Implementation of quality inspection necessary for facilities construction and engineering work and the equipment and materials procurement mentioned in the Basic Design Report.

e. Demolition and removal of the existing jetty apron.

2-2-4-4 Consultant Supervision

Upon undertaking construction, establish a liaison system among related institutions of the Government of Fiji, the JICA office, consultant and construction companies and make appropriate plans for necessary materials and equipment for supervision of construction, vehicles, various proceedings for planning of offices, etc. and quality control as well as timing and supervisory methods. With respect to personnel planning, in terms of technical levels necessary for supervision of construction, assignment, staff numbers and grouping etc., carefully investigate and make appropriate plans for on-site full-time supervising engineers, spot supervising engineers and assistants to be hired locally.

(1) Basic Concept

a. Following the conclusion of design and supervisory contracts with the Government of Fiji, the consultant shall conduct on-the-spot investigation and hold a final briefing session with Fisheries Department officials.

b. The consultant shall prepare drawings and documents necessary for bidding such as detailed design drawings, bidding specifications, structural calculation statements, numerical accounting statements, etc. in Japan. It shall then obtain the approval of relevant persons in Fiji.

c. Following the completion of bidding documents, the consultant shall select contractors and equipment suppliers through examination of applicants' qualifications for participation in bidding, bidding evaluations, etc. by taking appropriate procedures with the approval of the refrigerant.

d. Following the conclusion of construction contracts between the Government of Fiji and contractors, etc., the consultant shall undertake an embarkation inspection with the presence of third party institutions after checking drawings provided by contractors, confirming

specifications provided by equipment suppliers, and implementing factory inspections and trial operations in Japan.

e. On the Project site, the consultant shall dispatch supervising engineers and execute overall supervisory operations related to selection of local sub-contractors, regular meetings with related persons, works management, witnessing of progress inspections and quality control tests, and preparation of control reports, etc. Also, where necessary, the consultant shall make reports to the Japanese government agencies.

(2) Conditions for supervision of construction

a. Construction materials shall be procured mostly using marine transportation. In order to avoid delay in construction due to procurement and transportation, thoroughly confirm approval documents and order schedules.

b. Since the Project site is surrounded by resort facilities and a forest protection zone, take steps to keep noise generation and discharge of pollutants, etc. to a minimum.

c. Concerning the manufacture of concrete precast members, ensure the production of stable quality members by implementing thorough quality control and confirmation of concrete curing.

d. Since the construction works will mainly be implemented at sea on workvessels, ample care shall be taken to secure safety in the marine work area and to prevent confusion with other vessels during the transportation of materials.

e. Since the Project area has frequent rainy days and high humidity, it is important to secure the necessary number of workdays. Therefore, ample care will need to be shown regarding works schedule supervision.

(3) Implementation supervisory system

a. person in charge of the overall implementation shall, in cooperation with the permanent construction supervisor, check the implementation and management systems and execution drawings of contractors and supervise procurement of materials and equipment as well as transportation schedule, etc.

b. Materials and equipment to be procured in Japan shall undertake factory inspection and embarkation inspection by Japanese officers in charge.

c. Regular meetings shall be held with related persons on the Fiji side to adjust the implementation schedule and operations.

2-2-4-5 Procurement Plan

(1) Materials and equipment for construction

Construction materials produced in Fiji are cement, sand, aggregate and timber, etc. Other general construction materials used for civil purposes are imported from neighboring countries and can be purchased on the local market. Therefore, those materials that are difficult to procure locally, are expensive even if obtainable through import, or are difficult to procure in sufficient quality, shall be procured from third countries or Japan.

Table 2-43 Procurement Sources of Construction Materials and Equipment

Name	Procurement from (Policy)			Reason
	Local	Third countries	Japan	
Concrete aggregate	○			
Cement	○			
Deformed reinforcing steel	○			Third country products
Plywood for formwork, and other timber	○			Third country products
Steel pipe pile		○	○	Local procurement is difficult
Fender			○	Local procurement is difficult
FRP casing			○	Local procurement is difficult
Mooring rings and bits			○	Local procurement is difficult
Concrete block	○			
Structural steel frame			○	Due to restrictions in terms of construction periods and specifications
Aluminum sash	○			Local procurement is difficult
Rustproof roofing material	○			Local procurement is difficult
Rustproof coating	○			Decide according to the ease of procuring specifications
Paint	○			Local procurement is difficult
Building interior materials	○			Third country products
Electric installation materials	○		○	Economy
Lighting fixtures	○			Procurement of products conforming to specifications is difficult
Ice-making machine		○		Not produced locally
Plumbing material	○			
Air conditioner	○			

(2) Equipment and materials

1) Ice-making machine and ice storage

Most of the ice-making machines used in Fiji are either made in Japan or Australia. Japanese ice-making machines have been supplied in past grant aid projects implemented by the Government of Japan. On the other hand, Australian machines have been adopted in aid projects by other countries and by private sector companies, while compressors are

frequently procured from Germany. In recent years, because of concerns over the impact exerted on the atmosphere of refrigerant used in freezer equipment in Fiji, controls have been placed on the refrigerant that can be used in ice-making machines, freezers and refrigerators, etc. Accordingly, when selecting the ice-making machine, an important factor will be whether or not the refrigerant is a controlled type. There is no problem regarding refrigerant that are not controlled as ODS such as R0507 and R404A, however, refrigerant such as R-22, etc. are subject to control and need to be controlled by permitted handlers.

Upon surveying the procurement situation regarding ice-making machines made in New Zealand, there was found to be one maker of small commercial ice-making machines with capacity of between 200~400 kg, however, no makers of larger industrial ice-making machines could be confirmed. In consideration of this, examination was carried out on ice-making machines made in Australia (R-507 refrigerant) and New Zealand (R-22 or R-404). As a result of this, it was concluded valid and appropriate to procure an Australian ice-making machine that uses R-507 refrigerant. Concerning thermal insulation material for the ice storage, Australian products frequently use polystyrene panels, while Japanese products use urethane panels (aluminum surface material). Polystyrene has a lower thermal insulation effect than urethane, and polystyrene panels are frequently 1.5 times thicker than urethane panels under the same design conditions. Having said that, since both types of material ensure the thermal insulation functions required by the Project ice storage, both types of ice storage are considered feasible for the Project.

In consideration of the above factors, the Project ice-making equipment should be procured from Australia, while the ice storage should be procured from either Australia or Japan. Concerning the tools required for operation and maintenance of the ice-making machine, since this will be the first ice-making machine using the unrestricted refrigerant of R-507 to be procured by the Fisheries Department, the necessary utensils for collecting refrigerant from the machine and special tools for implementing maintenance shall also be procured.

2) Workshop tools

Many of the equipment and materials in the Project can be procured in Fiji, however, most of the powered tools and hand tools equipped in the existing workshop of the Lami Headquarter of the Fisheries Department are high quality and durable products made in advanced industrial nations in Europe and America, etc. In particular, concerning gas welders, since products that comply with oxygen and acetylene gas welder and pressure specifications currently widespread on the market must be purchased, it is considered appropriate to procure third country products that are currently available on the domestic market in Fiji.

As for other power tools and general tools, relatively cheap imported products from Korea, Taiwan and China are available on the local market, however, not many products can satisfy the required specifications and offer good quality assurance. Moreover, materials and sizes are inconsistent and stocks are not always available for some products. As a result, products frequently have to be ordered from abroad according to the contents of the order. As for tools made in Taiwan, China and Korea, etc., even though they are low prices, since they are often inferior in terms of quality, it is appropriate to procure from advanced countries.

In consideration of the above factors, gas welder equipment shall be procured locally, while other equipment shall be procured from advanced industrial countries such as Japan or Australia, etc.

2-2-4-6 Quality Control Plan

Quality control in the Project shall be implemented based on the following concept:

a. Specify normal standards or attributes for quality control in the drawings and specifications.

b. In order to secure quality, indicate in the drawings and specifications, management methods of the implementation scheme for each control item.

c. For the sake of confirmation of quality control at each implementation stage, confirm quality during the construction period using appropriate statistical methods.

d. Even in case of minor changes in the drawings and specifications or in the implementation scheme during the construction period, make appropriate note and record in documents.

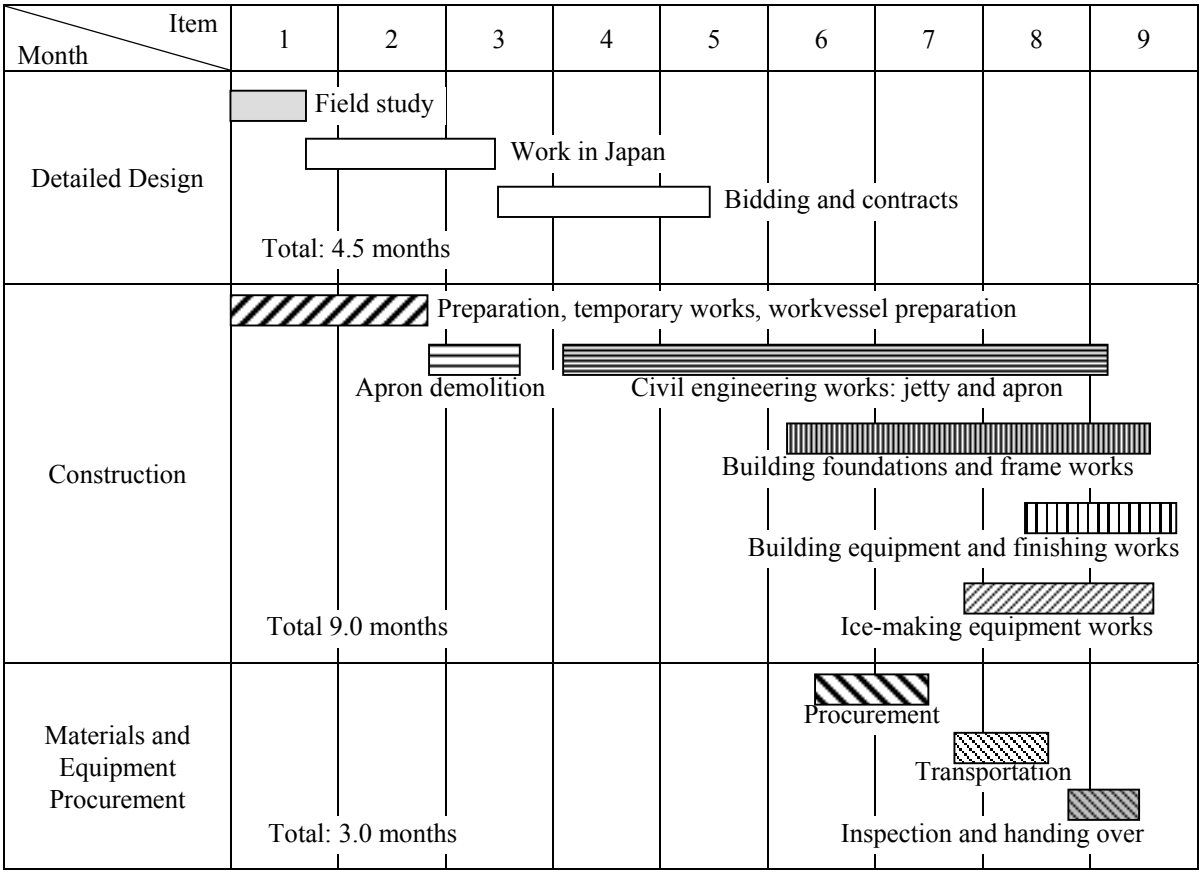
e. With respect to concrete, execute standard control and pay full attention to salt content control of fine aggregate.

f. Since steel pipe piles for the jetty will be placed into soft ground and it will be necessary to secure lateral reactive force in terms of structure when mooring vessels alongside the jetty, pay ample attention to the execution precision.

2-2-4-7 Implementation Schedule

Implementation of this project it is scheduled to take the following: 4.5 months for detailed design including detailed design of facilities and bidding; 9.0 months for construction including approval of drawings, construction, inspection, etc. following the conclusion of contracts with facility construction companies; and 3.0 months for procurement of equipment. Table 2-44 shows the Project implementation schedule.

Table 2-44 Project Implementation Schedule



Following signing of the Consulting Services Agreement between the implementing agency on the Fiji side and the Japanese consultant, the Government of Japan shall certify the agreement, and the consultant shall commence the detailed design. During the detailed design, the tender documents consisting of the detailed design drawings, specifications and tender guidelines, etc. will be prepared based on this basic design study report. During this period, the consultant shall hold discussions with the Government of Fiji concerning the detailed contents of facilities and equipment and obtain final approval from the Government of Fiji for the tender documents. Moreover, in implementing the detailed design discussions, in consideration of time for review by other related agencies in addition to the implementing agency on the Fiji side, a setup shall be established that does not interfere with the Project implementation schedule.

(1) Tender work

The Project facilities works contractor and equipment suppliers (Japanese corporations) shall be decided by tender. The tender, consisting of advertisement, review of participation qualifications, distribution of tender documents, bidding, assessment of the bidding results, designation of the

works contractor and binding of the works contract in that order, will require a period of approximately 2 months.

(2) Work for facilities construction and materials and equipment procurement

Following binding of the works contract and certification of the contract by the Government of Japan, the works will commence. Taking into account the scale and contents of the Project facilities and local construction situation, etc., assuming that no situations beyond human control occur, it is estimated that approximately 9.0 months will be required from the start to the end of works.

2-3 Obligations of Recipient Country

1) Securing and leveling of planned site for construction of facilities under the Project
2) Securing and provision of a temporary installation yard on the Project site during construction
3) Acquisition of all the procedures and permits required in Fiji for the implementation of the construction works and bearing of the costs thereof
4) Planting of vegetation and construction of fences and gates, etc. around the perimeter of the Project site
5) Purchase and installation of furniture, telephones and office equipment, etc. required for the Project facilities.
6) Bearing of all costs not covered by Japan's grant aid for items necessary for Project implementation
7) Bearing of costs for, and speedy implementation of, landing and customs clearance of products used in the Project.
8) Exemption of tariffs, domestic taxes and other financial charges that would otherwise be levied on Japanese nationals for products and services procured in the Project
9) Securing of conveniences for entry to and residency in Fiji for Japanese required for the implementation of the Project based on the certified contract
10) Expediting of procedures for a banking arrangement (BA) and A/P and bearing of the necessary banking fees for implementation of the Project.

2-4 Project Operation Plan

The Fisheries Department, under the supervision and guidance of the Ministry of Fisheries and Forests is responsible for the operation and maintenance of Fisheries Lami Jetty, which is the target facility of

the Project. A jetty master, ice-plant attendant, engineer and handyman, as well as 1 watchman during the day and 2 at night, belonging to the Lami Jetty Control Unit of the Management and Technical Service Section shall operate the facilities. Revenues obtained from jetty charges and ice sales, etc. shall be put into a Trust Fund Account, which shall be utilized to cover maintenance and repair expenses on the facilities.

2-5 Project Cost Estimate

2-5-1 Project Cost Estimate

Total project cost in the event of implementation will be 589 million yen. The breakdown of costs to be paid by both sides based on the previously mentioned scope of works and the estimation criteria indicated below in (3) is estimated as follows.

This cost estimate is provisional, not necessarily indicating the grant limit shwon in the E/N, and would be further examined by the Government of Japan for approval of the Grant.

(1) Cost to be borne by Japan

Project cost estimate: Approximately 577.9 million yen

Lami Fisheries Jetty: jetty length approx. 81 m x width approx. 10 m, administration block x 1 building 285 m^2, public toilets x 1 building 45 m^2, watchman's hut x 1 building 4 m^2

Cost Item				Cost Estimate (million yen)		
Facilities	Civil facilities	Jetty		361.1	426.4	508.6
		Apron		65.3		
	Building facilities	Administration block	Workshop, office, waiting room, water meter room, power receiving and distribution room	53.9	80.9	
			Ice-making machine and ice storage	15.1		
		Public toilets		6.3		
		Watchman's hut		1.0		
		Access road paving and landscaping		4.6		
Equipment					1.3	
Detailed design, consultant supervision, technical guidance						69.3

(2) Cost to be borne by the Fiji side: F$188.000 (approximately 11.66 million yen)

① Clearing of project site land: F$71.000 (approximately 4.40 million yen)
(Including demolition and removal of the existing buildings and floating jetty)

② Cost to secure and prepare alternative sites during the construction period
F$10.000 (approximately 0.62 million yen)

③ Cost to extend power, water and telephone lines to the facilities:
F$92.000 (approximately 5.71 million yen)

④ Cost to build and install gate and fencing:
F$15.000 (approximately 0.93 million yen)

F$188.000 (approximately 11.66 million yen)

(3) Estimation Criteria

① Estimation Point January 2005

② Exchange rate 1 US$ = 110.08 Japanese yen

1 AU$ = 80.11 Japanese yen

1 local currency (1F$) = 62.03 Japanese yen

③ Estimation period Implementation over a single phase, with detailed design, construction works- as indicated in the Implementation schedule.

④ Others The Project shall be implemented in accordance with Japan's Grant Aid Scheme.

2-5-2 Operation Cost

Concerning the operation and maintenance of the jetty facilities, it is planned to establish a new unit in the Technical Service Section and to assign a jetty master, ice-plant attendant, engineer, handyman and watchmen (3 members working in shifts).

Following completion of the Project facilities construction works, the necessary costs for operating and maintaining the facilities shall be paid from the budget of the Technical Service Section of the Fisheries Department Lami headquarters, in the same way as with the existing facility.

Concerning the management of charges collected from facility users, the Fisheries Department has set up trust fund accounts for 8 project facilities including the existing jetty and adopts an independent budgeting system for maintenance, development and repair costs, and it plans to apply the same trust fund account system to the Project facilities too. When establishing a trust fund account, approval and

authorization is obtained from the chief executive officer (CEO) of the Ministry of Fisheries and Forests for projects that entail generation of revenue in line with the project activities. The Accounting and Administration Department of the Ministry implements an audit of the account every month, and if the account balance falls below F$ 3,000 at the end of the month, withdrawals are suspended and verification and recommendations are conducted with respect to expenditure.

Basically speaking, the personnel expenses of Ministry of Fisheries and Forests personnel needed in the implementation of projects, as well as utilities costs for electricity and water supply in offices, etc. are paid from the government budget (general expenditure). This system also allows for project costs such as maintenance expenses and survey expenses, etc. including personnel costs for special purposes.

In the Project, water tariffs and electricity charges collected from fishing vessels shall not be put into the trust fund account but paid instead to the Fisheries Department. Meanwhile, other jetty charges and revenue from ice sales shall be put into the trust fund account.

Revenue items in the Project are planned as shown below, and it is considered that adequate funds can be collected from these sources to cover the cost of operating, maintaining and repairing the Project facilities and equipment.

The following table indicates the estimated operating balance of Fisheries Lami Jetty based on the independent accounting system and trust fund account.

Table 2-45 Estimate Operating Balance of Fisheries Lami Jetty

Estimate operating balance based on the independent accounting system

Revenue/Item		Breakdown	Amount/Year	(%)
① Jetty berthing charges			**32,880.00**	24.0%
	ⅢB	22-26m type: 13 vessels x 16 times/year x 2days x F$20/year	*8,320.00*	*6.1%*
	ⅢA	22-16m type: 3 vessels x 20 times/year x 1 day x F$20/year	*1,200.00*	*0.9%*
	Ⅱ	12-16m type: 8 vessels x 38 times/year x 1 day x F$15/year	*4,560.00*	*3.3%*
	Ⅰ	10-12m type: 3 vessels x 90 times/year x 1 day x F$15/year	*4,050.00*	*3.0%*
	FAO28, 33	19 vessels x 130 times/year x 1 day x F$5/day	*12,350.00*	*9.0%*
	FRP	6 vessels x 200 times/year x 1 day x F$2/day	*2,400.00*	*1.7%*
② Ice sales		948 tons/year x F$0.11	**104,280.00**	76.0%
Total revenue			**137,160.00**	100.0%
Expenditure/Item				
① Personnel cost			67,392.00	55.6%
Jetty master x 1		F$300/week x 52 weeks/year x 1 person	*15,600.00*	
Ice-plant attendant x 1		F$137/week x 52 weeks/year x 1 person	*7,124.00*	
Engineer x 1		F$158/week x 52 weeks/year x 1 person	*8,216.00*	
Handyman x 1		F$137/week x 52 weeks/year x 1 person	*7,124.00*	
Watchman (daytime) x 1		F$188/week x 52 weeks/year x 1 person	*9,776.00*	
Watchman (night) x 2		F$188/week x 52 weeks/year x 2 persons	*19,552.00*	
② Electricity charge			40,694.65	33.6%
Office and public toilets		(Average) 5.0 kWh x 24 h x 365 days x 0.2071 F4/kWh (Including wok in the workshop)	*9,070.98*	
Ice plant		24kW x 24h x (964t÷4t/day) ×1.1(10% loss foreseen)x 0.2071F$/kwh	*31,623.67*	
③ Water charge			3,820.80	3.1%
Office and public toilets		F$159.2/month (uniform at less than 150 m^3) x12 months	*1,910.40*	
Ice plant		F$159.2/month (uniform at less than 150 m^3) x12 months	*1,910.40*	
④ Facilities maintenance cost		Jetty building F$4,000/year + ice plant F$2,000/year	6,000.00	4.9%
⑤ Waste and Septic tank maintenance cost		Waste: F$200.0 x12 months Septic tank: $1,000/year (Avr. Once per 4 years)	3,400.00	2.8%
Total expenditure			**121,307.45**	100.0%
Balance (independent accounting base)			**+15,852.55**	
Balance (TFA base)		In the case where the government pays the ①personnel cost, ② electricity charge, ③ water charge	**+127,760.00**	

- The electricity charge to fishing vessels (shore power supply) is not counted because it is included in the individual facility electricity bill.
- The water charge to fishing vessels is not counted because it is included in the individual facility water bill.
- Workshop charges are not counted because users will bear the costs of materials and parts, while charges for space, tools and technical services will not be demanded.

CHAPTER 3 PROJECT EVALUATION AND RECOMMENDATIONS

CHAPTER 3 PROJECT EVALUATION AND RECOMMENDATIONS

3-1 Project Effect

Implementation of the aid activities in the Project can be expected to bring forth the following effects.

Current Conditions and Problems	Project Countermeasures (aid activities)	Project Effects and Degree of Improvement
Suva Harbour, which acts as the base of operations for offshore fishing boats, does not have well developed fishing port facilities. In particular, congestion is almost 200% at Muaiwalu wharf, which is intended for exclusive use by fishing boats in the commercial port zone on the eastern side of Suva Harbour. Since no other fishing port facilities exist, the operating efficiency of offshore fishing boats is low and economic losses for stakeholders are high. Fisheries Lami Jetty, located in the northwest of Suva Harbour, is too small and unsafe due to deterioration of the wood structure, and this is hindering conversion of some fishing boats from artisinal to offshore fishery operations (government policy objective).	Renovate and improve the existing Fisheries Lami Jetty and construct jetty facilities and related installations necessary for mooring Fijian offshore fishing boats measuring up to 26.5 m, converted offshore fishing boats and boats belonging to the Fisheries Department. (Jetty facilities, administration block, watchman's hut, land power supply equipment, water supply equipment)	It will be possible to disperse offshore fishing boats, which are currently concentrated at Muaiwalu jetty in Suva Harbour, thereby enabling congestion to be mitigated and the existing Fisheries Lami Jetty to be effectively utilized. In Lami district, mooring and catch landing functions will be improved for small and medium-scale fishing boats, and work efficiency will be improved for fishermen, fisheries processing and export-related workers. Since a homeport will be provided for survey and training boats owned by the Fisheries Department, fisheries development, survey and training activities will be vitalized.
The work environment for users of Fisheries Lami Jetty is undeveloped and environmental protection cannot be practiced; for example, public toilets and appropriate waste collection points are not available.	Construct hygienic toilets equipped with septic tanks; deploy waste collection receptacles, and improve the work environment. (Public toilets, septic tanks, waste collection receptacles).	As public hygiene facilities, toilets will be provided; moreover, it will become possible to separately collect and treat waste generated on the facilities, and it will be possible to implement sure environmental conservation.
Small-scale repair and maintenance facilities are lacking for small offshore fishing boats that have converted from artisinal fishing.	Construct a workshop capable of implementing small-scale fishing boat repairs, and supply repair equipment and tools. (Workshop, equipment, tools)	It will be possible to provide repair and maintenance services for small-scale fishing boats, thereby contributing to the smooth and safe operations of fishing boats.
Converted offshore fishing boats and artisinal fishing boats based in Suva, and local fishermen based in Lami find it difficult to purchase ice.	Install facilities for supplying and selling ice necessary for preserving the freshness of catches. (Ice plant, ice store)	Ice supply to offshore fishing boats and artisinal fishing boats that require small quantities of ice will be improved, and it will be possible to sell ice to fisheries workers that are based at Fisheries Lami Jetty.

Implementation of the Project can be expected to realize the following effects regarding fisheries activities by the following beneficiaries: 100 or more fishing boats and 1,110 crewmembers engaged in offshore fisheries based in Suva Harbour, 68 fisheries companies and 2,600 employees engaged in offshore fisheries and coastal fisheries, and approximately 300 artisinal fishermen and 780 crewmembers living in the central and eastern districts.

(1) Direct effects:

1) Increase in the number of offshore fishing boats utilizing Fisheries Lami Jetty (which currently only has mooring functions), and as a result, mitigation of congestion at Muaiwalu wharf located approximately 3 km to the east (average utilization rate will be reduced from 200% to 150%)

2) Improvement in work efficiency in the landing of catches and transportation to fisheries companies located in Suva and Lami (increased catches at Fisheries Lami Jetty)

3) Improvement in the operating environment for fishing boats converting to offshore fisheries (more fishing boats and ice sales, and fishing boat repair assistance at Fisheries Lami Jetty)

4) Support for artisanal fishermen based around Suva (more fishing boats and ice sales, and fishing boat repair assistance at Fisheries Lami Jetty)

(2) Indirect effects:

1) Contribution to increased exports of fisheries products as well as maintenance and development of fisheries as a foreign currency earning sector

2) Contribution to promotion of conversion from artisinal to offshore fisheries and employment of workers in the fisheries exporting sector

3) Contribution to the sustainable utilization of fisheries resources in coastal areas

3-2 Recommendations

(1) Exchange of opinions with facility users and local stakeholders:

Prior to implementation of the Project, the Fisheries Department aims to implement an environmental impact assessment, in which it will explain the objectives, contents, effects and benefits, etc. of the Project to local stakeholders, operators and residents, etc. In doing this, it

aims to secure understanding and consent for the Project and build relations of mutual trust with a view to realizing the smooth and efficient utilization of the Project facilities.

To ensure that the facilities are operated and managed in an orderly manner, based on the opinions and requests obtained in the above efforts, the Fisheries Department will need to promptly compile rules (including minor regulations and punitive regulations) concerning use of Lami Jetty facilities, and ensure the thorough understanding and upholding of the regulations with particular emphasis given to explaining to users the need for environmental consideration regarding nearby hotels, business operators and residents, etc.

(2) Fair and appropriate operation of jetty facilities:

Concerning public fishing port facilities, the Fisheries Department has operated and maintained Lautoka fishing port, which targets mainly fishing boats of 10~12 m and fisheries workers engaged in artisinal fisheries, since 1988. However, in the case of Fisheries Lami Jetty in the Project, utilization by a diverse range of fishing boats and fisheries personnel is planned, for example, offshore fishing boats measuring up to 26.5 m, offshore fishing boats converted from artisinal fishing boats measuring 10~16 m, and local fishing boats of 7 m or less. Accordingly, in order to provide fair and effective administrative support to these diverse fishing boats and fisheries personnel, it is desirable for the Fisheries Department to prescribe the work contents, responsibilities and mutual communication setups of staff and establish an adequate control setup that entails the sure collection and receipt of facilities charges.

(3) Preparation of an annual report:

It is desirable that the Fisheries Department prepares an annual report describing the management and utilization status and income/expenditure balance, etc. of the Fisheries Lami Jetty facilities, and aims for a high level of operating benefits by building and improving on a smooth and even more efficient management system for the facilities. Moreover, the said annual report should be submitted to the Ministry of Fisheries and Forests so that the ministry can confirm the fair and appropriate operation of the facilities and offer pertinent advice and guidance to the Fisheries Department when corrections and improvements are deemed necessary. Furthermore, it is desirable that the Ministry of Fisheries and Forests submit the said report to the JICA office in Fiji and report on the achievements of Japan’s Grant Aid in the country.

APPENDICES

1. Member List of the Study Team

(1) On the Basic Design Study

Mr. Shumon YOSHIARA	Leader	Deputy Resident Representative, JICA Fiji Office, Japan International Cooperation Agency (JICA)
Mr. Katsuji YOSHIKURA	Technical Adviser	Deputy Director, Construction Division, Fisheries Infrastructure department, Fisheries Agency
Mr. Hisashi SUZUKI	Project Coordinator	Assistant Resident Representative, JICA Fiji Office,
Mr. Nobuo ITOI	Chief Consultant / Fisheries Distribution Planning	Overseas Agro-Fisheries Consultants Co., Ltd. (OAFIC)
Mr. Masahiro YOKOGAWA	Civil Engineering/ Natural Condition Survey/ Environmental Impact Assessment	Overseas Agro-Fisheries Consultants Co., Ltd. (OAFIC)
Mr. Masami TSUCHIYA	Construction Planning / Cost Estimation	Overseas Agro-Fisheries Consultants Co., Ltd. (OAFIC)
Mr. Junichiro MORI	Equipment Planning/ Procurement Planning/ Cost Estimation	Overseas Agro-Fisheries Consultants Co., Ltd. (OAFIC)
Mr. Toru FUKUBAYASHI	Facility Planning	Overseas Agro-Fisheries Consultants Co., Ltd. (OAFIC)

(2) On the Explanation of the Draft Basic Design Study

Mr. Tadashi IKESHIRO	Leader	Resident Representative, JICA Fiji Office, Japan International Cooperation Agency
Mr. Katsuji YOSHIKURA	Technical Adviser	Deputy Director, Construction Division, Fisheries Infrastructure department, Fisheries Agency
Mr. Hisashi SUZUKI	Project Coordinator	Assistant Resident Representative, Fiji Office, JICA Fiji Office,
Mr. Nobuo ITOI	Chief Consultant / Fisheries Distribution Planning	Overseas Agro-Fisheries Consultants Co., Ltd. (OAFIC)
Mr. Masahiro YOKOGAWA	Civil Engineering/ Natural Condition Survey/ Environmental Impact Assessment	Overseas Agro-Fisheries Consultants Co., Ltd. (OAFIC)

2. Study Schedule

(1) On the Basic Design Study

No.	M/date	day	Schedule		Stay
			Government Officials: 1	Consultants : ①②③④⑤	
1	Jul/26	Mon	Tokyo→ (1, ①②④⑤)		Suva
2	Jul/27	Tus	Nadi→Lautoka, Survey of Lautoka Fishing Port, Lautoka →Nadi→Suva		Suva
3	Jul/28	Wed	Courtesy call on JICA, Courtesy call on Ministry of Fisheries & Forests (MF&F)		Suva
4	Jul/29	Thr	Courtesy call on Fisheries Department (F/D), Explanation of Inception report, Courtesy call on Embassy of Japan		Suva
5	Jul/30	Fri	Discussion with Fisheries Department, Arrangement of relational organization,		Suva
6	Jul/31	Sat	Site survey, Suva municipal Market survey, Fish export company survey Monitoring survey at the port facilities in Suva Harbor		Suva
7	Aug/01	Sun	Survey of Port facilities in Suva harbor, (③ arrive at Suva)		Suva
8	Aug/02	Mon	Discussion with Fisheries Department (Content of Project), EIA survey,		Suva
9	Aug/03	Tus	Discussion about draft of Minutes of Discussions (M/D), Signature on the M/D		Suva
10	Aug/04	Wed	Report to Embassy & JICA, (1) : Suva→Nadi, ①②③④⑤ : Field survey		Suva
11	Aug/05	Thr	(1) Nadi→Tokyo	Natural condition, Construction condition survey,	Suva
12	Aug/06	Fri	Topography survey, Detailed survey of existing facilities at project site		Suva
13	Aug/07	Sat	Field survey at Suva commercial port		Suva
14	Aug/08	Sun	Internal Meeting		Suva
15	Aug/09	Mon	Discussion with Fisheries Department (Components of Project),		Suva
16	Aug/10	Tus	Discussion with Fisheries Department, Discussion of relational organization		Suva
17	Aug/11	Wed	Discussion with Fisheries Department, Discussion of relational organization		Suva
18	Aug/12	Thr	Discussion with Fisheries Department, Discussion of relational organization		Suva
19	Aug/13	Fri	Discussion with Fisheries Department, Discussion of relational organization		Suva
20	Aug/14	Sat	Confirmation of survey result,		Suva
21	Aug/15	Sun	Internal Meeting		Suva
22	Aug/16	Mon	Discussion with Fisheries Department (③ Nadi→Tokyo)		Suva
23	Aug/17	Tus	Discussion with Fisheries Department (Components of Project)		Suva
24	Aug/18	Wed	Discussion with Fisheries Department (Equipment purchase condition survey)		Suva
25	Aug/19	Thr	Discussion with Fisheries Department (Construction material condition survey)		Suva
26	Aug/20	Fri	Discussion with Fisheries Department (Components of Project)		Suva
27	Aug/21	Sat	Confirmation of survey result,		Suva
28	Aug/22	Sun	Internal Meeting		Suva
29	Aug/23	Mon	(④ Nadi→Tokyo)		Suva
30	Aug/24	Tus	Discussion with Fisheries Department (management, operation and maintenance)		Suva
31	Aug/25	Wed	Discussion with Fisheries Department (management, operation and maintenance)		Suva
32	Aug/26	Thr	Final discussion with Fisheries Department, Report to Embassy & JICA		Suva
33	Aug/27	Fri	Report to Chief Executive Officer for MF&F. Boring survey		Suva
34	Aug/28	Sat	Confirmation of survey result, (⑤ Nadi→Tokyo)		Suva
35	Aug/29	Sun	①② Suva→Nadi		Suva
36	Aug/30	Mon	①② Nadi→Tokyo		

Government Officials: 1: Mr. K. YOSHIKURA, Technical Adviser

Consultants : ①Chief Consultant, ②Civil Engineering, ③Construction Planning, ④Equipment Planning, ⑤Facility Planning

(2) On the Explanation of the Draft Basic Design Study

No.	M/date	day	Schedule		Stay
			Government Officials: 1	Consultants : ①②	
1	Oct/25	Mon	Tokyo→ (1, ①②④⑤)		Suva
2	Oct/26	Tus	Nadi→Suva, Courtesy call on JICA, Courtesy call on Embassy of Japan		Suva
3	Oct/27	Wed	Courtesy call on Fisheries Department, Explanation of Draft Final Report,		Suva
4	Oct/28	Thr	Discussion with Fisheries Department, Explanation of Draft Final Report,		Suva
5	Oct/29	Fri	Discussion with Fisheries Department (management, operation and maintenance)		Suva
6	Oct/30	Sat	Internal Meeting		Suva
7	Oct/31	Sun	Internal Meeting		Suva
8	Nov/01	Mon	Discussion about draft of Minutes of Discussions (M/D),		Suva
9	Nov/02	Tus	Signature on the M/D, Report to Embassy and JICA		Suva
10	Nov/03	Wed	(1) Suva→Nadi	Discussion with Maritime & Port Authority, Discussion with Fiji Electric Authority	Suva
11	Nov/04	Thr	(1) Nadi→Tokyo	Discussion with Public Works Depertment, and National Fire Department	Suva
12	Nov/05	Fri	①② Suva→Nadi		Suva
13	Nov/06	Sat	①② Nadi→Tokyo		Nadi

Government Officials: 1: Mr. K. YOSHIKURA, Technical Adviser
Consultants : ①Chief Consultant, ②Civil Engineering

3. List of parties Concerned in the recipient Country

Ministry of Fisheries & Forests

Hon. Konisitabu Yabaki	Minister for Fisheries & Forests
Mr. Mitieli Baleivanualala	Chief Executive Officer

Fisheries Department

Mr. Saimoni Tuilaucala	Director of Fisheries
Mr. Malakai Tuiloa	Deputy Director of Fisheries
Mr. John Ah Tong	Fisheries Technical Officer
Mr. Apolozi Turaganivalu	Principal Fisheries Officer
Mr. Suresh Chand	Principal Fisheries Officer
Mr. Kelevi Natubavivi	Principal Fisheries Officer

Ministry of Local Government, Housing, Squatter settlement and Environment

(Department of town and country planning)

Ms Maraia Ubitau	Director

(Department of Environment)

Mr. Epeli Nasome	Director Environment
Mr. Pumale Reddy	Foreshore Officer
Mr. Shinichi Isoda	JICA Expert
Mr. Shakil Kumar	National Ozone Depleting Unit
Ms. Radhika Chndra	Assistant for NODU

(Public Works Department)

Mr. Robert M'caia	Principal Engineer
Mr. Nemani Waganivalu	Supervisor
Mr. Ilaitia	Supervisor
Mr. Samu	Cost Estimate

(Lami Town Council)

Mr. Sandeep Narayan
Mr. Jone Wailevu

(Maritime & Ports Authority of Fiji)

Mr. PenitikoCabenagauna Yauvoli	Deputy Port Master
Mr. Jess James Dunn	Senior Port Control Offocer
Mr. Waga S. Bauleka	Acting Senior Engineer, Operation and Maintenance

(Fiji Electric Authority)

Mr. William Bentley	Senior Technical Officer, Design & Planning

(National Fire Department)

Mr. Tupou	Division Fire Officer

(South Pacific Applied Geoscience Commission)

Mr. Bhaskar Rao
Mr. Robert Smith

(The University of the South Pacific)

Mr. Leon Zann
Prof. William G.L. Aalbersberg
Dr. Sereana Kubuabola

(Embassy of Japan in Fiji)

Mr. Kenro IINO	Ambassador of Japan
Mr. Shigeki TAKAYA	First Secretary
Mr. Motoo SAKAKIBARA	Second Secretary

(JICA Fiji Office)

Mr. Tadashi IKESHIRO	Resident Representative
Mr. Shumon YOSHIARA	Depty Resident Representative
Mr. Hisashi SUZUKI	Assistant Resident Representative

4. Minutes of Discussions

MINUTES OF DISCUSSIONS
ON
THE BASIC DESIGN STUDY
ON
PROJECT FOR REDEVELOPMENT OF FISHERIS LAMI JETTY
IN
THE REPUBLIC OF THE FIJI ISLANDS

In response to a request from the Government of the Republic of the Fiji Islands (hereinafter referred to as "Fiji"), the Government of Japan decided to conduct a Basic Design Study on the Project for Redevelopment of Fisheries Lami Jetty (hereinafter referred to as "the Project") and entrusted the study to the Japan International Cooperation Agency (hereinafter referred to as "JICA") .

JICA sent to Fiji the Basic Design Study Team (hereinafter referred to as "the Team") scheduled to stay in the country from 27th July to 30th August. The Team is headed by Shumon YOSHIARA, Deputy Resident Representative, JICA Fiji Office.

The Team held discussions with the officials concerned of the Government of Fiji 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.

Suva, 3rd August, 2004

Shumon YOSHIARA
Leader
Basic Design Study Team
Japan International Cooperation Agency

Mitieli BALEIVANUALALA
Chief Executive Officer
Ministry of Fisheries and Forests
Republic of the Fiji Islands

ATTACHMENT

1. Objective of the Project

The objective of the Project is redevelopment of the fish landing facilities and the ancillary shore facilities at Fisheries Lami Jetty

2. Project Site

The site of the Project is Fisheries Lami Jetty, as shown in ANNEX-1.

3. Responsible and Implementing Agency

3-1 The Responsible and Implementing Agency is Ministry of Fisheries and Forests, whose organization chart is as shown in ANNEX-2

3-2. Fisheries Department, whose organization chart is shown in ANNEX-2, shall bear the operation and maintenance of the facilities of Fisheries Lami Jetty after completion of the construction works.

4. Items Requested by the Government of Fiji

After discussions with the Team, the items described in ANNEX-3 were finally requested by Fiji side. JICA will assess the appropriateness of the request and will recommend to the Government of Japan for approval. However, final components will be decided after further study.

(1) Construction of the Buildings and Facilities
Details of items are listed in ANNEX-3

(2) Procurement of the Equipment
Details of items are listed in ANNEX-3.

5. Japan's Grant Aid Scheme

5-1. Fiji side understands the Japan's Grant Aid Scheme explained by the Team, as described in ANNEX-4.

5-2. Fiji side will take the necessary measures, as described in ANNEX-5, for smooth implementation of the Project, as a condition for the Japan's Grant Aid to be implemented

6. Schedule of the Study

6-1 The consultants will proceed to further studies in Fiji until 30th August.

6-2. JICA will prepare the draft report in English and dispatch a mission in order to explain its contents at the end of October 2004.

6-3. In case that the contents of the report is accepted in principle by the Government of Fiji, JICA will complete the final report and send it to the Government of Fiji in February 2005

7. Other Relevant Issues

7-1 Site selection

Both sides agreed that only Fisheries Lami Jetty was identified as the project site due to administrative difficulties with the Lami Fish Terminal.

7-2 Removal of the Existing Floating Jetty

(1) The Government of Fiji shall complete the removal of the existing floating jetty one month before the commencement of the construction, if the Project is decided to implement.

(2) The Government of Fiji promised to obtain the approval letter for removal of the existing jetty from Foundation of the people for the South Pacific which donated it. The approval letter will be submitted to JICA Fiji Office before the draft report explanation team visits Fiji.

7-3. Preparation of the Site for the Project

(1) The Government of Fiji shall clear and level the site necessary for the Project at least one month before the commencement of the construction, if the Project is decided to implement

(2) The Government of Fiji shall secure the alternative land and mooring area for the existing jetty facilities in the construction period.

7-4. EIA Approval and Construction Permit

The Government of Fiji promised to complete necessary arrangement to obtain the approval of Environmental Impact Assessment by the Department of Environment and the construction permit before the draft report explanation team visits Fiji.

7-5 Agreement with the Neighboring

The Government of Fiji shall obtain the agreement on the Project implementation from the neighboring communities, industries and business before the draft report explanation team visits Fiji.

7-6. Water distribution system and Guard Post

Fiji side requested a water distribution system and a guard post in addition to the original components of the requested facilities. Japanese side understood the necessity of them.

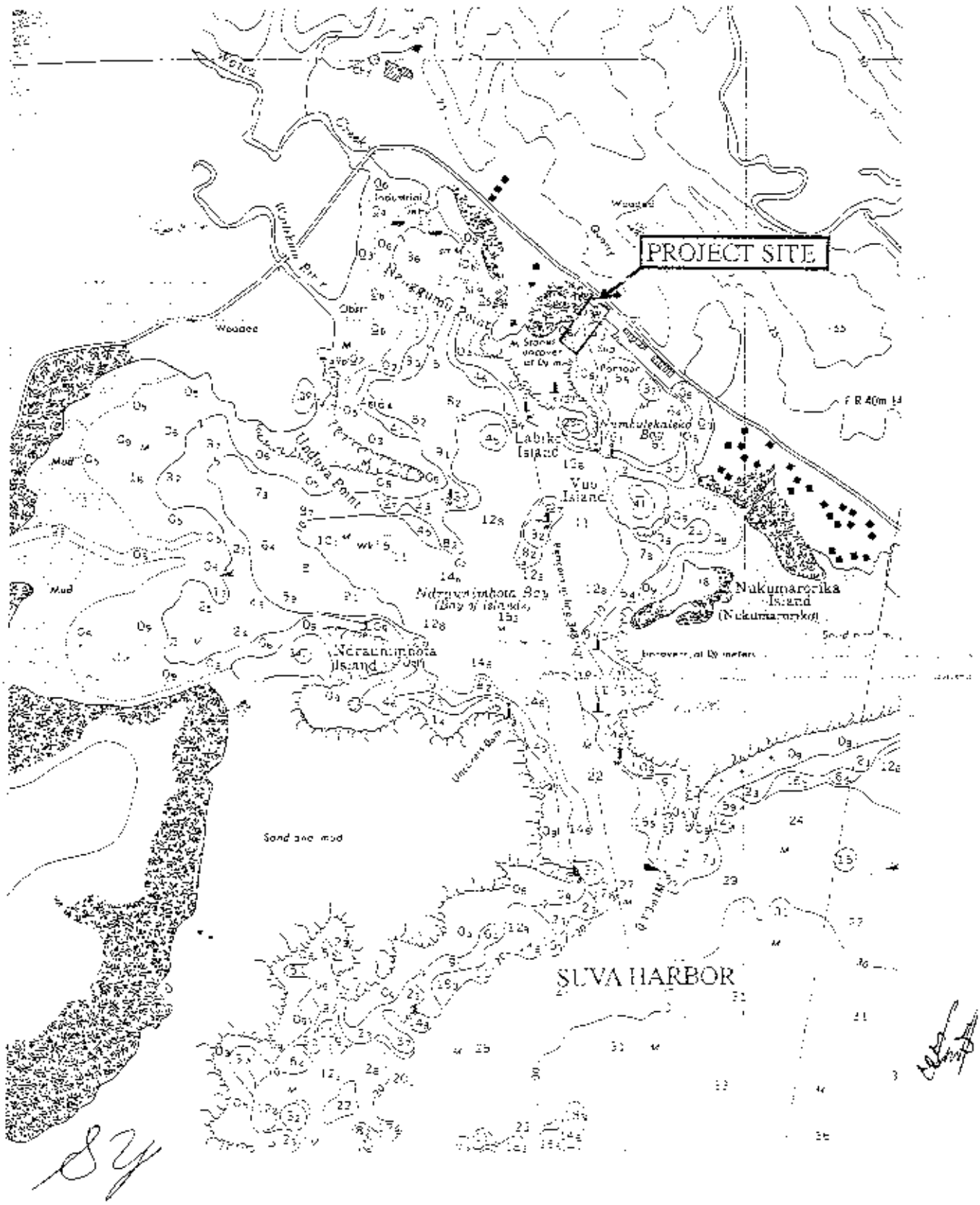
7-7. Demolish of Existing Concrete Apron

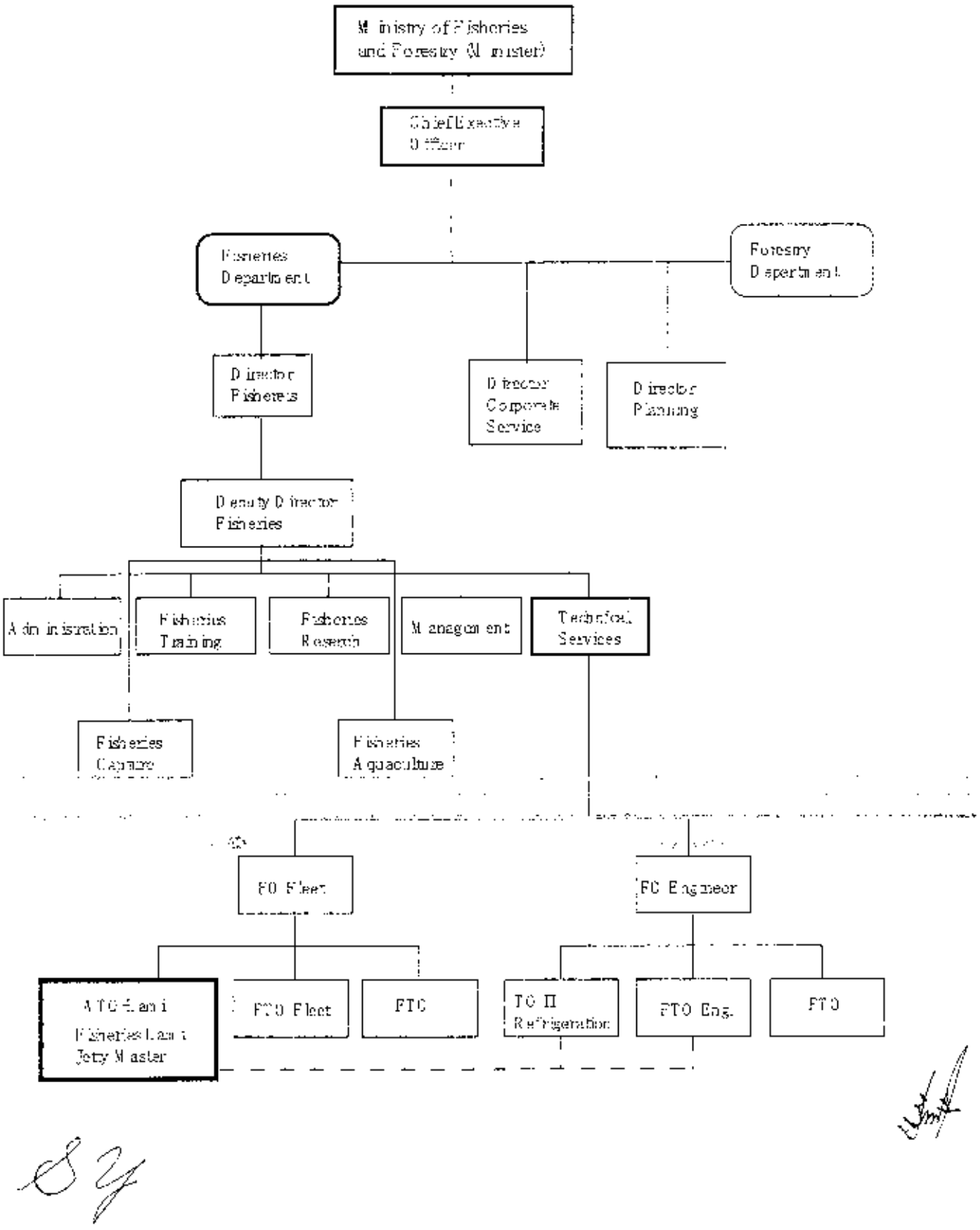
Japanese side recommended Fiji side to demolish the concrete apron which does not have enough strength for the entry of the transport truck. Fiji side understood the necessity of it and requested Japanese side to include the demolish of it.

7-8. Removal of Exiting Office

Both sides understood that the removal of the existing office will depend on the design based on further study and analysis. If the removal of the office will be decided, Fiji side will undertake it.

PROJECT SITE




Ministry of Fisheries and Forestry (Minister)
Chief Executive Officer
Fisheries Department
Forestry Department
Director Fisheries
Director Corporate Service
Director Planning
Deputy Director Fisheries
Administration
Fisheries Training
Fisheries Research
Management
Technical Services
Fisheries Capture
Fisheries Aquaculture
FO Fleet
FC Engineer
ATC Fleet
Fisheries Fleet
Jetty Master
FTO Fleet
FTC
TC II
Refrigeration
FTO Eng.
FTO

ITEMS REQUESTED BY THE GOVERNMENT OF FIJI

(1) Construction of the Building and Facilities
- a. Jetty
- b. Administration office and Workshop
- c. Power supply and Water distribution system
- d. Ice Plant
- e. Guard post
- f. Demolition and clear of existing concrete apron.
- g. Other relevant facilities (Pavement, parking lot, etc.)

(2) Procurement of the Equipment
- a. Bench and portable drill machines
- b. Dual head bench grinder
- c. Electric welder
- d. Gas welder
- e. High pressure cleaner
- f. Work bench
- g. Movable tool kit(table)
- h. Multi-tester
- i. Tacho meter(Rev counter)
- j. Vice
- k. Electric tools
- l. Hand tools

JAPAN'S GRANT AID SCHEME

1. Grant Aid Procedure

1) Japan's Grant Aid Program 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 Cabinet)
Determination of Implementation	(The Notes exchanged between the Governments of Japan and the recipient country)

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

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

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

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

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

2. Basic Design Study

1) Contents of the Study

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

a) confirmation of the background, objectives and benefits of the Project and also institutional capacity of agencies concerned of the recipient country necessary for the Project's implementation.
b) evaluation of the appropriateness of the Project to be implemented under the Grant Aid Scheme from the technical, social and economic points of view;
c) confirmation of items agreed on by both parties concerning the basic concept of the Project;
d) preparation of a basic design of the Project; and
e) estimation of costs of the Project.

The contents of the original request are not necessarily approved in their initial form as the contents of the Grant Aid project. The Basic Design of the Project is confirmed considering the guidelines of 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 of the jurisdiction of the organization in the recipient country actually implementing the Project. Therefore, the implementation of the Project is confirmed by all relevant organizations of the recipient country through the Minutes of Discussions.

2) Selection of the Consultants

For the smooth implementation of the Study, JICA uses a consulting firm selected through its own procedure (competitive proposal). The selected firm participates the Study and prepares a report based upon the terms of reference set by JICA.

At the beginning of implementation after the Exchange of Notes, for the services of the Detailed Design and Construction Supervision of the Project, JICA recommends the same consulting firm which participated in the Study to the recipient country, in order to maintain the technical consistency between the Basic Design and Details Design as well as to avoid any undue delay caused by the selection of a new consulting firm.

3. Japan's Grant Aid Scheme

1) What is Grant Aid?

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

2) Exchange of Notes(E/N)

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

3) "The period of the grant" means the one fiscal year which the Cabinet approves the project for Within the fiscal year, all procedure such as exchanged 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) Under the Grant, 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 and procurement firms, are limited to "Japanese nationals". (The term "Japanese nationals" means persons of Japanese nationality or Japanese corporations controlled by persons of Japanese nationality.)

5) Necessity of "Verification"

The Government of 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 of Japanese taxpayers.

6) Undertakings required to the Government of the recipient country

a) to secure a lot of land necessary for the construction of the Project and to clear the site;
b) to provide facilities for distribution of electricity, water supply and drainage and other incidental facilities outside the site;
c) to ensure prompt unloading and customs clearance at ports of disembarkation in the recipient country and internal transportation therein of the products purchased under the Grant Aid;
d) to exempt Japanese nationals from customs duties, internal taxes and fiscal levies which may be imposed in the recipient country with respect to the supply of the products and services under the verified contracts;
e) 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 work;
f) to ensure that the facilities constructed and products purchased under the Grant Aid be maintained and used properly and effectively for the Project; and
g) to bear all the expenses, other than those covered by the Grant Aid, necessary for the Project.

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

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

ANNEX-5

UNDERTAKINGS BY THE GOVERNMENT OF THE RECIPIENT COUNTRY

1. To secure a lot of land necessary for the Project;

2. To clear and level the site for the Project prior to the commencement of the construction;

3. To provide a proper access road to the Project site;

4. To provide facilities for distribution of electricity, water supply, telephone trunk line and drainage and other incidental facilities outside the site;

5. To undertake incidental outdoor works, such as gardening, fencing, exterior lighting, and other incidental facilities in and around the Project site, if necessary;

6. To ensure prompt unloading and customs clearance of the products purchased under the Japan's Grant Aid at ports of disembarkation in the Recipient Country;

7. To exempt Japanese nationals from customs duties, internal taxes and fiscal levies which may be imposed in THE RECIPIENT COUNTRY with respect to the supply of the products and services under the verified contracts;

8. 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;

9. To bear commissions, namely advising commissions of an Authorization to Pay (A/P) and payment commissions, to the Japanese foreign exchange bank for the banking services based upon the Banking Arrangement (B/A);

10. To provide necessary permissions, licenses, and other authorization for implementing the Project, if necessary;

11. To ensure that the facilities constructed and equipment purchased under the Japan's Grant Aid be maintained and used properly and effectively for the Project; and

12. To bear all the expenses, other than those covered by the Japan's Grant Aid, necessary for the Project.

MINUTES OF DISCUSSIONS
ON
THE BASIC DESIGN STUDY
ON
THE PROJECT FOR REDEVELOPMENT OF FISHERIES LAMI JETTY
IN
THE REPUBLIC OF THE FIJI ISLANDS
(CONSULTATION ON THE DRAFT REPORT)

In July 2004, Japan International Cooperation Agency (hereinafter referred to as "JICA") dispatched the Basic Design Study Team on the Project for Redevelopment of Fisheries Lami Jetty (hereinafter referred to as "the Project") and has prepared the draft report of the study based on the discussions, site surveys and technical examination in Japan.

In order to explain and to consult the Government of Fiji on the components of the draft report, JICA sent to Fiji the Draft Report Explanation Team (hereinafter referred to as "the Team"), which is headed by Mr. Tadashi IKESHIRO, Resident Representative, JICA Fiji Office, JICA and scheduled from 25 October to 6 November, 2004.

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

Suva, 2nd November, 2004

Tadashi IKESHIRO
Leader
Basic Design Study Team
JICA

Konisi YABAKI
Hon. Minister for Fisheries and Forests
Ministry of Fisheries and Forests
Government of Republic of the Fiji Islands

ATTACHMENT

1. Components of the draft report

1-1. Fiji side agreed and accepted the components of the draft report explained by the Team. Fiji side however requested the Team to consider the possibility for additional facilities as follows;

(1) a look-out balcony in the first floor on south side of the administration block

(2) an emergency exit and ladder from the office in the administration block

1-2. Fiji side understood the necessity of the object jutted out from the east side of the jetty constructed by the Project for the purpose to restrict that unauthorized fishing vessels moor on the above mentioned facility, and Fiji side agreed that the Project includes the above mentioned object.

2. Japan's Grant Aid System

Fiji side understood the Japan's Grant Aid Scheme as explained by the Team and will take necessary measures described in ANNEX-4 and ANNEX-5 which had been confirmed in the Minutes of Discussions of the Basic Design Study signed on 3 August 2004 on condition that the Grant Aid by the Government of Japan is extended to the Project.

3. Schedule of the Study

JICA will complete the final reports in accordance with the confirmed items and send them to the Government of Fiji around February 2005.

4. Other Relevant Issues

4-1 Both sides confirmed that Fiji side had already informed United States Embassy as per ANNEX-2 and United States Embassy have accepted on 29th October, 2004 that the existing wooden jetty funded by USAID will be demolished if the Project is decided to be implemented by the Government of Japan.

4-2 Both sides confirmed that the alternative mooring area of the vessels moored in the Project site during the construction period for the Project will be secured by Fiji side at least one month before the commencement of construction as per ANNEX-1.

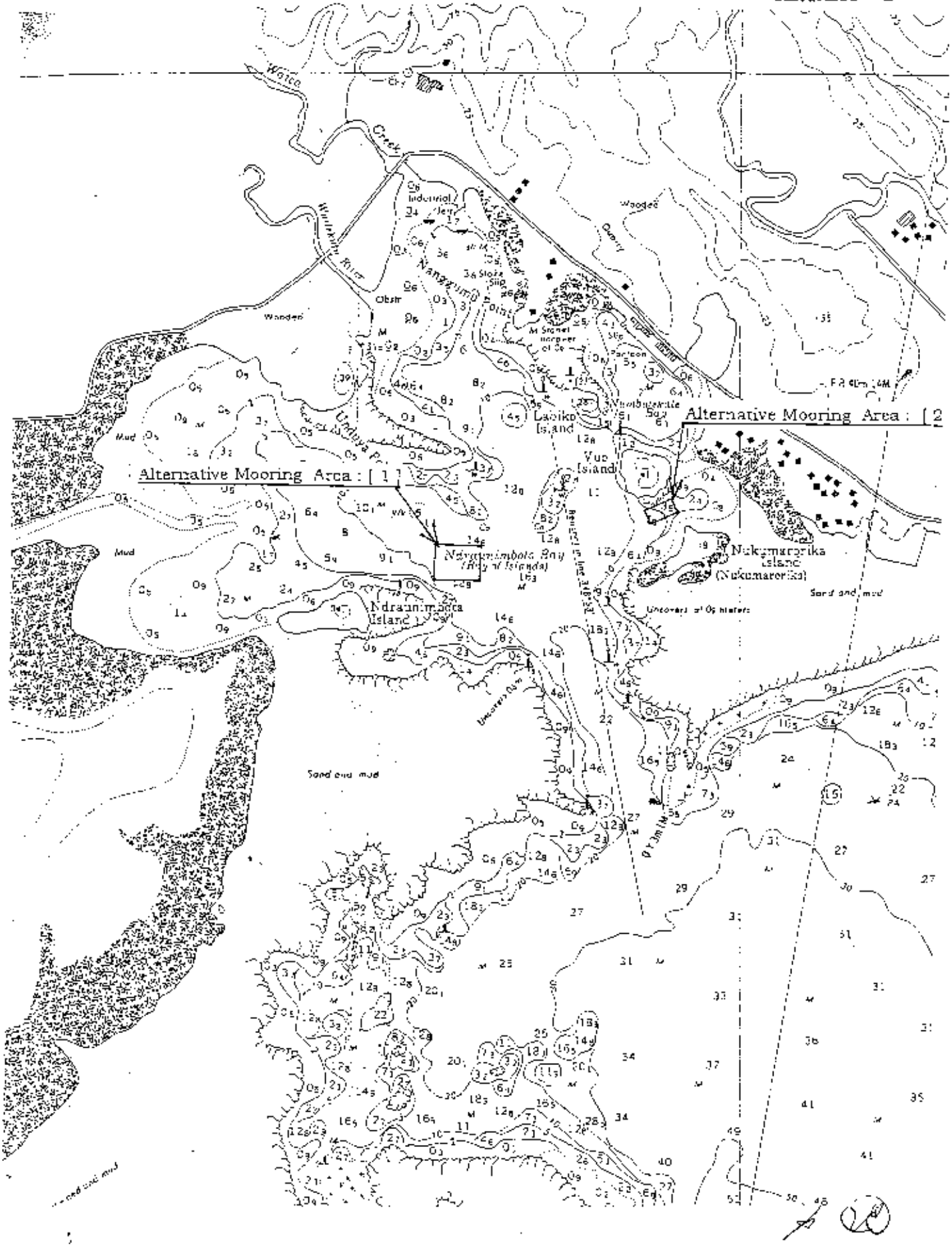
4-3 Fiji side promised to manage and maintain properly the facilities and equipment of the Project. Fisheries Department does not permit to moor any unauthorized vessel and long term mooring.

4-4 Fiji side promised to obtain the approval of the Environmental Impact Assessment from the relevant authorities necessary for the execution of the Project and the E. I. A will be carried out by the end of March, 2005 as per ANNEX-3.

4-5 Both sides reconfirmed that Fiji side will obtain the agreement on the Project implementation from the relevant stakeholders such as Department of Environment, Ministry of Lands, Official Signatory of Customary Fishing Rights and the neighboring communities, if the Project is decided to be implemented by the Government of Japan. The agreement will be submitted to JICA Fiji Office before 30th November, 2004.

ALTERNATIVE MOORING AREA

ANNEX - 1



MINISTRY OF FISHERIES & FORESTS

FISHERIES DEPARTMENT
P.O BOX 3165 LAMI
SUVA FIJI

OUR FISH
+OUR CHOICE
= OUR FUTURE

PHONE : (679) 3361122
FAX : (679) 3363500
: (679) 3363170

Reference: 34/18 /1

Date: Thursday 29th July 2004

United States Embassy
Loftus Street
Suva.

Dear Sir,

Re: Fisheries Lami Jetty Port Redevelopment.

1. Reference is drawn to the signed Memorandum of Cooperation (MOC) between the Government of the Republic of Fiji and; the Government of the United States of America dated 11/09/92.

1.2 The MOC specifies the 2 Governments mutual understanding with respect to USAID's kind assistance on the development of the Fisheries Lami Jetty.

2. Please be advised that the Government of Fiji through this Line-Ministry correspondence wishes to issue as agreed; the 90-Day Written Notice under Article XII, for the termination of the above MOC.

2.1 Fiji's Ministry of Foreign Affairs will be advised vide this note.

3. The termination of the MOC will allow the Department to progress with urgent Port Redevelopment Plans, as the present floating structure has badly deteriorated over the years, raising serious concern on compliance to Occupational Health & Safety regulations.

3.1 Sir, the Government of Fiji through the Department of Fisheries is at present considering the redevelopment of the same facility, via the assistance of JICA (Japan International Cooperation Agency).

4. In this respect the Department of Fisheries is seeking the US Governments formal advice, acknowledging the date to which the above MOC is to be effectively terminated.

4.1 We look forward to the US Government's formal response to enable the Department to progress on the above works. For any further enquiries into the proposed port redevelopment, please do not hesitate to contact the undersigned. Vinaka Saka Vakalevu.

.....
S. Chand
Principal Fisheries Officer
For Chief Executive Officer – Ministry Fisheries & Forests.

Cc: Chief Executive Officer – Ministry of Foreign Affairs
Chief Executive Officer – Ministry Fisheries & Forests
Director Fisheries
File.

FISHERIES LAMI JETTY REDEVELOPMENT PROJECT

ENVIRONMENTAL IMPACT ASSESSMENT
IMPLEMENTATION SCHEDULE

Year:	2005		
Months:	**January**	**February**	**March**
Objective:			
To carry out EIA Study for the Fisheries Lami Jetty Redevelopment Project	1. Prepare Terms of References	1. Continuation of EIA Survey	1. Receipt of First Draft EIA
	2. Advertise for Tender	2. Consultation with Dept of Environment	2. Completion of Final Report
	3. Receipt of Expression of Interest	3. Continuation of EIA Survey	3. Stakeholder Meeting
	4. Prequalification & Appointment	4. Consultation for Customary Fishing Rights Waiver	4. Acceptance of EIA

Footnote:

November & December 2004

Start Preparation for EIA consultation with Department of Environment

JAPAN'S GRANT AID SCHEME

1. Grant Aid Procedure

1) Japan's Grant Aid Program 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 Cabinet)
Determination of Implementation	(The Notes exchanged between the Governments of Japan and the recipient country)

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

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

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

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

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

2. Basic Design Study

1) Contents of the Study

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

a) confirmation of the background, objectives and benefits of the Project and also institutional capacity of agencies concerned of the recipient country necessary for the Project's implementation.
b) evaluation of the appropriateness of the Project to be implemented under the Grant Aid Scheme from the technical, social and economic points of view;
c) confirmation of items agreed on by both parties concerning the basic concept of the Project;
d) preparation of a basic design of the Project; and
e) estimation of costs of the Project.

The contents of the original request are not necessarily approved in their initial form as the contents of the Grant Aid project. The Basic Design of the Project is confirmed considering the guidelines of 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 through they may fall outside of the jurisdiction of the organization in the recipient country actually implementing the Project. Therefore, the implementation of the Project is confirmed by all relevant organizations of the recipient country through the Minutes of Discussions.

2) Selection of the Consultants

For the smooth implementation of the Study, JICA uses a consulting firm selected through its own procedure (competitive proposal). The selected firm participates the Study and prepares a report based upon the terms of reference set by JICA.

At the beginning of implementation after the Exchange of Notes, for the services of the Detailed Design and Construction Supervision of the Project, JICA recommends the same consulting firm which participated in the Study to the recipient country, in order to maintain the technical consistency between the Basic Design and Details Design as well as to avoid any undue delay caused by the selection of a new consulting firm.

3. Japan's Grant Aid Scheme

1) What is Grant Aid?

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

2) Exchange of Notes(E/N)

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

3) "The period of the grant" means the one fiscal year which the Cabinet approves the project for. Within the fiscal year, all procedure such as exchanged 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) Under the Grant, 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 and procurement firms, are limited to "Japanese nationals". (The term "Japanese nationals" means persons of Japanese nationality or Japanese corporations controlled by persons of Japanese nationality.)

5) Necessity of "Verification"

The Government of 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 of Japanese taxpayers.

6) Undertakings required to the Government of the recipient country

a) to secure a lot of land necessary for the construction of the Project and to clear the site;
b) to provide facilities for distribution of electricity, water supply and drainage and other incidental facilities outside the site;
c) to ensure prompt unloading and customs clearance at ports of disembarkation in the recipient country and internal transportation therein of the products purchased under the Grant Aid;
d) to exempt Japanese nationals from customs duties, internal taxes and fiscal levies which may be imposed in the recipient country with respect to the supply of the products and services under the verified contracts;
e) 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 work;
f) to ensure that the facilities constructed and products purchased under the Grant Aid be maintained and used properly and effectively for the Project; and
g) to bear all the expenses, other than those covered by the Grant Aid, necessary for the Project.

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 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 should open an account in the name of the Government of the recipient country in an authorized foreign exchange bank in Japan (hereinafter referred to as "the Bank"). The Government of Japan will execute the Grant Aid by making payments in Japanese yen to cover the obligations incurred by the Government of the recipient country or its designated authority under the verified contracts.
b) The payments will be made when payment requests are presented by the Bank to the Government of Japan under an Authorization to Pay (A/P) issued by the Government of recipient country or its designated authority.

ANNEX-5

UNDERTAKINGS BY THE GOVERNMENT OF THE RECIPIENT COUNTRY

1. To secure a lot of land necessary for the Project;

2. To clear and level the site for the Project prior to the commencement of the construction;

3. To provide a proper access road to the Project site;

4. To provide facilities for distribution of electricity, water supply, telephone trunk line and drainage and other incidental facilities outside the site;

5. To undertake incidental outdoor works, such as gardening, fencing, exterior lighting, and other incidental facilities in and around the Project site, if necessary;

6. To ensure prompt unloading and customs clearance of the products purchased under the Japan's Grant Aid at ports of disembarkation in the Recipient Country;

7. To exempt Japanese nationals from customs duties, internal taxes and fiscal levies which may be imposed in THE RECIPIENT COUNTRY with respect to the supply of the products and services under the verified contracts;

8. 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;

9. To bear commissions, namely advising commissions of an Authorization to Pay (A/P) and payment commissions, to the Japanese foreign exchange bank for the banking services based upon the Banking Arrangement (B/A);

10. To provide necessary permissions, licenses, and other authorization for implementing the Project, if necessary;

11. To ensure that the facilities constructed and equipment purchased under the Japan's Grant Aid be maintained and used properly and effectively for the Project; and

12. To bear all the expenses, other than those covered by the Japan's Grant Aid, necessary for the Project.

5. Cost Estimation Borne by the Recipient Country

(1) Cost to be borne by the Fiji side: F$188.000 (approximately 11.66 million yen)

① Clearing of project site land: F$71.000 (approximately 4.40 million yen)
(Including demolition and removal of the existing buildings and floating jetty)

② Cost to secure and prepare alternative sites during the construction period
F$10.000 (approximately 0.62 million yen)

③ Cost to extend power, water and telephone lines to the facilities:
F$92.000 (approximately 5.71 million yen)

④ Cost to build and install gate and fencing:
F$15.000 (approximately 0.93 million yen)

F$188.000 (approximately 11.66 million yen)

(2) Estimation Criteria

① Estimation Point January 2005

② Exchange rate 1 US$ = 110.08 Japanese yen

1 AU$ = 80.11 Japanese yen

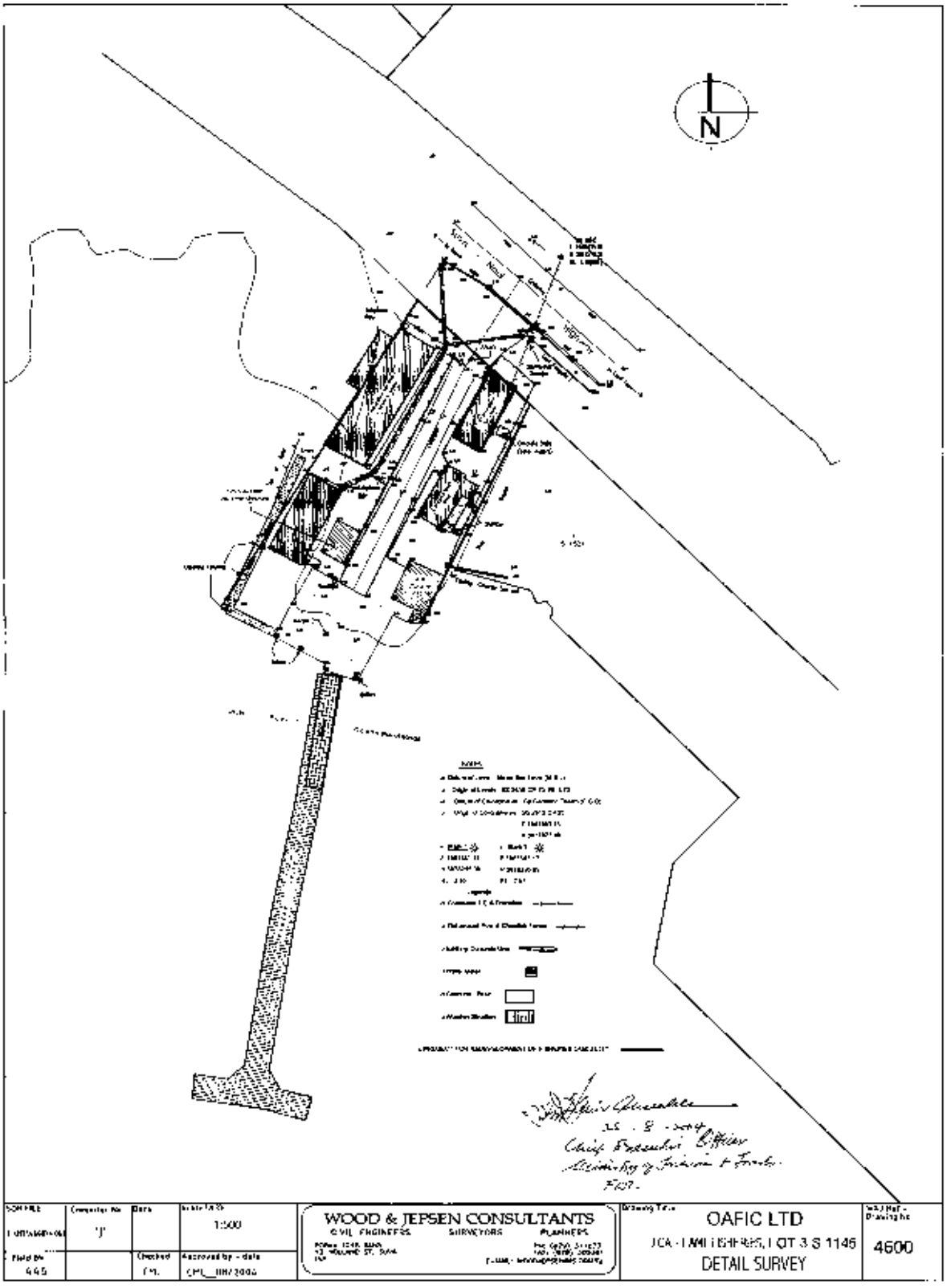
1 local currency (1F$) = 62.03 Japanese yen

③ Estimation period Implementation over a single phase, with detailed design, construction works- as indicated in the Implementation schedule.

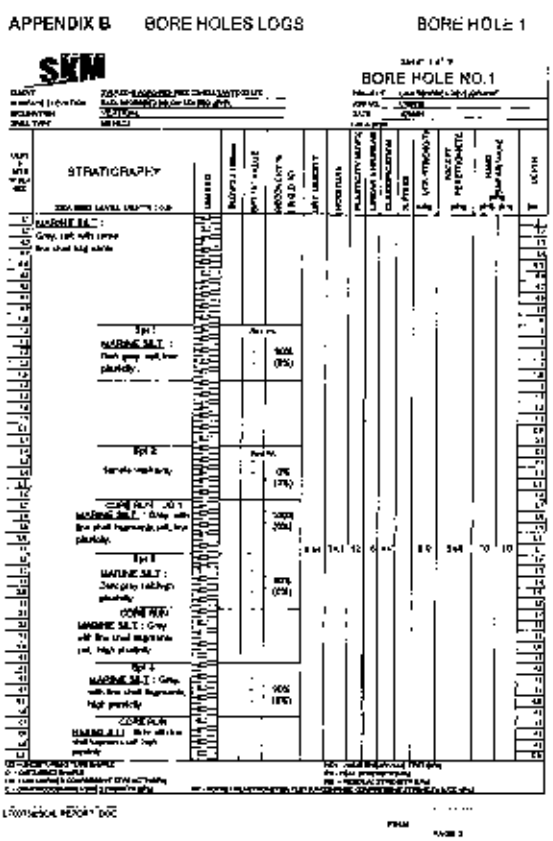
④ Others The Project shall be implemented in accordance with Japan's Grant Aid Scheme.

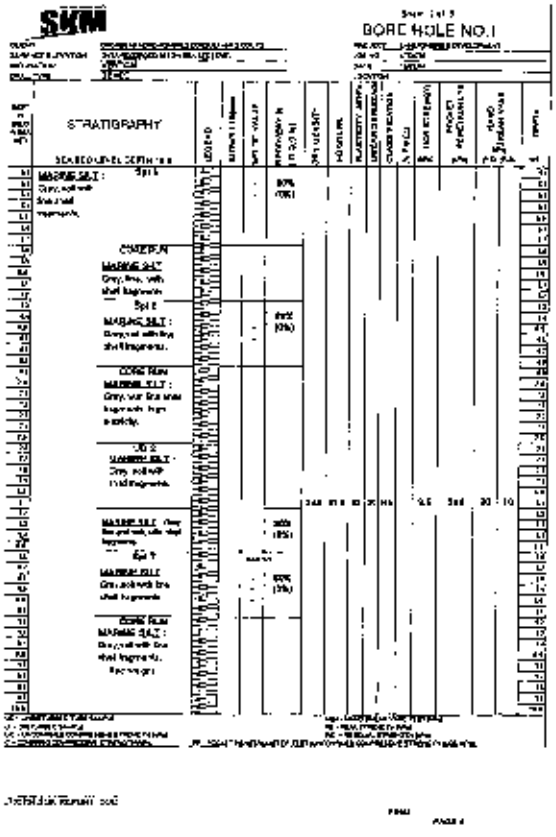
6. References

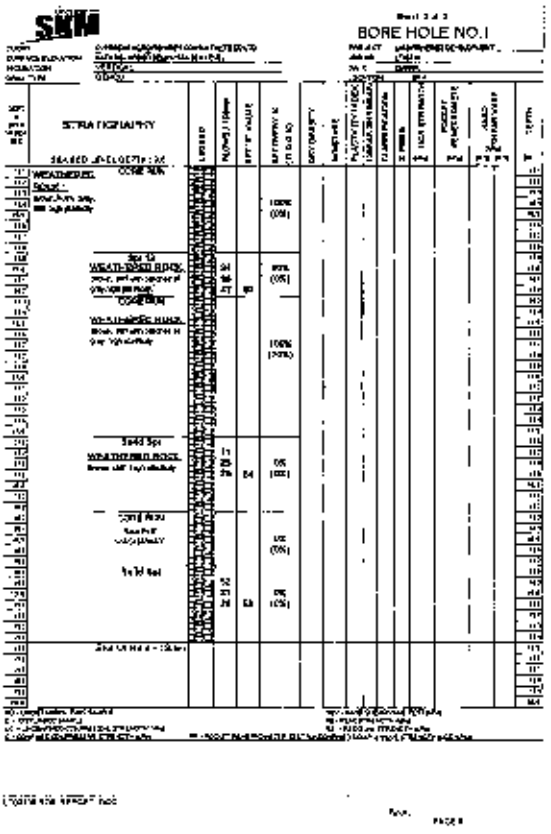
(1) Result of Topography Survey

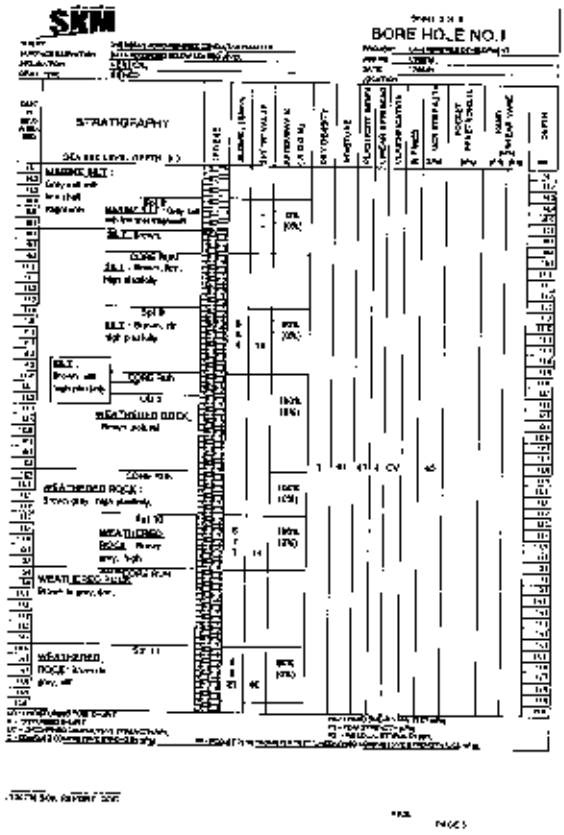


(2) Result of Soil Investigation Survey (Boring Survey)

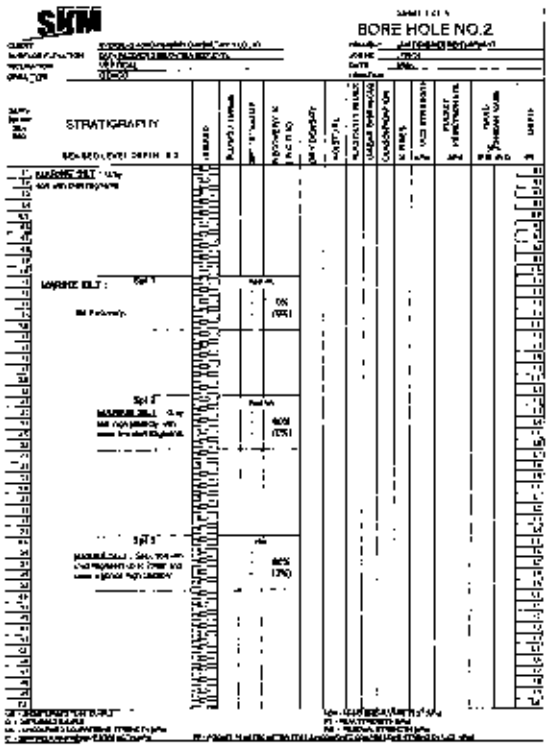


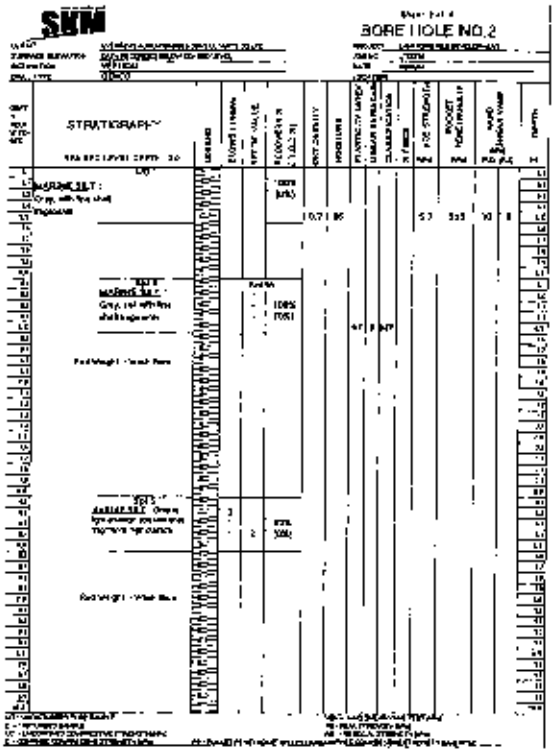


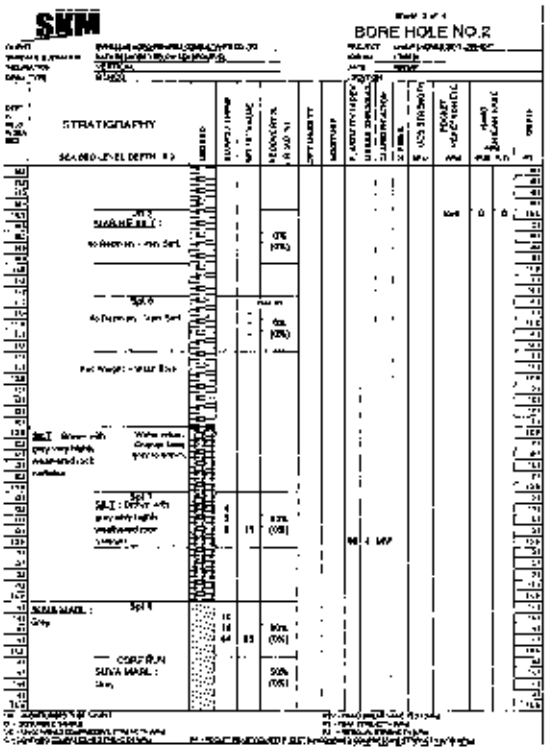


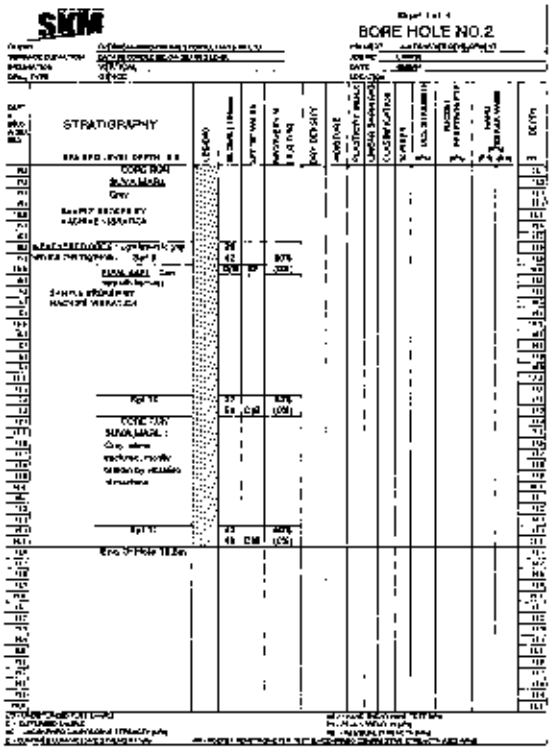


APPENDIX C BORE HOLES LOGS BORE HOLE 2









APPENDIX D USC TEST BOREHOLE 1

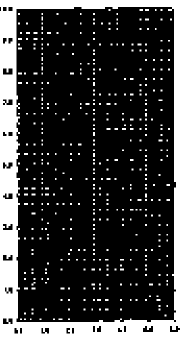
SKM

UNCONFINED COMPRESSIVE STRENGTH TEST

SAMPLE DIMENSION

COMPRESSION RING

MOISTURE CONTENT



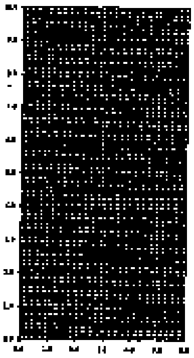
SKM

UNCONFINED COMPRESSIVE STRENGTH TEST

SAMPLE DIMENSION

COMPRESSION RING

MOISTURE CONTENT



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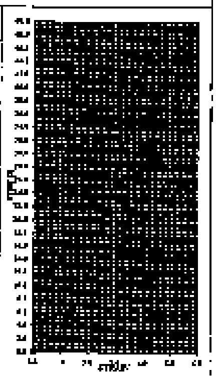
UNCONFINED COMPRESSIVE STRENGTH TEST

SAMPLE DIMENSION

COMPRESSION RING

MOISTURE CONTENT



APPENDIX E USCS TEST BOREHOLE 2

SKM

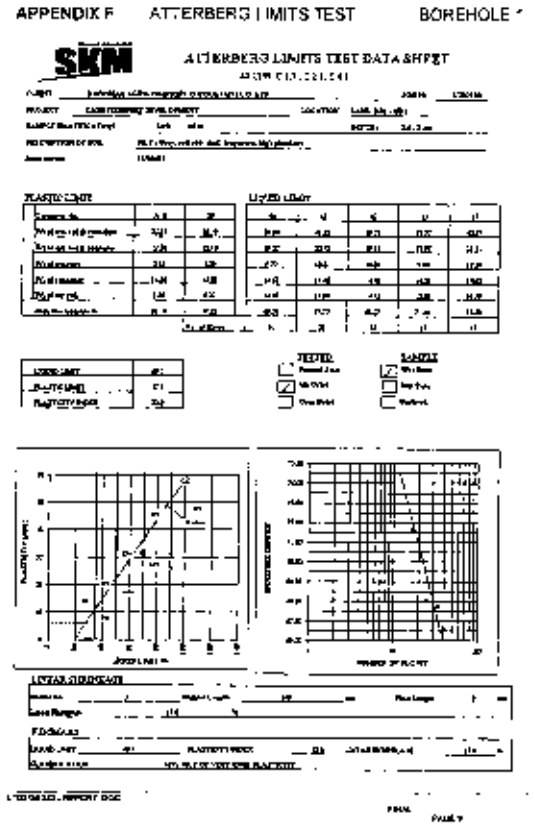
UNCONFINED COMPRESSIVE STRENGTH TEST

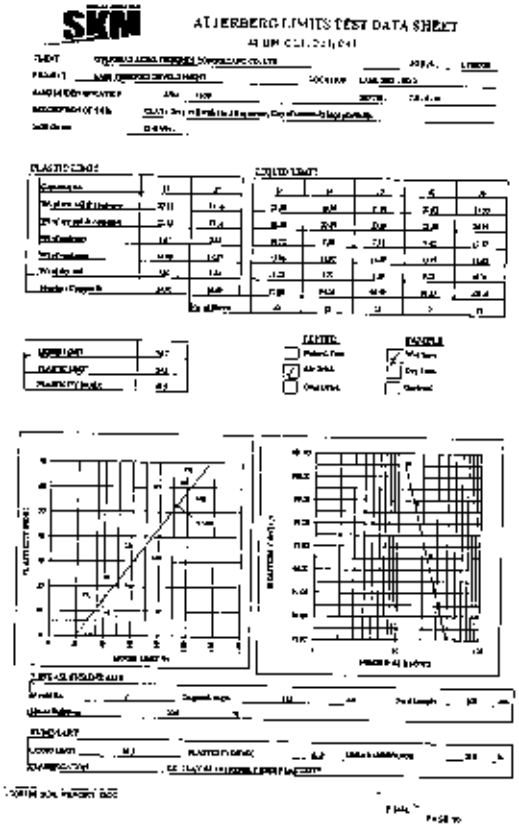
SAMPLE DIMENSION

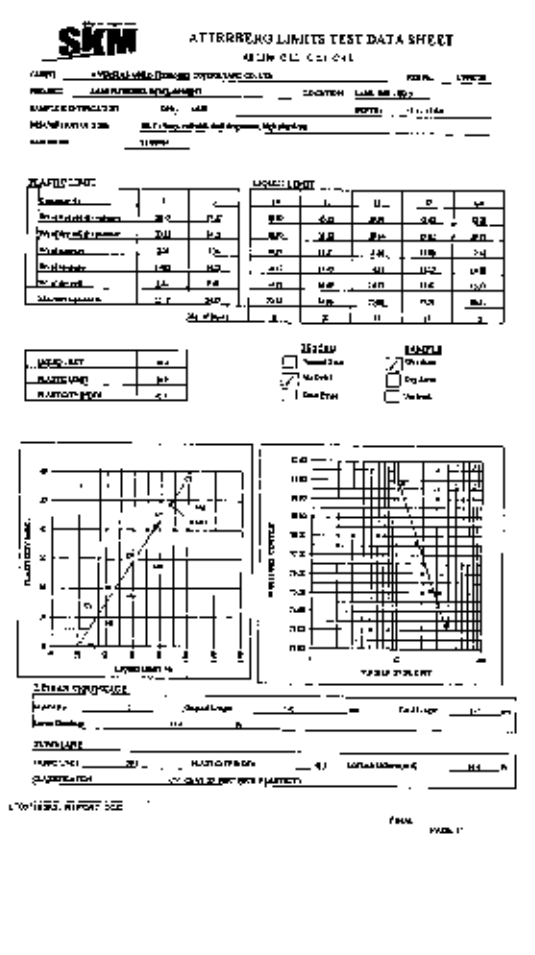
COMPRESSION RING

MOISTURE CONTENT

APPENDIX F ATTERBERG LIMITS TEST BOREHOLE







APPENDIX G ATTERBERG LIMITS TEST BOREHOLE 2