NO.

BASIC DESIGN STUDY REPORT
ON
THE PROJECT FOR IMPROVEMENT OF ARTISANAL COASTAL FISHERIES IN THE KOMBO SOUTH DISTRICT
IN
THE REPUBLIC OF THE GAMBIA

NOVEMBER 2001

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 Gambia, the Government of Japan decided to conduct a basic design study on the Project for Improvement of Artisanal Coastal Fisheries in the Kombo South District and entrusted the study to the Japan International Cooperation Agency (JICA).

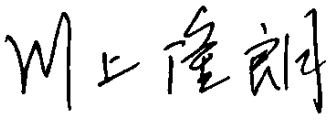
JICA sent to The Gambia a study team from 18th day of May to 10th day of June, 2001.

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

November, 2001



Takao Kawakami
President
Japan International Cooperation Agency

November, 2001

Letter of Transmittal

We are pleased to submit to you the basic design study report on the Project for Improvement of Artisanal Coastal Fisheries in the Kombo South District in the Republic of The Gambia.

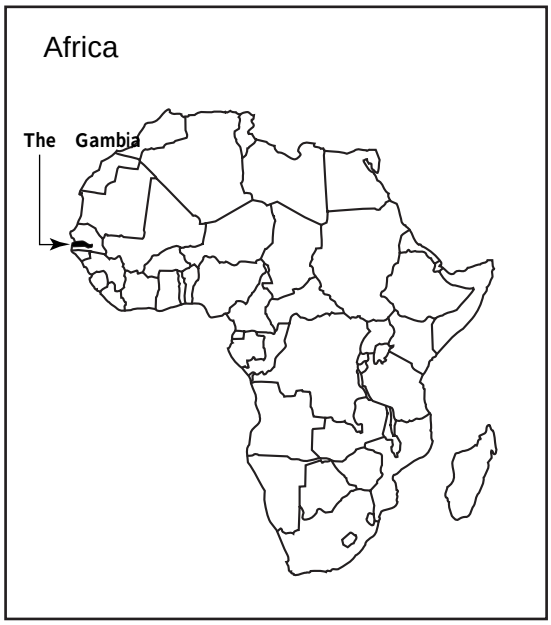
This study was conducted by Overseas Agro-Fisheries Consultants Co., Ltd., under a contract to JICA, during the period from May, 2001 to November, 2001. In conducting the study, we have examined the feasibility and rationale of the project with due consideration to the present situation of The Gambia and formulated the most appropriate basic design for the project under Japan's grant aid scheme.

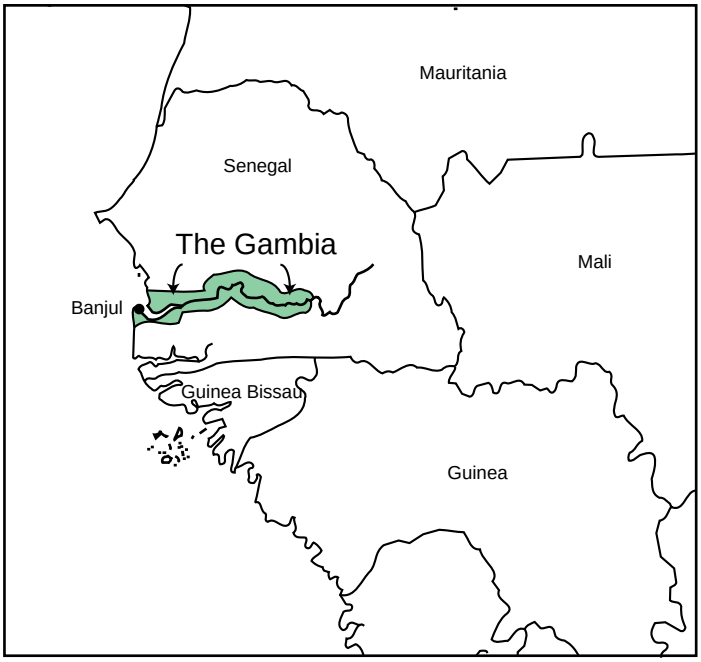
Finally, we hope that this report will contribute to further promotion of the project.

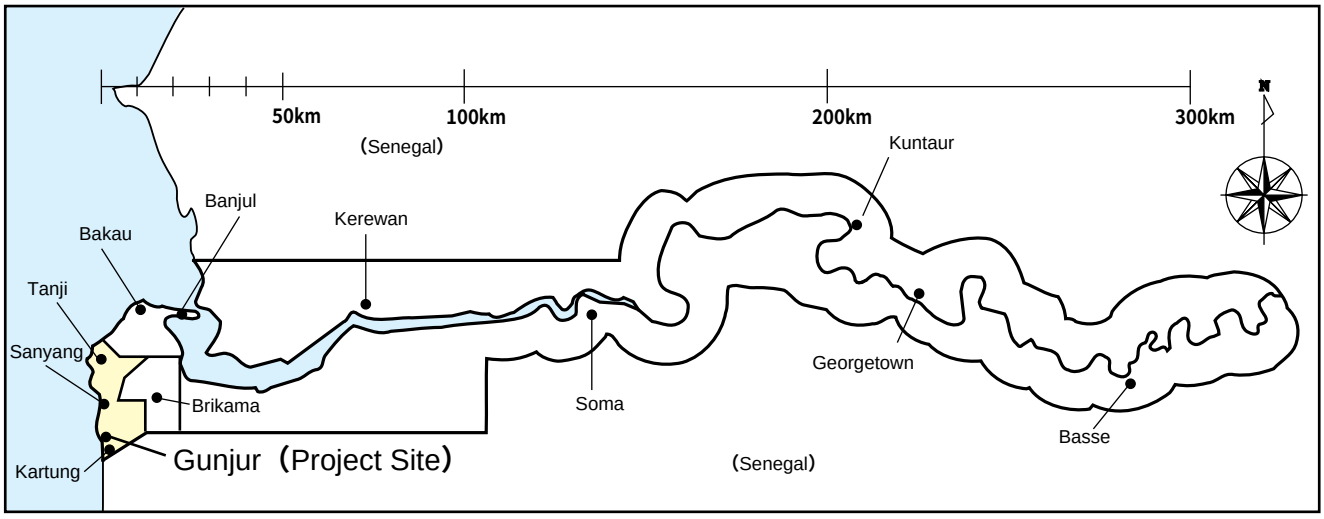
Very truly yours.

Munehiro Shimada
Project Manager,
Basic design study team on the Project for
Improvement of Artisanal Coastal Fisheries
in the Kombo South District
Overseas Agro-Fisheries Consultants Co., Ltd.

Location Map







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Abbreviations

For Fisheries Centers

BFC	: Bakau Fisheries Center
GFC	: Gunjur Fisheries Center
KFC	: Karton Fisheries Centers
SFC	: Sanyang Fisheries Center
TFC	: Tanji Fisheries Center

For Operation Body of Gunjur Fisheries Center

GFCOC	: Gunjur Fisheries Center Operation Committee
GFCMB	: Gunjur Fisheries Center Management Body
MC	: Management Committe
AS	: Accounting Section
CSS	: Chilled Storage Section
FCOS	: Fishing Canoes Operation Section
SS	: Security Section
FMS	: Fish Marketing Section
IPS	: Ice Plant Section

Others

PHL	: Post Harvest Loss

Summary

The Republic of The Gambia is located in the west end of the African Continent and its land area is approximately 11,000 km2, spreading 30 ~ 50 km to north and south and approximately 300 km to east and west, with being shaped like a belt along the River Gambia. Its geographical features form a wedge into Senegal and its climate belongs to the tropical savanna zone. The population is approximately 1.22 million (1998). With regard to the economic aspect, The Gambia is an agricultural country, as 80 % of labors are engaged in the agricultural sector, the sector contributes to approximately 30 % of GDP and peanuts produced as convertible goods into money account for approximately 70 % of the total incomes of export. The interruption of international assistance due to internal disturbance in 1994 and the stagnancy of agricultural production due to the decrease of international prices of primary products, droughts, damages by insects, etc. are major factors to obstruct the development of its economy. As the civil administration was recovered in 1997, IMF agreed to resume assistance to the economic restructure program in 1998 and international assistance was resumed in accordance with the progress of the civil administration and the recovery of public peace. The tourism becomes active gradually and its economy is advancing. GNP per person of the country is US$ 340 (1998), the balance of foreign debts is approximately US$ 480 million (1998), and the rate of inflation is 4.6 % (1990s).

In "Vision 2020" drawn up in 1996, National Development Plan of the Republic of The Gambia, the fishery sector is regarded as the prosperous sector to provide animal protein to the nation, to supply more opportunities of employment and to gain foreign currencies. In the Strategic Plan for the Fisheries Sector which applies to this National Development Plan, the utilization of fishery products is considered as one of the important development policies in order to improve the supply of food to the nation. Moreover, these development policies set the goals which include improvement of fishery infrastructure such as fishing ports, ice plants and refrigeration facilities, improvement of the supply system of fishery products and its marketing network and establishment of the system for management and maintenance of fishery facilities and fishing equipment. Especially, it is considered as significant task to improve Post Harvest Loss (PHL; discard of fish by deterioration of fish freshness during the process of marketing) of the marketed fresh fish of the landed fish.

The artisanal coastal fisheries in The Gambia has supported the supply of animal protein to the nation mainly by Bonga fish. The number of people who are engaged in the artisanal coastal fisheries is approximately 5 thousand and the number of those who are engaged in relevant processing and marketing activities is approximately 25 thousand. The artisanal coastal fishing is performed by operating the wooden fishing canoes with outboard engines and utilizing fishing nets, and approximately 500 fishing canoes were operated in 2000. Between 1996 and 2000, the artisanal coastal fisheries has brought approximately 30 thousand tons of fish landing annually and Bonga fish accounts for approximately 80 % of the total. Bonga fish is not only marketed as fresh fish, but also marketed after processing approximately 30 % of the total landed fish as smoked fish and 10 % as dry fish at fish landing sites. Smoked fish and dry fish are also dealt for export

to the adjoining countries and contribute to stimulating the economy and obtaining foreign currencies.

Gunjur Fisheries Center (GFC), Tanji Fisheries Center (TFC) and Bakau Fisheries Center (BFC) are major fish landing sites in the artisanal coastal fisheries. The situation of PHL of the landed fish has been improved at BFC and at TFC where the related facilities and equipment were improved under the Japan's Grant Aid Scheme. However, the fisheries infrastructure has not been improved in other fish landing sites. In the Kombo South District, centering Gunjur Fisheries Center (GFC) having the largest fish landings in the artisanal coastal fisheries, the ratio of PHL reaches to approximately 30 % (approximately 15 ~ 20 % of loss during the delivery of fresh fish to markets and 10 ~ 15 % of loss during sales at markets). The effective utilization of the landed fish has not been realized, due to the shortage and deterioration of the facilities related to processing and marketing of smoked fish and dry fish, the shortage of the facilities which support fisheries activities, and the shortage of the equipment for fishing canoe operation such as fishing canoes and fishing nets.

Under these circumstances, the Government of the Republic of The Gambia planned the Project for Improvement of Artisanal Coastal Fisheries in the Kombo South District in order to solve these problems in the artisanal coastal fisheries in the Kombo South District, with aiming to improve the facilities and equipment related to processing, marketing and fisheries at GFC and also to assist Karton Fisheries Center (KFC) and Sanyang Fisheries Center (SFC), and requested to the Government of Japan for Japan's Grant Aid Assistance to improve these facilities and equipment.

In response to this request, the Government of Japan decided to conduct a basic design study through JICA and dispatched a study team as follows:

Basic design field study	: May 18, 2001 to June 10, 2001
Draft basic design explanatory	: August 9, 2001 to August 16, 2001

Through the field study and examination in Japan, the background and the contents of the Project, natural conditions, the system of operation and maintenance, construction conditions, etc. were examined and analyzed. As the results of examination and analysis, in order to solve those problems in the artisanal coastal fisheries in the Kombo South District, it is considered necessary to promote improvement of facilities and equipment for assisting the marketed fresh fish, improvement of facilities for assisting processing and marketing for smoked fish and dry fish, improvement of facilities for assisting artisanal fisheries activities, improvement the equipment for maintaining the fishing canoes operation, and strengthening the system of maintenance of the fishery and marketing equipment, as well as strengthening of the activities of fisheries community and establishment of the system to improve the quality of freshness of the landed fish. Then, it will be expected that the smooth operation of the artisanal coastal fisheries in the Kombo South District is secured, the amount of its fish landing is maintained and the system of utilization of the landed fish as fresh fish and processed fish is improved. As the PHL of the marketed fresh fish decreases and the utilization of the landed fish is promoted, the supply of animal protein to the nation is expected to be promoted.

As it is considered appropriate that the contents of the Requested Japanese Assistance will be the improvement of facilities such as Ice Plant & Storage, Chilled Storage, Fish Handling Place, Smoke House, Dry Fish Storage, Toilets & Showers for Fisherfolks, Fishing Gear Locker, Maintenance Workshop, etc., and the improvement of the equipment such as Fish Box & Container, Refrigerated Vehicle, FRP Fishing Canoes, Outboard Engines, Fishing Nets, etc., the basic design is carried out as shown below;

1) Facilities

Facility	Contents & Scale
Fresh Fish Handling Building	Fish Handling Place, Ice Plant & Storage, Chilled Storage, Office, Machine Room, etc. Constructional area 728 m2, floor area 728 m2, reinforced concrete structure, one-storied construction, steel frame purlin, asphalt felt single roofing, concrete block wall.
Smoke House	Constructional area 216 m2, floor area 216 m2, reinforced concrete structure, one-storied construction, steel frame purlin, asphalt felt single roofing, concrete block wall.
Dry Fish Storage	Constructional area 144 m2, floor area 144 m2, reinforced concrete structure, one-storied construction, steel frame purlin, asphalt felt single roofing, concrete block wall.
Fishing Gear Locker	Constructional area 225 m2, floor area 225 m2, reinforced concrete structure, one-storied construction, steel frame purlin, asphalt felt single roofing, concrete block wall.
Toilets & Showers for Fisherfolks	Constructional area 102 m2, floor area 102 m2, reinforced concrete structure, one-storied construction, steel frame purlin, asphalt felt single roofing, concrete block wall.
Maintenance Workshop	Constructional area 72 m2, floor area 72 m2, reinforced concrete structure, one-storied construction, steel frame purlin, asphalt felt single roofing, concrete block wall.
Fuel Tank	Tank for pre-mix gasoline for outboard engines: 1 unit, 15 m3 Tank for diesel oil for diesel generators facilities: 1 unit, 15 m3
Facilities	Ice Plant: 2 units, 5 tons production / day Ice Storage: 2 units, 10 tons storage (approximate volume: 89 m3) Chilled Storage: 2 units, 4.2 tons storage (approximate volume: 107 m3) Electric equipment: generators 3 units (75KVA), power control boards and distribution boards, yard lighting 4 sets Water supply and drainage : pump up system, elevated tank, underground water piping, piping for water supply and drainage lines
Exterior	Paving : concrete paving of approximately 2,332 m2, shell paving of approximately 3,086 m2 Retaining wall: reinforced concrete structure, 1.4 m in height, approximately 260 m extension Septic tank: 1 unit, reinforced concrete structure, for 120 people use

2) Equipment

Equipment	Specifications & Numbers
Fish Box	669 boxes, approximate capacity 60 liters, polypropylene made
Fish Container	25 containers, approximate capacity 500 liters, Fiber Reinforced Plastic(FRP) made
Refrigerated Vehicle	3 vehicles, diesel engine drive, approximate engine output 180 HP, approximate max. load 5 tons
Insulated Vehicle	1 vehicle, diesel engine drive, approximate engine output 100 HP, approximate max. load 1 ton
Carrier Vehicle for Ice	1 vehicle, diesel engine 4 wheel drive, approximate max load 0.7 tons, with hood
FRP Fishing Canoes	12 canoes, Fiber Reinforced Plastic(FRP) made, approximately 13 m in length, 2 m in width, 1.1 in depth, open deck structure and canoe shape
Outboard Engine	12 engines for FRP Fishing Canoes, output 40 HP
Fishing Net	12 sets for FRP Fishing Canoes, encircling gill net, components (body net, rope, float, etc.)
Tools	1 set, for maintenance and repair tools for outboard engines such as digital rotation meter, tester, gauge, etc.
ORP Measuring Meter	1 set, portable ORP measuring meter, ORP & PH censors, censor stand, etc.
Others	6 garbage bins (approximate capacity 200 liters), 5 fire extinguishers

To implement the Project under the Japan's Grant Aid Scheme, it will require 4 months for detail design, 11 months for construction work, 8 months for procurement of the equipment and 15 months as the total implementation.

With regard to operation and maintenance of GFC, after the implementation of the Project, the annual incomes from sales of ice, usage fees of facilities, etc. are estimated as approximately 5,273 thousand Dalasis, while the annual expenditures for operation and maintenance of GFC are estimated as approximately 3,658 thousand Dalasis. Therefore, the sound financial condition will be expected for its operation and management.

The following effects will be expected by implementing the project and it is considered proper and significant as the project under Japan's Grant Aid Scheme.

(1) The following effects will be brought to the artisanal fisheries activities by 1,810 fisherfolks at GFC.

1) By improving Ice Plant & Storage, Fish Handling Place, etc., the icing ratio of the marketed fresh fish from GFC will improve up to 50 % from 0 % at present.

2) By improving Ice Plant & Storage, Chilled Storage, Insulated Vehicle, etc, the rate of PHL of the marketed fresh fish from GFC will decrease from 30 % to 15 % approximately.

3) By improving Refrigerated Vehicles, Fish Box & Container, etc., the delivery of approximately 2.5 tons of fresh fish per day on average to six inland unloading points targeted by the Project with maintaining the appropriate freshness, will be realized and that will contribute to the decrease of PHL rate.

4) By improving Smoke House, the smoked fish production will be improved.

5) By improving Dry Fish Storage, the appropriate storage of dry fish before shipment will be realized.

6) By improving FRP Fishing Canoes, Outboard Engines, Fishing Nets, Fishing Gear Locker, Toilets & Showers for Fisherfolks, Maintenance Workshop, etc., the efficiency of the fisheries activities will be improved.

7) The livings of approximately 7,000 persons of families of fisherfolks at GFC will be stabilized.

(2) In terms of the artisanal fisheries activities by 184 fisherfolks at SFC and 113 fisherfolks at KFC, by improving Carrier Vehicle for Ice and Fish Box & Container, the PHL rate of the marketed fresh fish from those fisheries centers will decrease from 30 % to 22.5 % approximately, and the effect to increase the amount of utilization of the landed fish will be brought in. 700 persons of families of fisherfolks at SFC and 400 persons of families of fisherfolks at KFC will stabilize their livings.

(3) As indirect effects, the following effects will be expected.

1) Fresh fish in appropriate freshness will be supplied to approximately 86 thousand people as the target consumers at six inland unloading points.

2) Fresh fish in appropriate freshness of the fish landed at GFC, SFC and KFC will be supplied to approximately 250 thousand consumers in the capital area markets.

3) By the increase of the utilization of the landed fish, the supply of animal protein to the nation will increase.

For the smooth and effective implementation of the Project, the following matters are recommended.

1) In order to manage the smooth operation and maintenance of the facilities and equipment improved by the Project, the members of the operation body will be required to increase to 27 members from 13 members at present and it is important to recruit qualified technicians for Ice Plant & Storage and Chilled Storage facilities. Then, it is planned to increase the member of the operation staff of Gunjur Fisheries Center Management Body (GFCMB) as the body for operation and maintenance, and the technicians for Ice Plant & Storage, Chilled Storage facilities, etc. are planned to be

dispatched from the Fisheries Department. The Fisheries Department is recommended to give proper advice and instructions upon the selection and employment of the members for operation and the operation planning and management performed by GFCMB, by making good use of its experiences of operation and maintenance for the similar projects in the past.

2) The facilities and equipment operated by the Project include the facilities and equipment such as Ice Plant & Storage, Generator Facilities, Vehicles, FRP Fishing Canoes, Outboard engines, which require the procurement of spare parts form overseas countries and regular maintenance. To operate these facilities and equipment smoothly and continuously, it is important to plan the appropriate maintenance schedule, to allocate the necessary expenses from the incomes from operation and to perform proper maintenance. The Fisheries Department is recommended to give proper advice and instruction upon operation and maintenance performed by GFCMB, by making good use of its experiences of operation and maintenance for the similar projects in the past.

3) As FRP Fishing Canoes, Outboard Engines and Fishing Nets apply to the equipment targeted for the Counterpart Fund reserve, it is planned to renew the applicable equipment by utilizing the fund when it is deteriorated. However, when the Counterpart Fund reserve is not smoothly accomplished, it will delay the renewal of the equipment and fail to improve the system of fishing canoes operation. Therefore, when the fund reserve is not allotted by the incomes from the operation of the related equipment, the Government of The Gambia plans to compensate the fund reserve. The Fisheries Department is recommended to be aware of the status of the Counterpart Fund reserve and promote the implementation of the compensation for the reserve by the Government of The Gambia.

4) To expect the continuous extension of the Project, it is important to grasp properly the effects by implementing the Project. The Fisheries Department is recommended to advise and instruct GFCMB on their activities in terms of measuring the effects of improvement related to the results index for the Project and to participate positively in the measuring the effects.

Contents

CHAPTER 1

BACKGROUND OF THE PROJECT

Chapter 1 Background of the Project

The artisanal coastal fisheries in the Republic of The Gambia supports the supply of animal protein to the nation mainly by Bonga fish. In these days, it has brought approximately 30 thousand tons of fish landing annually, and Bonga fish accounts for approximately 80 % of the total. Bonga fish is not only directly marketed as fresh fish, but also marketed after processing approximately 30 % of the total landed fish as smoked fish and 10 % as dry fish at fish landing sites. Smoked fish and dry fish are also dealt for export to the adjoining countries and contribute to stimulating the economy and obtaining foreign currencies. The number of people who are engaged in the related fisheries, processing and marketing activities reaches 30,000, and it also contributes to promoting the employment. In this concern, in "Vision 2020", National Development Plan of the Republic of The Gambia, the fishery sector is regarded as the prosperous sector to provide animal protein to the nation, to supply more opportunities of employment and to gain foreign currencies. In the Strategic Plan of the Fisheries Sector which applies to this National Development Plan, the utilization of fishery products is considered as one of the important development policies in order to improve the supply of food to the nation. Furthermore, these development policies set the goals which include improvement of fishery infrastructure such as fishing ports, ice plants and refrigeration facilities, improvement of the supply system of fishery products and its marketing network and establishment of the system for management and maintenance of fisheries facilities and fishing equipment.

Gunjur Fisheries Center (GFC), Tanji Fisheries Center (TFC) and Bakau Fisheries Center (BFC) are major fish landing sites in the artisanal coastal fisheries. The situation of PHL of the landed fish has been improved at BFC and at TFC where the related facilities and equipment were improved under the Japan's Grant Aid Scheme. However, the fisheries infrastructure has not been improved in other fish landing sites. In the Kombo South District, centering Gunjur Fisheries Center (GFC) having the largest fish landings in the artisanal coastal fisheries, the ratio of PHL reaches to approximately 30 % (approximately 15 ~ 20 % of loss during the delivery of fresh fish to markets and 10 ~ 15 % of loss during sales at markets). The effective utilization of the landed fish has not been realized, due to the shortage and deterioration of the facilities related to processing and marketing of smoked fish and dry fish, the shortage of the facilities which support fisheries activities, and the shortage of the equipment for fishing canoe operation such as fishing canoes and fishing nets.

In order to solve these problems for the artisanal coastal fisheries in the Kombo South District, the Project for Improvement of Artisanal Coastal Fisheries in the Kombo South District is planned by the Government of the Republic of The Gambia with aiming to improve the facilities and equipment related to marketing, processing and fisheries at GFC, and also assist Karton Fisheries Center (KFC) and Sanyang Fisheries Center (SFC) in the Kombo South District. In this concern, the Government of The Gambia requested to the Government of Japan for Japan's Grant Aid Assistance in order to execute the

improvement of these facilities and equipment. The outline of the request confirmed during the basic design field study is shown as follows:

Name of Components	Scale in Original Request	Request confirmation	Scale requested during the Basic Design Field Study
Ice Plant and Storage	10 tons / day	Requested	Same as original scale.
Chilled Storage	2 rooms, each 10 tons capacity	Requested	Same as original scale.
Cold Storage	2 rooms	Withdrawal	Request is withdrawn, because it is not necessary at present stage.
Fish Handling Place	Necessary space allocation	Requested	Same as the original scale, for cleaning fresh fish, etc.
Office	Necessary space allocation	Requested	Same as original scale, for operation and management work.
Meeting cum Training Class Room	Necessary space allocation	Requested	Same as original scale, for regular meeting of management body and training for fisherfolks.
Smoke House	1 building	Requested	Plural number of buildings
Fishing Gear Locker & Dry Fish Storage	4 building in total	Requested	2 buildings for Fishing Gear Locker and 1 building for Dry Fish Storage.
Toilets and Showers for Fisherfolks	1 building	Requested	Same as original scale.
Maintenance Workshop	1 building	Requested	Same as original scale, with including tools for maintenance and repair of outboard engines.
Water Supply Facilities from Deep Well	Not requested	Newly requested	Because the existing water source in the Site is not adequate for the Project purposes.
Fuel Tank	1 set	Requested	Same as original scale, for pre-mix gasoline for outboard engines and diesel oil for generator.
Water Reservoir	1 set	Requested	Same as original scale.
Refrigerated Vehicle	4 vehicles	Requested	Same as original scale.
Fish Box	600 boxes	Requested	Approximately 800 boxes.
Fish Container	10 containers	Requested	Approximately 30 containers.
FRP Fishing Canoes	12 canoes	Requested	Same as original scale.
Outboard Engine	12 engines	Requested	Same as original scale.
Fishing Net	12 sets	Requested	Same as original scale.
Vehicle	3 vehicles	Requested	Same as original scale, for carrying ice, distributing small amounts of fresh fish and collecting fish boxes.

CHAPTER 2

CONTENTS OF THE PROJECT

Chapter 2 Contents of the Project

2-1 Basic Concept of the Project

(1) Overall Goal and Project Objective

In "Vision 2020", National Development Plan of the Republic of The Gambia, the fishery sector is regarded as the prosperous sector to provide animal protein to the nation, to supply more opportunities of employment and to gain foreign currencies. In the Strategic Plan for the Fisheries Sector which applies to this National Development Plan, the utilization of fishery products is considered as one of the development policies in order to improve the supplies of food to the nation. Moreover, these development policies set the goals which include improvement of fishery infrastructure such as fishing ports, ice plants and refrigeration facilities, improvement of the supply system of fishery products and its marketing network, establishment of the system for management and maintenance of fishery facilities and fishing equipment.

Gunjur Fisheries Center (GFC), Tanji Fisheries Center (TFC) and Bakau Fisheries Center (BFC) are major fish landing sites in the artisanal coastal fisheries, which support the landings of Bonga fish that supplies animal protein to the nation mainly. The situation of PHL of the landed fish has been improved at BFC and at TFC where the related facilities and equipment were improved under the Japan's Grant Aid Scheme. However, the fisheries infrastructure has not been improved in other fish landing sites. In the Kombo South District, centering Gunjur Fisheries Center (GFC) having the largest fish landings in the artisanal coastal fisheries, the ratio of PHL reaches to approximately 30 % (approximately 15 ~ 20 % of loss during the delivery of fresh fish to markets and 10 ~ 15 % of loss during sales at markets). The effective utilization of the landed fish has not been realized, due to the shortage and deterioration of the facilities related to processing and marketing of smoked fish and dry fish, the shortage of the facilities which support fisheries activities, and the shortage of the equipment for fishing canoe operation such as fishing canoes and fishing nets.

In order to solve these problems for the artisanal coastal fisheries in the Kombo South District, the Project for Improvement of Aritsanal Coastal Fisheries in the Kombo South District, planned by the Government of the Republic of The Gambia, aims to improve the facilities and equipment related to marketing, processing and fishing at Gunjur Fisheries Center (GFC) and also aims to assist Kartong Fisheries Center (KFC) and Sanyang Fisheries Center (SFC) in the Kombo South District through this improvement. The Project Objectives include the goals to decrease 15 % from 30 % of the current post harvest loss (PHL) of the marketed fresh fish at GFC, to improve the system of processing and marketing of smoked fish and dry fish, to improve the facilities for assisting artisanal fisheries activities under the present situation and to maintain the fishing canoes operation.

(2) Basic Concept of the Project

In order to achieve the Project Objectives aforementioned, this Project intends to improve the facilities and equipment for assisting the marketed fresh fish, to improve the facilities for assisting processing and marketing for smoked fish and dry fish, to improve the facilities for assisting artisanal fisheries activities, to improve the equipment for maintaining the fishing canoes operation, and to strengthen the system of maintenance of the fishery and marketing equipment. At the same time, the Project promotes the strengthening of the activities of fisheries community and the establishment of the system to improve the quality of freshness of the landed fish. Then, it will be expected that the smooth operation of the artisanal coastal fisheries in the Kombo South District is secured, the amount of its fish landing is maintained, the system of utilization of the landed fish as fresh fish and processed fish is improved, the PHL of the marketed fresh fish decreases, the effective utilization of the landed fish is promoted and the supply of animal protein to the nation is promoted. Under the Project, the Requested Japanese Assistance will implement the construction of Ice Plant & Storage, Chilled Storage, Fish Handling Place, Operation & Management Facilities, Smoke House, Dry Fish Storage, Toilet & Shower for Fisherfolks, Fishing Gear Locker, Maintenance Workshop, Generator Facilities, Water Supply Facilities and Fuel Tank, and the procurement of Fish Box & Container, Refrigerated Vehicle, Carrier Vehicle, Fishing Equipment (FRP Fishing Canoe, Outboard Engine, Fishing Net) and Repair Tools.

2-2 Basic Design of the Requested Japanese Assistance

2-2-1 Design Policy

(1) Basic Policy

The scope of the Requested Japanese Assistance is examined as follows by each content of schemes which were targeted by the Project:

1) Improvement of the facilities and equipment for assisting the marketed fresh fish

At present, neither ice plant nor chilled storage is available at the fisheries centers in the Kombo South District, and the landed fish for fresh fish marketing is delivered to capital area markets and inland markets and sold there without cooling process. Accordingly, the discard of fish by deterioration of fish freshness during the process of distribution and sales (Post Harvest Loss; PHL) is caused. Especially as for Bonga fish, which accounts for more than 80% of the landed fish, deterioration of its freshness is distinguished. On the other hand, because there is not any method to store with cooling the fish landed in the early morning or night time until the starting time of delivery, it is unavoidable to deteriorate its freshness during those hours. Besides, the method of storing and cooling the fish is required for inland marketing of fresh fish during delivery, because the distance of which is about some hundreds kilometers away.

To improve the situation, cooling down the temperature of the landed fish by icing or chilling storage is effective to promote the maintenance of its freshness under low temperature. Incidentally, in the Baseline Survey in the field survey for this Basic Design Study, the variability of freshness among fresh Bonga fish with and without icing was examined by the ORP (oxidation reduction potential) value measuring, and, as a result, the effectiveness of cooling down by icing was confirmed to maintain fish freshness.

Therefore, in regard with improvement of the facilities and equipment for assisting the marketed fresh fish, it is appropriate that the following components are included in the contents of the Requested Japanese Assistance.

A) Ice Plant & Storage

The Ice Plant & Storage should be constructed for icing the marketed fresh fish distributed from the Kombo South District such as Gunjur Fisheries Center (GFC), Sanyang Fisheries Center (SFC) and Karton Fisheries Center (KFC), and then the decrease of PHL will be promoted. As for the icing ratio (ratio of ice weight used against fish weight), it is practical to adopt 0.5 of the icing ratio by considering the current situation of ice utilization at BFC and TFC and the affordability of icing costs by users.

B) Chilled Storage

Fish landing is carried out in the early morning, during 2 p.m. and 6 p.m. and in the night time. As the fish landed after 5 p.m. is delivered in the next day, deterioration of fish freshness between the fish landing and its delivery greatly affects PHL. Therefore, it is effective to decrease PHL by the introduction of Chilled Storage at GFC in order to store with chilling fresh fish after fish landing until its delivery.

C) Fish Handling Place

To handle the marketed fresh fish, it is required to remove fish from fish baskets for the dealing at the beach, to fish boxes for distribution. At this stage, washing out the landed fish will promote slow down of deterioration of fish freshness that could be caused by virus, etc. It will be effective to decrease PHL that Fish Handling Place is allocated adjoining to the Ice Plant to perform these procedures.

D) Refrigerated Vehicle

Even though the demand of fresh fish is also high in the inland markets of The Gambia, the distribution of fresh fish from the domestic landed fish to the inland markets has not presently increased much because of lacking ice plants and refrigerated vehicles, and the marketed fresh fish from Senegal is consumed despite of its high price. Several tons of fresh fish without cooling process are delivered to the inland markets everyday even from GFC. However, the inland markets are located in the distance of 100 to 400 km from the coastal areas and it requires 3 or 4 days to deliver fresh fish, so that PHL is outstanding and the required amount is not yet delivered. With this system of delivery, it is difficult to maintain the fish freshness only by icing, so that refrigerated vehicles are required in order to store the fresh fish in the cool temperature during delivery.

E) Fish Box & Container

In The Gambia, it is accustomed to use fish boxes to handle the landed fish, but the existing number of the fish boxes used are short of demand because those boxes are imported. As for Fish Boxes & Containers, small sized Fish Boxes for the landed fish and middle sized Insulated Fish Containers for ice or iced fish are required. By providing those Fish Boxes & Containers, it is considered effective to improve the system of fresh fish marketing which the Project aims for. It is considered appropriate that the small sized Fish Boxes are to be provided not only for storage in Chilled Storage but also for delivery by Refrigerated Vehicle and the Insulated Fish Containers are provided for temporary storage of ice at GFC, SFC and KFC and for the storage of iced fish at the points of unloading through delivery by Refrigerated Vehicle. On the other hand, for fish boxes which are requested for fresh fish marketing in the capital area markets, it is considered appropriate that those are excluded from the contents of the Requested

Japanese Assistance, because these are to be rent by unspecified individuals and used outside from the Project site, then, its firm management may not be expected.

F) Carrier Vehicle

The concept of the Project also intends to decrease PHL of the marketed fresh fish from SFC and KFC by the regular supplies of ice from GFC. To achieve this concept, a carrier vehicle for ice transportation will be required. On the other hand, the fresh fish is delivered by Banabanas from GFC to small-scale markets in the capital area, but public transportation services are not available at GFC and the methods of transportation to these small-scale markets are limited in comparison with the major markets. Then, it is difficult to deliver fresh fish to meet the demand in those small-scale markets. To improve this circumstance, another carrier vehicle is requested to assist in delivering fresh fish to small-scale markets located comparatively closer to GFC. As an insulated vehicle is, however, more appropriate than a standard carrier vehicle in terms of carrying fresh fish, it is proper to examine its grade in the component of D) Refrigerated Vehicle aforementioned.

2) Improvement of the facilities for assisting processing and marketing of smoked fish and dry fish

At present, approximately 30 % of the landed fish in the Kombo South District are processed as smoked fish and approximately 10 % are processed as dry fish, and those are delivered to capital area markets and inland markets, and sold in those markets. This is because that all of the landed fish cannot be allocated for the fresh fish marketing due to shortage of improvement of environment for fish distribution in The Gambia, and especially smoked fish has market value as individuals' taste. Therefore, the processing of smoked fish and dry fish, preservation of which is easier than that of the fresh fish, is regarded as the effective utilization of the landed fish for the time being. However, as smoke houses were constructed ten and a few more years ago, they have been remarkably deteriorated (23 of 480 smoke ovens are broken and unworkable at present, and for the next few years, approximately 100 of smoke ovens will be damaged and will become unworkable.). As smoke tends to leak from the deteriorated smoke oven, the combustion of timber is ineffective. As the eaves of smoke houses are low and correspondingly the inside area becomes filled with smoke, the health of smoke fish processors is put in jeopardy. It is concerned for smoke processing that the usage of timbers such as mangroves, etc. as fuel should affect the natural environment in The Gambia. On the other hand, adequate facilities to store dry fish are not available, so that dry fish is stored in huts with a roof of palm tree leaves, which does not keep out rain or wind efficiently, or is brought back home for storage.

Under the above background, though the smoke processing is one of the important methods of utilization of the landed fish for the time being, it is considered that the fresh fish marketing is expected to increase through improvement of ice making facilities and

the landed fish utilized as smoked fish will be gradually converted to be utilized for the marketed fresh fish. It is, consequently, considered appropriate that the improvement of smoke facilities in the Project should be minimized. On the other hand, for dry fish processing, the status of products storage has been inefficient, and its improvement is required.

Therefore, regarding improvement of the facilities for assisting processing and marketing of smoked fish and dry fish, it is considered appropriate that the following components should be included in the contents of the Requested Japanese Assistance:

A) Smoke House

At the standpoint of minimizing the improvement of the smoke facilities, it is appropriate that only one building of Smoke House, which is supposed to compensate 23 unworkable smoke ovens, should be improved. For the smoke filling inside the house, it will improve the situation to some extents by raising the height of roof and installing outlets for smoke discharge, but it will be impossible to perform smoke discharge perfectly because of the nature of operation to smoke fish.

B) Dry Fish Storage

As dry fish product is presently loaded into large-size trucks (5 - 10 tons capacity vehicle) once or twice a month for distribution, Dry Fish Storage is required to be improved with considering these cycles of loading.

3) Improvement of the facilities for assisting artisanal fisheries activities

Various kinds of facilities to assist the artisanal fisheries activities have been developed at GFC, but it becomes obvious that some facilities have been incapable of the current scale of fisheries activities by capacity shortage and deterioration of facilities, such are fishing gear lockers and toilets and showers for fisherfolks. Fishing gear lockers are for the storage of outboard engines and fishing gear, and these lockers are the most important land facilities for fishermen. There are, presently, 99 rooms of fishing gear lockers at GFC. All of them are utilized, but the number of the rooms is still short for demand, and some fishermen are obliged to bring outboard engines back home. Also, only two toilets amongst the existing toilets for fisherfolks are usable, and the deterioration of facilities and a septic tank is hard and causes the unhygienic environment. There is no shower available for fisherfolks so that they cannot take off sweat after hard work.

Under these circumstances, it is considered necessary that those facilities, which assist fishermen in smooth fisheries activities, should be improved, as they are engaged in the hardest part of the fishery industry and it is them that capture fish as the source of animal protein to the nation.

As a conclusion, in regard with improvement of the facilities for assisting artisanal fisheries activities, it is considered appropriate that the following components should be included in the contents of the Requested Japanese Assistance.

A) Fishing Gear Locker

It is determined proper to construct the additional number of Fishing Gear Lockers, which are required for the current artisanal coastal fisheries activities at GFC but in short supply.

B) Toilets and Showers for Fisherfolks

The existing toilets for fisherfolks are not expected for the future usage, from the aspects of hygiene and deterioration of facilities. It is considered appropriate to improve the Toilets and Showers for Fisherfolks in the appropriate scale to meet the current artisanal fisheries activities at GFC.

4) Operation & Management Facilities

The existing facilities at GFC such as smoke houses, etc. have been operated by Gunjur Fisheries Center Operation Committee (GFCOC), consisting of 16 members. In the existing facilities, there are one office and one meeting room both with the approximate size of 20 m2, but they are not ventilated well and poorly lit, and they can be used only by a few number of management personnel for their desk work. Therefore, even the regular meetings of GFCOC are held at open air space that is normally used for loading dry fish, etc. After the Project is implemented, both the existing facilities and the facilities, which are improved and constructed by the Project, need to be managed and operated by the same organization. As the existing office and meeting room are not adequate for those purposes from the aspect of its scale, it is planned to divert them into the storage for stock materials after the implementation of the Project. In terms of the management and operation of the Project, Gunjur Fisheries Center Management Body (GFCMB), which includes the present GFCOC as the main component, is to be organized. GFCMB consists of Central Committee (34 members), Sub Committee (14 members) and Management Committee and Operation Unit (totally 27 members). However, some members are overlapped between Central Committee and Sub Committee.

Therefore, in regard with Operation & Management Facilities, it is considered appropriate that the following components should be included in the contents of the Requested Japanese Assistance:

A) Office

The office is mainly for Management Committee and Operation Unit (which consists of 3 management staffs and 24 members for operation) to be stationed and engaged in management and operation work at GFC, and it is considered appropriate to improve the office by dividing into Administration Office and Engineer Office for the operation of Ice Plant, etc.

B) Meeting cum Training Class Room

In addition to the regular management and operation work, the management meeting attended by the members of Central Committee and Sub Committee are held monthly and annually. Besides, the periodical training for fishermen and fish processors is held. The themes of the training are instructions for safety operation of fishing canoes, improvement of maintenance of outboard engines and fishing gear, promotion of the freshness of the landed fish, hygiene control of the fish processing, etc. As rooms for those regular meeting and training are not based on daily use, it is considered appropriate to use the same room for both purposes.

5) Incidental Facilities

In regard with the operation of those facilities aforementioned, it is considered appropriate that the following incidental facilities should be included in the contents of the Requested Japanese Assistance:

A) Generator Facilities

At GFC, the public electricity power is not supplied and it is not prospected to be supplied in the near future. In addition, at fisheries centers in The Gambia, the electricity power is usually supplied by diesel generator facilities. Therefore, it is considered appropriate to place the diesel generator facilities, which apply to the operation of facilities improved by the Project.

B) Water Supply Facilities

As the existing windmill well at GFC is not proper for use for the Project from the aspects of the quality and quantity of the water, the Government of the Republic of The Gambia made a trial borehole at the point of 2.2 km from GFC and secured water source. The quality and quantity of water from that water source is considered adequate for the purposes of the Project. One of the Project objectives is to assist fresh fish marketing through improvement of the system of ice supply. By taking this point into consideration, even though it is 2.2 km from GFC, it is determined appropriate to introduce a pumping

up system, an elevated water tank at the point of water source and piping for water supply to GFC from the point of water source in order to supply water to GFC.

C) Fuel Tank

There are two purposes of usage. One is for storage of pre-mix gasoline as fuel for outboard engines of fishing canoes and another is for storage of diesel oil for diesel generator facilities. At GFC, a tank for pre-mix gasoline is in shortage and the pre-mix gasoline is stocked in drum cans that are kept in the storage, so that it could cause fire accidents under the current situation. An appropriate size of tank for pre-mix gasoline is required to be improved in accordance with the present artisanal coastal fisheries activities at GFC. A tank for storage of diesel oil for diesel generator facilities is determined necessary in order to assure the smooth operation of the facilities by the Project. Because these kinds of fuel are delivered from Banjul by tank lorry with the capacity of 10 tons, it is required to examine a capacity of tank with consideration of fuel supply procedures by this tank lorry.

6) Improvement of the equipment for maintaining the fishing canoes operation

Artisanal coastal fisheries at GFC have been performed by operating wooden fishing canoes with outboard engine and fishing net. As the life-span of wooden fishing canoes is estimated approximately 5 years and that of outboard engine and fishing net is approximately 3 years, construction of fishing canoes and procurement of outboard engine and fishing gear are required regularly in order to maintain the amount of fish landing. However, the timber materials to construct fishing canoes depend on import from the adjoining countries. The construction of wooden fishing canoes at GFC has been faced with difficulties, because those materials become hard to obtain due to the shortage of timber resources in the adjoining countries and the consequent rise of market prices. On the other hand, outboard engines and fishing net, which were compelled to be imported from the developed countries, are short for demand due to the underdevelopment of related import industry and the difficulty in allocating foreign currencies necessary for import. Therefore, under the situation, those are procured sometimes even by smuggling from the adjoining countries.

Under these circumstances, the Requested Japanese Assistance in renewal procurement of fishing canoes, outboard engines and fishing net at GFC, will promote maintaining the amount of fish landing there and contributes to the maintenance of the supplies of animal protein to the nation. Also, in regard with fishing canoes, it is expected to contribute to the stabilization of the operation by introducing FRP Fishing Canoes, because the life-span of them is longer and the operation is safer than those of wooden fishing canoes.

However, the following points are the significant prerequisite conditions in terms of the operation of equipment that apply to the Requested Japanese Assistance:

A) Under Japan's Fishery Grant Aid Scheme, FRP Fishing Canoes, Outboard Engines and Fishing Net apply to the equipment targeted for the Counterpart Fund reserve, so that the Government of the Republic of The Gambia has an obligation to complete the Counterpart Fund reserve, which deserves 2/3 of FOB price of the applied equipment, within the settled period after the conclusion of the Exchange of Notes. This settled period is four years in principle. However, with considering the standard life-span of the concerned equipment, it is appropriate to determine this settled period as seven years for FRP Fishing Canoes and as four years for Outboard Engines and Fishing Nets for this Project. By considering these points, the Government of the Republic of The Gambia is requested to make an appropriate plan including budgetary source, regular funding process, etc. in order to form the Counterpart Fund reserve. Furthermore, the Government of The Gambia has to report annually on formation of the Counterpart Fund reserve and make prior consultation on usage of the Counterpart Fund with the Government of Japan. The usage of the Counterpart Fund is allowed only after completion of formation of the Counterpart Fund reserve.

B) Under Japan's Grant Aid Scheme, it is considered most proper that the equipment, which applies to the Counterpart Fund reserve, should be sold to its users. Then, it is desirous that the Government of The Gambia should adopt an appropriate way of operation of FRP Fishing Canoes, Outboard Engines, and Fishing Net with consideration of the above idea under Japan's Grant Aid Scheme.

7) Strengthening the system of maintenance of the fishery and marketing equipment

To maintain the artisanal coastal fisheries activities at GFC, it is important that the maintenance and repair of outboard engines used for the fishing canoes operation are performed accurately. Since there is neither appropriate facility nor equipment available at GFC for these purposes, the daily maintenance of outboard engines is unable to be performed at present, and these are transported to Banjul in case of breakdown. This circumstance shortens the life-span of outboard engines, hinders the prevention of breakdown by the daily maintenance and jeopardizes the stabilization of fishing canoes operation. Also, the adequate daily maintenance of Ice Plant, Chilled Storage, Generator Facilities and vehicles to be improved by the Project will bring about the continuous utilization of facilities and equipment and the decrease of management and maintenance costs. Therefore, it is considered appropriate to include Maintenance Workshop with Repair Tools, where the maintenance and repair of those facilities and equipment are performed, in the contents of the Requested Japanese Assistance. However, the main object of maintenance and repair work is outboard engine, so that it is practical that the level of maintenance and repair work for Ice Plant, Chilled Storage, Generator Facilities and vehicles should be kept in minimum requirement.

(2) Design policy for natural conditions

1) Well consideration is taken to ventilation by natural winds and sunshades to the direct sunlight because of the hot and humid climate

2) Well consideration is taken to possibilities of rust on metals to be caused by a sea breeze, since the Project Site faces the coast.

3) Because there forms a gentle slope from the inland side to the Project Site, the drainage of rainwater is required to be considered not only for the catchment in the Project Site but also for the rainwater running into the Project Site from the surrounding area. Therefore, it will be planned with considering the watercourse that allows the rainwater run out of the Project Site by the installation of the retaining wall that surrounds the Project Site.

4) Well consideration is taken to avoid the pollution at the coast by waste and wastewater from Fish Handling Place and Toilets and Showers for Fisherfolks of the Project.

5) According to the results of interviews about wave and tide conditions on beach adjoining to the Project Site, low possibilities are assumed for occurrence of erosion etc. in the construction area of the Project Site.

Design conditions for the natural conditions related to the design of facilities

Climate factors:

Temperature	Maximum: 36 C° Minimum: 15 C°
Wind velocity	40m/sec.
Earthquake	Lateral seismic coefficient: 0.1

Soil factors:

Bearing power of soil	long term: 0.1 MPa, short term: 0.2 MPa

(3) Policy for social and economic conditions

The Project Site is at the artisanal fisheries center where three categories of activities such as fisheries, marketing and fish processing are mingled. Those who are engaged in fisheries, marketing and fish processing are a group of people to support each other, from the viewpoint of making a living by handling fish, but their interests are sometimes conflicted. As the best solution for this problem, those people concerned are accustomed to have enough opportunities of discussion in The Gambia. As a great number of people are related to fisheries, marketing and fish processing, the number of participants in the meetings at fisheries centers often becomes several tens. As this scale of meeting has been held in BFC and TFC, the similar meetings are expected to be held in GFCMB of the Project. It is important to have a sense of cooperation on a daily basis especially at in the fisheries activities where various marine accidents may happen. In regard with the

implementation of the Project, these social and economic characteristics are necessary to be considered.

(4) Policy for conditions of construction

Regarding the design of architectural work, Development Control Regulations, 1995 are effective in The Gambia. According to these regulations, the structural design is basically referred to the British Standards, but the standards in the other countries can be applied when those standards are properly established in technical aspects. As many of the Japanese standards were applied to the past projects under Japan's Grant Aid Scheme, the related Japanese standards are to be applied to the facilities' design of the Project.

In regard with procurement of the equipment, almost target equipment in the Project is not available for sale in The Gambia, except for the materials of fishing net such as floats and lead, and there are only a few agencies to deal with this equipment. Then, the equipment for the Project is hardly procured locally. Therefore, it is the basic policy to procure Japanese products also with considering the assurance of performance, stable delivery, etc.

As for miscellaneous regulations, since there are no regulations for refrigeration facilities such as ice plant, etc in The Gambia, the regulations that are effective in Japan will be applied. As far as the generator facilities and the electric equipment are concerned, the local standard will be applied for voltage, frequency, plug sockets, but the Japanese standards will be applied for the rest. There have not been any particular problems to procure the equipment and facilities based on the Japanese standards, though the same procurement was implemented for the past Bakau and Tanji projects.

The major standards to be applied to the design in the Project are summarized as follows:

- Standard for Structural Calculation of Reinforced Concrete Structure
  (: Architectural Institute of Japan)
- Design Standard for Steel Structures
  (: Architectural Institute of Japan)
- Recommendations for Design of Building Foundations
  (: Architectural Institute of Japan)
- Common Specifications of Architectural Work
  (: Public Building Association of Japan)
- Japan Industrial Standard (JIS)
  (: Japan Standard Institute)
- High Pressure Gas Control Regulations
  (: High Pressure Gas Control Association of Japan)

(5) Policy for utilization of local constructors

Many of local constructors are small and middle scaled ones in The Gambia. Though the large-scale or specific civil engineering and construction work are often conducted by constructors of Senegal or other countries, local constructors are capable of implementing general work such as earth work and concrete work. Therefore, in terms of general work excluding the special work for refrigeration facilities such as Ice Plant and Chilled Storage, the method of construction will be examined to make the local general method to be applicable in order to utilize local constructors as sub-contractors.

(6) Policy in relation with the capabilities of operation and management by the implementation body.

Gunjur Fisheries Center Operation Committee (GFCOC) is in charge of operation and management of the existing facilities at GFC, and, for last 17 years, it has been engaged in operating the facilities such as smoke houses and fishing gear lockers through collecting usage fees and in coordinating fisheries and marketing activities at GFC. Therefore, GFCOC is considered to have the basic experience in personnel management, usage fee collection system and mediation of conflicts between fisherfolks which are related with operation of facilities in the fisheries center. Upon implementing the Project, GFCOC will be merged with Sub Committee of Gunjur Fisheries Center Management Body (GFCMB) which is a rivet of organization for management for the Project. Therefore it is considered that the past experience of GFCOC will be utilized effectively.

The field management and operation of facilities and equipment at the Project Site will be performed by Management Committee (3 members) and Operation Unit (24 members), under Sub Committee of GFCMB. As 3 members for managing staff and mechanics are planned to be dispatched from the Fisheries Department to Operation Unit especially for the operation of ice plant and storage, refrigerator vehicles, workshop, etc., Operation Unit will carry out the operation properly at the Project Site. That is because the Fisheries Department has much experience in management of the above facilities and equipment and it has promoted the education of related mechanics through the technical training in Japan.

As it is considered that the system of operation aforementioned is efficient enough for utilization and maintenance of the facilities and equipment of the Project, it is not necessary to examine the Software Components related to the Project during construction supervision period. However, it is considered necessary to assist the technical training in Japan related to the maintenance and repair of refrigeration facilities and the monitoring system for improvement of fish freshness that are expected to be established through the Project. On the other hand, similar projects such as past Bakau and Tanji projects were smoothly implemented because the Government of Japan dispatched related experts, so that it is considered appropriate to dispatch related experts continuously from now on.

(7) Policy for determining grade of facilities and equipment

[1] Fundamental conditions for determination of scale

The scale examination will be based on the statistics and results of field survey of Basic Design Study in 2000. The operating days are to be 365 days per year.

1) Annual yields of fish landing in the Kombo South District

Table 2-1 Annual yields of fish landing at each fisheries center in 2000 (Unit: ton)

Name of center	Bonga	Others	Yields
GFC	7,741	1,766	9,507
SFC	1,268	415	1,683
KFC	71	563	634
Total	9,080	2,744	11,824

2) Allocation of utilization of the landed fish

Table 2-2 Allocation of utilization of the landed fish (Unit: ton/year)

Name of Center	Species	Allocation			
GFC	Bonga 7,741	Fresh fish marketing	4,645	AC	3,948
				PHL (15%)	697
		Smoked material	2,322		
		Dry material	774		
	Others 1,766	Fresh fish marketing	1,148	AC	976
				PHL (15%)	172
		Smoked material	88		
		Dry material	530		
SFC	Bonga 1,268	Fresh fish marketing	761	AC	590
				PHL (22.5%)	171
		Smoked material	380		
		Dry material	127		
	Others 415	Fresh fish marketing	270	AC	209
				PHL (22.5%)	61
		Smoked material	21		
		Dry material	124		
KFC	Total 634	Fresh fish marketing	412	AC	319
				PHL (22.5%)	93
		Smoked material	32		
		Dry material	190		
Kombo South	Total 11,824	Fresh fish marketing	7,236	AC	6,042
				PHL	1,194

District		Smoked material	2,843		
Total		Dry material	1,745		

Note: 1) The rate of PHL shows the situation after the implementation of the Project.
2) Abbreviations: AC: Actual Consumption, PHL: Post Harvest Loss

[2] Examination on scale and grade of each component

1) Facilities and equipment for assisting the marketed fresh fish

A) Ice Plant & Storage

(i) Ice Plant

The required amount of ice for each fisheries center in the Kombo South District is calculated based on the icing ratio of 0.5 to target the landed fish to be demarcated for the fresh fish marketing as follows:

GFC	5,793 tons / year ÷ 365 days x 0.5 =	7.94 tons / day
SFC	1,031 tons / year ÷ 365 days x 0.5 =	1.41 tons / day
KFC	412 tons / year ÷ 365 days x 0.5 =	0.56 tons / day
	Total	9.91 tons/day

However, 1 ton of ice per day is planed to be distributed from TFC to SFC in Tanji project, so that 1 ton will be excluded from the total. Therefore, the required amount of ice in the Project is 8.91 tons per day.

Correspondingly, the calculation of the required ice making capacity should be based on operation ratio with consideration of suspension of operation for maintenance of the ice plant, adjustment of ice production for the decreased amount of the landed fish due to stormy weather, melting loss, etc. Though approximately 80 % of operation ratio are often adopted, the Project expects the high rate of utilization of facilities, so that the ice making capacity is calculated, based on 90 % of operation ratio.

The required icing capacity = 8.91 ton / day ÷ 0.9 = 9.9 ≒ 10 tons / day

The number of ice making machine is arranged as 2 sets with the capacity of 5 tons / day in order to perform economical operation to meet the variability of demands between high and low fishing seasons and also to prepare for suspension of operation for maintenance and unexpected troubles.

(ii) Ice Storage

Ice storage is often designed to store the total amount of ice produced by ice plant in 2 or 3 days. However, in the Kombo South District, fishing is normally performed throughout

a year and ice will be taken out of storage almost everyday, so that it is assumed that ice storage with comparatively small capacity could be functioned. On the other hand, because fish landing will be concentrated in the hours between around 6 am and 9 am and 4 pm and 7 pm, and correspondingly the demand of ice will be concentrated in the same hours, it is required to stock reasonable amount of ice. Based on these points, Ice Storage is planned to have a capacity to store the total amount of ice produced in 2 days. In addition, the Ice Storage will be divided into two rooms to meet the divisions of the ice making machine.

The required capacity for Ice Storage = 10 tons / day x 2 days = 20 tons
(10 tons capacity / room x 2 rooms)

B) Chilled Storage

The annual amount of the landed fish demarcated for the fresh fish marketing at GFC is 5,793 tons, and the average amount per day is 15.87 tons. The ratio of fish landing is 25% in the morning, 50% between 2pm and 6 pm, and 25 % after 6 pm. Most of fish landing in the morning is distributed to the capital area markets. Most of fish landing between 2 pm and 6 pm is also delivered within the day, but the most of fish landing after 5 pm is allocated for stocking for the inland markets or for the capital area markets on the following day. As, especially, the majority of the landed fish in the afternoon of days in high fishing season and the landed fish after 5 pm in normal fishing season are delivered to the market on the following day, the facilities for cooling preservation are required until the delivery in order to prevent PHL. Therefore, the scale of required capacity of Chilled Storage is calculated, with targeting on the amount of fish landing after 5 pm. And it is planned to divide the storage into two rooms in order to operate flexibly to meet the daily changes of stocking demand.

To improve the effectiveness to maintain the fish freshness, it is a prerequisite to cool fish body down to the chilling temperature by icing upon storing, and the temperature of the storage is planned as -5 C° ~ 0 C°, which is normal temperature for chilling preservation.

The amount of fresh fish for storage = 15.87 tons x 35 % = 5.55 ≠ 5.6 tons / day
(the amount of fish landing between 5 pm and 6 pm is assumed 10 % of its total)
The amount of ice = 5.6 tons x 0.5 = 2.8 tons / day
The total amount for storage = 5.6 tons + 2.8 tons = 8.4 tons / day
(4.2 tons / room x 2 rooms)

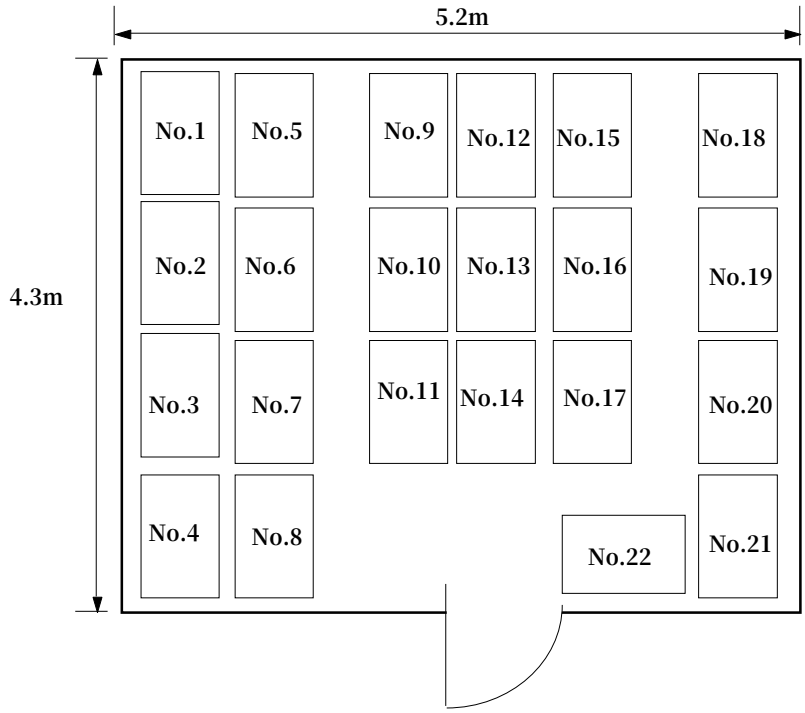
For the stocking in the storage, it is appropriate to adopt the stacking system with fish boxes based on the consideration of the effective procedure to take in and out of storage, the prevention to damage fish, the effectiveness of insulation, etc. As the fish boxes used in TFC and BFC are reputed well for both its capacity and specifications, it is considered appropriate to adopt the similar fish boxes. The capacity of this box is approximately 60 liters, and storing ratio of iced fish is 0.55 kg / liter, then it is possible to store 33 kg of iced fish in one box. For the stacking system of fish boxes, the stacking of 6 boxes (total

height; 1.2 m) is considered proper from the viewpoints of effective performance and safety.

Based on the points above, the necessary number of boxes is calculated as follows, and the following scale of chilled storage is examined to be required by allocation of fish boxes stacked by the above way with considering the space of path.

The capacity of fish box = 60 liters x 0.55 kg / liter = 33kg / box
(fresh fish 22 kg + ice 11 kg)
The required number of fish boxes = 8,400 kg ÷ 33 kg = 225 boxes
(128 boxes / room + 127 boxes / room)

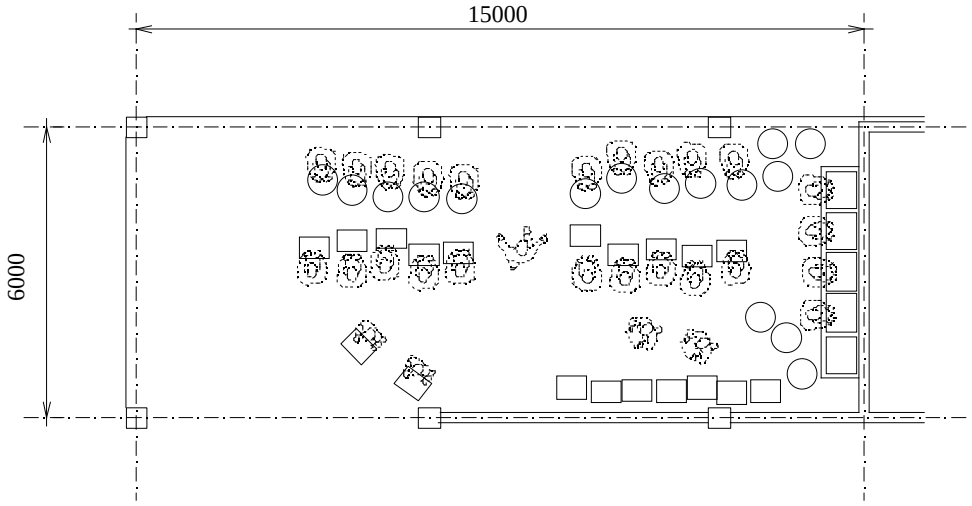
The number of stacking space = 128 boxes ÷ 6 stocking ≠ 22 units
The inside height of the storage = 2.2 m



C) Fish Handling Place

As the activities at the Fish Handling Place by the Project, the fresh fish in the fish baskets brought from the beach are removed into fish boxes after washing out, and then ice brought from the ice plant will be placed in those fish boxes. Therefore, the Fish Handling Place will be planned to be located adjoining to the Ice Plant with washing facilities.

The required number of washing facilities are examined, based on the hours between 2 pm and 6 pm when sessions of fish landing are concentrated. During these hours, the amount of fish landed and used for the fresh fish marketing is approximately 7.9 tons (15.87 tons x 50 %). As the approximate amount of the landed fish is 1 ton per one Bonga fishing canoe, so this figure is equivalent to the total amount landed by 8 fishing canoes. Consequently, the cycle of fish landing is one session in every 30 minutes on average (4 hours ÷ 8 fishing canoes), such work space and number of washing facilities are required for washing out of the landed fish, removal and icing during 30 minutes. As 30 kg of fish is contained in the fish basket used for fish landing, approximately 33 of fish baskets are brought in the Fish Handling Place per one session of fish landing. This fish handling process is planned to be divided in two rotations. Therefore, 16 fish baskets would be handled in 15 minutes. By referring to the similar procedure at BFC, it takes 10 minutes for removal (110 pieces of fish) and a few minutes for icing, so that washing out process should be done within about 3 minutes in order to perform the whole procedure within 15 minutes. Therefore, 5 washing facilities for 16 fish baskets of the landed fish are required (16 ÷ 3). Regarding the space required for removal of fish, the workspace is allocated in between 16 fish baskets and fish boxes as shown below and the required area is calculated.



(D) Refrigerated Vehicle

(i)Refrigerated Vehicle

(a) Amount to be delivered

Regarding operation of the Refrigerated Vehicle, it is aimed to deliver the similar extent of fresh fish as the amount of its consumption in the capital area (annually 12.7 kg / capita), to 50 % of residents within 10 km from the unloading points. The amount per delivery, which is calculated according to this, is shown in Table 2-3. 3 tons as an approximate amount per delivery is equivalent to the feasible amount in present commercial delivery by Banabanas. Therefore, the amount per delivery is planned to be 3 tons per one delivery trip.

Table 2-3 Amount of the fresh fish delivered for the inland markets

Unloading points	Population within 10 km (persons)	Amount of fresh fish delivered per day (kg)
Sibanor	6,397	111
Bwiam	5,739	100
Bondali Jola	3,295	68
Soma	19,001	331
Georgetown	98,523	1,714
Base	39,285	683
Total	172,870	3,007

As for delivery, the stocking system by fish boxes is adopted as well as Tanji project, with taking such points into consideration as loading into the refrigerated vehicle, the effective stocking work, the decrease of damage to fish and the effectiveness by cooling preservation. It is planned to deliver fresh fish with icing because the delivery takes a few days. The specifications of fish boxes are the same as the ones used at the Chilled Storage. Based on these, the number of fish boxes required for one Refrigerated Vehicle and the scale of the Refrigerated Vehicle are planned as follows:

The number of fish boxes = 138 boxes (3,007 kg ÷ 22 kg (fish) / box = 136.7, then, 137 boxes are required and one more empty box is added for loading management.)

Specifications : Loading weight - approximately 5 tons
Power of engine- approximately 180 HP
Total length - approximately 7 m
Dimension of container : 5.0 m (L) x 2.0 m (W) x 2.0 m (H)

(b) The required number of Refrigerated Vehicle

As the delivery schedule plan with consideration of the distance from GFC and the time for unloading work is shown below, it requires 3 days per one delivery.

First Day

Loading	06:00-07:00
Running	07:10-09:30
Distribution	(unloading)
Sibanor	09:30-09:40
Bwiam	10:10-10:20
Bondali Jola	10:50-11:00
Soma	11:40-12:10
Georgetown	15:30-16:30
Stay at Georgetown	

Second Day

Running to Basse	08:00-10:00
Distribution	(unloading)
Basse	10:00-11:00
Storage cleaning	11:00-11:30
Return to Soma	12:00-17:00
Stay at Soma	

Third Day

Running to Gunjur	08:00-12:30
Unloading fish boxes	
Car washing	13:30-15:00
Maintenance	15:00-17:00
Stand-by for the following departure	

Also, the cycle of delivery by 3 Refrigerated Vehicles is shown as below. For maintenance of refrigerated vehicles and rest for drivers, one day for maintenance is secured for every twice of delivery. As a matter of fact, according to this cycle of delivery, the fresh fish will not be delivered to the unloading points once a week. Namely, as a daily average, approximately 2.57 tons (3tons x 6 days ÷ 7days) of fresh fish, which is equivalent to 10.9 kg / capita consumption for target person annually, are delivered. However, the above amount will be appropriate to perform the improvement aimed by the Project, because such fact is considered that the amount of consumption inland is generally less than that in the capital area. As a conclusion, the number of Refrigerated Vehicles is examined as 3 units.

Delivery Cycle of Refrigerated Vehicles

Day	No.1	No.2	No. 3
1		off	
2			off
3			
4			
5			
6			
7	off		
8		off	
9			off
10			
11			
12			
13			
14	off		
15		off	

(ii) Insulated Vehicle

As the carrier vehicle is requested in order to assist the delivery of fresh fish to the small-scale markets in the capital area where the public transportation services are not available, it will be examined here because the specifications of Insulated Vehicle is more preferable for the purpose of carrying fresh fish rather than those of general vehicle. Since outskirts of the capital area are not connected by trunk roads, the fresh fish is not well delivered to the small-scale markets in many towns and villages despite of demand of the fresh fish in those markets. On the other hand, as GFC is located in 2.5 km away from the trunk road, public transportation services are not available and private transporters come to GFC irregularly. Especially, the transportation to these small-scale markets from GFC is limited. The purpose of using Insulated Vehicle is to assist the delivery of fresh fish to these markets where are located far away from these trunk roads.

(1) Amount of fresh fish for delivery

The delivery of fresh fish from GFC to the small-scale markets in the capital area is planned to be operated twice a day (morning and afternoon) in order to meet the time of fish landing, by targeting Banabanas who work in the small-scale markets within the relatively short distance from GFC shown in Table 2-4.

The amount per delivery

= Per one Banabana (200 kg of fresh fish + 100 kg of ice) x 2 Banabanas = 600 kg

The annual amount of fresh fish to be delivered
= (200 kg x 2) x 2 round trips x 365 days = 292 tons / year

Table 2-4 Towns having small-scale markets for the delivery of fresh fish by Insulated Vehicle and the population of the surrounding

(Unit: person)

Kombo North District	Population	Kombo Central & South District	Population.
Yumdum	3,540	Jambajelly	9,983
Farato	2,935	Jamburr	2,666
Dasilameh	1,988	Kembujeh	1,988
		Kitty	1,714
	8,463		16,351

Note: The targeted number of population for the delivery of fresh fish by insulated vehicle is 24,814 people, the annual amount of delivery is 292 tons, and this is equivalent to 11.8 kg of fresh fish consumption per capita annually.

(2) Operation cycle of Insulated Vehicle
Morning: Gunjur ↔ Kombo Central & South District
Afternoon: Gunjur ↔ Kombo North District

Consequently, the dimension of the Insulated Vehicle is planned be as follows:

Specifications of Insulated Vehicle: Loading weight ; 1 ton
Total length ; approximately 4 m
Loading room (internal dimension);
2.8 m (L) x 1.6 m (W) x 1.8 (H)

E) Fish Box & Container

(i) Fish Box

As aforementioned, the usage of fish boxes is for stocking in the Chilled Storage and stocking in the Refrigerated Vehicles, and the required numbers are as follows:

• For Chilled Storage	255 boxes
• For Refrigerated Vehicles	138 boxes per vehicle, for 3 vehicles , 138 boxes x 3 = 414 boxes
• The required number of fish boxes	255 boxes + 414 boxes = 669 boxes

(ii) Insulated Fish Container

The purpose of using Insulated Fish Containers is for temporary stock of ice at GFC, for stock of ice at SFC and KFC and for stock of the iced fish at unloading points by Refrigerated Vehicle. When only small amount of ice is taken out from the Ice Storage, the temperature of the inside of Ice Storage becomes high by opening and closing the door. Therefore the Insulated Fish Container should be located for temporary stock of ice in front of the Ice Storage to prevent this. Ice is sold in the same way at TFC. It is considered appropriate that the specifications of Insulated Fish Containers should be the similar with Insulated Fish Container with the capacity of 500 liters as the one for Tanji project, in consideration with the smoothness of putting and taking ice out and of the inside cleaning. This Insulated Fish Container will store 275 kg (500 liters, 0.55 kg / liter) of ice or fish. Based of this capacity, the required number is calculated.

(a) For stock of ice

For temporary stock at GFC; 2 containers
(to store 550 kg for small sales of ice)

For ice stock at SFC; 1 container / 2 cycles.
(As daily stock is 420 kg, 250 kg of ice is stored per one cycle with being divided into 10 kg bags.)
For ice stock at KFC; 1 container / 2 cycles.
(As daily stock is 560 kg, 250 kg of ice is stored per one cycle with being divided into 10 kg bags.)
For distribution of ice to SFC and KFC; 2 containers

(b) For unloading points

The amount of the iced fish to be delivered to the unloading points and the required containers of storage for the iced fish are shown as follows:

Table 2-5 The required number of containers (Unit: kg / day)

Unloading points	The daily amount of fresh fish distribution	Ice	The total amount of storage	The required number of containers
Sibanor	111	56	167	1
Bwiam	100	50	150	1
Bondali Jola	68	34	102	1
Soma	331	166	497	2
Georgetown	1,714	857	2,571	10
Basse	683	342	1,025	4
Total	3,007	1,505	4,512	19

Totally 25 containers including 4 containers for ice stock, 2 containers for ice distribution and 19 containers for inland unloading points are required for the Project.

F) Carrier Vehicle

The purpose of using a Carrier Vehicle is to transport ice from GFC to SFC and KFC. The specifications of 4 wheel drive will be required in consideration with running on the bad conditions of road. Also, it is necessary to attach a hood to prevent melting ice.

The amount of ice to be transported is calculated based on the required amount for icing at SFC and KFC.

- For SFC Demand: 420 kg / day
  1 container x 2 cycles / day
  2 round trips / day (approximately 1.5 hours / 1 round trip)
- For KFC Demand: 560 kg / day
  1 container x 2 cycles / day
  2 round trips / day (approximately 1.5 hours / 1 round trip)

On the other hand, the ice even in the Insulated Fish Containers will melt during long time stock, but the fish landing is divided in the morning and in the afternoon at each fisheries center, so that the ice should be transported to meet the timing of fish landing.

Cycles of Carrier Vehicle operation

Morning : Gunjur ↔ Sanyang, Gunjur ↔ Karton, for delivery of ice
Afternoon : Gunjur ↔ Sanyang, Gunjur ↔ Karton, for delivery of ice

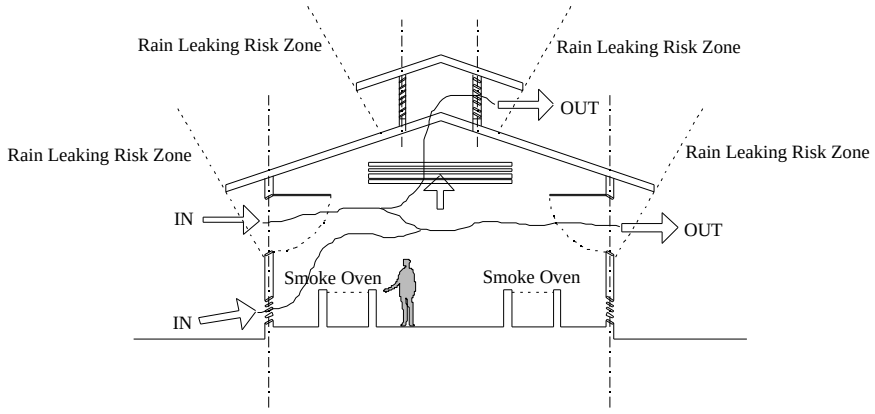
G) ORP Measuring Meter

In order to monitor the status of improvement of fish freshness by icing, 1 set of ORP measuring meter will be equipped in the quality control laboratory of the Fisheries Department.

2) Facilities for assisting processing and marketing of smoked fish and dry fish

A) Smoke House

Capacity of 23 smoke ovens, which are targeted for improvement by the Project, is equivalent to that of one smoke house of the existing facilities. As for the existing smoke house, the orientations of positioning facilities are divided into two categories; one is parallel to the coastline and the other is vertical. The position of smoke ovens and plane layouts are similar in each smoke house, and there is no functional inefficiency with this positioning of smoke ovens. Therefore, the plane plans for the Project facilities will follow the existing smoke house. In regard with the problem of smoke filling inside the house, the examination of sectional plans will be carefully considered to design mainly the height of roof, walls, and outlets, etc. as shown below, which will help discharge smoke by natural ventilation. Even though the required number is 23 smoke ovens, the existing smoke house is standardized to be equipped with 24 smoke ovens per one building, so that the Project facility will be equipped with 24 smoke ovens.



B) Dry Fish Storage

Dry fish products is to be approximately 20 % in weight in comparison with raw material. At GFC, though the small amount of dry fish is sometimes shipped by pick-up trucks, etc., the great amount of dry fish is often shipped by the large-scale truck of 10 tons loading capacity. That is because the prices of dry fish is low and the great amount need to be transported at one time to keep transport expenses in low portion. The large-scale truck visits GFC usually once every two weeks. As approximately 10 tons of dry fish products are equivalent to approximately 50 tons of raw material weight, this amount is well-balanced with 59 tons (1,304 tons ÷ 44 weeks x 2 weeks) as the average amount of dry fish processing at GFC in the period of two weeks. Therefore, it is considered appropriate to improve Dry Fish Storage that helps control the dry fish products with meeting the visit of the large-scale truck.

• Specific gravity of dry fish	: 0.85 (specific gravity of raw material) x 0.2 = 0.17
• Volume of 10 tons of dry fish	: 10 tons ÷ 0.17 = 58.8 m3
• Required capacity	: 58.8 ÷ 0.6 (stocking ratio) = 98 m3
• Required area of storage	: 98 ÷ 1.5 m (stocking height) = 65 m2

For the required scale above, it is appropriate to allocate 8 rooms by taking it into consideration to avoid accidents during stocking the products, etc. In addition, space for loading need to be secured in front of the storage.

3) Facilities for assisting for artisanal fisheries activities

A) Fishing Gear Locker

The additional numbers to be required are examined, with considering the situation of the present capacity of facilities (99 rooms) being in short against the status of the fishing

canoes operation at GFC in 2000. As shown below, fishing gear lockers were in short for 8 months in 2000.

Month	The number of fishing canoes operation	The number of rooms in short
Jan.	174	75
Feb	174	75
Mar.	174	75
Apr.	133	34
May	119	20
Jun.	76	Satisfied
Jul.	62	Satisfied
Aug.	53	Satisfied
Sep.	58	Satisfied
Oct.	101	2
Nov.	109	10
Dec.	106	7

Approximately 37 rooms (298 ÷ 8 = 37.27) are calculated as the average number of shortage. With reference to this figure, provided the additional number to be required were 36 rooms, the status of shortage would be solved in 9 months and 50 % of shortage would be solved between January and March when the shortage is outstanding. Therefore, 36 rooms are determined appropriate number to be added. On the other hand, it is considered appropriate to allocate 36 rooms into two buildings, because the structure of facility will be thin and long if all rooms are allocated in one building. Therefore, two buildings of Fishing Gear Lockers including 18 rooms each is considered appropriate to be improved.

B) Toilets and Showers for Fisherfolks

(i) Toilets for Fisherfolks

The main users of Toilets for Fisherfolks are smoke processors, dry processors, fishermen and Banabanas. But fishermen and Banabanas stay at the Project Site only in limited hours. Then, it is considered appropriate to calculate the number of hygienic equipment by targeting on smoke processors and dry processors as usual users. The allocation of users as target users for calculation sets shown in Table 2-6.

Table 2-6 Assumed users of Toilets for Fisherfolks (Unit: person)

Allocation of users	Male	Female	Total
Smoke processors	97	50	147
Dry Processors	50	163	213
Total	147	213	360

As for the number of hygienic equipment, the required number will be calculated by the formula recommended by the Society of Heating, Air-conditioning and Sanitary Engineers of Japan, based on the arriving ratio of the case in the office that has the similar utilization forms. The results are shown in Table 2-7.

Table 2-7 Utilization forms of toilets

	Arriving ratio	Occupancy period (seconds)	Evaluation level of waiting time	Calculated figure
Stool for male	0.130	300	Level 2	4
Urinal for male	0.600	30	Level 2	3
Washbasin for male	0.700	20	Level 2	3
Stool for female	0.600	90	Level 3	5
Washbasin for female	1.000	30	Level 2	4

Note: The unit of arriving ratio is a person / (minute x 100 persons). Level 1 shows the status of almost no waiting time. Level 2 for normal waiting status, and level 3 for the status of waiting in the occupancy period by one person.

Therefore, Toilets for Fisherfolks will be equipped with the followings:

Toilets for male: 4 stools, 3 urinals and 3 washbasin

Toilets for female: 5 stools, 4 washbasin

(ii) Showers for Fisherfolks

The number of shower pins to be placed in Showers for Fisherfolks will be calculated, by targeting fishermen as the main users in the conditions of waiting time in level 2. The number of users is as follows:

The number of target users = number of fishing canoes (112) x number of crew (8) x days of operation (22 days / month) x utilization ratio (0.5) =328 people

To correspond to this, provided that 8 minutes should be for the occupancy period of showering and 6 hours should be concentrated period in the morning and the afternoon when the fishing canoes returned from fishing, the number of showers in the conditions of waiting time in level 1 is calculated as follows:

The number of showers = [328 x 8 / (6 x 60)] = 7.29

On the other hand, the number of washbasin for male in the conditions of waiting time in level 2 is 75 % of that in level 1. Referring to this, the necessary number is calculated as follows:

The necessary number of showers = 7.29 x 0.75 = 5.47

Therefore, the Showers for Fisherfolks will be equipped with 5 pins of showers.

4) Operation & Management Facilities

A) Offices

Due to the operation and management, it is considered appropriate to position Ice Plant & Storage, Chilled Storage, and Fish Handling Place in the same building, and this building will be called as Fresh Fish Handling Building.

Administration Office is located in the Fresh Fish Handling Building as the core of operation and management in order to intend smooth implementation of the Project. Totally 9 persons, including managers of Management Committee (3 persons) and others, will perform the operation and management in the Administration Office. As main responsibilities of refrigeration technicians are supervision of operation of refrigeration facilities, generator facilities, etc., it is planned that an Engineer Room will be arranged at the corner of the machine room in the Fresh Fish Handling Building. For Chilled Storage Section (CSS), Ice Plant Section (IPS), Fish Marketing Section (FMS) and others, it is planned that 2 Engineer Rooms are allocated for performing operation and management jobs in the field. By referring to 5 m2 / person ~ 15 m2 / person as the standard unit for floor area for the main office in Japan (by Compilations of Architectural Design by Architectural Institute of Japan), the Project will adopt 6 m2 / person for the Administration Office and 5 m2 / person for Engineer Rooms, and the required floor area of each room is calculated. The results of calculation are summarized as follows:

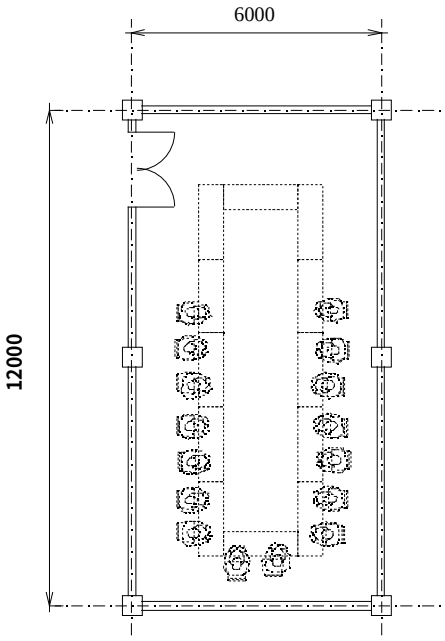
Section	Name of Position and Number of Person	Total Number	Required floor area (m2)	Location
Administration Office	Management Committee (3) Controller, CSS (1) Vehicle supervisor, FMS (1) Head cashier, AS (2) Security, SS (2)	9	54	Fresh Fish Handling Building
Engineer room 1	Head refrigeration technician, IPS (1) Assistant refrigeration technician, IPS (1) Trainee refrigeration technician, IPS (1)	3	15	
Engineer room 2	Drivers, FMS (3) Ice controller, IPS (1) Ice assistant, IPS (1)	5	25	
Engineer room 3	Assistant, CSS (2)	2	10	
Engineer room	Head gear technician, FCOS (1) Assistant, FCOS (1)	2	10	Workshop

Note: Abbreviations

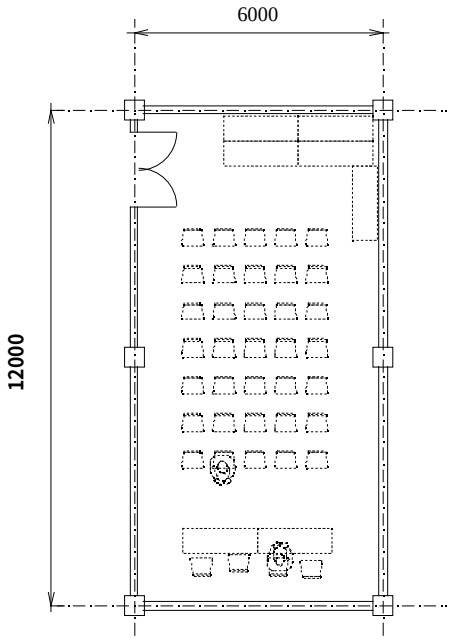
FMS	: Fish Marketing Section,	AS	: Accounting Section,
IPS	: Ice Plant Section,	SS	: Security Section,
CSS	: Chilled Storage Section,	FCOS	: Fishing Canoe Operation Section,

B) Meeting cum Training Class Room

This room will be utilized for monthly or special management meetings attended by Central Committee and Sub Committee and training for fishermen and processors. As the meetings held by Central Committee are attended by 39 members which include 34 members of Central Committee, 3 members of Management Committee, the Director of the Fisheries Department, and a person in charge of the Project in the Fisheries Department, these meetings are not necessary to be held as round-table style. The meetings held by Sub Committee are attended by 16 members which include 14 members of Sub Committee, the Director of the Fisheries Department and a person in charge of the Project in the Fisheries Department, and these meetings are necessary to be held as round-table style. On the other hand, as for training, safety operation of fishing canoes, improvement of maintenance of outboard engines and fishing gear, etc, will be instructed, and the scale of training varies, as the number of participants will range between 10 and 50. Therefore, for the calculation of the required floor area of Meeting cum Training Class Room, the required area is examined by targeting the meetings of 39 members by Central Committee, referred to the standard values for layout of a meeting room indicated in the Compilations of Japan aforementioned. These standard values point out 0.7 m2 for area occupied by one person, 1.2 m wide of path from the wall, etc. to be secured. Based on the standard values aforementioned, the area of 72.35 m2 is calculated to be required, but a room of 72 m2 can accommodate 39 people and 16 people at each meeting style as shown below. Therefore, 72 m2 will be planned as the floor area of the Meeting cum Training Class Room.



Meetings of 16 Members with Table



Meetings of 39 Members without Table

5) Incidental Facilities

A) Generator Facilities

The generating power is calculated, based on the demand of electricity power required for the facilities and equipment improved by the Project. The major machinery which requires electricity power is the ice making machine, compressors for refrigeration facilities, water supply equipment, electrical tools for the maintenance workshop, lightings in the facilities, etc. The number of the generators will be planned as 2 units for regular operation and 1 unit for contingency, by taking such points into consideration as capability of economical operation with correspondence to variability of demand for power, the suspension required for maintenance and repair, etc.

In regard with adoption of electric current for start-up, the capacity of generator and start-up system will be determined, with targeting the compressors for the ice making machine, which requires the greatest amount of power for start-up by considering durability, economy and simple operation.

The generators will be allocated in the machine room with the compressors for the ice making machine, because it is considered that operation of those equipment is carried out by the same operator. It is planned that sound-proofing type is adopted for a measure against noise and waste heat of heat exchanger of cooling water is exhausted to outside directly with outside installation of the heat exchanger. As the additional incidental facilities, service tank for diesel oil for daily operation will be allocated in the machine room. In addition, the operating cum switch boards of generators will be placed independently, so that the appropriate operation and technical supervision for facilities will be arranged.

B) Water Supply System

The following equipment and construction will be required in order to assure the water supply from water source secured by the Project to the Project Site.

At the point of the water source, distance of which is 2.2 km away from the Project Site, it is required to introduce a pumping up system from deep well, a control panel, an elevated water tank. On the other hand, between the point of the water source and the Project Site, the piping work for water supply and wiring work for power supply will be required. In regard with the scales of these equipment and facilities, the appropriate scale of Water Supply System will be designed, based on the calculation of the required amount of water used for Ice Plant, Fresh Fish Handling Place, Toilets and Showers for Fisherfolks, etc.

C) Fuel Tank

There are two purposes of usage. One is for storage of diesel oil for Generator Facilities and the other is for storage of pre-mix gasoline as fuel for outboard engines of fishing canoes. The fuel is transported to GFC by tank lorry with the capacity of 10 tons, and it usually takes 1 week for delivery after the order. Therefore, it will be appropriate to order the fuel at the timing of consuming approximate10 tons. Consequently, the calculation of the required capacity of each fuel tank is based on the capacity of a tank lorry and consideration on prevention of overflow at refilling and contingency capacity between order and delivery, then the capacity is planned as 15 tons, which is 1.5 times of the amount of fuel per supply by the tank lorry.

The capabilities by 10 tons of fuel for its consumption is calculated as follows. The tank for diesel oil for Generator Facilities is capable of operation of the generators for about a month. As the tank for pre-mix gasoline is capable of 250 days of fishing canoes operation, approximately 7,741 fishing canoes operations (7,741 tons annual landing / 1 ton landing per canoe) are carried out annually for Bonga fishing as daily operation. Then, it is necessary to supply fuel to the tank for pre-mix gasoline approximately 31 times per year (7,741 ÷ 250), that is, twice a month.

The assumed amount of diesel oil consumption by generator facilities:
300 liters / day (condition: 75KVA x 75% load x 24 hours operation x 2 units)
The total operation days by 10 tons capacity : 33 days (10,000 liters ÷ 300 liters / day)

The assumed amount of pre-mix gasoline consumption by outboard engine per one fishing trip: Approximately 40 liters / day • canoe
The total operation number of fishing canoes by 10 tons capacity
: 250 canoes • day (10,000 liter ÷ 40 liter / canoe)

6) Equipment for maintaining the fishing canoes operation

A) Examination on the required number of the equipment

At GFC, there are two groups (3 ~ 4 persons per group) of carpenters in service for construction of fishing canoe, and they have been engaged in the construction of wooden fishing canoes at Gunjur beach for more than 20 years. According to the interviews with those two groups, 10 ~ 12 fishing canoes (90 % of total for Bonga fishing) as an annual average have been constructed for the past 10 years. However, due to the difficulties in obtaining timber materials for construction, the number of annual construction of fishing canoes has currently been decreased. The problems with construction of wooden fishing canoes are the difficulty in obtaining timber materials for construction and the consequent rise of their market prices. Though those materials were imported from adjoining countries such as Senegal, Guinea Bissau, they become in short these days even in those countries, then they have gradually been imported from Ghana, Nigeria and Cameroon, where are far away, and the problems become intensified.

Under these circumstances, the costs for the construction of wooden fishing canoes have been rising up to 65,000 ~ 75,000 Dalasis, so that the new construction is hardly accomplished. Most of fishing canoes have been repaired to recover the exterior wooden boards of canoe body every 2 or 3 years. The safeness and the effectiveness of the operation performance have outstandingly deteriorated because new and old wooden boards are covered in overlapping and the water is often leaked from the old part. Then, the life span of wooden fishing canoes becomes 5 ~ 6 years nowadays due to difficulty of procurement of good quality wood and sticking new materials on deteriorated ones, though it was 8 ~ 10 years before.

There are 68 fishing canoes, which are based regularly at GFC, and fishing activities are performed by local owners of those canoes and local fishermen. Provided the life-span should be 5.5 years, 12 fishing canoes (68 canoes ÷ 5.5 years = 12.4 canoes) as an annual average are calculated to be required to substitute deteriorated ones. Consequently, in order to maintain the current amount of fish landing, it is considered essential to perform the construction of 12 fishing canoes at present. Also, as the life spans of outboard engines and fishing net are approximately 3.5 years, these are required to be introduced at the same time.

B) Consideration on Counterpart Fund reserve

FRP Fishing Canoes, Outboard Engines and Fishing Net apply to the equipment targeted for the Counterpart Fund reserve, so that the Government of the Republic of The Gambia has an obligation to complete the Counterpart Fund reserve, which deserves 2/3 of FOB price of the targeted equipment. Considering the life-span of the concerned equipment, it is determined appropriate that the settled period for forming the Counterpart Fund reserve should be 7 years for FRP Fishing Canoes and 4 years for Outboard Engines and Fishing Nets. The estimated amount of Counterpart Fund reserve and the estimated amount of deficit to be covered by the Government of The Gambia are shown as follows:

(i)The estimated amount required for Counterpart Fund reserve

Target Equipment	2/3 of FOB price / one set	Counterpart Fund reserve for 12 sets
FRP Fishing Canoes	Approx. 400,000 Dalasis	4,800,000 Dalasis
Outboard Engines & Fishing Net	Approx. 73,000 Dalasis	876,000 Dalasis
	Total	5,676,000 Dalasis

(ii)Estimated revenues and expenditures by Bonga fishing canoes operation

a) Annual revenues and expenditures per one Bonga fishing canoe

Fish sales income by Bonga fishing canoe		230,000 Dalasis / year
Expenses for fuel	-)	76,800 Dalasis / year
Gross profit		153,200 Dalasis / year

(Allocation of gross profit)

50 % of gross profit	; 76, 600 Dalasis / year	payment to fishermen
10 % of gross profit	; 15,320 Dalasis / year	reserve for maintenance and repair costs
40 % of gross profit	; 61,280 Dalasis / year	allocation for Counterpart Fund reserve

(During initial four years, 15,000 Dalasis is allocated for Counterpart Fund reserve for Outboard Engines • Fishing Nets and 46,280 Dalasis is allocated for Counterpart Fund reserve for FRP Fishing Canoes annually.)

b) Estimated amount of Counterpart Fund reserve by 12 Bonga fishing canoes operation

(Estimated amount of Counterpart Fund reserve for Outboard Engines • Fishing Nets during four years.)
15,000 Dalasis / year x 4 years x 12 operations = 720,000 Dalasis

(Estimated amount of Counterpart Fund reserve for FRP Fishing Canoes during seven years.)
(46,280 Dalasis / year x 4 years + 61,280 Dalasis / year x 3 years) x 12 operations = 4,427,520 Dalasis

Therefore, the Counterpart Fund reserve could not be completed only by allocation of gross profit by Bonga fishing canoes operation, the Government of The Gambia is required to cover the deficit for the necessary reserve, which is equivalent to 156,000 Dalasis (876,000 - 720,000) for 12 sets of Outboard Engines • Fishing Nets and 372,480 Dalasis (4,800,000 – 4,427,520) for 12 sets of FRP Fishing Canoes, and to complete the Counterpart Fund reserve. On the other hand, the Government of The Gambia plans to utilize Artisanal Fisheries Development Fund, the recent budget of which is 1 million Dalasis per year, for source of covering the deficit. As 5 sets of FRP Fishing Canoes • Outboard Engines • Fishing Net have already been introduced for the Tanji project, the plans for covering the deficit for Counterpart Fund reserve for the Project are shown as follows:

Plans for covering the deficit for of Counterpart Fund reserve for Tanji project and this Project

(Currency: Dalasis)

Year	For Tanji Project	For Outboard Engines & Fishing Nets of this Project	For FRP Fishing Canoes of this Project	Total
2001	284,850	-	-	284,850
2002	284,850	-	-	284,850
2003	284,850	39,000	18,120	341,970
2004	284,850	39,000	18,120	341,970
2005		39,000	18,120	57,120
2006		39,000	18,120	57,120
2007		-	100,000	100,000
2008		-	100,000	100,000
2009		-	100,000	100,000
Total	1,139,400	156,000	372,480	

Note: As the reserve should be completed within 4 years for the Tanji project, the deficit of 284,850 Dalasis {(473,000 Dalasis ÷ 4 years - 61,280 Dalasis) x 5 sets} is required to be covered every year. By considering the plan for the Tanji project, the amount of covering the deficit in 2003 and 2004 for this Project is allocated less than the other years.

As shown above, the amount of covering the deficit, by the Government of The Gambia to form the Counterpart Fund reserve, is 57,120 up to 341,970 Dalasis annually. On the other hand, in May, 2001, the Government of The Gambia supplied 200,000 Dalasis from Artisanal Fisheries Development Fund as the fund for Tanji project to start up the operation. Based on these points, the Government of the Republic of The Gambia is considered to afford to cover 57,120 up to 341,970 Dalasis annually for the deficit for the reserve. Therefore, it is considered appropriate that the Project introduces 12 sets of FRP Fishing Canoes • Outboard Engines • Fishing Net.

C) Other points to be considered

Provided the FRP Fishing Canoes should be introduced by the Project, the main body for fishing canoes operation will be GFCMB. A great number of owners, who face the financial problems to construct fishing canoes, understand this situation well, and it is important for them to continue fishing even as a hired captain, or they would rather consider it preferable. Also the introduction of FRP Fishing Canoes will be expected to affect the living of local carpenters for fishing canoes. When these circumstances were inquired of the Fisheries Department and those local carpenters, such facts are found that the amount of repair work for the existing fishing canoes (112 canoes in operation) increases and the construction work of other small-scale canoes are still available, and it is, consequently, confirmed that the introduction of 12 FRP Fishing Canoes will not greatly affect the living of the local carpenters.

7) Maintenance Workshop

The contents of work at Maintenance Workshop are maintenance and repair of outboard engines and repair of fishing gears such anchors, etc. used for fishing canoes. Simple maintenance and repair of vehicles will be performed at Maintenance Workshop as well. For these works, general and special tools required for maintenance aforementioned will be introduced.

In regard with work space, the floor area of 54 m2 (6 m x 9m) is secured as the workspace for hangers to be installed for maintenance of outboard engines, for one work table to be equipped in its surrounding area to disassemble and assemble the parts, and, for space for 3 people such as a head gear technician and an assistant of FCOS and a fisherman to work at the same time. The test tank (approx. 1.5 m x 1.5 m) for trial operation of outboard engines after maintenance and repair will also be allocated at the corner of the Maintenance Workshop. Other than this, a storage room for tools and spare parts will be allocated in order to store spare parts and special tools, and this room will be utilized for an Engineer Room as well. By considering space for the shelf (3 m wide x 2 m high x 0.5 m deep) for tools and spare parts and one work desk for the control of spare parts, the scale of the storage room for tools and spare parts is determined as 12 m2 (4 m x 3m).

(8) Policy for construction methods, construction terms and procurement methods

The construction terms are determined in consideration on the construction terms, which are limited because the Project is implemented under the Japan's Grant Aid Scheme, and on the physical situation of the Project site that is located 60 km away from the capital area where the communication and transportation services are inconvenient. In addition, as the rainy season between June and October may affect the progress of construction work, possibilities of some delay of construction work because of the weather will be considered upon the determination of construction terms. And, at the same time, such construction methods, structures and materials will be examined to shorten the construction terms.

2-2-2 Basic Plan

The comparisons between the requested scales for components confirmed during the field survey, and the contents of the Requested Japanese Assistance as the results from the examination in Japan in reference to these scales, are shown as follows, and also the backgrounds of the differences between the requested scales and the contents of the Requested Japanese Assistance are shown as well.

Name of facilities or equipment	Requested Scale	Requested Japanese Assistance	Background for differences
Ice Planet & Storage	10 tons of daily production	10 tons of daily production	
Chilled Storage	2 rooms with the capacity of 10 tons each.	2 rooms with the capacity of 4.2 tons each.	It is considered appropriate to store the landed fish in the afternoon only.
Fish Handling Place	Securing the required space	90 m2 of required space is secured.	
Office	Securing the required number of rooms	The required number of rooms are secured	
Meeting cum Training Class Room	Securing the required space	72 m2 of required space is secured.	
Smoke House	Several buildings	1 building	It is considered appropriate to construct only one building to compensate 23 unworkable smoke ovens at present.
Fishing Gear Locker	2 buildings	2 buildings	
Dry Fish Storage	1 building	1 building	
Toilets and Showers for Fisherfolks	1 building	1 building	
Maintenance Workshop	1 building	1 building	
Generator Facilities	1 set 3 units of generators	1 set 3 units of generators	
Water Supply System	Newly requested	1 set	It is considered significant to secure water supply from the water source to the Project Site by construction of necessary facilities.
Fuel Tank	1 set, 10 tons of each	1 set, 15 tons of each	For fuel of outboard engines and generator.
Water Reservoir	1 set	1 set	
Refrigerated Vehicle	4 vehicles	3 refrigerated vehicles 1 insulated vehicle	3 refrigerated vehicles are determined capable of the necessary delivery to the inland markets, and 1 insulated vehicle is determined necessary for delivery of the fresh fish to small-scale markets in the capital area.
Fish Box	800 boxes	669 boxes	The required numbers are calculated by targeting only fish boxes for Chilled Storage and for Refrigerated Vehicles.
Insulated Fish Container	30 containers	25 containers	By calculation of necessary number

FRP Fishing Canoe	12 units	12 units	
Outboard Engine	12 sets	12 sets	
Fishing Net	12 sets	12 sets	
Carrier Vehicle	3 vehicles	1 vehicle	A carrier vehicle for ice is determined necessary. An insulated vehicle is considered for fresh fish marketing to small-scale markets. A carrier vehicle for collection of fish box is determined unnecessary.

2-2-2-1 Basic Plan for Site Layout

For the allocation of facilities, the appropriate site and the overall allocation will be examined in accordance with the following points:

(1) It is planned to examine the Site Layout with considering the current flow of the landed fish as Bonga fish in order to enable the movement inside the Project Site rational and natural, and to realize the maintenance of the fish freshness, with utilizing the functions of existing facilities and fisheries activities.

(2) It is planned to intend smooth flow of the traffic lines for vehicles related to marketing of the landed fish, and for rational flow to consider safety as well as to avoid futility of space in the Project Site.

(3) Smoke House will be positioned in the leeward side with considering the certainty of the frequent direction of wind in order to avoid smoke flowing into the other facilities.

(4) As a basis, by concentrating facilities in the right side of the Project Site, the rational functions of the facilities will be promoted, but Dry Fish Storage and Smoke House will be located in the left side of the Project Site, where dry fish and smoked fish are mainly processed.

2-2-2-2 Construction Plan

(A) Area Plan

1) Fresh Fish Handling Building

This building functions as the center of the whole facilities, and is composed of the facilities and equipment for assisting the marketed fresh fish (Ice Plant & Storage, Chilled Storage and Fish Handling Place) and Operation and Management Facilities (Office and Meeting cum Training Class Room). Each machinery for Ice Plant & Storage, Chilled Storage and Generator Facilities is planned to be concentrated in the machine room, by considering the convenience of maintenance and management. As for the layout of each room, the whole facilities for assisting the marketed fresh fish such as Fish Handling Place,

Ice Storage and Chilled Storage are connected and located in the beachside of the building, and the machine room will be located in the backside of these facilities. At the side of the inland, the whole Operation and Management Facilities such as Office, Meeting cum Training Class Room, toilets for staff will be located.

2) Smoke House

Following the layout of the existing smoke house, 1 unit including 6 smoke ovens is planned to be positioned at 4 points. 24 smoke ovens are installed totally in smoke processing room. And storage cum handling space for smoking materials and products is located in the next room.

3) Dry Fish Storage

8 rooms for storage and the open platform with roof for work space for loading products in front of storage will be constructed. As the ventilation is important for the storage of dry fish, the extra space for ventilation in addition to the stocking space of dry fish is considered in the area of each storage room.

4) Fishing Gear Locker

The scale of each room is determined as 6.25 m2, referred to the scale of the existing fishing gear locker. 2 lines of 9 rooms, totally 18 rooms, are allocated for one building. Then, two building having 36 rooms totally are located nearby a group of the existing fishing gear lockers. 900 mm width for opening door is planned to secure space for handling fishing gears such as outboard engine, fishing net, ropes, etc. The hanger is placed in each room to store outboard engine.

5) Toilets and Showers for Fisherfolks

This facility is of common use for fishermen, smoked fish processors, dry fish processors and Banabanas. The styles of toilets and showers will be planned, based on the utilization which is accustomed locally. This facility consists of 3 rooms including 2 toilet rooms separated for male and female, and a shower room.

6) Maintenance Workshop

Maintenance Workshop consists of work space, storage for spare parts and an engineer room. Inside of the Maintenance Workshop, a test tank for operation test of outboard engines and hangers for outboard engines are installed. The opening door of Maintenance

Workshop of more than 1,600 mm width and a type of a double door is planned in order to secure space for loading and unloading of outboard engines, etc.

7) Incidental Facilities, etc.

As the other incidental facilities, a pump up system at the point of water source, a water supply pipings, fuel tanks and a septic tank will be planned. Total number of fuel tank is 2 units, one for pre-mix gasoline for outboard engines and the other for diesel oil for Generator Facilities.

8) Exterior Facilities

For exterior facilities, garbage spot, parking space for Refrigerated Vehicles, drainage of rainwater in the site, the retaining wall to surround the exterior of the Project Site are planned. As for the paving in the site, concrete paving is planned for the passages of vehicles and shell paving is planned for the rest of the part. The drain in the site is planned to be discharged from north side of the Project Site to the outside.

The area of each room in each facility is summarized as follows:

Building • Facility	Room	Area (m2)	Formula for area calculation (by measuring center columns)
Fish Handling Bldg.	Fish Handling Place	90.00	6.0 x 15.0 = 90.0 m2
	Ice Storage	40.50	4.5 x 4.5 x 2 rooms = 40.5 m2
	Chilled Storage	48.60	4.5 x 5.4 x 2 rooms = 48.6 m2
	Inspection Passage	33.00	1.2 x 4.5 x 2 + 22.2 x 1.0 = 33.00 m2
	Icing and Loading Space	156.00	24.0 x 6.5 = 156.00 m2
	Machine Room	72.00	12.0 x 6.0 = 72.0 m2
	Office	61.20	6.0 x 10.2 = 61.2 m2
	Meeting cum Training Class Room	72.00	6.0 x 12.0 = 72.0 m2
	Engineer Room 1	18.00	6.0 x 3.0 = 18.0 m2
	Engineer Room 2	25.20	4.2 x 6.0 = 25.2 m2
	Engineer Room 3	12.60	3.0 x 4.2 = 12.6 m2
	Toilets for Staff	25.20	6.0 x 4.2 = 25.2 m2
	Kettle Room	3.24	1.8 x 1.8 = 3.24 m2
	Corridor	64.26	1.8 x (5.5 + 9.0 + 4.2) + 3.0 x 10.2 = 80.46 m2
	Sub Total	727.50	
Smoke House	Smoke Processing Room	172.80	9.0 x 19.2 = 172.8 m2
	Storage cum Handling Space	43.20	9.0 x 4.8 = 43.2 m2
	Sub Total	216.00	
Dry Fish Storage	Dry Fish Storage	72.00	3.0 x 3.0 x 8 rooms = 72.0 m2
	Handing • Work Space	72.00	3.0 x 24.0 = 72.0 m2
	Sub Total	144.00	
Fishing Gear Locker	Fishing Gear Locker	225.00	2.5 x 2.5 x 18 rooms x 2 buildings = 225.00 m2

Toilets and Showers for Fisherfolks	Female Toilets	36.60	6.0 x 6.0 = 36.0 m2
	Male Toilets	36.00	6.0 x 6.0 = 36.0 m2
	Shower Room	30.00	6.0 x 5.0 = 30.0 m2
	Sub Total	102.00	
Maintenance Workshop	Work Space	48.00	6.0 x 8.0 = 48.0 m2
	Engineer Room	12.00	4.0 x 3.0 = 12.0 m2
	Storage for spare parts	12.00	4.0 x 3.0 = 12.0 m2
	Sub Total	72.00	

(2) Section Plan

1) Fish Handling Building

The front side of Ice Storage and Chilled Storage will be designed as platform style with a rise of the floor up to 750 mm high from the ground level, in order to avoid dust from the ground surface and to facilitate the shipment and loading work of the fresh fish. The floor level of Office and Meeting cum Training Class Room will be the same. Also, the slope will be placed from the front of Ice Storage to the floor of Fish Handing Place to prevent the wastewater from flowing into Ice Storage, and to plan the clarification of working section. As smooth movement and walk for fisherfolks are considered, a gentle slope about 1/8 will be placed with some stairs from the beach into Fish Handling Place. The facilities are basically one-storied. As the ice making machine, however, will be installed on the top of Ice Storage, only the parts concerned will be two-storied by rising the roof, and the natural ventilation is planned by the placement of screen blocks between the top and the bottom of roofs.

2) Smoke House

As the ground level of its construction area forms a gentle slope, the floor level is planned to meet this ground level. As the natural ventilation is very important for the function of the facility, about 4 meters of eaves height will be secured, and the openings will be placed at the bottom of the exterior wall for air supply and at the top for smoke discharge. The form of roof will be gable, and the monitor is installed on the roof for assuring ventilation from roof.

3) Dry Fish Storage

As the location of Dry Fish Storage is planned to be adjoining to Smoke House, the ground level of its construction area forms a gentle slope as well. To design the platform, it is planned to keep level difference about 800 mm by utilizing the natural slope in order to simplify the loading by large-scale carrier trucks. As ventilation is important for the storage of dry fish, louvers and screen blocks for air supply and discharge will be placed

at the door and at exterior wall as the backside. The roof will be a shed roof by rising it at the side of loading platform and it is planned that an eave gutter and a down pipe will be placed only at the backside of facilities.

4) Fishing Gear Locker

The floor level will be approximately 200 mm higher than the ground level, and the eaves height is planned as 3,500 mm. The roof will be a shed roof. As screen blocks will be placed at the bottom of the entrance door and at tops of exterior and interior walls, a bit ventilation is expected. For the security reason, no windows will be installed.

5) Toilets and Showers for Fisherfolks

As each booth of toilets and showers are not closed completely but separated by installing the partitions of 2,100 mm in height up to the ceiling, the ventilation of the top part of the booths will be expected. Mechanical ventilation is not considered, but the natural ventilation is considered by means of placing screen blocks right under the eaves of the girder of exterior wall.

6) Maintenance Workshop

The floor level will be approximately 200 mm higher than the ground level, and the eaves height is planned as 3,500 mm. The roof will be a shed roof. The ceiling will be placed at the engineer room. As the attic, however, will be disclosed without the ceiling for the workspace and storage room, natural ventilation is expected by means of placing screen blocks right under the eaves of the girder of exterior wall. Windows will be placed for day-lighting, but a lattice will be placed at the exterior wall for the security purpose.

7) Incidental Facilities

In regard with a pump up system at the point of water source, an elevated water tank is planned for a water tank, as the water supply to the Project Site is conducted by natural gravity. Ground installation will be adopted for a fuel tank for pre-mix gasoline and an underground installation will be adopted for a fuel tank for diesel oil and a septic tank.

8) Exterior Facilities

As there are the existing facilities in the Project Site, it is planned not to change much of the current ground level. As the area of the right side of the Project Site is approx. 13,000 m 2 and is comparatively large, the slope for surface of paving and drain gutter will be planned in slope of about 1/200. At the left side of the site for construction of the Project

facilities, though a gentle slope is presently formed as aforementioned, a big scale of land formation will not be planned to keep the present forms of land.

(3) Structure Plan

The basic structure of all facilities is of reinforced concrete structure which is one of general structures in The Gambia. As all facilities are one-storied, foundation style will be planned with considering 0.1 MPa as a bearing power of soil for the long term design, based on the results of the geological survey. And spread foundation by reinforced concrete will be planned. The floor will be designed as type of slab on earth. As large horizontal force may not occur without having earthquakes, the moment resisting frame only with columns and beams is planned at the upper part, and the placement of reinforced concrete slab for the roof is not planned. For the structure design, the design load as shown in Table 2-8, is adopted.

Table 2-8 Design load

Classification of load	Design load	Remarks
Fixed load	Concrete: 23 N / cm3 Reinforced concrete: 24 N /cm3 Concrete block: 14 N / cm3	Recommendation for Loads on Buildings by Architectural Institute of Japan
Wind load	1 KN / m2	Equivalent to 40 m / sec. of wind velocity
Seismic force	K = 0.1	No earthquakes in The Gambia but considered as extra force for horizontal force.

(4) Equipment Plan

1) Equipment plan for ventilation

Natural ventilation and natural draft will be principle, but ceiling fans will be installed in particular rooms for desk work, etc. The equipment for ventilation in each facility is shown in Table 2-9.

Table 2-9 Equipment plan for ventilation in each room

Building • Facility	Room	Ceiling fan	Ventilating fan	Remarks
Fresh Fish Handling Bldg.	Fish Handling Place	-	-	
	Icing • Loading Space	-	-	
	Machine Room	-	❍	
	Office	❍	-	
	Meeting cum Training Class Room	❍	-	
	Engineer Room 1 ~ 3	❍	-	
	Toilets	-	❍	
	Corridor	-	-	
Smoke House	Smoke Processing Room	-	-	
	Storage and Work Space	-	-	
Dry Fish Storage	Dry Fish Storage	-	-	
	Fish Handling • Work Space	-	-	
Fishing Gear Locker	Fishing Gear Locker	-	-	
Toilets and Showers for Fisherfolks	Female Toilets	-	-	
	Male Toilets	-	-	
	Shower Room	-	-	
Workshop	Workshop	-	❍	Ventilating fan: for fuel tank
	Engineer Room	❍	-	
	Storage for Spare Parts	-	-	
Water Reservoir • Pump Up Room		-	-	

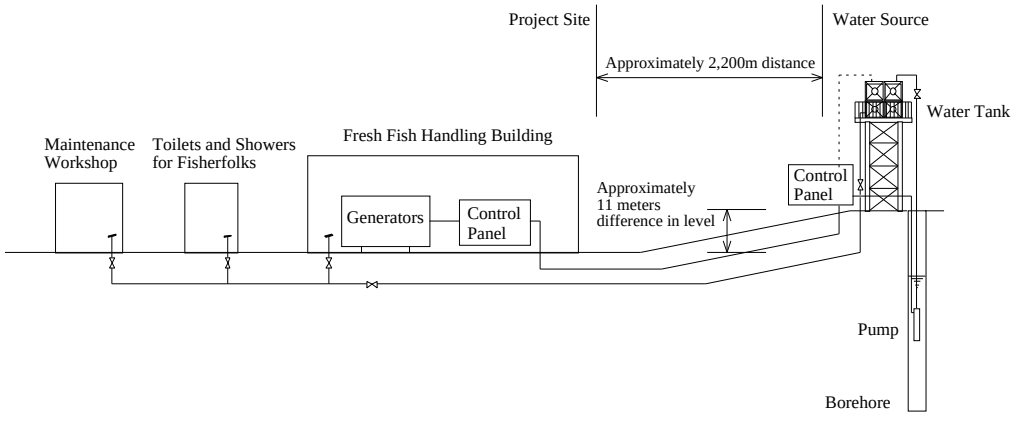
Remark; Ceiling fan is a type of propeller fan attached to ceiling

2) Equipment plan for Water Supply System

i) Water Supply System

The water will be supplied to the Project Site by placing the pump up system at the water source (deep well) and through water piping to the Project Site. The water supply system, from lifting pump in deep well in the water source to the Project Site, is shown as follows:

Figure 2-1 Water Supply System



ii) Scale of water supply

The calculation of amount of water to be used by the Project and the outline of specifications of water supply equipment are shown as Table 2-10.

Table 2-10 Calculation on amount of water to be used

Item	Outline	
Amount of water to be used	Ice Plant	12.0 m3 / day
	Toilets & Washbasin:12 units x 3 times / hour x 10 hours x 0.02 + 26 of staff numbers x 0.02 m3	7.7 m3 / day
	Shower: 328 people x 3 / 4 times x 0.04 m3	9.8 m3 / day
	Fish Handling Place - washing fresh fish: 7.9 tons x 0.2 m3	1.6 m3 / day
	Fish Handling Place - washing floor: 246.0 m2 x 0.01 m3	2.5 m3 / day
	Fish Handling Place - washing fish boxes: 1 m3 / time x 2 times	2.0 m3 / day
	Total	35.6 m3 / day
Elevated Tank	Capacity: 18 m3 as approx. 50 % storage of amount used per day Specifications: FRP tank of sandwich panel of thermal insulating material	
Lift Pumping for Water Source	Underwater centrifugal pump	

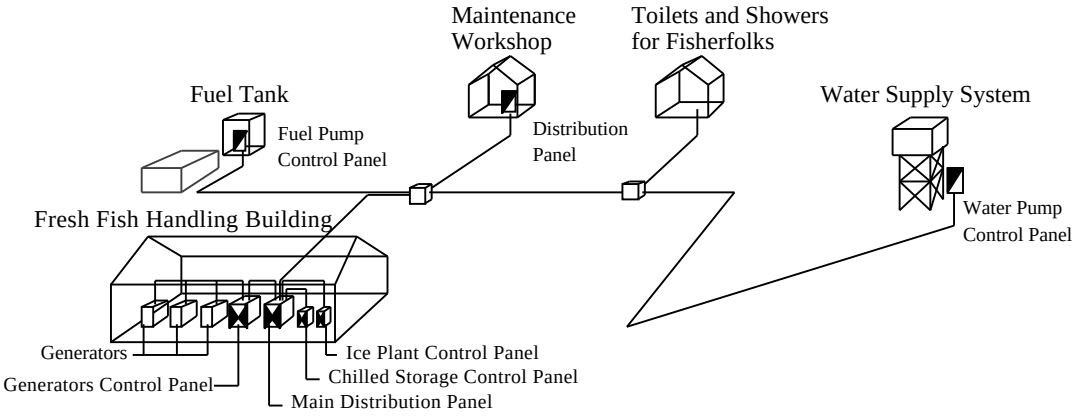
3) Equipment plan for drainage and hygiene

The drainage will be treated within the Project Site, because public drainage is not available in its surrounding area. The drainage lines will be divided as two lines for waste water mainly from toilets, and for waste water from showers and washbasin and from the Fish Handling Place by cleaning fish and floor. In regard with the drainage treatment, waste water from toilets is planned to be treated by a septic tank based on the standard specifications in The Gambia, and other waste water from showers, etc. is planned to be screened by waste traps, which will separate and collect impurity, etc., and discharged into the soak pit. The scale of the septic tank will be adopted as Code 10 of standards in The Gambia, which has a capacity for 91 to 100 persons use. In addition, regarding the drainage of rainwater, direct discharge to the outside of the Project Site is planned.

4) Equipment plan for electricity power

The whole electric equipment required for the facilities and equipment in the Project is planned to be operated by generators all day.

The wiring of power supply will be installed by vinyl insulated wire through conduit pipe, from the generator in the machine room in the Fresh Fish Handling Building, via the switch board, to the electric equipment in the Fresh Fish Handling Building. For the other buildings such as Maintenance Workshop, Toilets and Showers for Fisherfolks building, and water supply equipment and fuel supply equipment, the cable wiring of power supply will be installed through the underground wire. The electricity power will not be supplied to Fishing Gear Locker, Smoke House and Dry Fish Storage.



In consideration with the load required for operation of 2 sets of ice making machines (approx. 50 kW) and 2 Chilled Storages (15.0 kW) and the start-up load for those machines, the scale of equipment is determined as follows:

Model of generator : diesel engine drive alternating generator, three-phase and four wire system, low noise type, water cooling system (radiator)

Capacity of generating power : approx. 75 KVA (60 kW)
3 sets (2 sets for regular operation, 1 set for contingency)

Power system : 380 V, 50 Hz, there-phase and four-wire system, single phase 220 V

Fuel : diesel oil

Standard outfits : tools and expendables

Incidental equipment : switch board, fuel service tank, exhaust air duct for radiator

5) Equipment for Ice Plant & Storage

For Ice Plant, an ice making machine will be installed on the support which is placed at the top of the Ice Storage. The operation is of automatic type with storing ice in the storage by gravity. Major machines of Ice Plant are compressor, condenser, liquid receiver, etc. As they are installed in the machine room separate from the ice making machine body, easy maintenance and repair and regular overhaul are expected. As the condenser will be made of copper pipe and copper fin to avoid salt corrosion caused by sea breeze, the long life span will be expected. On the other hand, as the hardness of water of the water source is 175 mgCaCos / liter, and is comparatively high, a magnetic

field style filter for hard water will be installed in the water supply line to the ice making machine to prevent from lowering the ability to produce ice.

Though refrigeration equipment to avoid ice melting in the Ice Storage will not be placed, the thickness of insulation panel is planned as 100 mm, which is comparatively thicker than usual. Then, simplification of the whole equipment for Ice Plant & Storage and energy conservation will be expected. The main specifications are shown as follows:

Classification of ice : plate ice

Capability of ice production : 5 tons / 24 hours, automatic type x 2 sets,
temperature of water source: 29 C°

Condensing system : air cooling system, refrigerant: R-22

Compressor : reciprocating & open type, single stage compressing

Ice storage : prefabricated insulated panel storage (approx. 10 tons / storage),
dimension; 4,500 mm (L) x 4,500 mm (D) x 2,300 mm (H)
x 100 mm (T)

Accessories : weight scale (100 kg) x 1 unit, scoop x 1 unit,
clothing for cold temperature x 2 outfits, gloves x 2 pairs.

6) Equipment for Chilled Storage

In terms of equipment for the chilled storage, 8.4 tons of stocking capacity is divided in two rooms, and the refrigerant line will be installed separately to each room. For the same reason as the equipment for the ice plant, such components as compressor, condenser, liquid receiver, etc. will be located in the machine room and the condenser will be made of copper pipe and copper fin. The main specifications are shown as follows:

Inside capacity : 4.2 tons of capacity (approx. 50 m3) x 2 rooms

Chilling temperature : 0 ~ -5 C°

Cooling system : R-22, direct expansion system

Compressor : reciprocating & open type, single stage compressing x 2 sets

Condensation system : air cooling system

Inside cooling : unit cooler (hanged on the ceiling), defrost system:
electric heater

Storage body : prefabricated insulated panel storage

Maintenance tools for chilled storage: 1 set

Accessories : weight scale (100 kg) x 1 unit,
clothing for cold temperature x 2 outfits, gloves x 2 pairs.

7) Equipment for Fuel Tank

The following equipment for fuel tank will be arranged for diesel oil for generator facilities and pre-mix gasoline for outboard engines:

- Tank for diesel oil:
  capacity 15 tons (corrosion resistance, underground tank) x 1 unit
- Tank for pre-mix gasoline :
  capacity 15 tons (corrosion resistance, underground tank) x 1 unit
  filling device (dispenser: pump, with measuring meter) x 1 unit

(1) Plan for construction materials

The construction materials for each facility are as follows:

Table 2-11 Finish plan of exteriors of facilities

Building • Facility		Finish Plan
Fresh Fish Handling Building	Roof	: steel frame main house, plywood 12 t, asphalt felt, asphalt tile,
Smoke House	Bask side eaves	: plywood 12 t, PARP
Dry Fish Storage	Exterior wall	: CB (partly screen CB), CR, AEP
Fishing Gear Locker	Column • beam	: Concrete, CR, AEP
Toilets and showers for Fisherfolks	Window	: aluminum window
Workshop	Door	: galvanized steel door , PAHP
	Exterior floor	: CTFCH
Fresh Fish Handling Building	Fish handling place,	: CTFCH
Dry Fish Storage	Platform floor	: CTFCH
Fresh Fish Handling Building	Exterior fittings	: aluminum louvers
Smoke House		
Dry Fish Storage		

Note: The following abbreviations are applied in the above Table.
PARP : Phthalic Acid Resin Paints
CB : Concrete Block
CR : Cement Rendering
AEP : Acrylic Enamel Painting
CTFCH : Concrete Trowel Finishing Coated by Hardener

Table 2-12 Finish plan of interiors of facilities

Building	• Facility	Finish		
		Floor	Wall	Ceiling
Fresh Fish Handling Building	Office Meeting cum Training Class Room Engineer Room Entrance, Corridor	Floor: F2 Type Plinth: F3 Type	W3 Type	C1 Type
	Machine Room	Floor: F2 Type Plinth: F3 Type	W2 Type	C2 Type
	Kettle Room	Floor: F2 Type Plinth: F3 Type	W1 Type	C1 Type
	Toilets	Floor: F1 Type	W1 Type	C1 Type
Smoke House	Smoke Processing Room Storage • Work Space	Floor: F2 Type Plinth: F3 Type	W3 Type	C2 Type
Dry Fish Storage				
Fishing Gear Locker				
Workshop	Workshop Engineer Room Storage for Spare Parts			
Water Reservoir	• Pump Up Room			
Toilets and Showers for Fisherfolks	Female Toilets Male Toilets	Floor: F4 Type Plinth: F5 Type	W3 Type	C2 Type
	Shower Room	Floor : F1 Type	W1 Type	C2 Type

Note: The finish plan of interiors of facilities are mainly divided into the following categories:

Floor:
F1 Type: Magnetic tile
F2 Type: concrete trowel finish coated by hardener
F3 Type: concrete rendering, polyvinyl chloride enamel painting
F4 Type: concrete trowel, solvent finish coating
F5 Type: concrete rendering, solvent finish coating

Wall:
W1 Type: Magnetic tile
W2 Type: concrete block, concrete rendering, polyvinyl chloride enamel painting
W3 Type: concrete block, concrete rendering, acrylic enamel painting

Ceiling:
C1 Type: plywood 12 t, phthalic acid resin painting
C2 Type: open attic, plywood 12 t, phthalic acid resin painting

2-2-2-3 Equipment Plan

(1) Overall Plan

The equipment improved by this Project constitutes the similar equipment already introduced for the Bakau and Tanji projects. Therefore, in the Project, the similar grades of specifications are, as a principle, planned in consideration with the simple management and maintenance and simple operation for users, unless the improvement and modification are required from the past operation.

(2) Equipment Plan

1) Fish Box & Container

a) Fish Box

Number	:	669 boxes
Specifications	:	
Capacity	:	approx. 60 liters (with handle)
Internal dimension	;	approx. 730 mm x 420 mm x 195 mm
Materials	;	polypropylene, color; green

b) Insulated Fish Container

Number	:	25 containers
Specifications		
Capacity	:	approx. 500 liters (with lid)
Internal dimension	;	approx. 1,200 mm x 720 mm x 600 mm
Materials	;	FRP and hard urethane board, color; green

2) Refrigerated Vehicle

Number	:	3 vehicles
Specifications		
Model	:	diesel engine drive, long wheel base
Engine output	;	approx.180 HP
Load (max.)	:	approx. 5 tons
Platform dimension	;	approx. 5,000 mm (L) x 2,000 mm (B) x 2,000 mm (H)

3) Insulated Vehicle

Number	:	1 vehicle
Specifications		
Model	:	diesel engine drive, short wheel base
Engine output		approx. 100 HP

Load (max.)	:	approx. 1 ton
Platform dimension		approx. 2,800 mm (L) x 1,600 mm (B) x 1,800 mm (H)

4) Carrier Vehicle for Ice

Number	:	1 vehicle
Specifications		
Model	:	diesel engine drive, 4 wheel drive, with a hood
Load (max.)	:	approx. 0.7 tons

5) FRP Fishing Canoe

Number	:	12 canoes
Specifications		
Material	:	Fiber Reinforced Plastic (FRP)
Structure	:	open type deck structure with vertical and horizontal sub framing, reinforcement for abrasion on bulk, keel at bow and stern sides, with opening hanger for mounting outboard engine and sail & mast
Dimension	:	approx. 13 m in length, 2 m in width, 1.1 m in depth
Crew capacity	:	8 persons
Boat shape	:	open deck canoe shape
Propelling system	:	removal outboard engine
Accessories	:	magnetic compass, anchor with rope, life jacket (8 sets), rain suits (8 pairs)

6) Outboard Engine

Number	:	12 engines for FRP Fishing Canoes aforementioned
Specifications		
Fuel	:	pre-mix gasoline
Output	:	40 HP, manual start-up, seawater cooling
Fuel tank	:	approx. 20 liter x 5 units for one engine
General tools		
• spare parts	:	1 set

7) Fishing Net

Number	:	12 sets for FRP Fishing Canoes aforementioned
Specifications	:	Encircling gill net
Components of fishing net		
Body net	:	Nylon multi-filament, color; white

		single joint, 210 d / 12 x 90 mm / string, 140MD x 1,800 m (150 m x 12 rolls) / set
Twine		Nylon, white, 10 S / 12, 200 g / roll x 30 rolls / set
Rope	:	polyethylene, color; black 8 mm diameter x 200 m / roll x 9 rolls / set
Float	:	ebonite, buoyancy 103 g size; 140 mm x 50 mm x 10 mm 2,124 pieces / set
Lead	:	lead, approx. weight - 75g, 2,124 pieces / set size; 30 mm x 21 mm x 10 mm
Buoy	:	plastic, color; orange approx. 400 mm diameter x 2 units / set

8) Tools

a) For Machine Room	:	1 set for maintenance and repair (see the Attachment Table-1)
b) For Maintenance Workshop	:	1 set for maintenance and repair (see the Attachment Table-2)

9) ORP Measuring Meter

Number	:	1 set
Specifications	:	One meter body , three ORP censors, one PH censor, one censor stand with holder, two water bottles of capacity 500 cc with nozzle

10) Garbage Bin

Number	:	6 pieces
Specifications	:	For Fish Handing Building and Maintenance Workshop
Capacity	:	Approx. 200 liters (polypropylene)
Category	:	combustible waste x 2, noncombustible waste x 2, fresh refuse x 2

11) Fire Extinguisher

Number	:	5 pieces
Installation	:	2 pieces for machine room in Fresh Fish Handling Building (potable, for fuel fire)
	:	2 pieces for Workshop, 1 piece for Fuel supply facility

(Attachment Table-1: Tools for Machine Room)

Name	Number	Purpose of Use
Vacuum pump	1	A
Vacuum gauge set	1	A
Refrigerant detector	1	A
Lattice trench	2 each	A
Flaring and cutting tool kit	1	A
Torque wrench	1	B
Tester	1	B
Standard general tool set	1	B
Corking gun	1	A

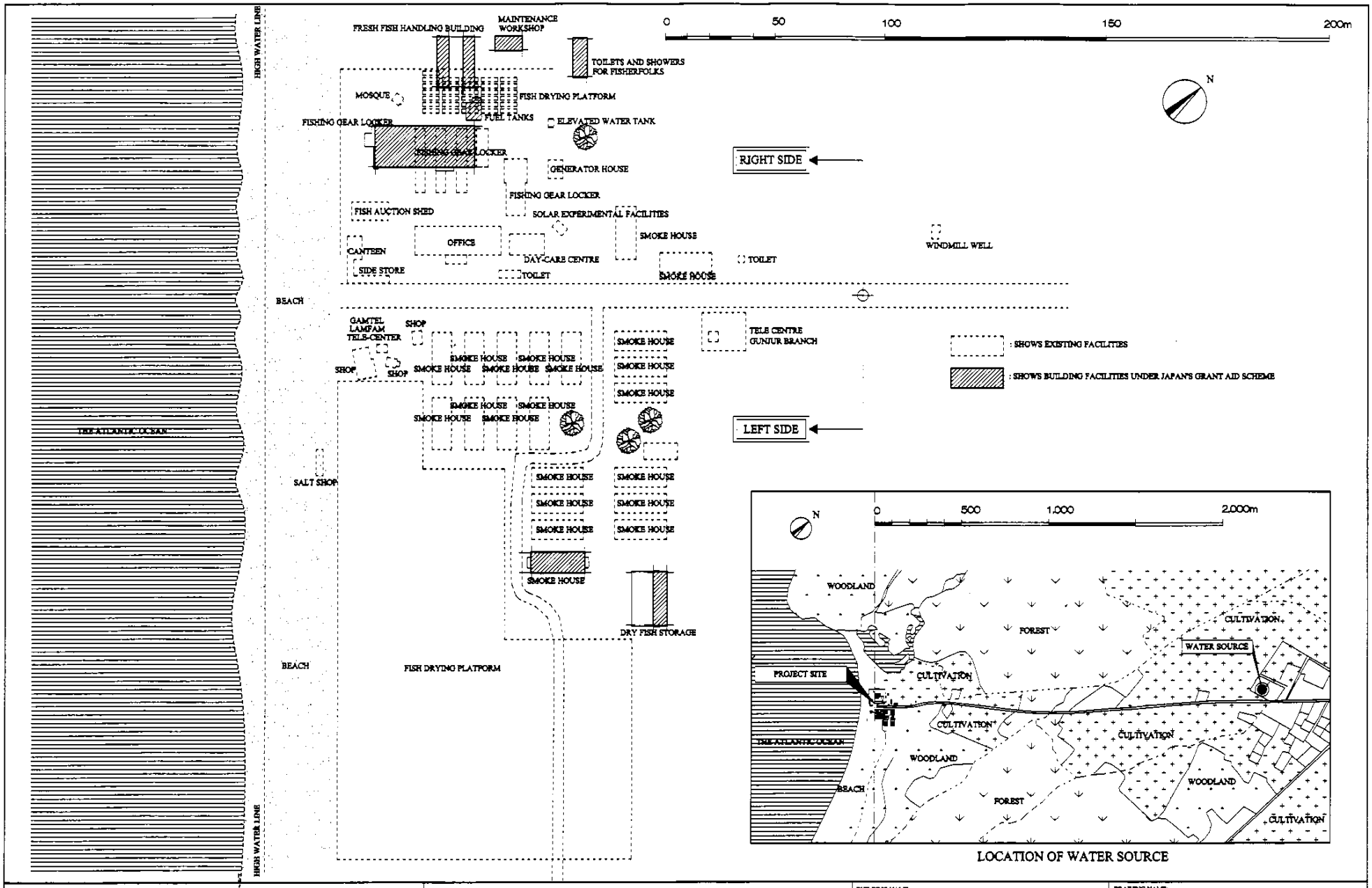
Note: A ; For maintenance and repair for Ice Plant & Storage and Chilled Storage
B ; For maintenance and repair for Generator Facilities

(Attachment Table-2: Tools for Maintenance Workshop)

a) General tools for maintenance and repair for outboard engines and fishing canoes' parts		
Name	Number	Remarks
Air compressor	1	
Welding apparatus	1	
Gas cutting and welding device	1	
Desktop electric drill	1	
Electric grinder	1	
Vice (medium)	1	
Vice (small)	1	
Socket wrench set	1	
Hexagonal wrench set	1	
Shifting spanner (medium)	1	
Shifting spanner (small)	1	
Screwdriver set	1	
Torque wrench (medium)	1	
Torque wrench (small)	1	
Steel hammer (medium)	1	
Steel hammer (small)	1	
Plastic hammer	1	
Rubber hammer	1	
File set	1	
Tap and die set	1	
Calipers	1	
Tester	1	

b) Special tools for maintenance and repair for outboard engines		
Name	Number	Remarks

Dial gauge	1	
Portable circuit tester	1	
Ignition timing light	1	
Compression gauge	1	
Digital circuit tester	1	
Digital rotation meter	1	
Fly wheel puller	1	
Fly wheel holder	1	
Gear puller	1	
Piston insert apparatus	1	
Stopper as guide plate	1	
Bearing puller	1	
Centering bolt	1	
Pinion nut holder	1	
Socket adapter	1	
Ring nut extension bar	1	
Puller head	1	
Slide hammer handle	1	
Ring nut wrench	1	
Drive shaft holder	1	
Electric terminal kit	1	
Power unit stand	1	
Test propeller	1	



LOCATION OF WATER SOURCE

THE PROJECT FOR IMPROVEMENT OF ARTISANAL COASTAL FISHERIES IN THE KOMBO SOUTH DISTRICT IN THE REPUBLIC OF THE GAMBIA

NOTES:

BUILDING NAME:

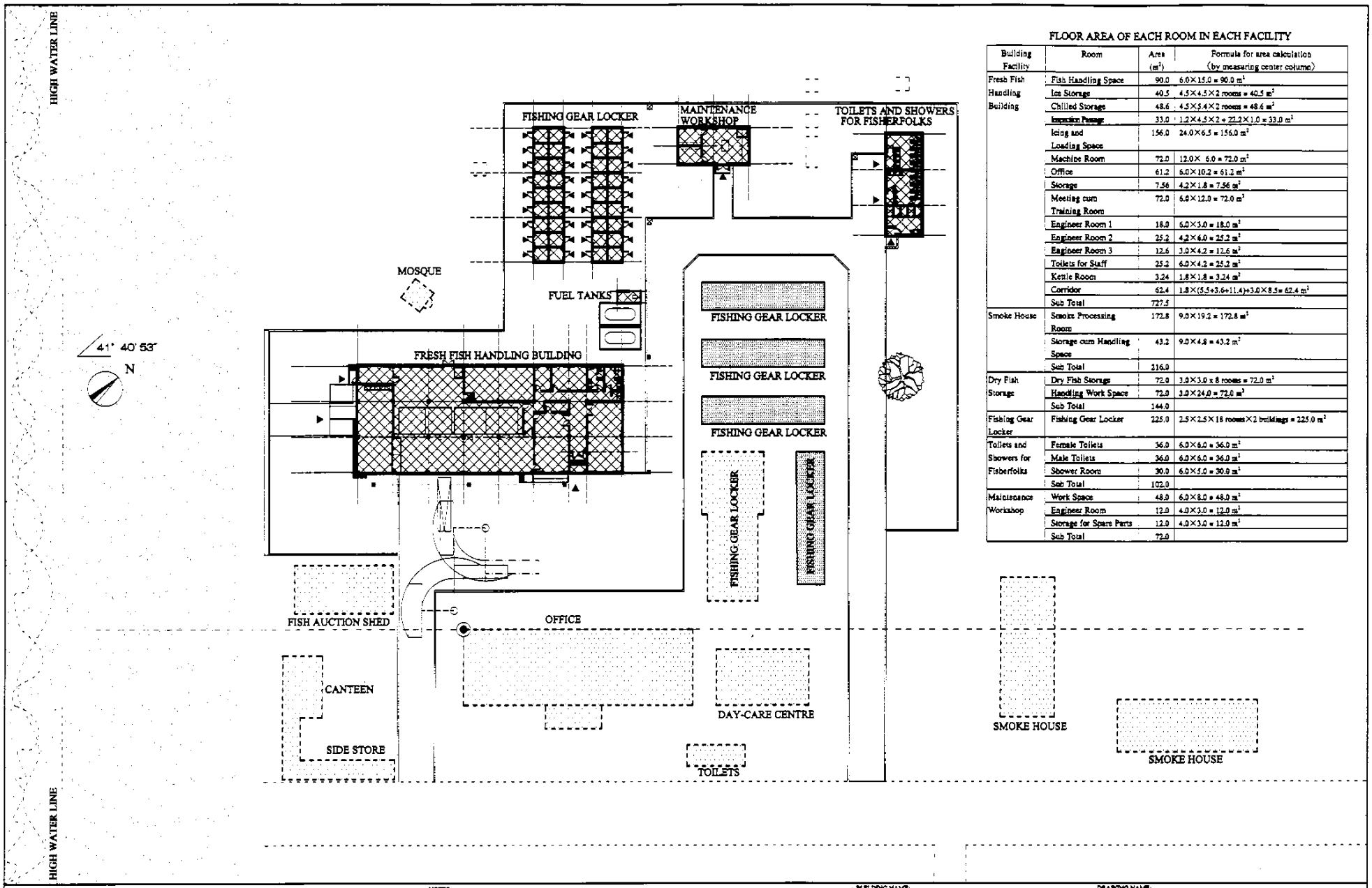
DRAWING NAME: PROJECT SITE PLAN

DATE:

SCALE: 1/1,600

DWG. NO.: A-01

OAFIC OVERSEAS AGRO-FISHERIES CONSULTANTS CO., LTD.



FLOOR AREA OF EACH ROOM IN EACH FACILITY

Building Facility	Room	Area (m^2)	Formula for area calculation (by measuring center column)
Fresh Fish Handling Building	Fish Handling Space	90.0	$6.0 \times 15.0 = 90.0\ m^2$
	Ice Storage	40.5	$4.5 \times 4.5 \times 2$ rooms $= 40.5\ m^2$
	Chilled Storage	48.6	$4.5 \times 5.4 \times 2$ rooms $= 48.6\ m^2$
	Inspection Passage	33.0	$1.2 \times 4.5 \times 2 + 22.2 \times 1.0 = 33.0\ m^2$
	Icing and Loading Space	156.0	$24.0 \times 6.5 = 156.0\ m^2$
	Machine Room	72.0	$12.0 \times 6.0 = 72.0\ m^2$
	Office	61.2	$6.0 \times 10.2 = 61.2\ m^2$
	Storage	7.56	$4.2 \times 1.8 = 7.56\ m^2$
	Meeting cum Training Room	72.0	$6.0 \times 12.0 = 72.0\ m^2$
	Engineer Room 1	18.0	$6.0 \times 3.0 = 18.0\ m^2$
	Engineer Room 2	25.2	$4.2 \times 6.0 = 25.2\ m^2$
	Engineer Room 3	12.6	$3.0 \times 4.2 = 12.6\ m^2$
	Toilets for Staff	25.2	$6.0 \times 4.2 = 25.2\ m^2$
	Kettle Room	3.24	$1.8 \times 1.8 = 3.24\ m^2$
	Corridor	62.4	$1.8 \times (5.5+3.6+11.4)+3.0 \times 8.5 = 62.4\ m^2$
	Sub Total	727.5	
Smoke House	Smoke Processing Room	172.8	$9.0 \times 19.2 = 172.8\ m^2$
	Storage cum Handling Space	43.2	$9.0 \times 4.8 = 43.2\ m^2$
	Sub Total	216.0	
Dry Fish Storage	Dry Fish Storage	72.0	$3.0 \times 3.0 \times 8$ rooms $= 72.0\ m^2$
	Handling Work Space	72.0	$3.0 \times 24.0 = 72.0\ m^2$
	Sub Total	144.0	
Fishing Gear Locker	Fishing Gear Locker	225.0	$2.5 \times 2.5 \times 18$ rooms $\times 2$ buildings $= 225.0\ m^2$
Toilets and Showers for Fisherfolks	Female Toilets	36.0	$6.0 \times 6.0 = 36.0\ m^2$
	Male Toilets	36.0	$6.0 \times 6.0 = 36.0\ m^2$
	Shower Room	30.0	$6.0 \times 5.0 = 30.0\ m^2$
	Sub Total	102.0	
Maintenance Workshop	Work Space	48.0	$6.0 \times 8.0 = 48.0\ m^2$
	Engineer Room	12.0	$4.0 \times 3.0 = 12.0\ m^2$
	Storage for Spare Parts	12.0	$4.0 \times 3.0 = 12.0\ m^2$
	Sub Total	72.0	

THE PROJECT FOR IMPROVEMENT OF ARTISANAL COASTAL FISHERIES IN THE KOMBO SOUTH DISTRICT IN THE REPUBLIC OF THE GAMBIA

OAFIC OVERSEAS AGRO-FISHERIES CONSULTANTS CO., LTD.

NOTES:
: SHOWS EXISTING FACILITIES
: SHOWS PLANNED FISHING GEAR LOCKER (TO BE CONSTRUCTED BY THE RECIPIENT COUNTRY)

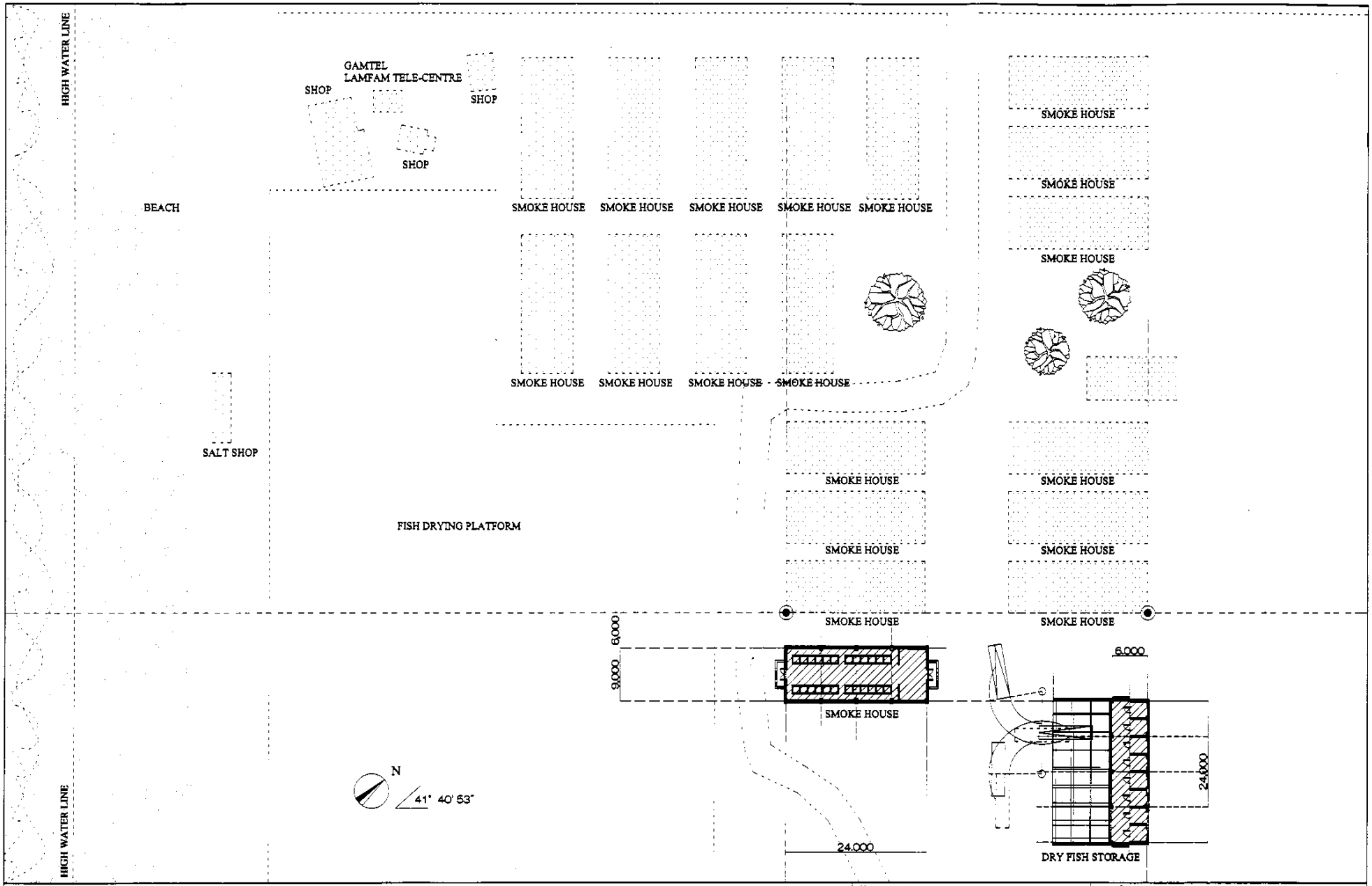
BUILDING NAME:

DRAWING NAME: PROJECT SITE PLAN (RIGHT SIDE)

DATE:

SCALE: 1/600

DWG NO.: A-02



THE PROJECT FOR IMPROVEMENT OF ARTISANAL COASTAL FISHERIES IN THE KOMBO SOUTH DISTRICT IN THE REPUBLIC OF THE GAMBIA

NOTES: : SHOWS EXISTING FACILITIES

BUILDING NAME:

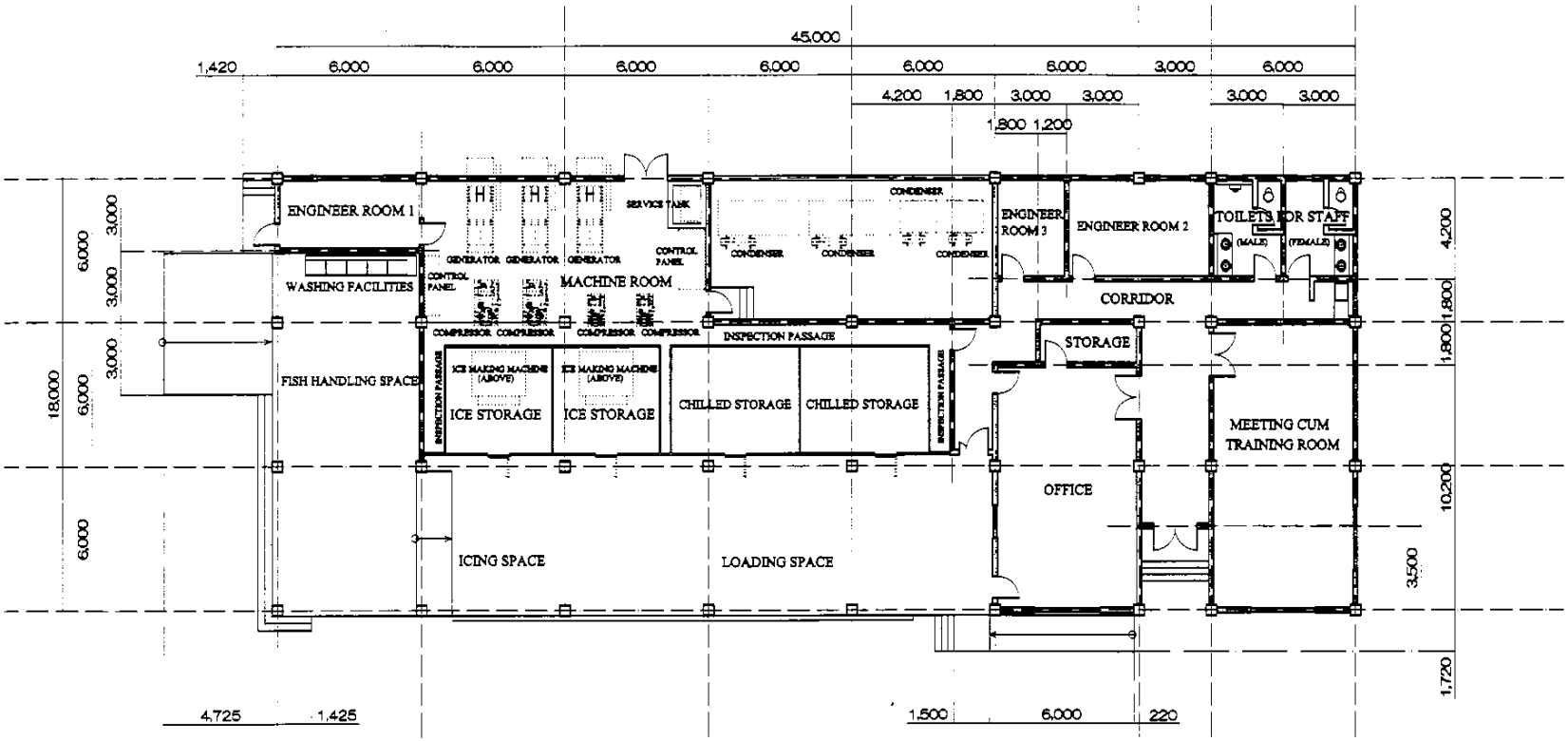
DRAWING NAME: PROJECT SITE PLAN (LEFT SIDE)

DATE:

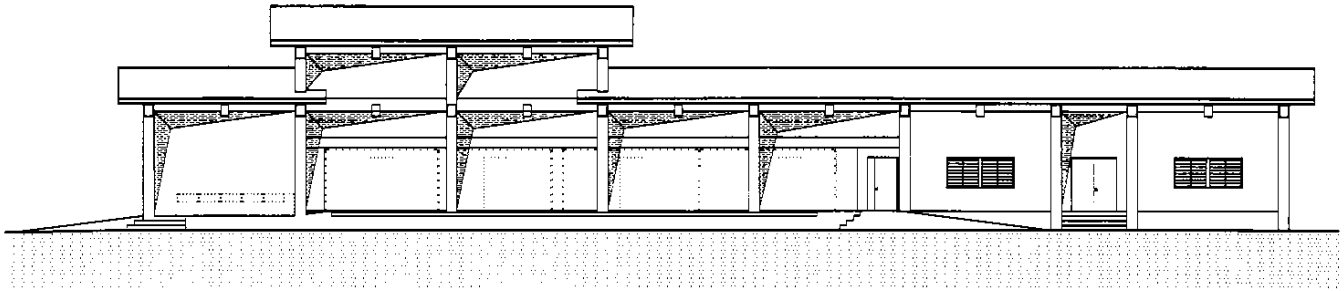
SCALE: 1/600

DWG. NO.: A-03

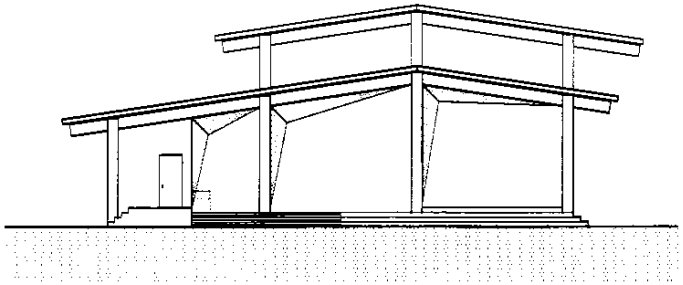
OAFIC OVERSEAS AGRO-FISHERIES CONSULTANTS CO., LTD.



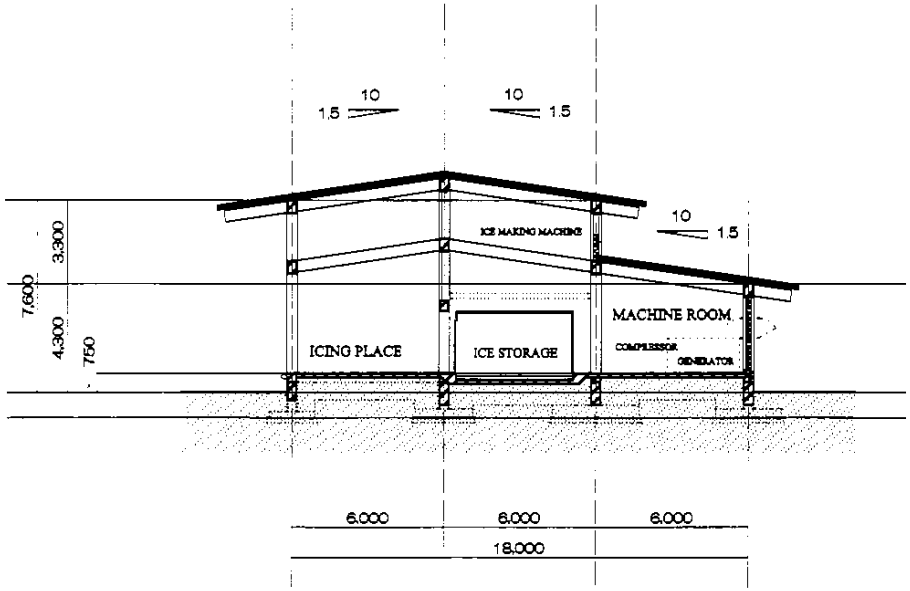
THE PROJECT FOR IMPROVEMENT OF ARTISANAL COASTAL FISHERIES IN THE KOMBO SOUTH DISTRICT IN THE REPUBLIC OF THE GAMBIA	NOTES:	BUILDING NAME: FRESH FISH HANDLING BUILDING	DRAWING NAME: FLOOR PLAN
OAFIC OVERSEAS AGRO-FISHERIES CONSULTANTS CO., LTD.		DATE:	SCALE: 1/200 / DWG. NO.: A-04



SOUTHEAST SIDE ELEVATION



SOUTHWEST SIDE ELEVATION



SECTION

THE PROJECT FOR IMPROVEMENT OF ARTISANAL COASTAL FISHERIES IN THE KOMBO SOUTH DISTRICT IN THE REPUBLIC OF THE GAMBIA

NOTES:

BUILDING NAME: FRESH FISH HANDLING BUILDING

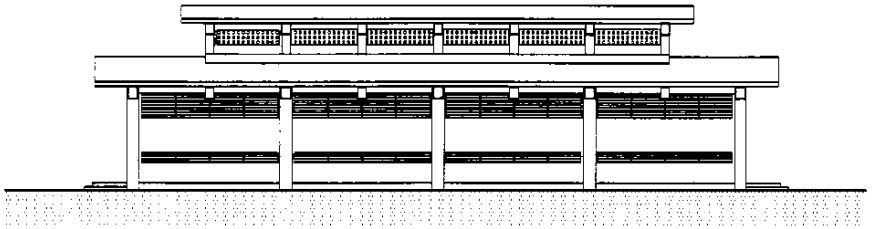
DRAWING NAME: ELEVATIONS AND SECTION

OAFIC OVERSEAS AGRO-FISHERIES CONSULTANTS CO., LTD.

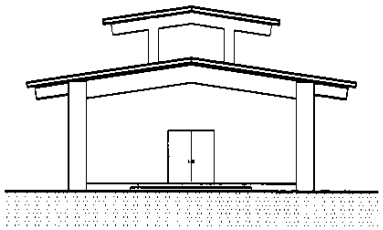
DATE:

SCALE: 1/200

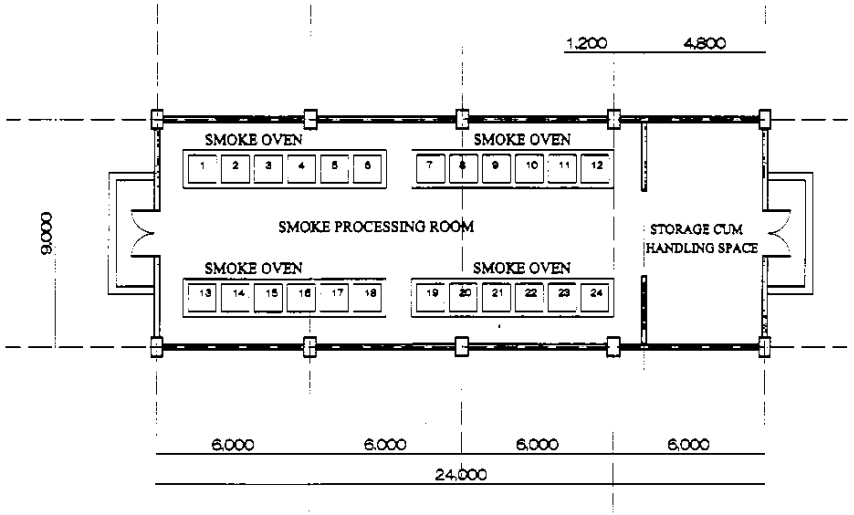
DWG. NO.: A-05



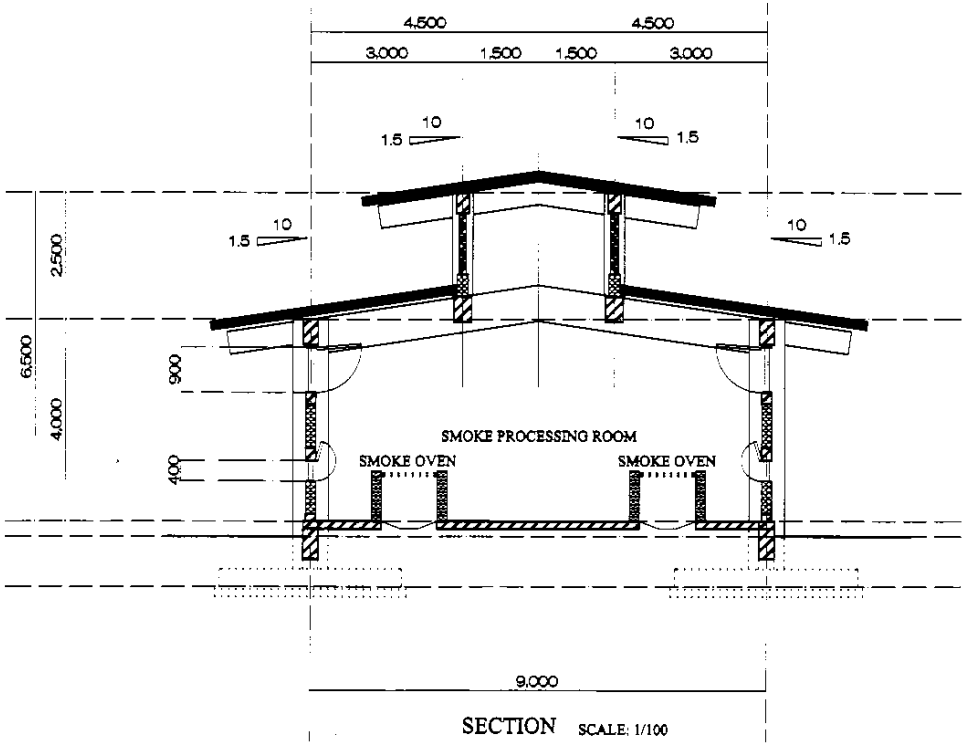
SOUTHEAST SIDE ELEVATION SCALE: 1/200



SOUTHWEST SIDE ELEVATION SCALE: 1/200



FLOOR PLAN SCALE: 1/200



SECTION SCALE: 1/100

THE PROJECT FOR IMPROVEMENT OF ARTISANAL COASTAL FISHERIES IN THE KOMBO SOUTH DISTRICT IN THE REPUBLIC OF THE GAMBIA

NOTES:

OAFIC OVERSEAS AGRO-FISHERIES CONSULTANTS CO., LTD.

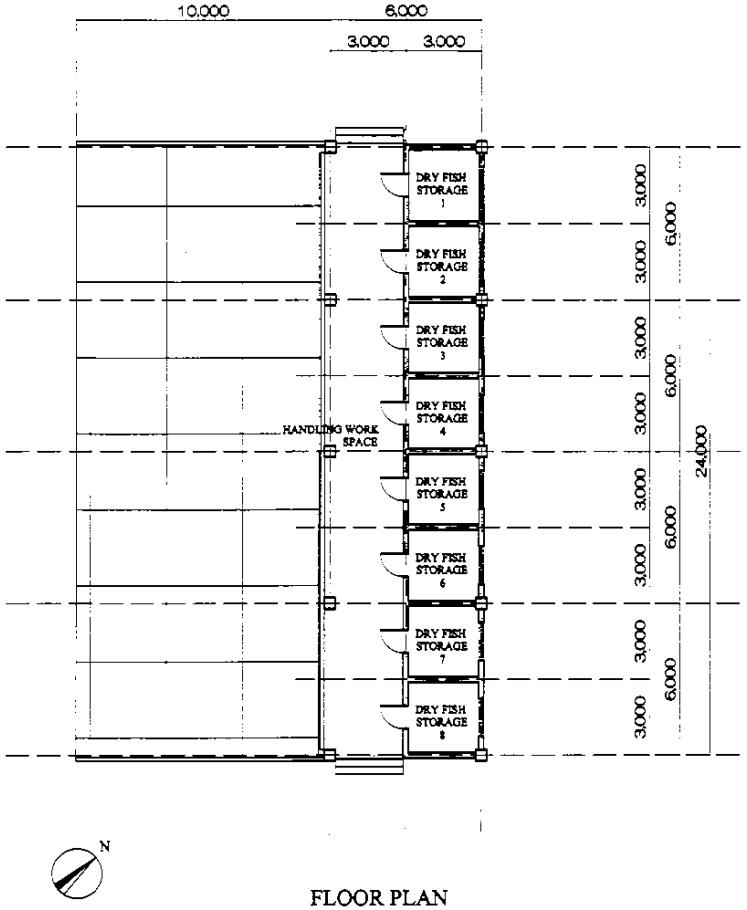
BUILDING NAME: SMOKE HOUSE

DRAWING NAME: FLOOR PLAN, ELEVATIONS AND SECTION

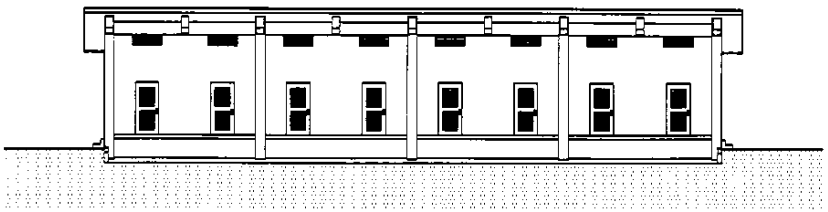
DATE:

SCALE: 1/200 1/100

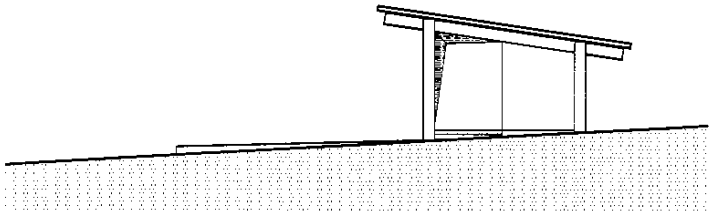
DWG. NO.: A-06



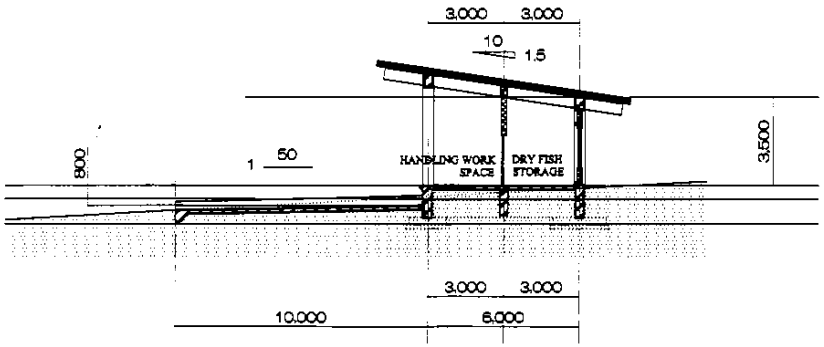
FLOOR PLAN



SOUTHWEST SIDE ELEVATION



SOUTHEAST SIDE ELEVATION



SECTION

THE PROJECT FOR IMPROVEMENT OF ARTISANAL COASTAL FISHERIES IN THE KOMBO SOUTH DISTRICT IN THE REPUBLIC OF THE GAMBIA

OAFIC OVERSEAS AGRO-FISHERIES CONSULTANTS CO., LTD.

NOTES:

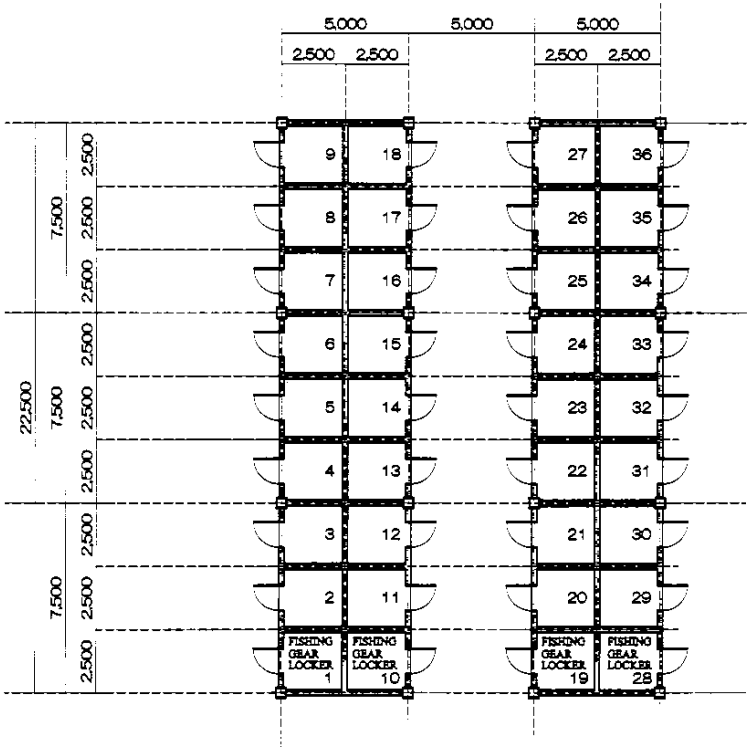
BUILDING NAME: DRY FISH STORAGE

DRAWING NAME: FLOOR PLAN, ELEVATIONS AND SECTION

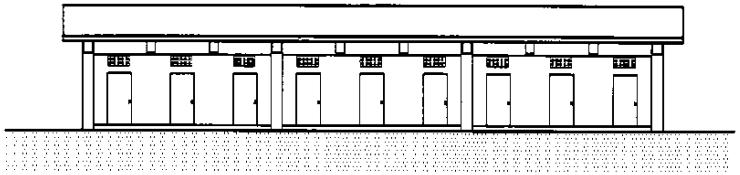
DATE:

SCALE: 1/200

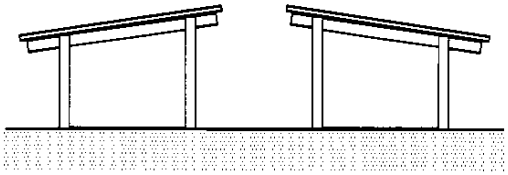
DWG. NO.: A-07



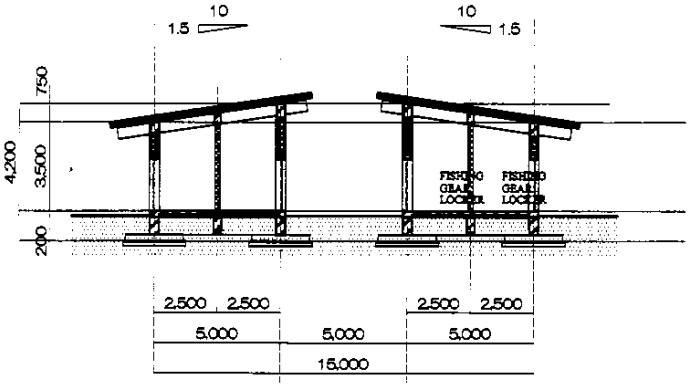
FLOOR PLAN



SOUTHWEST SIDE ELEVATION



SOUTHEAST SIDE ELEVATION



SECTION

THE PROJECT FOR IMPROVEMENT OF ARTISANAL COASTAL FISHERIES IN THE KOMBO SOUTH DISTRICT IN THE REPUBLIC OF THE GAMBIA

NOTES:

BUILDING NAME: FISHING GEAR LOCKER

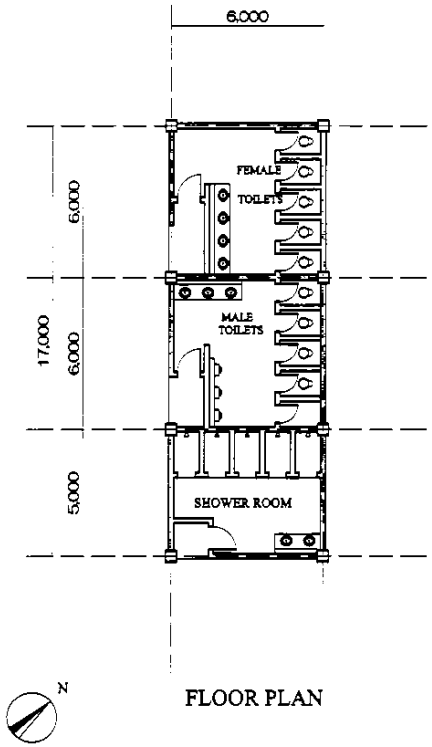
DRAWING NAME: FLOOR PLAN, ELEVATIONS AND SECTION

OAFIC OVERSEAS AGRO-FISHERIES CONSULTANTS CO., LTD.

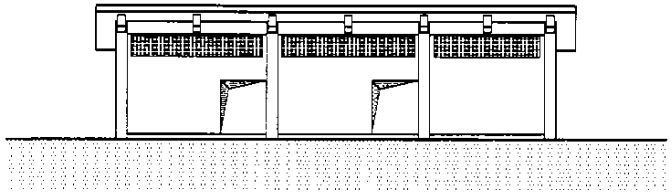
DATE:

SCALE: 1/200

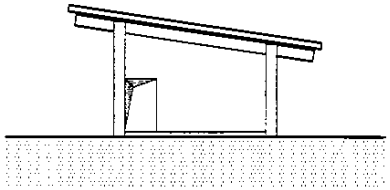
DWG. NO.: A-08



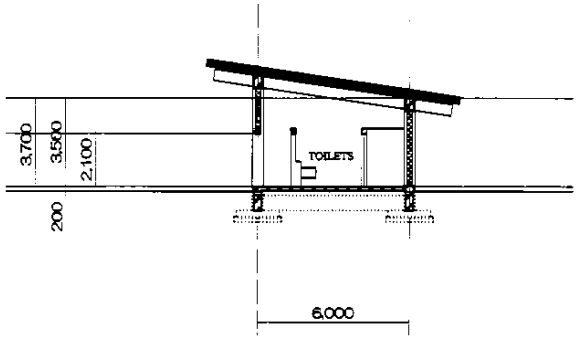
FLOOR PLAN



SOUTHWEST SIDE ELEVATION



SOUTHEAST SIDE ELEVATION



SECTION

THE PROJECT FOR IMPROVEMENT OF ARTISANAL COASTAL FISHERIES IN THE KOMBO SOUTH DISTRICT IN THE REPUBLIC OF THE GAMBIA

OAFIC OVERSEAS AGRO-FISHERIES CONSULTANTS CO., LTD.

NOTES:

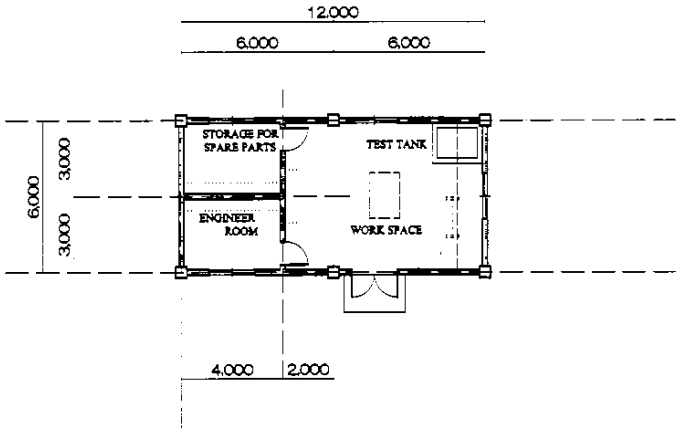
BUILDING NAME:
TOLETS AND SHOWERS FOR FISHERFOLKS

DRAWING NAME:
FLOOR PLAN, ELEVATIONS AND SECTION

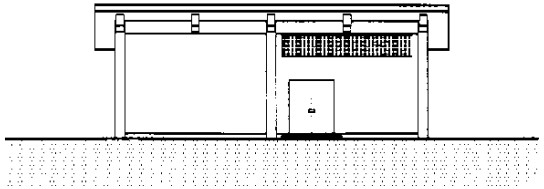
DATE:

SCALE: 1/200

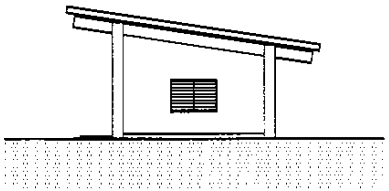
DWG. NO.: A-09



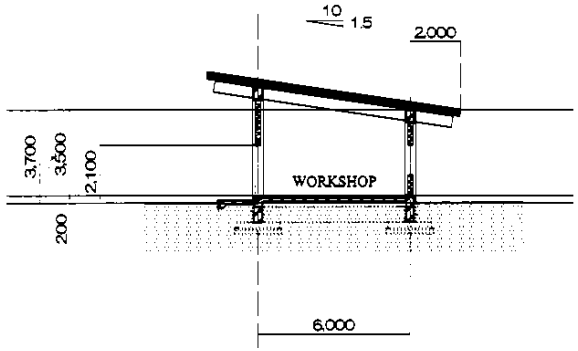
FLOOR PLAN



SOUTHEAST SIDE ELEVATION



SOUTHWEST SIDE ELEVATION



SECTION

N

THE PROJECT FOR IMPROVEMENT OF ARTISANAL COASTAL FISHERIES IN THE KOMBO SOUTH DISTRICT IN THE REPUBLIC OF THE GAMBIA

NOTES:

OAFIC OVERSEAS AGRO-FISHERIES CONSULTANTS CO., LTD.

BUILDING NAME: MAINTENANCE WORKSHOP

DRAWING NAME: FLOOR PLAN, ELEVATIONS AND SECTION

DATE:

SCALE: 1/200

DWG. NO.: A-10

2-2-4 Implementation Plan

2-2-4-1 Implementation Policy

(1) Basic Policy

This Project is implemented under Japan's Grant Aid Scheme by the Government of Japan. Therefore, in consideration with the construction to be completed within prescribed construction terms, construction work should be implemented on the appropriate standards and under proper supervision of the work, with planning appropriate construction terms, procurement of equipment and materials, construction schedule and quality control.

1) The project will construct facilities by using space in a part of the existing fisheries center. As the existing fisheries facilities are positioned near the Project Site and are utilized by local fisherfolks at present, it is planned not to disturb the present fisheries activities upon the execution of construction.

2) The preservation of natural environment in the adjoining residence and facilities should be considered.

3) The firm relationship with persons concerned in The Gambia side will be intended as well as better mutual understanding at each stage of construction work in order to avoid misinterpretation on the related procedures.

4) As the local technique and labor force for the execution of construction reach the certain standard, these should be examined carefully and be made the best use of.

5) For the selection of equipment, the equipment, operation and maintenance of which are simple and spare parts of which are obtainable, should be examined.

6) The local custom, traditions and culture should be respected and considered on the execution of construction and management of labor.

(2) Policy for the utilization of local construction companies

Though most of construction companies are small-scale and middle-scale in The Gambia, they are capable of executing such general work as earth work and concrete work. Therefore, in terms of general work, it should be considered to enable the selection of the common construction method locally and it is the policy to utilize them as much as possible as sub contractors. On the other hand, there are not any engineering companies that specialize in the installation work of the equipment such as Ice Plant and Chilled Storage, so that Japanese engineers should be dispatched upon such execution of work.

(3) Implementation organization of The Gambia side

The Department of State for Fisheries, Natural Resources and the Environment is responsible agency for the Project at The Gambia side, and it is the main body for preparation of conclusion of the Exchange of Notes and Banking Arrangement. In regard with the implementation of the Project, the Fisheries Department, under aforementioned Stage Department, is responsible for practical work, and is also engaged in Agreement for Consulting Services with consultants, Contract for Construction with contractors, prescribed procedures to related organizations, inspection • approval • acquirement of permission on the contents of the implementation plans and receipt of materials for construction and equipment for procurement.

2-2-4-2 Implementation Conditions

(1) The safety during construction work is prioritized, and such measures are required as prohibition to access to the construction area except related people during the periods of construction.

(2) Though the construction site is far way from the capital area and its outskirts, many fisherfolks are coming and going at the timing of fish landing in the morning and in the afternoon, so that the loading and unloading of the materials and equipment should be cautious during the time of fish landing.

(3) As almost facility is constructed in the backside of the existing facilities, the plan for traffic line of construction vehicles should be considered carefully and, also, the temporary yard plan and plans of construction methods should be examined prudently.

(4) As the majority of materials and equipment for construction, which is even procured locally, is transported on land from Senegal, its stock in market is not adequate in the kinds and quantity. Therefore, mismanagement of procurement of the materials may greatly affect the construction schedule. As a conclusion, the proper planning of the procurement of equipment and materials is necessary.

2-2-4-3 Scope of Work

When the Project is implemented under the Japan's Grant Aid Scheme, the followings are the scope of works for Japan and The Gambia sides, and the expenditure should be attributed as divided.

(1) Responsibilities shared by The Gambia Side

1) To secure the sites planned for the construction by the Project, and to evacuate or relocate the existing buildings and obstacles in the Project Site.

2) To secure land for underground water piping from the water and for electric wiring to the Project Site.

3) To secure the sites for temporary yard for construction and field office.

4) To construct the necessary exterior fences, gates and guard's room in the Project Site.

5) To procure furniture necessary for the offices constructed by the Project.

(2) Responsibilities shared by Japanese side

1) To render related consulting services such as the detail designing, assistance for tendering and construction work supervision.

2) To supply all materials and labor for construction by Japanese side for the Requested Japanese Assistance for the Project.

3) To execute overseas and inland transport of imported equipment procured by Japanese side for the Requested Japanese Assistance required for the Project.

4) To go through inspection of qualities required for the construction work and the equipment procured by Japanese side for the Project.

2-2-4-4 Consultant Supervision

Based on the contents of the design of the Project, the consultant engages in inspection of the contents and methods of construction, plan for quality control, etc. and takes fair construction supervising system. Upon the execution of work, the communication system among the related organizations of The Gambia, JICA office, a consultant and a contractor, should be properly managed as well as the planning for arrangement of equipment, transportation and office, and the methods of procedures, terms and management relevant to the quality control. Also, in regard with the personnel plan, the technical levels, arrangement, numbers and organization of its supervision should be carefully considered and properly planned.

2-2-4-5 Procurement Plan

1) Construction Materials

General construction materials, except for specific kinds of finishing materials and equipment, are widely marketed locally, and will possibly be procured in The Gambia. As those materials meet the specifications by the Project, except for the specific materials, the utilization of materials marketed in The Gambia is planned. The specific materials

are defined as the materials which are not easily obtained, the delivery date become unstable, even when succeeded in obtaining, or quality of which are not adequate enough, and these specific materials are, therefore, planned to be procured from Japan.

Table 2-13 Allocation of procurement of construction materials

Construction Materials	Country		Reasons
	The Gambia	Japan	
Crushed stone, sand, cement	❍		Adequate specifications for the Project
Concrete block	❍		
Forming materials	❍		
Paints	❍		
Tile	❍		
Reinforcing bar		❍	Those with quality to meet the Project standards are unobtainable locally.
Roofing materials		❍	Unobtainable locally.
Steel fittings		❍	Those with quality to resist corrosion by sea breeze are unobtainable locally.
Hardener		❍	Unobtainable locally.
Lighting equipment		❍	Those with quality to resist corrosion by sea breeze are unobtainable locally

2) Equipment

The equipment procured by the Requested Japanese Assistance of the Project, except for partial components of fishing net, is neither manufactured nor permanently sold in The Gambia. In reference to the components of fishing gear, the products made in South East Asia are sold in Banjur, but the quantity is small, and the choices of size and materials are limited. Accordingly, most of fishermen purchase them in Senegal under this situation. Therefore, the complete unit of fishing net is hardly procurable in The Gambia. Then, it is planned not to procure the equipment under local procurement.

On the other hand, the equipment, which meets the required specifications by the Project and is more advantageous than products of Japan from the aspect of maintenance and repair services, is considered to be procured as the third country's products. However, for the equipment concerned for the Project, there are not the third country's products, manufacturers of which have stable agents in The Gambia and of which maintenance and repair services and sales of spare parts are more advantageous than Japanese products.

Besides, for the following reasons, all equipment for the Project are planned to be procured as Japanese products.

i) As a great number of technicians have had training in Japan, and they instruct many technicians who are hired locally, they are accustomed to handling the fishing gear, outboard engines, refrigeration facilities and generator facilities which are made in Japan.

ii) Though Japanese products were introduced for the past Bakau and Tanji projects, there has been no special problem with their operation. Also, four experts, who were dispatched for these two projects, have provided the technical instructions by using fishing gear, outboard engine, fishing machinery of Japanese products.

iii) Through the projects aforementioned, the Fisheries Department understands the system of contacts with Japanese manufacturers and purchase orders, etc. in regard with maintenance and repair and purchase of Japanese products, and is accustomed to measures and procedures required for management and maintenance after procurement.

Table 2-14 Allocation of procurement of equipment

Equipment	Country	Reasons
Fish Boxes Refrigerated Vehicles, Insulated Vehicle Carrier Vehicle for ice FRP Fishing Canoes ORP Measuring Meter	Japan	These are impossible to be procured locally. No advantage on the third country's products is confirmed.
Outboard Engines • Fishing Gear	Japan	Most of outboard engines utilized by fishermen are the products of Japan and the spare parts can be procured in Gambia, but the spare parts of outboard engines made in European and American products are not sold regularly.
Tools	Japan	General tools are procurable locally, but tools for outboard engines • refrigeration facilities which limit manufacturers and models are not procurable locally. No advantage on the third country's products for the assurance of after service is confirmed.

2-2-4-6 Quality Control Plan

Based on the following policies, quality control for construction work will be supervised for the Project.

1) To instruct the standards and specific values for quality control clearly in the design specifications, etc.

2) To make a quality control plan which instructs method, order, frequency, etc. of control activities, according to each item to be controlled and to utilize the plan to examine causes of malfunctions and ways of treatment during construction in order to assure the designed quality.

3) To confirm each data of quality control quantitatively to satisfy the standard of the quality, by using statistical methods such as check sheets, control chart, histogram, etc., depending on features of quality.

4) To pursue the causes by means of methods such as analysis chart of characteristic factors, and to take a treatment to prevent recurrence, when data of quality control are within the control limit of quality but indicate abnormal signs

5) For the quality control of concrete, to measure slump, temperature, air contents, etc. upon every test of sample, and to conduct experiments for compression strength on one week and four weeks curing. As for concrete strengths, to assure the design quality, by making the control chart based on the data from the experimental results and implementing the quality control as aforementioned.

2-2-4-7 Implementation Schedule

The Project plans to require 4.0 months for the detail design and the implementation to tendering 11 months for the approval of the drawings after the constructor contract and construction terms for the construction and inspection, etc., 5 month for the approval of the drawings and the production of the equipment after tendering, 2.5 month for transportation, and 0.5 month for the inspection and delivery.

Implementation Schedule

	Name of process	1	2	3	4	5	6	7	8	9	10	11	12
Detail Design	Detailed design survey												
	Tender preparation												
	Tendering												
Const-ruction	Preparation												
	Structure work												
	Finishing work												
	Facility work & installation												
	Inspection												
Equipment Procure-ment	Manufacturing												
	Transportation												
	Installation												

2-3 Obligations of Recipient Country

1) To secure the site planned for the construction by the Project, and to evacuate or relocate the existing buildings and obstacles in the Project Site.

2) To acquire the prior permission from EC and FAO to evacuate the existing facilities in the Project Site.

3) To acquire admission and permissions required for the implementation of the Project and the related construction work.

4) To complete procedures immediately to contract of the Banking Agreement and to issue the Authorization to Payment required for the implementation of the Project.

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

6) To exempt Japanese nationals from customs duties, internal taxes and other fiscal levies which will be imposed in The Gambia with respect to the supply of the products and services under the Verified contracts.

7) 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 Gambia and stay therein for the performance of their work.

8) To secure the sites for a temporary yard for construction and field office.

9) To take necessary measures to keep out the irrelevant people in the Project Site during the related construction work.

10) To construct the necessary exterior fences, gates and guard's room in the Project Site.

11) To procure furniture necessary for the offices constructed by the Project.

12) To share the expenditures required for the implementation of the Project but not shared by the Japan's Grant Aid.

13) To complete the Counterpart Fund reserve for the equipment concerned within the settled period and to ensure the system of duty free sales of pre-mix gasoline to artisanal fishermen.

2-4 Project Operation Plan

2-4-1 Organization of Operation and Management at GFC

The operation and management of the facilities and equipment of the Project will be executed by Gunjur Fisheries Center Management Body (GFCMB) under the supervision and instruction of the Fisheries Department. GFCMB consists of Central Committee, Sub Committee, Management Committee and Operation Unit. Central Committee is responsible for the coordination of local issues and Sub Committee is responsible for the coordination of the issues among fisherfolks in the Project Site. Management Committee manages the operation directly for the utilization of facilities and equipment and Operation Unit is engaged in the field work. This Operation Unit consists of 24 members as shown below, but 3 members of those are planned to be dispatched from the Fisheries Department, and the rest of 21 members will be the recruited from existing members of GFCOC and new employees. This system of operation and management at GFC is similar with those at BFC and TFC. The organization of GFCMB is shown in Figure 2-2. The positions of the members and the contents of jobs are summarized in Table 2-15.

Figure 2-2. The organization of GFCMB

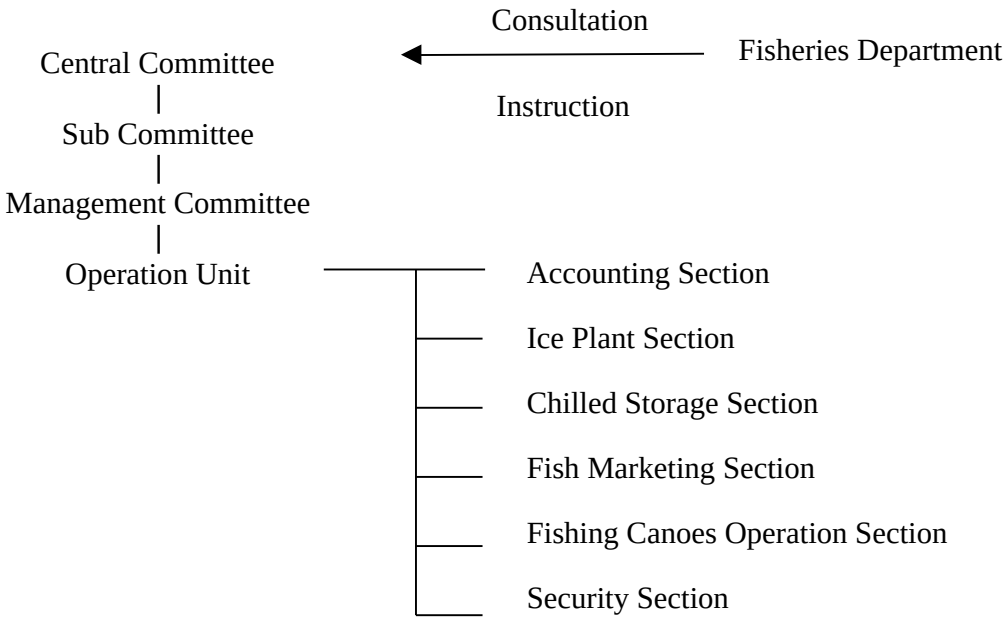


Table 2-15. Personnel of GFCMB for operation

Department	Position	Number		Main jobs
		FD	GFC	
Central Committee			(34)	Coordination between Gunjur community and GFC.
Sub Committee			(14)	Coordination between the Project activities and fisherfolks. Auditing.
Management Committee			3	Overall management of the Project activities. Account settlement of revenues and expenditures. Operation and financial report to Central Committee and FD.
Operation Unit		3	21	
AS	Head cashier		2	Accounting and administration
IPS	Head refrigeration technician	1		Technical responsibility for generator, Ice Plant, Chilled Storage, etc.
	Assistant refrigeration technician		1	In charge of operation and maintenance of ice plant, refrigeration equipment, generator, etc.
	Trainee refrigeration technician		1	In charge of operation and maintenance of ice plant, refrigeration equipment, generator, etc.
	Ice controller		1	In charge of collection of ice charge and usage fees for Chilled Storage.
	Ice assistant		1	In charge of sales of ice.
CSS	Controller		1	Management on storage of fresh fish and usage of fish boxes.
	Assistant		2	Assistance for the above job
FMS	Vehicle supervisor	1		Management on operation of refrigerated vehicles and other vehicles.
	Driver		5	Refrigerated vehicle (3), Insulated vehicle (1), Carrier Vehicle for Ice (1), maintenance.
FCOS	Head gear technician	1		Technical instructor for repair of outboard engines and inventory management
	Assistant		1	Assistance for the above job and in charge of sales of pre-mix gasoline
SS	Security		2	Patrol in the site and management on parking.
	Cleaner		2	Cleaning of facilities, toilets and showers.
	Assistant		2	Collection of usage fees of toilets and showers.

Abbreviations:
FD: Fisheries Department MC: Management Committee
AS: Accounting Section, IPS: Ice Plant Section, CSS: Chilled Storage Section,
FMS: Fish Marketing Section FCOS: Fishing Canoes Operation Section, SS: Security Section

2-4-2 Operation Forms

The operation form will be basically the same form as the form implemented for the Bakau project, and also that form for the Tanji project which follows the form of Bakau project.

The operation form of management, operation and maintenance of the facilities and equipment by the Project is as follows:

(1) Ice plant

1) Users : Banabanas and vendors for transportation for fresh fish,

Refrigerated Vehicle.

2) Operation System

Management	:	Operation and management are executed and ice sales are performed by IPS of Operation Unit.
Operation	:	Direct sale to users by unit of kilogram.
Maintenance	:	Daily maintenance is performed by IPS of Operation Unit and repair work is assisted by FCOS.

(2) Chilled Storage

1) Users	:	Banabanas and vendors for transportation for fresh fish, Refrigerated Vehicle.

2) Operation System

Management	:	Operation is performed by IPS of Operation Unit and inventory is checked by CSS of Operation Unit.
Operation	:	Usage fees are collected per one box at every entrance (the longest storage is 36 hours per one entrance).
Maintenance	:	Daily maintenance is performed by IPS of Operation Unit and repair work is assisted by FCOS.

(3) Fish Handling Place

1) Users:	:	Banabanas and vendors for transportation for fresh fish, Refrigerated Vehicle.

2) Operation System

Management	:	Management for utilization is executed by CSS of Operation Unit.
Operation	:	Buyers of ice and users of Chilled Storage are targeted and no usage fees are charged.
Maintenance	:	Cleaning is assisted by SS of Operation Unit.

(4) Refrigerated Vehicles & Insulated Vehicle

1) Users	:	Banabanas and vendors for transportation for fresh fish

2) Operation System

Management	:	Drivers are hired and management is executed by FMS of Operation Unit.
Operation:	:	Usage fees are collected per one delivery. Users compensate the expenses of fuel and meals for drivers.

Maintenance : Daily maintenance and repair are performed by FMS of Operation Unit with assistance by FCOS, but users are responsible for abnormal exhaustion of spare parts.

(5) Fish Box

1) Users : Users of Chilled Storage, Refrigerated Vehicles and Insulated Vehicle.

2) Operation System

Management : Management on utilization and inventory is executed by CSS of Operation Unit.

Operation : Usage fees are charged by one box per one day.

Maintenance : Deterioration is inspected by FBS of Operation Unit and users are charged for abnormal damage and exhaustion

(6) Insulated Fish Container

1) Users : a) Banabanas at inland unloading points of fresh fish,
b) Fisheries Communities at SFC and KFC,
c) IPS and FMS of Operation Unit

2) Operation System

Management : Management on utilization and inventory is executed by CSS of Operation Unit.

Operation : a) For Banabanas of inland distributions points of fresh fish, usage fees are charged by one container per one day.
b) For Fisheries Communities at SFC and KFC and IPS and FMS of Operation Unit, usage fees are not charged.

Maintenance : Deterioration is inspected by CSS of Operation Unit and users are charged for abnormal damage and deterioration.

(7) Carrier Vehicle for Ice

1) Users : FMS of Operation Unit

2) Operation System

Management : A driver is hired and management is executed by FMS of Operation Unit, and ice transportation job is assisted by the assistant of CSS.

Operation : Planned amount of ice is regularly transported to SFC and KFC and sold to Fisheries Communities. The price of ice is 50 % higher than that of GFC.

Maintenance : Daily maintenance and repair are performed by FMB of Operation Unit with assistance of FCOS.

(8) Smoke House

1) Users : Smoked fish processors usually stayed at GFC.

2) Operation System

Management : Management on utilization is executed by AS of Operation Unit.

Operation : Usage fees are charged by one oven per one day and collected by month.

Maintenance : Deterioration is inspected by AS of Operation Unit and users are charged for abnormal damage and exhaustion.

(9) Dry Fish Storage

1) Users : Dry fish processors usually stayed at GFC and vendors for related transportation.

2) Operation System

Management : Management on utilization is executed by AS of Operation Unit.

Operation : Usage fees are charged by one room per one day and collected by month.

Maintenance : Deterioration is inspected by AS of Operation Unit and users are charged for abnormal damage and deterioration.

(10) Fishing Gear Locker

1) Users : Fishermen usually engaged in fish landing at GFC.

2) Operation System

Management : Management on utilization is executed by AS of Operation Unit.

Operation : Usage fees are charged by one room per one day and collected by month.

Maintenance : Deterioration is inspected by AS of Operation Unit and users are charged for abnormal damage and deterioration.

(11) Toilets & Showers for Fisherfolks

1) Users : Fisherfolks usually engaged in fisheries activities at GFC.
2) Operation System

Management	:	Management on utilization is executed by SS of Operation Unit.
Operation	:	Usage fees are collected per every usage by the assistant of SS.
Maintenance	:	Cleaning is managed by SS of Operation Unit and deterioration of facilities is inspected by AS.

(12) Maintenance Workshop

1) Users : Fishermen usually engaged in fish landing at GFC, etc.

2) Operation System

Management	:	Management on utilization is executed by FCOS of Operation Unit.
Operation	:	Basically, no usage fees are charged for utilization of tools and work space.
Maintenance	:	Deterioration is inspected by FCOS of Operation Unit and users are charged for missing and abnormal breakdown of the repair tools.

(13) Fuel Tank for outboard engines

1) Users : Fishermen usually engaged in fish landing at GFC

2) Operation System

Management	:	Operation is executed by FCOS of Operation Unit and management is executed by AS.
Operation	:	Fuel is supplied with presence of a head gear technician of FCOS and fuel charges are paid to AS.
Maintenance	:	Deterioration is inspected by FCOS.

(14) Generator Facilities, Water Supply Facilities, etc.

1) Users : Operation Unit

2) Operation System

Management & Operation	:	Operation is executed mainly by IPS of Operation Unit.
Maintenance	:	Daily maintenance and repair are performed in collaboration between IPS and FCOS of Operation Unit.

(15) FRP Fishing Canoes, Outboard Engines and Fishing Net

1) Users : Fishermen usually engaged in fish landing at GFC

2) Operation System

Management : Based on the instruction of the Fisheries Department, Management Committee selects appropriate fishermen and designates them captains. Those captains form a group of fishermen (crew). Management Committee hires them and operates the equipment. Field management is executed by FCOS and AS of Operation Unit.

Operation : AS pays 50% of gross profit (fish sales exclusive of fuel cost) to hired fishermen as their fees, and collects 40 % of gross profit as usage fees. The rest 10% is saved by AS for maintenance cost until the end of fiscal year, and the balance of maintenance cost is paid to hired fishermen as their fees at the end of fiscal year. All usage fees collected are saved on the bank account as independent subject for Counterpart Fund reserve.

Maintenance : Deterioration is inspected by FCOS of Operation Unit, and users are charged for abnormal damage and exhaustion, cost of which exceeds the aforementioned maintenance cost.

Price of Ice (unit: Dalasis)

Sales at GFC	Sales at SFC & KFC
1.0 / kg	1.25 / kg

Usage fees of each facility (unit: Dalasis)

Chilled Storage	Refrigerated Vehicle	Insulated Vehicle	Fish Box	Insulated Fish Container
10 / box • usage	1,500 / delivery	200 / delivery	2 / box • day	10 / container • day
Smoke House	Dry Fish Storage	Fishing Gear Locker	Toilet	Shower
1.0 / smoke oven • day	1.5 / room • day	1.5 / room • day	0.2 / usage	0.5 / usage

2-4-3 Estimated Cost for Operation and Maintenance

Though only the initial operating fund will be allocated by the Fisheries Department from the Artisanal Fisheries Development Fund for such expenses as fuel of generators and registration fees of vehicles, all other expenses are planned to be managed as self-supporting basis by CFCMB. The estimated revenues and expenditures of operation of GFC after the implementation of the Project are shown in Table 2-16.

The estimation is based on the following references and the market prices in June, 2001.

1) Labor cost : Salary of personnel estimated by FD
2) Fuel expenses for generators : Market rate in June, 2001
3) Maintenance cost : Based on the actual figures of operation at BFC with including the expenses which a consultant determines necessary.
4) Ice price : Price at BFC and TFC in June, 2001
5) Usage fees : Fees adopted at BFC and TFC basically

Table 2-16 Estimation on revenues and expenditures of operation at GFC

(Unit: D = Dalasis)

Revenues / item	Breakdown	Amount / year
Ice sales	GFC: 7,940 kg / day x D 1.0 / kg x 365 days = 2,898,100 SFC: 420 kg / day x D.1.25 / kg x 365 days = 191,625 KFC: 560 kg / day x D 1.25 / kg x 365 days = 255,500	3,345,225
Chilled Storage	255 boxes / day x 365 days x 0.8 x D10.0 = 744,600	744,600
Refrigerated Vehicle	2 round trips / week x 52 weeks / year x 3 vehicles x D 1,500 / 1 round trip = 468,000	468,000
Insulated Vehicle	2 round trips / day x 365 days x D 200 / 1 round trip = 146,000	146,000
Fish Box	{255 boxes x 365 days x 0.8 + 414 x 6 days / week x 52 weeks / year} x D 2.0 / day = 407,256	407,256
Insulated Fish Container	19 containers x 365 days x D 10.0 / container • day = 69,350	69,350
Smoke Oven	24 smoke ovens x 365 days x 0.8 x D 1.0 / day = 7,008	7,008
Dry Fish Storage	8 rooms x 365 days x 0.8 x D 1.5 / day = 3,504	3,504
Fishing Gear Locker	36 rooms x 365 days x D 1.5 / day = 19,710	19,710
Toilet	12 toilets x 3 usages / hour x 10 hours / day x 365 days x D 0.2 / usage = 26,280	26,280
Shower	328 usages • person / day x (3 / 4) x 365 days x 0.8 x D 0.5 / usage = 35,916	35,916
Total		5,272,849

Expenditures / item	Breakdown	Amount / year
Labor	Salaries for employees Breakdown is shown in attached Table 2-16-1	151,800
Diesel Generators	Fuel : 298 liters / day x 2 units x 365 days x D 7.75 / liter Lubrication oil: 25 liters x 3 units x 6 times / year x D22.0 / liter Maintenance cost: 10 % of the equipment price / year = 150,000 / year	1,685,935 9,900 150,000
Ice Plant	Maintenance cost: 10 % of the equipment price / year = D 525,000 / year	525,000
Chilled Storage	Maintenance cost: 10 % of the equipment price / year = D 150,000 / year	150,000
Refrigerated Vehicle	Tires: D 18,000 x 3 vehicles, lubrication oil: D 5,280 x 3 vehicles, insurance D 40,000 x 3 vehicles, parts: D 37,500 x 3 vehicles	302,340
Carrier Vehicle for Ice	Fuel: 14 liters / day x 365 days x D 9.75 / liter = D 49,800 Tires: D 8,000, lubrication oil: D 2,100, insurance: D 10,000, parts: D 7,500	77,400
Insulated Vehicle	Tires: D 8,000, lubrication oil: D 2,600, insurance: D 15,000, parts: D 7,500	33,100
Cost for Transportation, Communications, Expendables	D 5,000 / month x 12 months	60,000
Maintenance for Buildings	D 15,000 / month x 12 months	180,000
Contingency (10 %)		332,048
Total		3,657,523

Table 2-16-1 Breakdown of labor cost

Section	Position	Number of people	Monthly salary	Amount
MC	Member	3	500.00	18,000.00
AS	Head cashier	2	700.00	16,800.00
IPS	Head refrigeration technician	1	800.00	9,600.00
IPS	Assistant refrigeration technician	1	600.00	7,200.00
IPS	Trainee refrigeration technician	1	500.00	6,000.00
IPS	Ice controller	1	500.00	6,000.00
IPS	Ice assistant	1	450.00	5,400.00
CSS	Controller	1	500.00	6,000.00
CSS	Assistant	2	450.00	10,800.00
FMS	Vehicle supervisor	1	450.00	5,400.00
FMS	Driver	5	400.00	24,000.00
FCOS	Head gear technician	1	500.00	6,000.00
FCOS	Assistant	1	450.00	5,400.00
SS	Security	2	350.00	8,400.00
SS	Cleaner	2	350.00	8,400.00
SS	Assistant	2	350.00	8,400.00
		27		151,800.00

The annual profits are estimated to be 1,615,326 Dalasis from the balance of 5,272,849 Dalasis of the revenues and 3,657,523 Dalasis of expenditures.