

Saint Vincent and the Grenadines

**Ministry of Agriculture, Rural Transformation,
Forestry, Fisheries and Industries**

**THE PREPARTORY SURVEY
FOR
THE PROJECT FOR IMPROVEMENT
OF FISHERY EQUIPMENT AND MACHINERY
IN
SAINT VINCENT AND THE GRENADINES**

August 2014

Japan International Cooperation Agency

System Science Consultants Inc.

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PREFACE

Japan International Cooperation Agency (JICA) decided to conduct the preparatory survey and entrust the survey to System Science Consultants Inc.

The survey team held a series of discussions with the officials concerned of the Government of Saint Vincent and the Grenadines, and conducted a field investigation. As a result of further studies in Japan, 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.

Finally, I would like to express my sincere appreciation to the officials concerned of the Government of Saint Vincent and the Grenadines for their close cooperation extended to the survey team.

August, 2014

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SUMMARY

1. Background of the Project

(1) Background of the Project Request

Fisheries products are favored animal protein by the people of St. Vincent and the Grenadines (hereinafter referred to St. Vincent). However, its per capita fish consumption is at the low standard of about 10 kg/ year. About 500 tons of fish products which is equivalent to about 63% of a total fish landed (about 785 tons in 2011), are imported. Not only a reduction of imported fish products but also a promotion of offshore pelagic fishing and development of unutilized fish resources, and improvement of utilization ratio by quality control of landed fish, are issues for St. Vincent that need to be dealt urgently.

The Government of Japan has supported developing main fish landing sites aiming at efficient fisheries and an effective use of fisheries products in the past 20 years. Currently, approximately 90% of a total fish catch is landed and distributed at these landing sites.

These facilities, especially the cooling equipment that are necessary for quality control of fish, are deteriorated in recent years. As a result, there increases cases that the facilities are losing their original functions and/or experiencing low cooling efficiency. Replacing the cooling equipment is therefore becoming an urgent issue.

On the other hand, despite a need for an increase of fish production, an overfishing in the coastal waters is also pointed out. St. Vincent is therefore in a position to look into appropriate fisheries management for sustainable use of fisheries resources. For increasing fish production, it is necessary to promote further development of offshore resources as well as to procure equipment for fisheries management that would contribute to sustainable use of coastal resources.

In this context, the St. Vincent Government formulated “The Project for Improvement of Fisheries Equipment and Machinery in St. Vincent and the Grenadines” and requested the grant assistance to Japan.

(2) Summary of the Requested Project

The requested contents of the grant assistance are summarized as follows:

- a) Cooling equipment concerned: Replacement of the cooling equipment necessary for six (6) fisheries centers out of eight (8) centers that were constructed by Japanese assistance in the past.
- b) Introduction of the equipment for promoting activities of the Fisheries Division such as a multi-purpose research vessel, monitoring radar for illegal fishing boats, refrigerating vehicles, submerged type Fish Aggregating Device (hereinafter referred to FAD), etc.

(3) Circumstances on the requested Project

1) Natural Conditions

St. Vincent and the Grenadines, lying between the Caribbean Sea and North Atlantic Ocean, is sublime with warm and moist northeast trade winds. The country is composed of St. Vincent Island (the main island) and the Grenadines Islands with about 600 large and small islands. The main island is volcanic. Total land area is 389 km² out of which the main island occupies 344km². The continental

shelf area is 2,081km².

In the tropical oceanic climate, its temperature stays fairly consistent throughout the year. The average yearly temperature is 26.5°C and the average yearly humidity is 77 %.

The average annual precipitation is about 3,800mm in the mountainous areas and 1,500mm in the lowlands. There are rainy (May-November) and dry (December-April) seasons. The most rain falls between June and November including the hurricane season between September and November. The daily rainfall sometimes shows 150mm~200 mm in October when a hurricane comes. Additionally, constant trade wind is blowing by the velocity of around 5m/sec from the east northeast and east.

It is important to note careful planning to avoid potential hurricanes is indispensable for the outdoor works.

2) Socio-environmental Considerations

The focus of proposed project is to replace cooling equipment installed in existing fisheries facilities. The special considerations should be made to the following three areas:

① Scheduling to avoid excess operational interruptions:

The cooling equipment in daily use will have to be temporarily shut down for replacement and installation. The work should be scheduled to avoid peak fishing season and alternative ways to refrigerate marine products during the shutdown period should be arranged.

② Identifying methods to store reusable materials and to dispose waste materials:

The existing cooling equipment will be dismantled for replacement and installation. All parts will be sorted out by the contractor side and left by the construction site in two piles: one as reusable parts and another as waste materials. The St. Vincent side is obliged to make decisions on where to store reusable parts and how to dispose the waste, and follow through the decisions.

③ Ensure practices that maximize recovery and recycling of ozone-depleting substances:

In this project, the Hydro chlorofluorocarbon (hereinafter referred to HCFC) type refrigerants in old equipment will be replaced. Safe removal of HCFC and filling them in cylinders is essential to avoid releasing them in the air.

3) Global Issues

This Project is to replace old cooling equipment which was previously installed by Japan's grant aid. The Project will comply with the *Montreal Protocol on Substances that Deplete the Ozone Layer* in selecting an alternative refrigerant for the replaced equipment.

The Protocol is designed to phase-out or to reduce the production and consumption of HCFC (R22 & etc.) as well as HFC (R404a & etc.) to protect the earth's fragile ozone layer and to slow down global warming. The current international agreement is in the following areas:

*Phase-out of HCFC refrigerants to zero: Year 2020 (2030 for developing countries)

*Freeze the production and consumption of HFC: Undetermined, however, drastic reduction by 2030 (2040 for developing countries) is likely to be agreed.

In this Project, ammonia would be considered as the most realistic refrigerant of all those meets the condition above. However, final decision of refrigerant should be done by the St. Vincent side depending on the age & size of equipment, level of malfunctions and other specific conditions. Following three options will be examined for their choice.

*Convert to ammonia

* Convert to HFC (to avoid ammonia and HCFC refrigerants)

* Keep the current refrigerants (to maintain existing equipment to its mechanical life)

2. Contents of the Project

2-1 Basic Concept of the Project

(1) Overall Goal and Project Purpose

The governmental strategies for fisheries development are clarified in the 2012 budget statement as the “Corporate Plan and Advance Proposal 2013-2015”, including its vision, mid-term strategies and annual top priority action plans.

The fundamental policy for fisheries development is “sustainable utilization and effective development/management of fisheries resources”. The mid-term strategies contain following 13 items:

- 1) On-going liaison with various regional/international organizations regarding stock management, conservation, resource development, etc.
- 2) Strengthening linkages with fisher folk organizations
- 3) Research, assessment and conservation activities on important aquatic resources
- 4) Research on socio-economic circumstances of fishers
- 5) Public awareness and education programs for police, judiciary, schools, etc.
- 6) Training for staff and those within the industry
- 7) Promoting increased utilization of aquatic resources
- 8) Enhancement of data gathering and analysis capabilities
- 9) Exploratory fishing for resource mapping as well as fishing method development
- 10) Continue strengthening the Fisheries Division to deal with present as well as new and emerging issues (high seas fishery management, export certification, etc.)
- 11) Continued upgrading marketing infrastructure to meet international standards
- 12) Development and implementation of a comprehensive strategy for the distribution of fish and fish products locally and internationally
- 13) Development and implementation of a comprehensive management and development and strategic plans for the fisheries sector

As a part of measures to achieve the said overall goals, the mid-term purposes of the Project are; i) to keep up the function of fish distribution infrastructure of existing fisheries centers and ii) to promote proper fisheries management by providing necessary equipment for achieving sustainable use of fisheries resources.

Since the effect of improvement of distribution function that is the main contents of the Project will be shown within short time period, the target year is set as three (3) years after the Project is completed.

(2) Outline of the Project

This Project focuses on six (6) sites among eight (8) fishery centers which Japan has assisted in the past 20 years. In order to achieve the said Project purposes, large fishery equipment (including the cooling equipment of ice machine, etc.) will be replaced and/or upgraded. Additionally, the Project will also introduce such equipment that might contribute to promoting proper fisheries management for sustainable use of fishery resources.

2-2 Overview of the Survey Results and the Project (Operational Plans/Equipment Plans)

(1) Field Survey and Preparation of the Report

- January 11 to February 23, 2014: Field survey
- May 21 to May 22, 2014: Explanation of the Draft Final Report

(2) Principles of Outline Design

The Project is targeted to the previously procured cooling equipment that needs urgent repairs. The landed fish volume remains almost the same with small fluctuations in the past 10 years. The following principles for equipment replacement will be employed:

- All the cooling equipment that has strong impact on St. Vincent's fish distribution and needs urgent repairs.
- New equipment will keep the same capacity and functions of the existing equipment.
- To select refrigerant by reflecting what has been agreed in the Montreal Protocol upon replacing cooling equipment/ machinery. It is desirable to select ammonia as the refrigerant having less impact on ozone depletion and global warming.. However, since the Government of St. Vincent has a view that the choice of ammonia is still immature, R404a, one of HFC, has been selected in this Project because it has longer time allowance for its phasing out according to the Montreal Protocol.
- To conduct thorough technical transfer to the maintenance staff for the safety and sustainable operation of the cooling equipment upon introducing a new refrigerant.

St. Vincent has requested equipment for fisheries management since the coastal resources have been stagnated. The new equipment will be selected according to the following principles:

- Equipment to disperse fishing pressure in coastal fishing
- Equipment that induces synergy effect on this Project and the ongoing project, "Caribbean Fisheries Co-management Project"(hereinafter referred to CARIFICO), by linking both projects

(3) Outline and Project Design

Based on the St. Vincent Government's request, field survey and discussions with the representatives of the country, the Grant Aid is focused on improving inefficient distribution of fisheries products and to disperse excessive fishing pressure in coastal waters by:

- a) Replace cooling equipment/ machineries in 6 locations (Calliaqua, Paget Farm (Bequia Is.), Friendship Bay (Canouan Is.), Clifton (Union Is.), Kingstown, and Owia).
- b) Procure vehicles for using activities of Fisheries Division at Kingstown
- c) Procure submerged FAD in two locations (South and North)

The requested fuel tank and dispenser at Barrouallie is not included in components of the Project because it requires a new location for installation.

Monitoring radar for fishing boats is not included although there are needs for it. Because the Survey team could not find out a fixed annual operation and management plan.

A fisheries research vessel is not included although there is a need for it. One reason is, in accordance with the record submitted to the team, that the previously procured vessel has not been utilized as often as expected. And another is that the team could not find out a fixed operational plan or specifics for using the new vessel.

The importance of artificial reefs for lobster and fish is well understood. However, because its actual manufacturing procedure is equivalent to local construction work and a number requested is big requiring a long period of time, their introduction is excluded from the Project.

(4) Design Summary

The following table shows the list of equipment to be procured.

List of Planned Equipment/machineries

| Site and Planned Equipment | | Components | | Quantity | |
|----------------------------|----------------------|--------------------------------------|---|----------|---|
| Calliaqua | | | | | |
| 1 | Refrigerating system | | | 1 lot | |
| | 1-1 | Ice plant | | 1 lot | |
| | | 1-1-1 | Condensing unit (Compressor and Condenser integrated model) | | 1 |
| | | 1-1-2 | Ice machine (Flake type, 1ton/day) | | 1 |
| | | 1-1-3 | Control panel | | 1 |
| | 1-2 | Compressor | | 1 lot | |
| | | 1-2-1 | Ceiling mounted packaged cooler unit for Cold storage | | 2 |
| | | 1-2-2 | Control panel for Cold storage | | 2 |
| | 1-3 | Ice storage, Chilled room, Cold room | | 1 lot | |
| | | 1-3-1 | Ice storage, 1500mm(L) x 2700mm(W) x 2200mm(CH) t=100mm | | 1 |
| | | 1-3-2 | Chilled room, 1500mm(L) x 2700mm(W) x 2200mm(CH) t=100mm | | 1 |
| | | 1-3-3 | Cold room, 1500mm(L) x 2700mm(W) x 2200mm(CH) t=100mm | | 1 |
| | 1-4 | Equipment for facility | | 1 lot | |
| | | 1-4-1 | Transformer | | 1 |
| | | 1-4-2 | AVR | | 1 |
| Paget farm (Bequia Is.) | | | | | |

| | | | | | |
|------------------------------|----------------------|--|---|-------|---|
| 2 | Refrigerating system | | | 1 lot | |
| | 2-1 | Ice plant | | 1 lot | |
| | | 2-1-1 | Condensing unit (Compressor and Condenser integrated model) | | 2 |
| | | 2-1-2 | Ice storage, 2700mm(L) x 1800mm(W) x 2200mm(CH) t=100mm | | 1 |
| | | 2-1-3 | Ice machine (Flake type, 1ton/day) | | 2 |
| | | 2-1-4 | Control panel | | 2 |
| | 2-2 | Cooling unit for Cold storage | | 1 lot | |
| | | 2-2-1 | Condensing unit (Compressor and Condenser integrated model) | | 2 |
| | | 2-2-2 | Control panel for Cold storage | | 2 |
| | 2-3 | Equipment for facility | | 1 lot | |
| 2-3-1 | | Transformer | | 1 | |
| 2-3-2 | | AVR | | 1 | |
| Friendship Bay (Canouan Is.) | | | | | |
| 3 | Refrigerating system | | | 1 lot | |
| | 3-1 | Ice plant | | 1 lot | |
| | | 3-1-1 | Condensing unit (Compressor and Condenser integrated model) | | 2 |
| | | 3-1-2 | Ice machine (Flake type, 1ton/day) | | 2 |
| | | 3-1-3 | Control panel | | 2 |
| | 3-2 | Compressor | | 1 lot | |
| | | 3-2-1 | Ceiling mounted packaged cooler for Cold storage | | 2 |
| | | 3-2-2 | Control panel for Cold storage | | 2 |
| | 3-3 | Ice storage, Chilled room, Cold room | | 1 lot | |
| | | 3-3-1 | Ice storage, 1800mm(L) x 2700mm(W) x 2200mm(CH) t=100mm | | 1 |
| | | 3-3-2 | Chilled room, 1800mm(L) x 2700mm(W) x 2200mm(CH) t=100mm | | 1 |
| | | 3-3-3 | Cold room, 1800mm(L) x 2700mm(W) x 2200mm(CH) t=100mm | | 1 |
| | 3-4 | Equipment for facility | | 1 lot | |
| | | 3-4-1 | Transformer | | 1 |
| | | 3-4-2 | AVR | | 1 |
| *3 | Subsidiary works | | | 1 lot | |
| | *3a | New machine building | | 1 lot | |
| | *3b | Equipment for water collection system and its installation | | 1 lot | |

| | | | |
|----------------------------|----------------------|---|-------|
| Clifton (Union Is.) | | | |
| 4 | Refrigerating system | | 1 lot |
| | 4-1 | Ice plant | 1 lot |
| | | 4-1-1 Condensing unit (Compressor and Condenser integrated model) | 2 |
| | | 4-1-2 Ice machine (Flake type, 1ton/day) | 2 |
| | | 4-1-3 Control panel | 2 |
| | 4-2 | Compressor | 1 lot |
| | | 4-2-1 Ceiling mounted packaged cooler for Cold storage | 2 |
| | | 4-2-2 Control panel for Cold storage | 2 |
| | 4-3 | Ice storage, Chilled room, Cold room | 1 lot |
| | | 4-3-1 Ice storage, 1800mm(L) x 2700mm(W) x 2200mm(CH) t=100mm | 1 |
| | | 4-3-2 Chilled room, 1800mm(L) x 2700mm(W) x 2200mm(CH) t=100mm | 1 |
| | | 4-3-3 Cold room, 1800mm(L) x 2700mm(W) x 2200mm(CH) t=100mm | 1 |

| | | | | |
|--------------------|-------------------------------|--|-------------|---------|
| | 4-4 | Equipment for facility | | 1 lot |
| | | 4-4-1 | Transformer | 1 |
| | | 4-4-2 | AVR | 1 |
| *4 | Subsidiary works | | | 1 lot |
| | *4a | Replacing large iron doors and flame | | 1 lot |
| | *4b | Equipment for water collection system and its installation | | 1 lot |
| Kingstown | | | | |
| 5-1 | Overhaul of compressor | | | 1 lot |
| 5-2 | Refrigerated van | | | 2 units |
| Owia | | | | |
| 6-1 | Elevated water reservoir tank | | | 1 lot |
| 6-2 | Ice plant | | | 1 lot |
| | 6-2-1 | Ice machine (Flake type, 1ton/day) | | 1 |
| | 6-2-2 | Evaporative condenser | | 1 |
| | 6-2-3 | Compressor for ice machine | | 1 |
| | 6-2-4 | Control panel | | 1 |
| | 6-2-5 | Equipment for facility | | 1 lot |
| | | 6-2-5-1 | AVR | 1 |
| *6 | Subsidiary works | | | 1 lot |
| | *6a | Exchanging fuel supply equipment | | 1 lot |
| | *6b | Replacing incoming panel | | 1 lot |
| Fisheries Division | | | | |
| 7 | Submerged-type FAD | | | 2 lots |

*: Subsidiary Work

3 Work Period and Cost Estimate

(1) Period

It is anticipated to take 4 months for consultants to prepare the detail design after E/N and G/A signed off. The contractor is verified by the Japanese Government through an official tendering process. Then, contracted contractor starts procurement tasks and consultants start procurement supervision. They need 11 months to complete their tasks.

(2) Cost Estimate

Estimated cost borne by the Government of St. Vincent is approximately EC\$ 117.9 thousand, for the accomplishment of this Project by the Government of Japan.

4 Project Implementing Agencies

The responsible government body of the Project is the Ministry of Agriculture, Rural Transformation, Forestry, Fisheries and Industries (Ministry of Agriculture: MOA), and the implementing agency is the Fisheries Division (FD) under MOA. The MOA takes care of Banking Arrangement (B/A), Authorization to Pay (A/P), etc. The FD is in charge of the operation and management of completed facilities and installed equipment.

5 Management System

Cooling equipment that engaged to be replaced is restricted to the existing equipment/ machineries. Therefore, the same operation and maintenance structure will be applied before and after the Project.

Capital Kingstown's fisheries complex is the main fish distribution center in this country, and managed by NFML (National Fish Marketing Ltd.). The cooling equipment of the facility have been kept in good condition by the maintenance staff.

In case of the facilities of Calliaqua, Clifton and Owia, maintenance staff of the FD are directly engaging in.

In case of Paget Farm and Friendship Bay, those facilities are currently not operated. The FD has decided to operate directly for Paget Farm and to give a lease for Friendship Bay by dispatching the maintenance staff in the form of a circuit basis.

Refrigerant of above mentioned facilities except Owia will be converted from R22 to R404a by the Project (Owia has been using R404a since its beginning.).

It is anticipated these facilities will be well maintained even after the renovation by the Project through providing sufficient technical training during the installation works.

6 Project Evaluation

As explained below, the relevance and the effectiveness of the Project are anticipated to be high.

(1) Relevance

1) Contribution to achieve overall goals of the mid/long term fisheries development plan

The governmental strategies for fisheries development are clarified in the 2012 budget statement as the "Corporate Plan and Advance Proposal 2013-2015", including its vision, mid-term strategies and annual top priority action plans.

The fundamental policy for fisheries development is "sustainable utilization and effective development/ management of fisheries resources". The mid-term strategies contain 13 items in which include development of comprehensive distribution strategies of fisheries products, improvement of fisheries infrastructure, implementation of various surveys for appropriate resources utilization, etc.

The Project aims to improve and maintain the function of fisheries distribution facilities that have been built by Japanese Grant Aid in the past, and to contribute to sustainable use of fisheries resources through promoting proper fisheries management, which serves to achieve the government policy for fisheries development stated above.

2) Relevance to policies/guideline of assistance by the Government of Japan

In the Assistance Policy to St. Vincent (April, 2014) by the Government of Japan, the fisheries sector is stated as one of important assistance fields (midterm target), and is commented to continue the cooperation for its sustainable development and management of fisheries. In this regards, this Project is relevant to the assistant policy of the Government of Japan, and high in appropriateness since the project aims to improve the fish distribution of Saint Vincent and the Grenadines and to promote its fisheries management.

(2) Effectiveness

1) Quantitative impact

Most cooling equipment targeted in the Project is ready to stop functioning due to salt damages as well as aging deterioration. Therefore, the concrete effect of replacing cooling equipment is the same as prolonging the function of the equipment for another 15 years.

In developing countries, the cooling methodology in fishing/distribution exclusively relies on ice. The effect of replaced cooling equipment can be evaluated by whether they can supply enough ice or not.

Project objective sites have similar fishing patterns except the one in Owia. Cooling equipment is small-scale and have similar capacity for ice production. Therefore, Calliaqua, located near the capital city of Kingstown, is considered to be an appropriate target site for the evaluation.

To quantitatively evaluate whether replaced cooling equipment are operated effectively or not, we have to figure out how much ice is used for monthly landed fish. In general, cooling effectiveness of fresh fish is assessed by ice/fish ratio = 1 as a standard. However, the ice/fish ratio might be under 1 in the project sites because this standard of preserving freshness of fish is not prevalent among fishermen and also the distribution time is relatively short for it is a small country. If it is the case, the baseline at the time of replacement cannot be determined unless actual ice/fish ratio is measured in each site, which unfortunately has to be left in future.

If the ice/fish ratio is actually measured in each site, quantitative measurements can be possible by the following methodologies (See the Table below):

- Calculate monthly volume of produced ice by monthly cumulative operating hours of the cooling equipment
- Calculate average monthly ice/fish ratio by monthly landed fish volume
- Compare the monthly ice/fish ratio with the baseline ratio measured at the time of replacement of the cooling equipment

Quantitative Effect of the Project

| Quantitative Effects | Baseline Value (2014) | Target Value (2018) [3 years after completion] |
|--|-----------------------|---|
| Ice/fish ratio (Calliaqua) | α | $\alpha \leq$ |
| Registered number of fishermen operating at the point of submerged FAD as their fishing ground | No persons/year | Total 500 persons/ year |

The following preconditions need to be met for quantitative evaluation of the project effectiveness.

Preconditions :

- a) The maintenance staff should record operating hours in the daily log book. The operating hours should be determined by the cumulative operating time meter installed on the cooling equipment. In addition, the total operating hours should be recorded every month.
- b) The landed volume recording staff should keep the total volume of landed fish every month.
- c) An ice making machine with its capacity of 1 ton/day produces 1 ton of ice during 19.2 operating hours (80 % of 24 hours).

2) Qualitative Effects

The following Table shows qualitative effects of equipment/ machinery by this Project.

Qualitative Effects of Equipment at each Project site

| Site | Project component | Effects |
|---------------------------------|--|--|
| Calliaqua | To replace ice plant, cold storage and chilled room To convert the refrigerant from R22 to R404a | By extending existing cooling capacity for 15 more years, stable supply of fresh fish to surrounding areas will be continued. Ice will continue to be supplied. |
| Paget Farm (Bequia Is.) | To replace ice plant and cold storage To convert the refrigerant from R22 to R404a | By recovering functions of the facility, supply of fresh fish to local areas and the main island will be restored. Ice will continue to be used. |
| Friendship Bay (Canouan Is.) | To replace ice plant, cold storage, and chilled room To convert the refrigerant from R22 to R404a | Same as above |
| Clifton (Union Is.) | To replace ice plant, cold storage and chilled room To convert the refrigerant from R22 to R404a To repair a water tower and large iron door | By recovering functions of the facility, supply of fresh fish to local areas will be restored. Ice will continue to be used. |
| Kingstown | To supply spare parts of existing compressor To replace refrigerating vans | The supply of fresh fish to inland areas will continue to be maintained. |
| Owia | To replace a water reservoir tank (including a sedimentation tank), To replace ice machine and condenser To replacement and relocate fuel supply equipment To replace an incoming panel | Minimum function for a fish landing site will continue to be secured by restoring the supply of water, fuel and ice. |
| Offshore | To introduce submerged-type FAD | Thoughts for sharing resources will be grown among fishermen and it enlightens them for natural resource management |

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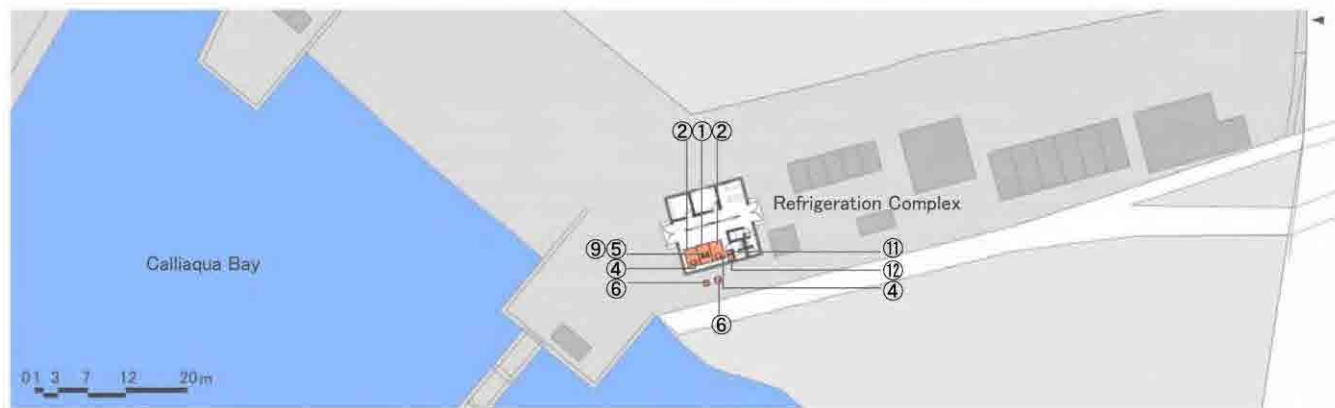
LOCATION MAP



PERSPECTIVE



6. Owia



1. Calliaqua



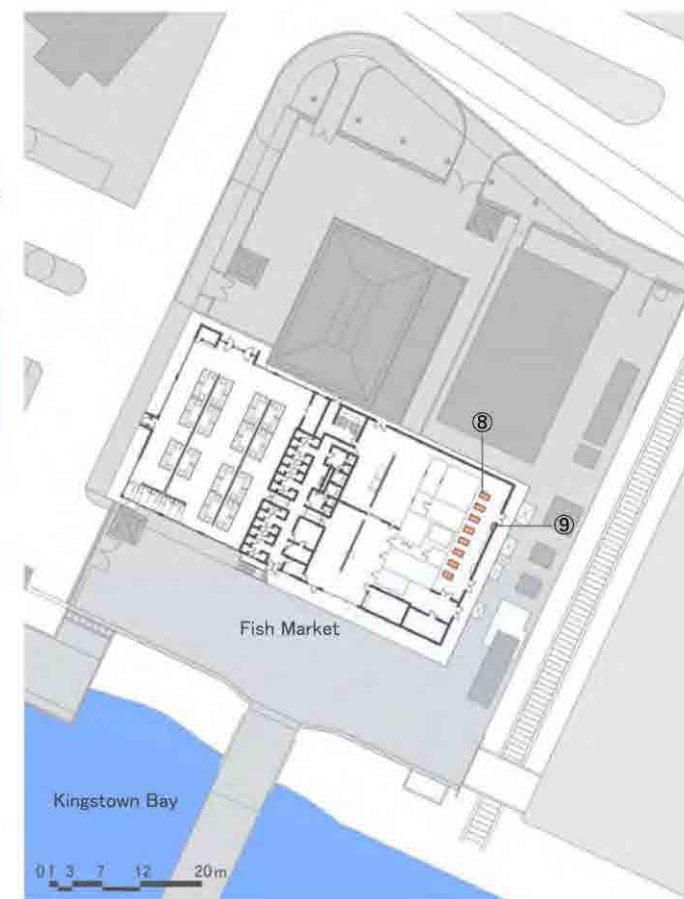
3. Friendship Bay/ Canuan Island



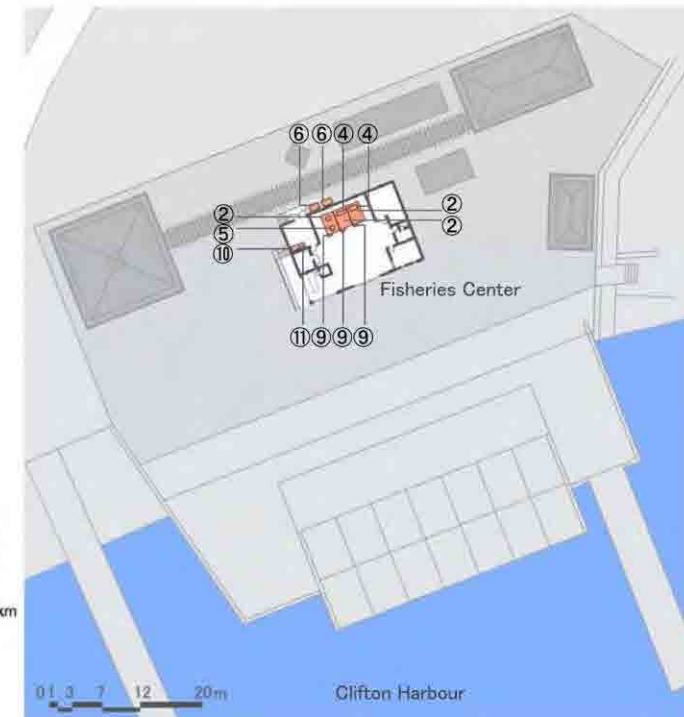
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ABBREVIATIONS

| | |
|----------|---|
| A/ P | Authorization to Pay |
| B/A | Banking Arrangement |
| CARICOM | Caribbean Community |
| CARIFICO | Caribbean Fisheries Co-Management Project |
| CIDA | Canada International Development Agency |
| CFC | Chlorofluorocarbons |
| EEZ | Exclusive Economic Zone |
| E/N | Exchange of Notes |
| FAD | Fish Aggregating Device |
| FD | Fisheries Division |
| G/A | Grant Agreement |
| GDP | Gross Domestic Product |
| HCFC | Hydro Chlorofluorocarbons |
| HFC | Hydro Fluorocarbons |
| JICA | Japan International Cooperation Agency |
| MOA | Ministry of Agriculture, Rural Transformation, Forestry, Fisheries and Industries |
| MPAs | Marine Protected Areas |
| NFML | National Fish Marketing Ltd |

Chapter 1 Background of the Project

Chapter 1 Background of the Project

1-1 Background of the Request of Grant Aid

(1) Background of the Request

Fisheries products are favored animal protein by the people of St. Vincent and the Grenadines (hereinafter referred to St. Vincent). However, its per capita fish consumption is at the low standard of about 10 kg/ year. About 500 tons of fish products which is equivalent to about 63% of a total fish landed (about 785 tons in 2011), are imported. Not only a reduction of imported fish products but also a promotion of offshore pelagic fishing and development of unutilized fish resources, and improvement of utilization ratio by quality control of landed fish, are issues for St. Vincent that need to be dealt urgently.

The Government of Japan has supported developing main fish landing sites aiming at efficient fisheries and an effective use of fisheries products in the past 20 years. Currently, approximately 90% of a total fish catches are landed and distributed at these landing sites.

These facilities, especially the cooling equipment/machineries that is necessary for quality control of fish, are deteriorated in recent years. As a result, there increases cases that the facilities are losing their original functions and/or experiencing low cooling efficiency. Replacing the cooling equipment is therefore becoming an urgent issue.

On the other hand, despite a need for an increase of fish production, an overfishing in the coastal waters is also pointed out. St. Vincent is therefore in a position to look into appropriate fisheries management for sustainable use of fisheries resources. For increasing fish production, it is necessary to promote further development of offshore resources as well as to procure equipment for fisheries management that would contribute to sustainable use of coastal resources.

In this context, the Government of St. Vincent formulated “The Project for Improvement of fisheries equipment / machineries in St. Vincent” and requested the grant assistance to Japan.

(2) Summary of the Request

The requested contents of the grant assistance are summarized as follows:

- a) Cooling equipment concerned: Replacement of the cooling equipment necessary for six (6) fisheries centers out of eight (8) centers that were constructed by Japanese assistance in the past.
- b) Introduction of the equipment for promoting activities of the Fisheries Division such as a multi-purpose research vessel, a monitoring radar for illegal fishing boats, refrigerating vehicles, submerged FAD, etc.

1-2 Natural Conditions

St. Vincent and the Grenadines, lying between the Caribbean Sea and North Atlantic Ocean, is sublime with warm and moist northeast trade winds. The country is composed of St. Vincent Is. (the main island) and the Grenadines Islands with about 600 large and small islands. The main island is volcanic. Total land area is 389 km² out of which the main island occupies 344km². The continental shelf area is 2,081km² rich in small pelagic, demersal fishes, shells and lobsters, most of which is located in the Grenadines islands areas. The offshore water is believed to have abundant fish stocks as it is a migratory area of large pelagic.

In the tropical oceanic climate, its temperature stays fairly consistent throughout the year. The average

yearly temperature is 26.5°C and the average yearly humidity is 77 %. The temperature gets cooler enough in the mornings and evenings.

The average annual precipitation is about 3,800mm in the mountains and 1,500mm in the lowlands due to northeast trade winds and the Soufriere Mountain. There are rainy (May-November) and dry (December-April) seasons. The most rain falls between June and November including the hurricane season between September and November. In capital Kingstown, located in the southern island, the average yearly precipitation is 2,066 mm. In North Windward, located in northern island, the amount of rainfall is approximately 1.5 times more than Kingston: the average monthly precipitation is about 245mm and 3,045 mm yearly. There is not much difference in average yearly temperature between Kingston and North Windward. In the past 5 years in particular, the days with more than 10mm-rainfall a day reaches to 66 days on average in the North Windward region. The daily rainfall sometimes shows 150mm~200 mm in October when a hurricane comes in the rainy season.

Additionally, constant trade wind is blowing by the velocity of around 5m/sec from the east. The wind from east northeast and east blows constantly all year round.

The proposing project will not be impinged by the weather conditions as it is done mostly indoor operations to replace cooling equipment. It is important to note, however, careful planning to avoid potential hurricanes is indispensable for the outdoor works for subsidiary facilities, etc.

1-3 Socio-environmental Considerations

The focus of proposed Project is to replace the cooling equipment previously installed in existing fisheries facilities. During the work, the special considerations should be made to the following three (3) areas:

1) Scheduling to avoid excess operational interruptions:

The cooling equipment in daily use will have to be temporarily shut down for replacement/repair of the equipment/machineries. The work should be scheduled to avoid peak fishing season, and alternative ways to refrigerate fisheries products during the shutdown period should be arranged.

2) Identifying methods to store reusable materials and to dispose waste materials:

The existing cooling systems will be dismantled for repair and installation. All parts will be sorted out by the contractor and left the construction site in two piles: one as reusable parts and another as waste materials. The St. Vincent side is obliged to make decisions on where to store reusable parts and how to dispose the waste, and follow through the decisions.

3) Ensure practices that maximize recovery and recycling of ozone-depleting substances:

In this Project, the Hydro chlorofluorocarbons (hereinafter referred to HCFC) type refrigerants in existing equipment will be replaced by HCFC substitutes such as hydro fluorocarbons (hereinafter referred to HFC) or ammonia. Safe removal of HCFC type refrigerants and filling them in cylinders is essential to avoid releasing the refrigerant in the air.

1-4 Global Issues

This Project is to replace the existing cooling equipment which was previously installed by Japan's grant aid assistance. We will comply with the *Montreal Protocol on Substances that Deplete the Ozone Layer* in selecting an alternative refrigerants of new equipment.

The Protocol is designed to phase-out or to reduce the production and consumption of HCFC (R22 & etc.) as well as HFC (R404a & etc.) to protect the earth's fragile ozone layer and to slow down global warming. The current international agreement is in the following areas:

- * Phase-out of HCFC refrigerants to zero: Year 2020 (2030 for developing countries)
- * Freeze the production and consumption of HFC: Undetermined, however, drastic reduction by 2030 (2040 for developing countries) is likely to be agreed.

In this Project, ammonia would be considered as the most realistic refrigerant of all those meets the condition above. However, final decision of refrigerant should be done by the St. Vincent side depending on the age & size of equipment, level of malfunctions and other specific conditions. Following three options will be examined for their choice:

- * Convert to ammonia
- * Replace to HFC (to avoid ammonia and HCFC refrigerants)
- * Keep the current refrigerants (to maintain existing equipment to its mechanical life)

Chapter 2 Contents of the Project

Chapter 2 Contents of the Project

2-1 Basic Concept of the Project

(1) Overall Goal and Project Purpose

The governmental strategies for fisheries development are clarified in the 2012 budget statement as the “Corporate Plan and Advance Proposal 2013-2015”, including its vision, mid-term strategies and annual top priority action plans.

The fundamental policy for fisheries development is “sustainable utilization and effective development/ management of fisheries resources”. The mid-term strategies contain following 13 items:

- 1) On-going liaison with various regional/international organizations regarding stock management, conservation, resource development, etc.
- 2) Strengthening linkages with fisher folk organizations
- 3) Research, assessment and conservation activities on important aquatic resources
- 4) Research on socio-economic circumstances of fishers
- 5) Public awareness and education programs for police, judiciary, schools, etc.
- 6) Training for staff and those within the industry
- 7) Promoting increased utilization of aquatic resources
- 8) Enhancement of data gathering and analysis capabilities
- 9) Exploratory fishing for resource mapping as well as fishing method development
- 10) Continue strengthening the Fisheries Division to deal with present as well as new and emerging issues (high seas fishery management, export certification, etc.)
- 11) Continued upgrading marketing infrastructure to meet international standards
- 12) Development and implementation of a comprehensive strategy for the distribution of fish and fish products locally and internationally
- 13) Development and implementation of a comprehensive management and development and strategic plans for the fisheries sector

As a part of measures to achieve the said overall goals, the mid-term purposes of the Project are i) to keep up the function of fish distribution infrastructure of existing fisheries centers and ii) to promote proper fisheries management by providing necessary equipment for achieving sustainable use of fisheries resources.

Since the effect of improvement of distribution function that is the main contents of the Project will be shown within short time period, the target year is set as three (3) years after the Project is completed.

(2) Outline of the Project

This Project focuses on six (6) sites among eight (8) fishery centers which Japan has assisted in the past 20 years. In order to achieve above Project purposes, large fishery equipment (including the cooling equipment of ice machines, etc.) will be replaced and/or upgraded. Additionally, the Project will also introduce such equipment that might contribute to promoting proper fisheries management for sustainable use of fishery resources.

The refrigerant conversion from HCFC to HFC will be conducted by the Project in accordance with the phase-out year stated in the Montreal Protocol. At the sites where the cooling equipment is replaced, training on safe operation and maintenance and other necessary technical transfer will be incorporated in the work plans.

2-2 Outline Design of the Japanese Assistance

2-2-1 Design Policy

(1) Basic Policy

The Project is targeted to the previously procured cooling equipment that needs urgent repairs. The landed fish volume remains almost the same with small fluctuations in the past 10 years. The following principles for equipment replacement will be employed:

- All the cooling equipment that has strong impact on St. Vincent's fish distribution and needs urgent repairs is targeted.
- New equipment will keep the same capacity and functions of the existing equipment.
- To select refrigerant by reflecting what has been agreed in the Montreal Protocol upon replacing cooling equipment/ machinery. It is desirable to select ammonia as the refrigerant having less impact on ozone depletion and global warming. Since the Government of St. Vincent has a view that the choice of ammonia is still immature, R404a, one of HFC, has been selected in this Project because it has longer time allowance for its phasing out according to the Montreal Protocol.
- To conduct thorough technical transfer to the maintenance staff for the safety and sustainable operation of the cooling equipment upon introducing a new refrigerant.

St. Vincent has requested equipment for fisheries management since the coastal resources have been stagnated. The new equipment will be selected according to the following principles:

- Equipment to disperse fishing pressure in coastal fishing
- Equipment that induces synergy effect on this Project and the ongoing project, "Caribbean Fisheries Co-management Project" (hereinafter referred to CARIFICO), by linking both projects

(2) Design Policy on Installation of Equipment/machineries

1) Policy for natural and environmental conditions

Target sites are the sites where fisheries facilities had been constructed by the Japanese assistance in the past. Since the survey on natural conditions had been conducted when these facilities were built, it is not conducted under this survey. Natural conditions of target sites have been applied referring to the past survey reports. They are shown in Table 2.1.

Table 2.1 Natural and Environmental Conditions of Each Target Site

| Items | | Calliaqua | Kingstown | Owia | Bequia Is. | Canouan Is. | Union Is. |
|--|-----------|---|-------------------------------------|-----------------------------------|---|--------------------------------------|--------------------------------------|
| Temperature | °C | 29.0~33.0 / 21.0~23.5 (Max. Temp./ Min. Temp.) | | | 33.5(Sep.) 18.0(Jan.) | - | 33.5(Sep.) 18.0(Jan.) |
| Humidity | % | 70.1~81.0 | | | Av.78 | - | Av. 78 |
| Annual Rainfall | mm | 2,066 (Southern part/ main island) 3,420(Northern part/ main island) | | | 1,665 Max. 20mm/h | 1,001 | 999 Max. 20mm/h |
| Wind direction/ Wind speed (m/s) | | ENE~E/2.5~15.0 | | | NE~SE 12~18 | - | NE~SE 12~18 |
| Seismic force (horizontal seismic force) | | 0.14 (Building Standard Act in Japan) | | | | | |
| Soil property | Surface | fine sand | fine sand | - | coral sand, partially clay, and silt | coral sand, partially clay, and silt | coral sand, partially clay, and silt |
| | Base-ment | coral crushed sand | - | - | consolidated sandstone with silt and clay/ gravel | consolidated sand with stones | 7onsolidate sand with stones |
| Remarks | | - | - | - | - | measurement and soil test required | - |
| Reference | | BDR(1996) Completion drawing (1998) | BDR(1993) Completion drawing (1994) | BDR (2006) Detailed Design (2009) | BDR(1993) | BDR(1996) Completion drawing (1998) | BDR(1993) |

Remarks: BDR; Basic Design Report (reported years are noted in brackets)

St. Vincent is located along the path of hurricane. Extreme rainfall is also expected due to the global warming effect (In December 2013, St. Vincent experienced landslide and some of the main roads were closed due to wash. The pipeline of the river dam was also partially damaged.). The work plan therefore shall well be developed considering such weather conditions.

2) Policy for socio-economic conditions

When the Project carries out its works, especially for replacing cooling equipment/ machinery, the operation of existing equipment/ machinery needs to be shutdown. In other word, cooling equipment/ machinery will not be accessible during the replacing work. Therefore, the work shall be conducted during the lean fishing season. At the same time, by avoiding overlap of work schedules for each site, accessibility to other fisheries facilities shall be insured.

3) Policy for procurement/ construction conditions

a) Equipment/ machinery

The main equipment/machinery/ machinery of the Project is cooling equipment/ machinery which is to be procured from abroad. As for procurement of a compressor, the Project shall consider procuring the open types that are popular in Japan and are comparatively easier for repairing and maintaining locally instead of semi-closed types that are popular in Europe and the United States and are difficult to be repaired and maintained locally.

Regarding the submerged-type FAD, the Project shall procure from Japan since the product with

10 year guarantee is only available in Japan.

b) Subsidiary works

Since subsidiary facilities would be dealt by the local contractors, its equipment/ machineries are basically of those locally available applying conventional construction methods that local contractors are able to handle.

i) Policy for construction methods for subsidiary works

Considering structures of general buildings in the locality, reinforced concrete and concrete block buildings can be constructed conventionally without any trouble. Plastering cement mortar is also a commonly used construction method in the area. Applying reinforced concrete for the subsidiary building with block walls and salinity tolerant colored steel sheet for the roof is thought to be appropriate as a basic specification.

ii) Policy for recruiting local contractors

By observing the sites, it is assessed that there is no problem in technical capacity among local contractors in case of construction works handling reinforced concrete including reinforcing bar arrangement, formwork and concrete placement work. Although some attention on covering depth of concrete on the reinforcements and intervals of reinforcement bar is necessary, local workers are considered to have enough skills for conducting the above-mentioned works.

Local workers, however, are not much experienced with processing skills on complicated heavy steel frame materials except handling light materials. Therefore, the Project will secure either the technical capacity or the supply capacity of labor force not only from the domestic contractors but also from those of the CARICOM (Caribbean Community).

4) Policy for operation and maintenance

The major issue that was faced during operation and maintenance of Japanese cooling equipment installed in the past is difficulty in spare parts procurement. In some cases, spare parts procurement took several months. The Project will, therefore, secure extra spare parts for the core equipment/ machinery made in any countries.

On the other hand, the submerged-type FAD basically does not require maintenance once it is installed. It is considered that there is no big obstacle in procuring spare parts for vehicles such as a cooling truck, etc.

5) Policy for setting up equipment grade

Since the main component of the Project is the replacement of existing large-scale equipment/ machineries assisted by Japan's Grand Aid in the past, therefore, the grade for equipment/ machineries shall be the same with the existing equipment grade.

6) Policy for procurement method and construction period

Considering 3) procurement conditions and 5) equipment grade, the main equipment/ machineries to be procured shall basically be made in Japan. The Project will secure spare parts that are locally not available.

Since the landed volume in the peak fishing season (Jan. to May) is approximately 1.6 times more than that of the lean fishing season (Oct. to Dec.) in St. Vincent, the construction period shall be designed during the lean fishing season (July to Dec.).

2-2-2 Basic Plan (Equipment Plan)

(1) Requested Contents

Requested equipment/ machineries are broadly classified into 2 categories. They are: i) replacing cooling equipment/machineries; and ii) introducing necessary equipment for appropriate fish distribution and fisheries management. The list of requested items is shown in Table 2.2.

Table2.2 List of Requested Equipment/ machineries

| Site/ Category | | | Name of Equipment/ machineries (replacement/ newly introduced/ repair) | Quantity |
|----------------|------------------------------|----------------------|---|-----------------|
| 1 | Calliaqua | | | |
| | 1-A | Cooling system | Ice plant (1ton/day), cold storage, chilled room (refrigerant: to be changed from R22 to R404a) (replacement) | 1 set |
| 2 | Paget farm (Bequia Is.) | | | |
| | 2-A | Cooling system | Ice plant (1ton/day x 2units), cold storage (-10℃), distribution panel (refrigerant: to be converted from R22 to R404a) (replacement) | 1 set |
| 3 | Friendship Bay (Canouan Is.) | | | |
| | 3-A | Cooling system | Ice plant (2ton/day), cold storage, chilled room (refrigerant: to be converted from R22 to R404a) (replacement) | 1 set |
| | 3-B | Subsidiary works | Water collecting system (repaired) | 1 set |
| 4 | Clifton (Union Is.) | | | |
| | 4-A | Cooling system | Ice plant (1ton/day x 2units) (refrigerant: to be converted from R22 to R404a) (replacement) | 1 set |
| | 4-B | Subsidiary works | Large iron door (repair) | 1 set |
| | 4-C | Subsidiary works | Concrete water tower/ water collecting system (repair) | 1 set |
| 5 | Kingstown | | | |
| | 5-A | Cooling system | Spare parts for existing cooling machines (repair) | 1 set |
| | 5-B | Fish distribution | Refrigerated van with loading capacity of 500kg (replacement) | 2 vehicles |
| 6 | Barrouallie | | | |
| | 6-A | Fisheries equipment | Fuel tank and dispenser (replacement) | 1 set |
| 7 | Owia | | | |
| | 7-A | Cooling system | Compressor, refrigerant receiver tank, condenser, ice machine, driving motor (replacement) | 1 set |
| | 7-B | General equipment | Water reservoir tank (replacement) | 1 set |
| | 7-C | Fisheries equipment | Fuel supply equipment (replacement) | 1 set |
| | 7-D | General equipment | Incoming panel (replacement) | 1 set |
| 8 | Fisheries Division | | | |
| | 8-A | Fisheries management | Radar control center: Radar, microwave, AIS receiver, CCTV camera, weather station, power supply unit, UPS and tower (new introduction) | 1 set |
| | 8-B | Fisheries management | Radar monitoring station (Union Island): same as above (new introduction) | 1 set |
| | 8-C | Fisheries management | Submerged-type FAD (new introduction) | 2sets |
| | 8-D | Fisheries management | Multi-purpose boat (replacement) | 1 set |
| | 6-E | Fisheries management | Artificial reefs for lobster and for fishes (new introduction) | 30 sets each |

(2) Plan of Equipment

As a result of the field survey at objective sites, the Project assessed the needs of replacing cooling equipment as it is over their mechanical life span and ready for replacement despite its good maintenance except the cases at Paget Farm (Bequia Is.) and Friendship Bay (Canouan Is.). Followings are the results of assessment:

- 1) All the cooling equipment/machineries at Calliaqua, Paget Farm (Bequia Is), Friendship Bay (Canouan Is.) and Clifton (Union Is.), are to be replaced caused by damages of heavy rust and deterioration of mechanical life span. Current cooling capacities are to be followed.

Along replacing above explained facilities, the current refrigerant is to be converted from HCFC (R22) to HFC (R404a or others). It is ideal to exchange the refrigerant to ammonia. However, the Government of St. Vincent considers that they are not yet ready to use ammonia, as their experience is limited.

The rain water collection systems at Friendship Bay and Clifton are under malfunction due to deterioration of the materials. At Clifton, the large iron door of the main building facing the sea and the water tower are damaged by deterioration. The Project will repair these subsidiary facilities for maintaining functions of the cooling equipment.

On the other hand, though the Fisheries Division has renovated an existing fisheries facilities by their own efforts in order to respond to the requirement of HACCP at Paget Farm (Bequia Is.), its cooling system was broken due to lack of adaptation to electrical instability and its function could not be restored (The ice plant is malfunctioning due to deterioration). The functional recovery of this renovated facility as a whole is not targeted by the Project. However, the survey assessed the necessity of restoring fish distribution system by engaging replacing the ice plant and cold storage (-10°C) for fishing activities in this island.

In a case of Friendship Bay (Canouan Is.), the existing facility was leased to a private sector and had been smoothly operated. However, its operation has stopped when a person in charge suddenly moved to the UK. At the same time, the survey assessed the cooling equipment is severely deteriorated as it reached to its mechanical life span. The Fisheries Division is currently preparing to take over its operation for the time being. Hence there will be no problem in its operational structure, the Project decided to replace its facilities.

- 2) Despite its aging, the cooling equipment/machineries (refrigerant: R22) at Kingstown, the biggest fisheries complex in St. Vincent, are well maintained. The survey assessed that the equipment/machineries can be maintained for a while and only an overhaul shall be needed (Over all replacing of the cooling equipment/machineries is expected in 2020 as it is the year for the usage limit of R22. The refrigerant will also be converted to other ones at that time.). Therefore, the Project supplies only spare parts for the overhaul of existing compressors and the controller in Kingstown.

Existing two (2) refrigerating vans for fish distribution are to be replaced due to their severe deterioration.

- 3) Though the fisheries center at Owia is still new six (6) years after its completion, its cooling equipment and other subsidiary facilities are heavily corroded by electric corrosion combined with

sea water splash and strong sea wind. Following four (4) items are essential to be repaired by the Project:

- i) Replacing elevated water reservoir tank, ii) replacing/relocating the fuel supply equipment, iii) replacing the incoming panel and iv) replacing ice making equipment
- 4) On the other hand, floating type FADs have been introduced under the on-going technical cooperation project, CARIFICO, and recognition towards FAD by fishers is being promoted. While the life span of a floating type FAD is half year to 2 years that of a submerged-type FAD is approximately for 10 years. Since its introduction is considered as an effective tool for the Fisheries Division to understand possible fishing styles and fisheries management for future, a submerged-type FAD will be included in the Project plan. Two submerged-type FADs are requested: one to be located in the east and another to be in the west of the main island. The Project assesses such request is appropriate and useful in understanding the effect of their introduction.

Following requested items have not been planned in this Project:

- 1) Despite the need for a fuel tank and dispenser at Barrouallie is recognized, the requests will not be responded under this Project. This is because the survey concluded a necessity of a new location for their installation due to a number of constraining factors including: intruded seawater; impacts on neighboring facilities; limited spacing and others.
- 2) Despite the need for a monitoring radar for illegal fishing boats is recognized, this request will not be responded under the Project. There are several reasons: The survey team could not find out an annual operation and/or management plan; also no discussion has been taken place regarding the possibility of coordination with the Coast Guard which currently implements radar monitoring; and they could not get some documents and/or information about measures to be taken against illegal fishing boats. The survey concluded that the plan for radar operation needs to be developed before introducing actual equipment.
- 3) Though the significance of introducing a fisheries research boat is understood, the operation rate of the current research boat (Blackjack) is low (approximately 10 times per year) and it is unclear how often the boat is to be used when a new boat is introduced as its annual operation plan is not explicit. Therefore, replacing a research boat is excluded from the Project plan.
- 4) The importance of artificial reefs for lobster and fish is well understood. However, because its actual manufacturing procedure is equivalent to local civil works and a number requested is big requiring a long period of time, their introduction is excluded from the Project.

2-2-3 Outline Design Drawing

The list of planned equipment/machineries and drawings of those site plan/equipment layout plan, are shown in the following (1) and (2).

(1) Planned Equipment/machineries and Quantity

The list of planned equipment is shown in the Table 2.3. The contents of the request by St. Vincent indicate only the names and the quantity. However, as the cooling system is composed of several components, the following list also includes the names of these composing equipment/machineries.

Table 2.3 List of Planned Equipment/ Machineries

| Site and Planned Equipment | | Components | | Quantity | |
|------------------------------|----------------------|--------------------------------------|---|----------|-------|
| Calliaqua | | | | | |
| 1 | Refrigerating system | | | 1 lot | |
| | 1-1 | Ice plant | | 1 lot | |
| | | 1-1-1 | Condensing unit (Compressor and Condenser integrated model) | | 1 |
| | | 1-1-2 | Ice machine (Flake type, 1ton/day) | | 1 |
| | | 1-1-3 | Control panel | | 1 |
| | | 1-2 | Compressor | | 1 lot |
| | 1-2-1 | | Ceiling mounted packaged cooler unit for Cold storage | | 2 |
| | 1-2-2 | | Control panel for Cold storage | | 2 |
| | 1-3 | Ice storage, Chilled room, Cold room | | 1 lot | |
| | | 1-3-1 | Ice storage, 1500mm(L) x 2700mm(W) x 2200mm(CH) t=100mm | | 1 |
| | | 1-3-2 | Chilled room, 1500mm(L) x 2700mm(W) x 2200mm(CH) t=100mm | | 1 |
| | | 1-3-3 | Cold room, 1500mm(L) x 2700mm(W) x 2200mm(CH) t=100mm | | 1 |
| | 1-4 | Equipment for facility | | 1 lot | |
| | | 1-4-1 | Transformer | | 1 |
| | | 1-4-2 | AVR | | 1 |
| Paget farm (Bequia Is.) | | | | | |
| 2 | Refrigerating system | | | 1 lot | |
| | 2-1 | Ice plant | | 1 lot | |
| | | 2-1-1 | Condensing unit (Compressor and Condenser integrated model) | | 2 |
| | | 2-1-2 | Ice storage, 2700mm(L) x 1800mm(W) x 2200mm(CH) t=100mm | | 1 |
| | | 2-1-3 | Ice machine (Flake type, 1ton/day) | | 2 |
| | | 2-1-4 | Control panel | | 2 |
| | | 2-2 | Cooling unit for Cold storage | | 1 lot |
| | 2-2-1 | | Condensing unit (Compressor and Condenser integrated model) | | 2 |
| | 2-2-2 | | Control panel for Cold storage | | 2 |
| | 2-3 | Equipment for facility | | 1 lot | |
| | | 2-3-1 | Transformer | | 1 |
| | | 2-3-2 | AVR | | 1 |
| Friendship Bay (Canouan Is.) | | | | | |

| | | | |
|----|----------------------|---|-------|
| 3 | Refrigerating system | | 1 lot |
| | 3-1 | Ice plant | 1 lot |
| | | 3-1-1 Condensing unit (Compressor and Condenser integrated model) | 2 |
| | | 3-1-2 Ice machine (Flake type, 1ton/day) | 2 |
| | | 3-1-3 Control panel | 2 |
| | 3-2 | Compressor | 1 lot |
| | | 3-2-1 Ceiling mounted packaged cooler for Cold storage | 2 |
| | | 3-2-2 Control panel for Cold storage | 2 |
| | 3-3 | Ice storage, Chilled room, Cold room | 1 lot |
| | | 3-3-1 Ice storage, 1800mm(L) x 2700mm(W) x 2200mm(CH) t=100mm | 1 |
| | | 3-3-2 Chilled room, 1800mm(L) x 2700mm(W) x 2200mm(CH) t=100mm | 1 |
| | | 3-3-3 Cold room, 1800mm(L) x 2700mm(W) x 2200mm(CH) t=100mm | 1 |
| | 3-4 | Equipment for facility | 1 lot |
| | | 3-4-1 Transformer | 1 |
| | | 3-4-2 AVR | 1 |
| *3 | Subsidiary works | | 1 lot |
| | *3a | New machine building | 1 lot |
| | *3b | Equipment for water collection system and its installation | 1 lot |

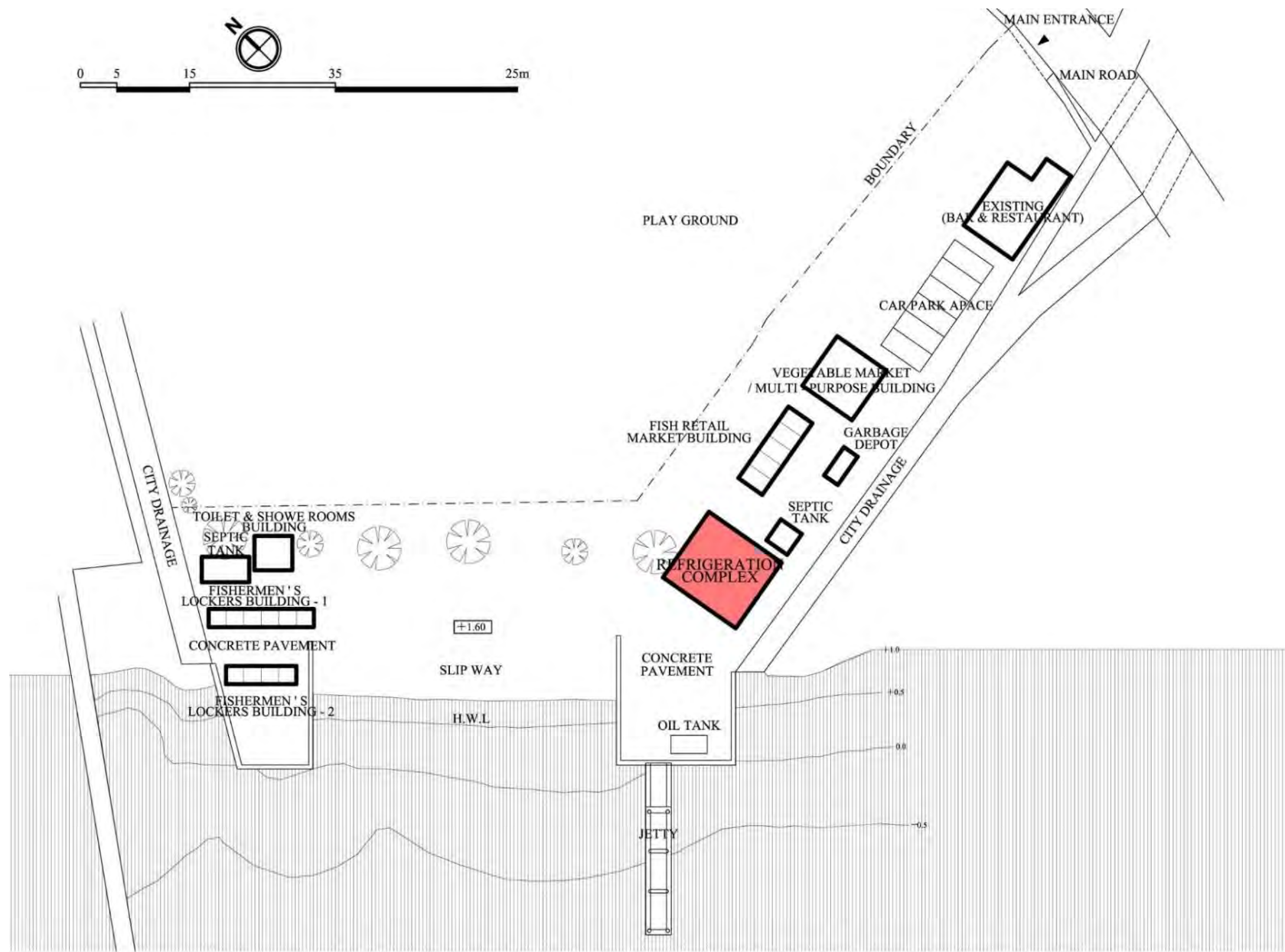
| Clifton (Union Is.) | | | | | |
|---------------------|-------------------------------|--|---|---------|---|
| 4 | Refrigerating system | | | 1 lot | |
| | 4-1 | Ice plant | | 1 lot | |
| | | 4-1-1 | Condensing unit (Compressor and Condenser integrated model) | | 2 |
| | | 4-1-2 | Ice machine (Flake type, 1 ton/day) | | 2 |
| | | 4-1-3 | Control panel | | 2 |
| | 4-2 | Compressor | | 1 lot | |
| | | 4-2-1 | Ceiling mounted packaged cooler for Cold storage | | 2 |
| | | 4-2-2 | Control panel for Cold storage | | 2 |
| | 4-3 | Ice storage, Chilled room, Cold room | | 1 lot | |
| | | 4-3-1 | Ice storage, 1800mm(L) x 2700mm(W) x 2200mm(CH) t=100mm | | 1 |
| | | 4-3-2 | Chilled room, 1800mm(L) x 2700mm(W) x 2200mm(CH) t=100mm | | 1 |
| | | 4-3-3 | Cold room, 1800mm(L) x 2700mm(W) x 2200mm(CH) t=100mm | | 1 |
| | 4-4 | Equipment for facility | | 1 lot | |
| | | 4-4-1 | Transformer | | 1 |
| | | 4-4-2 | AVR | | 1 |
| *4 | Subsidiary works | | | 1 lot | |
| | *4a | Replacing large iron doors and flame | | 1 lot | |
| | *4b | Equipment for water collection system and its installation | | 1 lot | |
| Kingstown | | | | | |
| 5-1 | Overhaul of compressor | | | 1 lot | |
| 5-2 | Refrigerated van | | | 2 units | |
| Owia | | | | | |
| 6-1 | Elevated water reservoir tank | | | 1 lot | |
| 6-2 | Ice plant | | | 1 lot | |
| | 6-2-1 | Ice machine (Flake type, 1ton/day) | | 1 | |

| | | | |
|---------------------------|--------------------|----------------------------------|--------|
| | 6-2-2 | Evaporative condenser | 1 |
| | 6-2-3 | Compressor for ice machine | 1 |
| | 6-2-4 | Control panel | 1 |
| | 6-2-5 | Equipment for facility | 1 lot |
| | 6-2-5-1 | AVR | 1 |
| *6 | Subsidiary works | | 1 lot |
| | *6a | Exchanging fuel supply equipment | 1 lot |
| | *6b | Replacing incoming panel | 1 lot |
| Fisheries Division | | | |
| 7 | Submerged-type FAD | | 2 lots |

*: Subsidiary Work

(2) Site Plan and Equipment Layout Plan

Drawings of the site plan and the equipment layout plan in each site are shown in Fig.2.1~ Fig.2.12. The Project sites are Calliaqua, Paget Farm (Bequia Is.), Friendship Bay (Canouan Is.), Clifton (Union Is.), Kingstown and Owia.



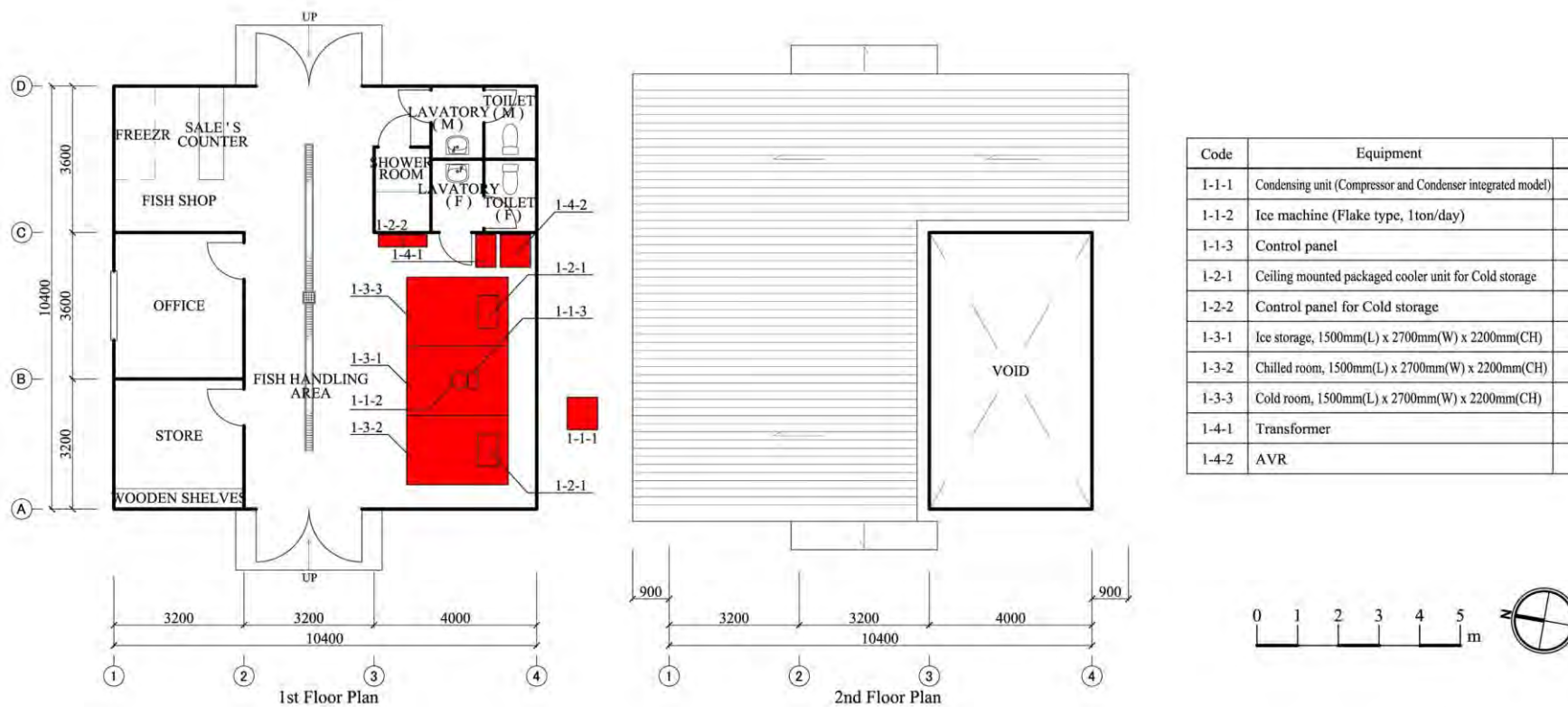
The Project for improvement of fishery equipment/machinery in Saint Vincent / 1. Calliaqua

Site Plan

May 2, 2014

Fig.2.1 Site plan of Calliaqua

Fig.2.2 Layout plan for equipment/ machinery in Calliaqua



The Project for improvement of fishery equipment/machinery in Saint Vincent / 1. Calliaqua
Layout Plan for Equipment/ machinery

2) Paget farm (Bequia Island)

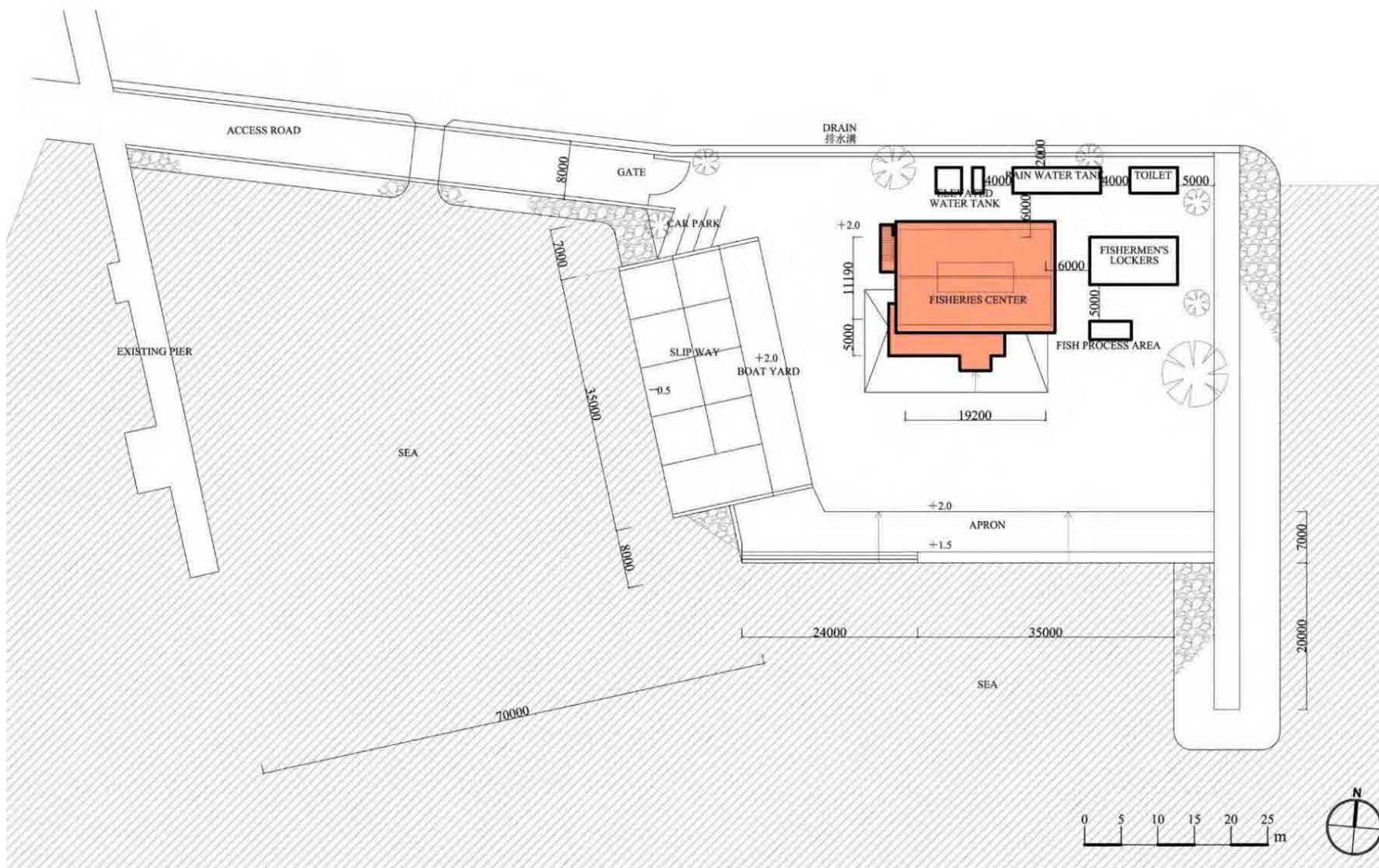
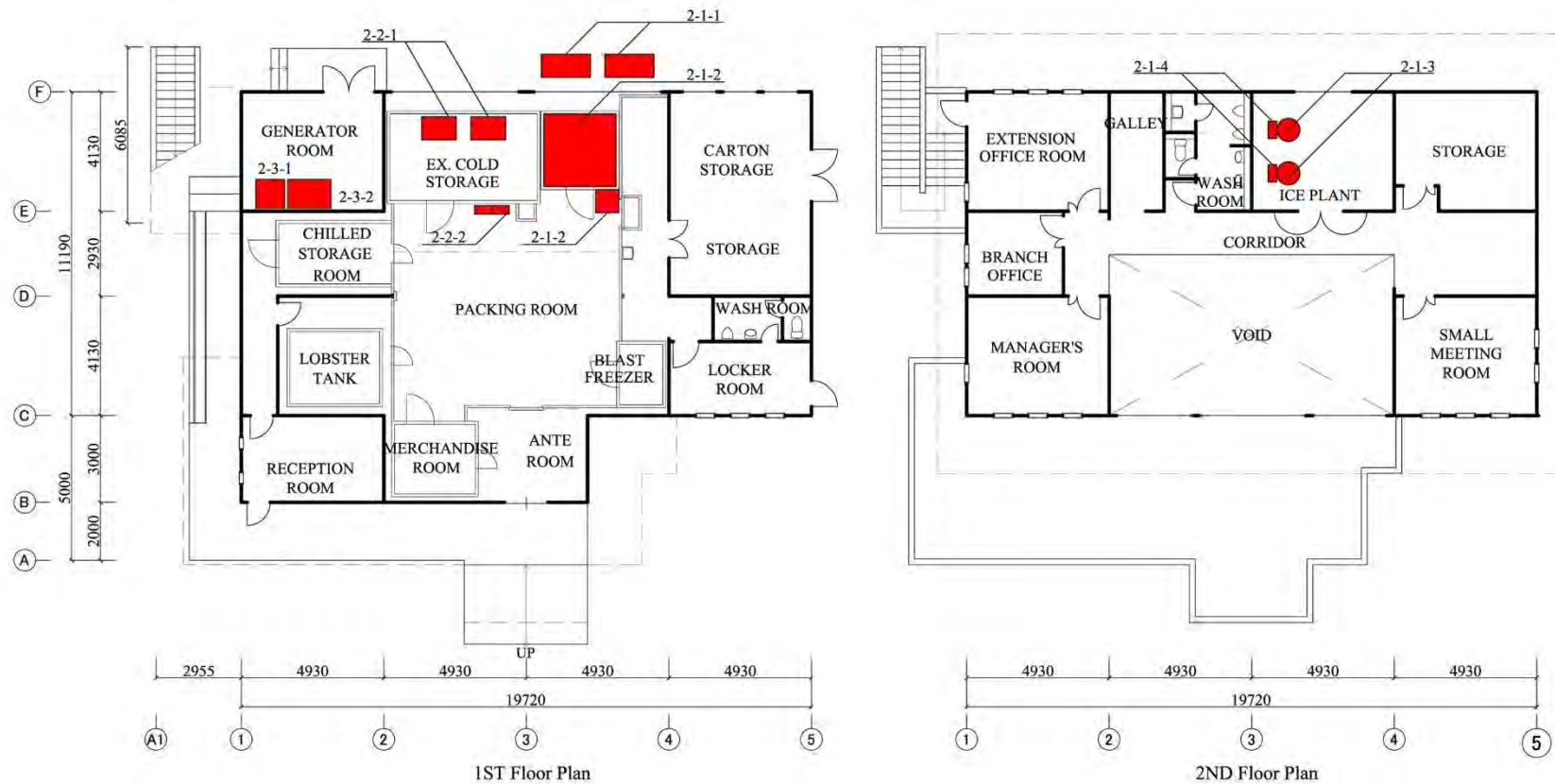


Fig.2.3 Site plan of Paget Farm

Fig.2.4 Layout plan for equipment/ machinery in Paget Farm



| Code | Equipment | Qty |
|-------|---|-----|
| 2-1-1 | Condensing unit (Compressor and Condenser integrated model) | 2 |
| 2-1-2 | Ice storage, 2700mm(L) x 1800mm(W) x 2200mm(CH) | 1 |
| 2-1-3 | Ice machine (Flake type, 1ton/day) | 2 |
| 2-1-4 | Control panel | 2 |

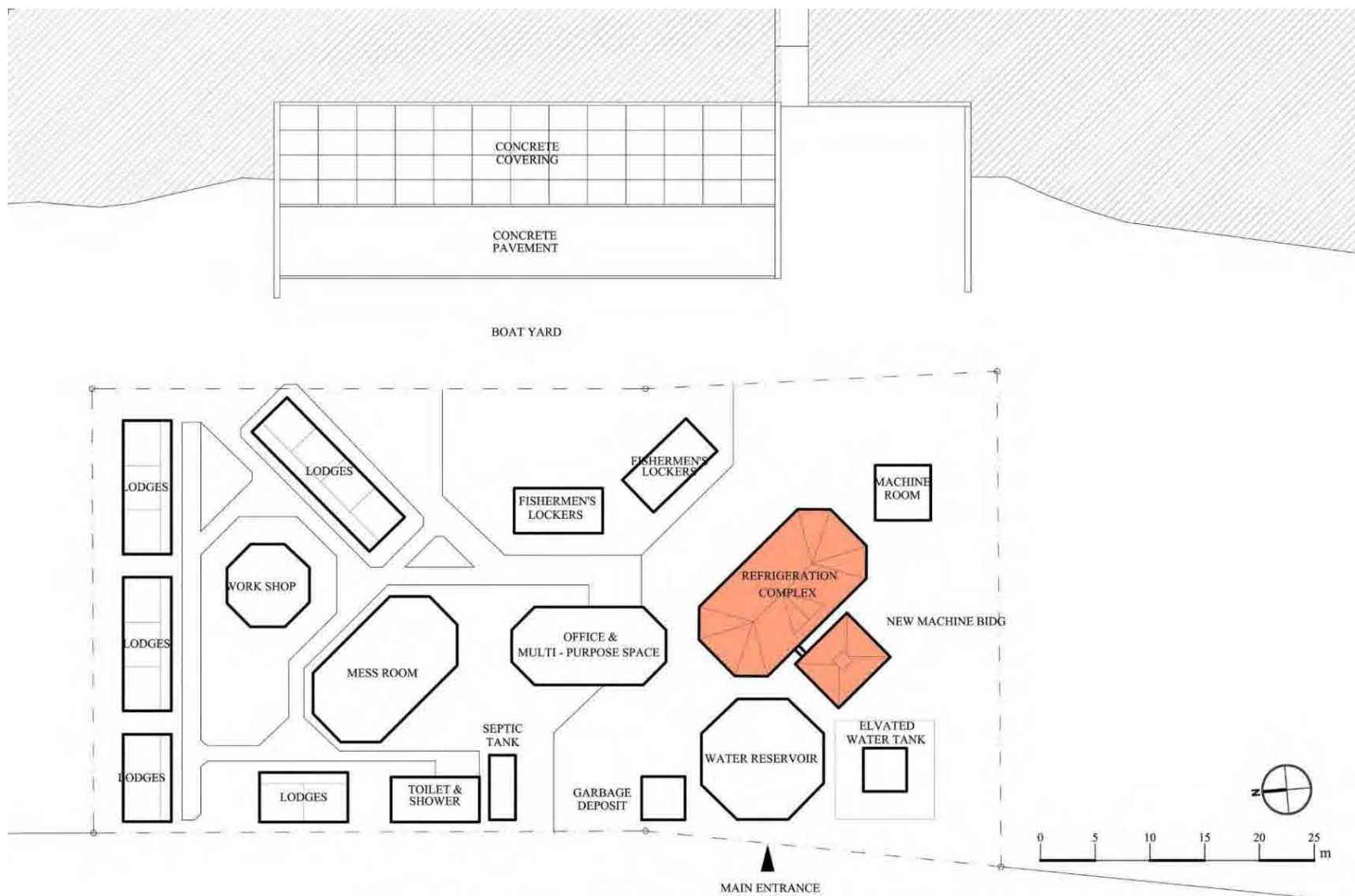
| Code | Equipment | Qty |
|-------|---|-----|
| 2-2-1 | Condensing unit (Compressor and Condenser integrated model) | 2 |
| 2-2-2 | Control panel for Cold storage | 2 |
| 2-3-1 | Transformer | 1 |
| 2-3-2 | AVR | 1 |



The Project for improvement of fishery equipment/machinery in Saint Vincent / 2. Pajet Farm

Layout Plan for Equipment/ machinery

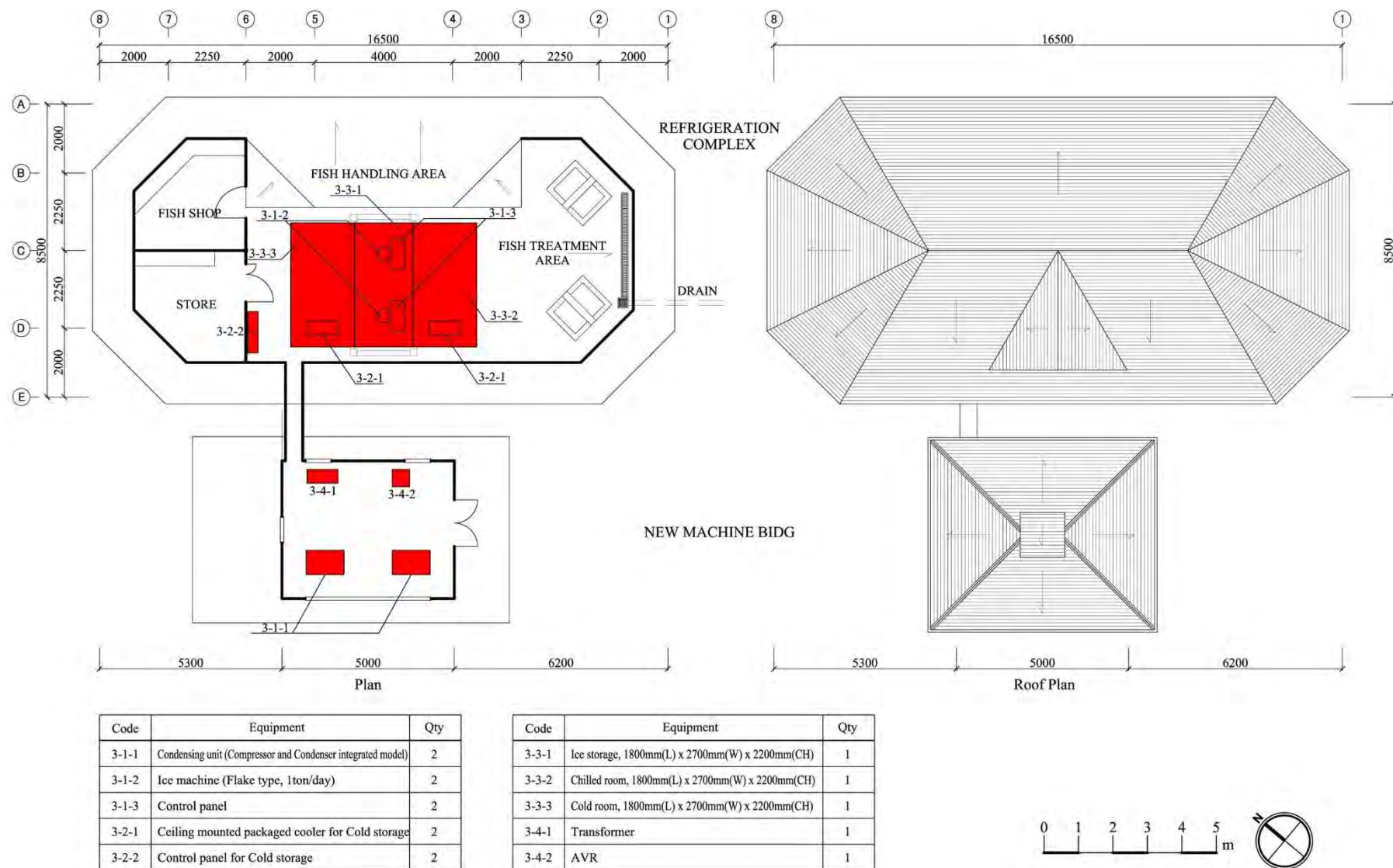
3) Friendship Bay (Canouan Island)



The Project for improvement of fishery equipment/machinery in Saint Vincent / 3. Friendship Bay
Site Plan **April 30, 2014**

Fig.2.5 Site plan of Friendship Bay

Fig. 2.6 Layout plan for equipment/ machinery in Friendship Bay



The Project for improvement of fishery equipment/machinery in Saint Vincent / 3. Friendship Bay
Layout Plan for Equipment/ machinery

4) Clifton (Union Island)

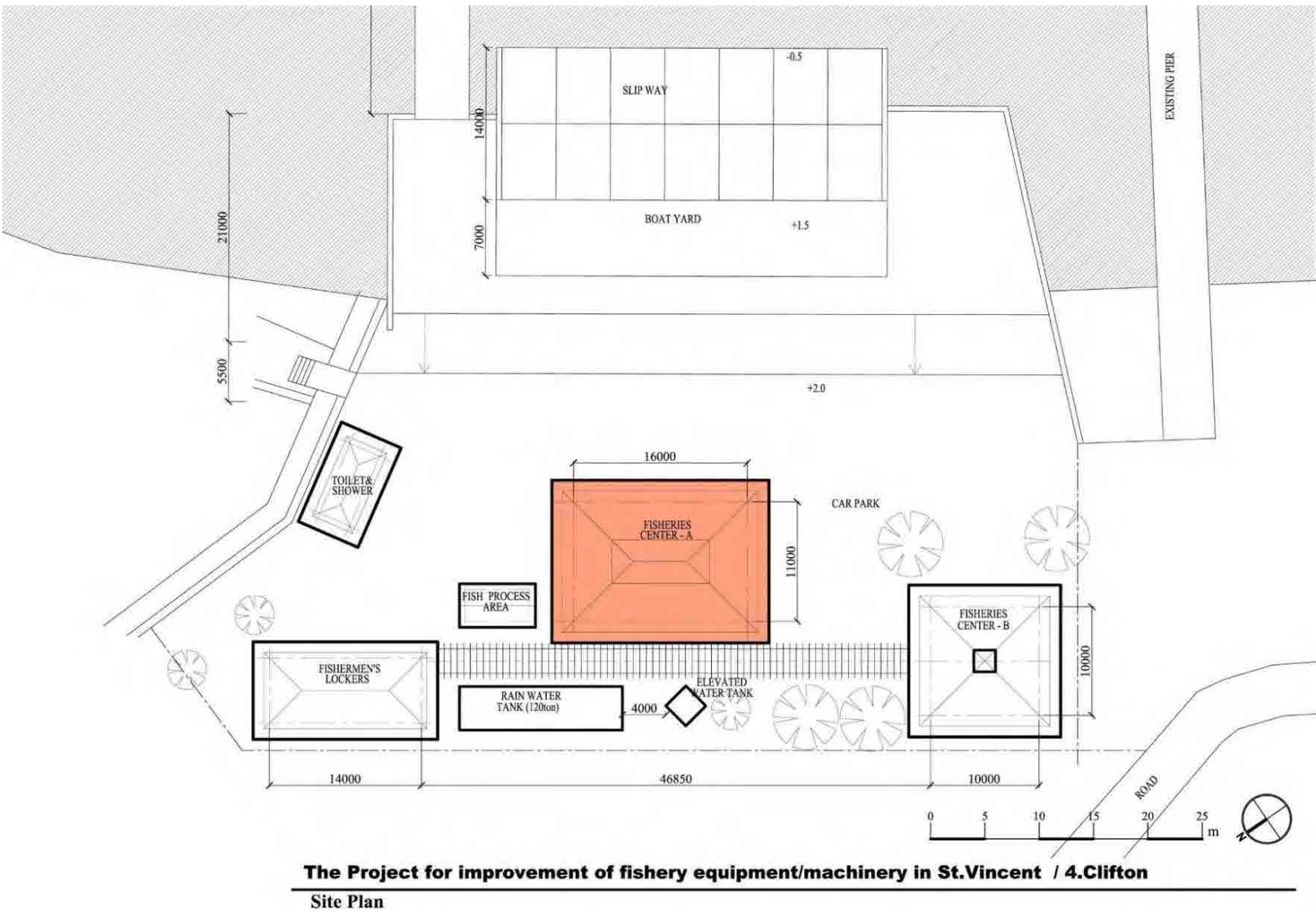
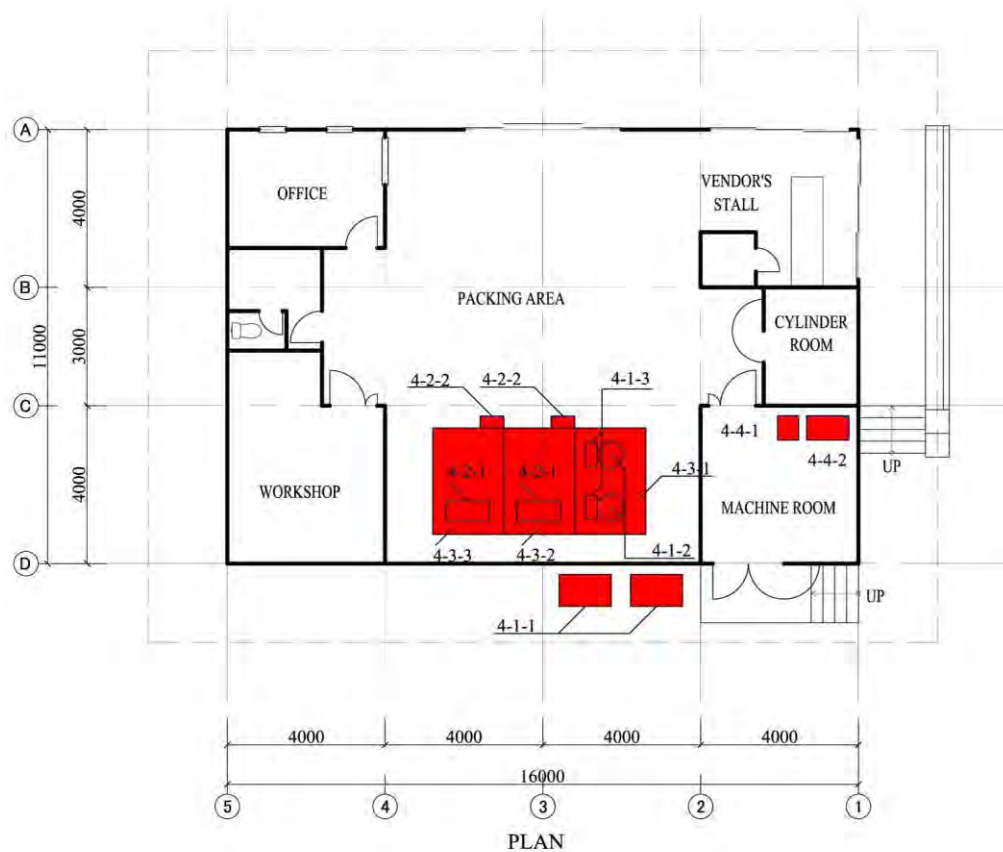
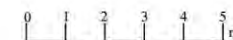


Fig.2.7 Site plan of Clifton of Clifton

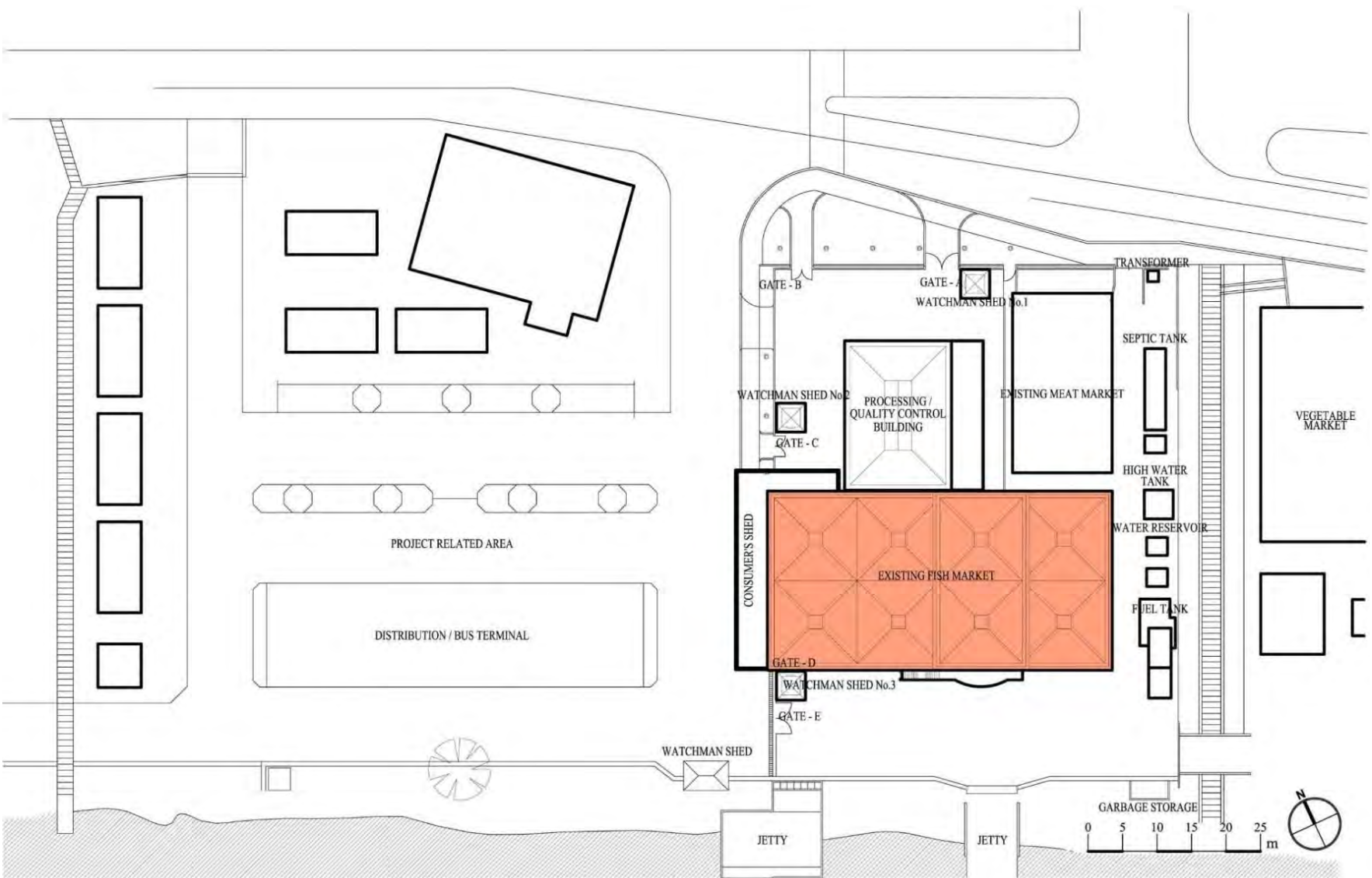
Fig.2.8 Layout plan for equipment/ machinery in Clifton



| Code | Equipment | Qty |
|-------|---|-----|
| 4-1-1 | Condensing unit (Compressor and Condenser integrated model) | 2 |
| 4-1-2 | Ice machine (Flake type, 1ton/day) | 2 |
| 4-1-3 | Control panel | 2 |
| 4-2-1 | Ceiling mounted packaged cooler for Cold storage | 2 |
| 4-2-2 | Control panel for Cold storage | 2 |
| 4-3-1 | Ice storage, 1800mm(L) x 2700mm(W) x 2200mm(CH) | 1 |
| 4-3-2 | Chilled room, 1800mm(L) x 2700mm(W) x 2200mm(CH) | 1 |
| 4-3-3 | Cold room, 1800mm(L) x 2700mm(W) x 2200mm(CH) | 1 |
| 4-4-1 | Transformer | 1 |
| 4-4-1 | AVR | 1 |



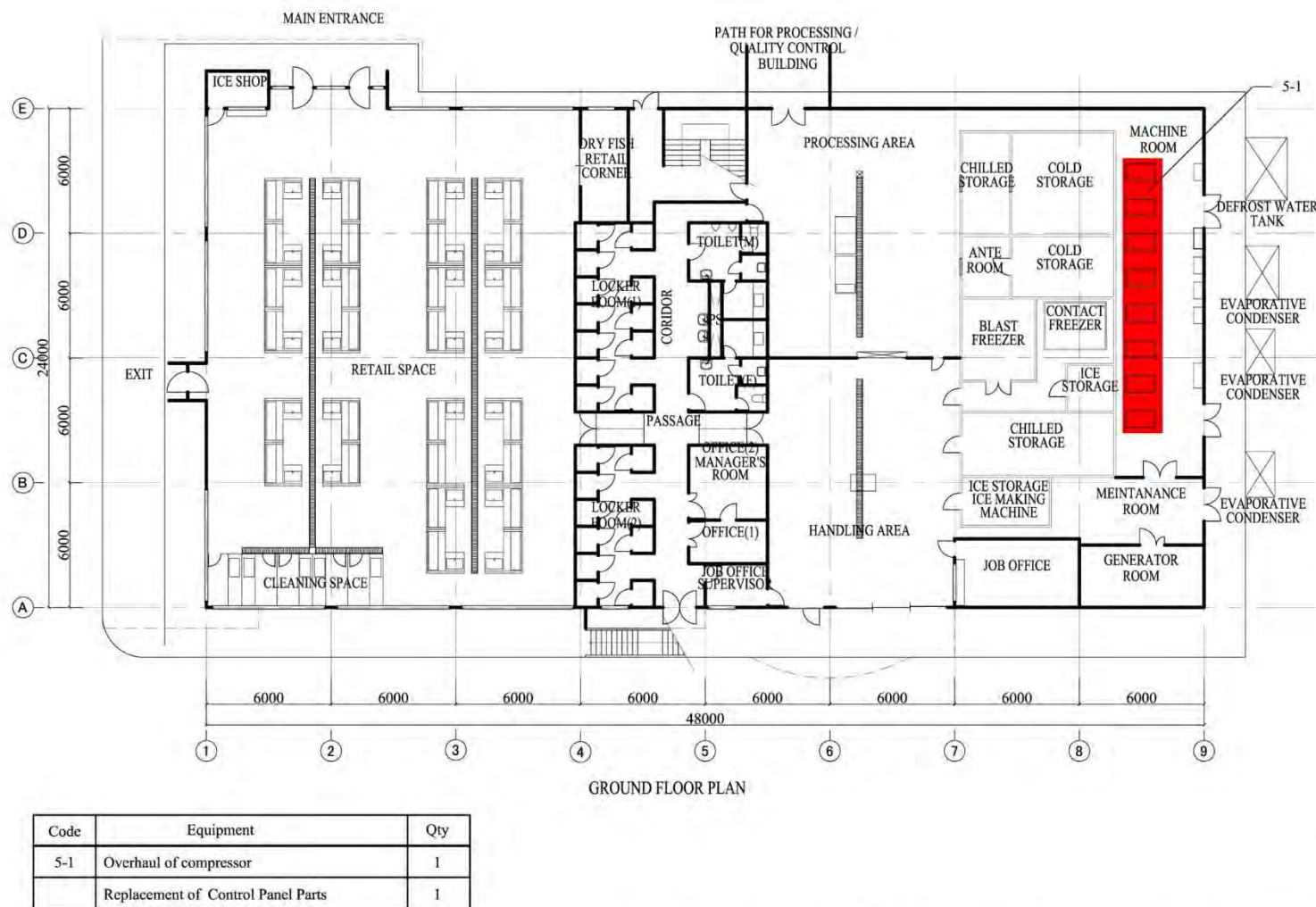
5) Kingstown Fish Market



The Project for improvement of fishery equipment/machinery in St.Vincent / 5.Kingstown
Site Plan

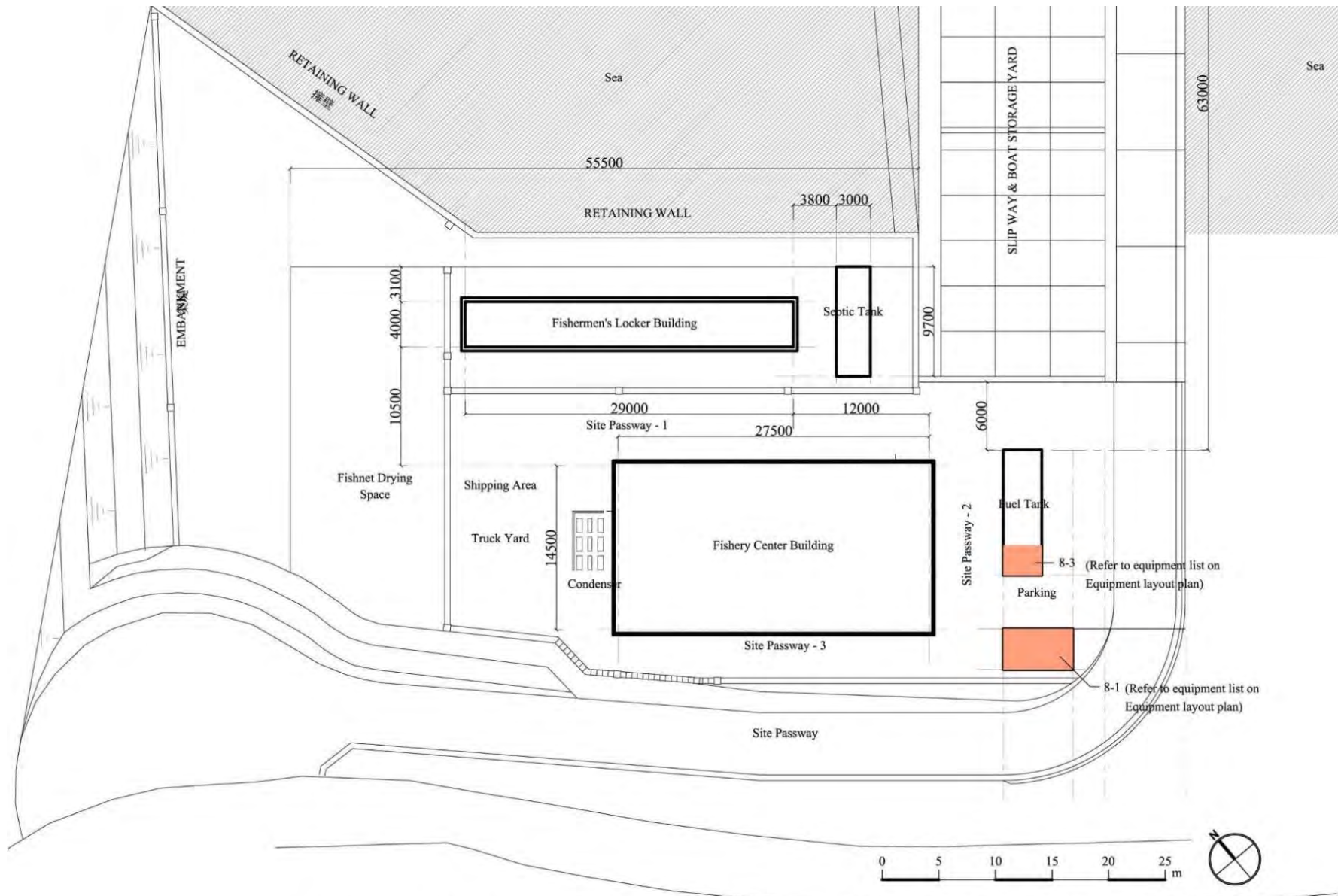
Fig.2.9 Layout plan of Kingstown

Fig.2.10 Layout plan for equipment/ machinery in Kingstown



The Project for improvement of fishery equipment/machinery in Saint Vincent / 5.Kingstown
Layout Plan for Equipment/ machinery

Fig.2.11 Site plan of Owia

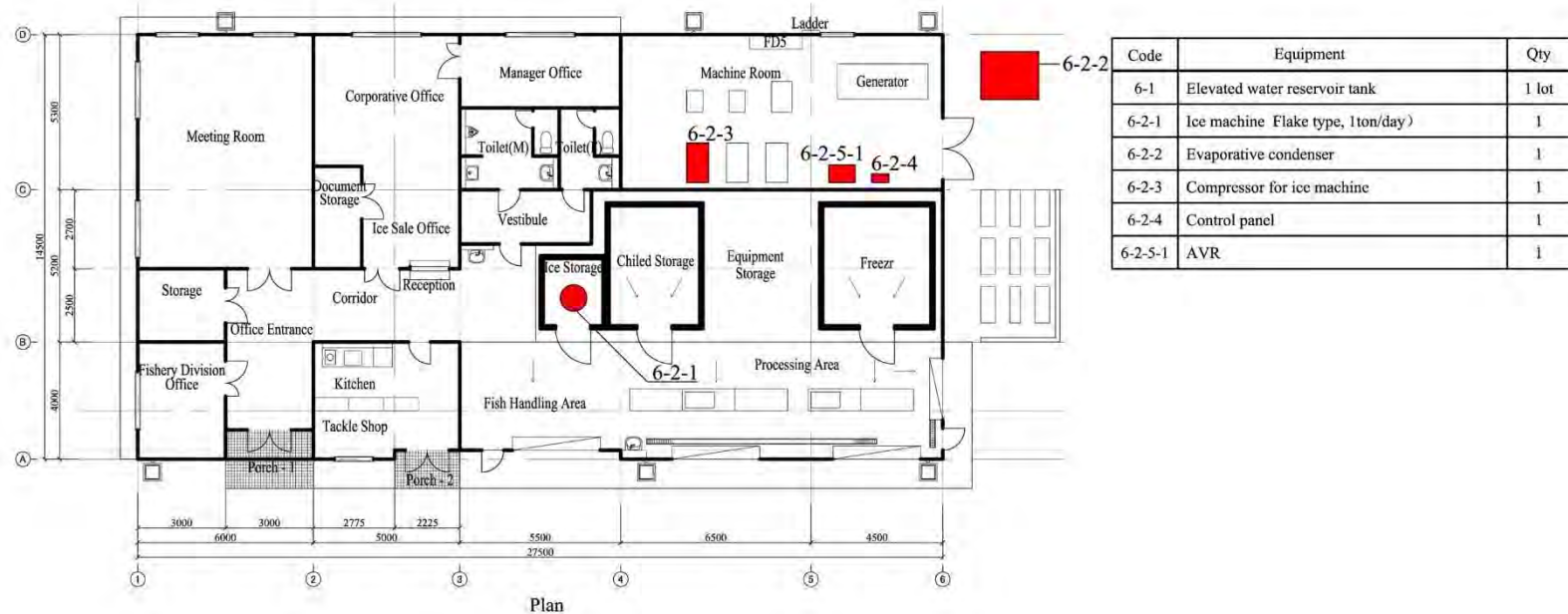


6) Owia

The Project for improvement of fishery equipment/machinery in St.Vincent / 8.Owia

Site Plan

Fig.2.12 Layout plan for equipment/ machinery in Owia



The Project for improvement of fishery equipment/machinery in Saint Vincent / 6.Owia
Layout Plan for Equipment/ machinery

2-2-4 Implementation Plan

2-2-4-1 Implementation Policy

The Project is to be carried out under the Japan's Grand Aid Scheme. For the smooth implementation of the Project, it is important that opinions to be well exchanged among the implementation agency of the recipient country, the Japanese consultant and a contracted contractor for procurement and installation of equipment/ machinery.

(1) Basic Policy in Implementing the Works

The Project implementation requires the cabinet approval by the Government of Japan after being reviewed by relevant organizations/personnel in Japan. Following the approval, an Exchange of Notes (E/N) is signed by the two governments. The Project is then to be implemented in line with the following criteria.

- 1) The Project is funded by taxes of Japanese citizen, and will be implemented in line with the Grand Aid Scheme as stipulated under the budgetary system of Japan.
- 2) The Government of St. Vincent will enter into contract with a Japanese consultant to which will be delegated the tasks of supporting tendering procedure and implementing construction /procurement supervision based on the results of the preparatory survey for the Project.
- 3) Under the above described cooperation from the consultant, the Government of St. Vincent will select a Japanese contractor (trading firm or manufacturer) by open tendering. A contract is signed with this entity for comprehensive procurement and installation of equipment/ machineries under the Project.

(2) Basic Policy for Procurement

- 1) Suitable sites for temporary storage of procured equipment/ machineries are to be secured either in warehouse or on premises of target facilities in order to avoid theft and accidents during their installation works.
- 2) Unpacking and transport of equipment/ machineries is to be done by local workers. Engineers from the manufacturer are to be dispatched for assembly and installation of equipment/ machineries. A managerial engineer is also dispatched from Japan for directing the overall work schedule.
- 3) Since a number of subsidiary facilities works requires high-level management, an engineer for construction management is dispatched from Japan.

(3) Implementing Agency of the Recipient Country

The responsible agency of the Project in St. Vincent side is the Ministry of Agriculture, Rural Transformation, Forestry, Fisheries and Industries (hereinafter referred to MOA) and an implementing agency for operation and maintenance is the Fisheries Division (hereinafter referred to FD) under the MOA.

2-2-4-2 Implementation Conditions

(1) Equipment/ machineries

Acquiring correct handling as well as operation and maintenance methods of introduced equipment/ machineries by users at eight sites (6 sites for replacing cooling equipment, 2 sites for introducing submerged-type FAD) is important for their appropriate operation and sustainable development of fisheries in St. Vincent. Therefore, the Project shall prepare users' manuals for major equipment/ machineries and provide advises and training for their operation and maintenance by dispatching experts.

(2) Subsidiary Works

The interviews with local construction companies reveal that there are a limited number of contractors as well as skilled technicians especially carpenters, reinforcing bar placers, and masons. The number of employees of each contractor is also limited to 15 to 20. Subsidiary works of the Project are relatively small scale such that to renovate existing facilities and conducting additional construction of small scale buildings for machineries. However, in order to keep minimum quality standards as a Grand Aid project, the works are expected to be undertaken by a contractor who has experiences as a subcontractor in past Grand Aid projects.

Contractors that are able to conduct works of the Project in St. Vincent and CARICOM are shown below.

Table 2.4 Name of Contractors

| St. Vincent | CARICOM |
|---|---|
| <ul style="list-style-type: none">• Roads, Buildings and General Services Authority (BRAGSA)• Gibson Construction Limited• K-Group Kelectric• Nelson's Construction & Designer | <ul style="list-style-type: none">• DEVCON (TCI) Ltd. (Antigua) |

2-2-4-3 Scope of Works

Respective tasks borne by the Japanese and St. Vincent sides are to be clearly demarcated to ensure smooth Project coordination and implementation. The demarcation of the works is shown in Table2.5.

Table2.5 Major Undertakings for Both Governments

| | Items | To be covered by Grant Aid | To be covered by Recipient Side |
|----|---|----------------------------|---------------------------------|
| 1 | To explain and reach an agreement with facility users regarding inaccessibility to the facilities during construction works | | ● |
| 2 | To clear unnecessary materials within the target sites | | ● |
| 3 | To conduct installation works | ● | |
| 4 | To fill refrigerant that to be discarded into cylinders upon removing existing equipment | ● | |
| 5 | To remove and store cylinders with refrigerant that to be discarded | | ● |
| 6 | To remove and store dismantled existing equipment outside of the target sites | | ● |
| 7 | To enter into a B/A with a Japanese bank | | |
| | 1) To execute A/P | | ● |
| | 2) To pay commission | | ● |
| 8 | To ensure unloading and custom clearance at port of embarkation | | |
| | 1) To transport the products from Japan to the recipient country via marine/air | ● | |
| | 2) To process tax exemption and custom clearance of the products for disembarkation | | ● |
| | 3) To conduct inland transportation from the port of disembarkation to the Project sites | ● | |
| 9 | To exempt internal taxes and other taxes over materials/ equipment procured by contracted constructors at St. Vincent as well as payment for services | | ● |
| 10 | To exempt customs duties, internal taxes, value-added tax and other fiscal levies which will be imposed to necessary duties of Japanese nationals | | ● |
| 11 | To accord Japanese nationals for their entry into the recipient country and stay therein for the performance of their work | | ● |
| 12 | To maintain and use properly and effectively the equipment provided under the Project | | ● |
| 13 | To bear all the expenses, other than those to be borne by the Grant, necessary for construction of the facilities as well as for the transportation and installation of the equipment | | ● |

B/A: Banking Arrangement; A/P: Authorization to Pay

2-2-4-4 Consultant Supervision

(1) Detail Design and Tasks of Tendering Process

The Project begins after the official Exchange of Notes (E/N) is signed between the Japanese and the St. Vincent Governments and the Grant Agreement (GA) is signed by JICA and the St. Vincent Government. The following tasks are executed after a contract is signed between the St. Vincent's responsible agency (MOA) and Japanese consultant.

1) Detail Design

The consultant conducts following tasks shown below:

- Preparation of tender documents (technical specifications, design documents)
- Provision of technical information

2) Selection of Contractors

After the tender documents are completed, the responsible agency (MOA) starts a selection

process of Japanese contractors by general competitive tendering. The consultants provide assistance during the process. The steps are:

- Tender announcement → Tender evaluation → Contract negotiation

After the contractor selection, the consultant works closely with the responsible agency (MOA) and the implementation agency (FD) to enforce smooth process of tax exemption procedure and budgeting by agencies concerned.

On the other hand, the consultant carefully examines procurement and installation documents submitted by the selected contractor. The contents to be included in the procurement and installation documents are listed in the Table 2.6 below.

Table 2.6 List of Documents for Procurement and Installation Works

| |
|---|
| Manufacture drawings, Catalogs, Installation plan, Construction drawings, Work schedules, Organization chart for procurement and installation work, Temporary work plan, Quality control plan, Procurement plan, Safety control plan, Environment management plan |
|---|

(2) Plan of Construction/Installation Supervision

The replacement of cooling equipment is strongly related with handlings of subsidiary facilities/equipment. Also, work items of subsidiary facility are quite different at each site. Therefore, an experienced architectural engineer will be dispatched for a short period to provide support and supervision for quality control and in deciding whether new and existing equipment are compatible to each other.

This engineer will also serve for the same tasks in the projects concurrently implemented in the neighboring countries (Saint Lucia and Grenada). The engineer will provide information about conditions of the foundation work such as a condenser, construction of a new machinery building and equipment facilities, and workability and capabilities of local contractors in other 2 countries for comparison.

(3) Plan of Procurement Supervision

As the Project needs to be carried out during the lean fishing season and covers 6 sites, installation works will be conducted at multiple sites simultaneously. In addition, training on operation and maintenance of cooling equipment is required upon conversion of their refrigerant to R404a. Reflecting these, a consultant shall reside for supervision from an arrival of equipment/ machineries until the completion of installation.

A resident supervisor will conduct periodical meetings with the contractor during the Project period to confirm, discuss and provide advises on the work progress, quality, completion forms, and safety management. The supervisor will also prepare a monthly report during installation works and submit to the implementation agency of St. Vincent and JICA in order to share the work progress.

2-2-4-5 Quality Control Plan

Items, contents and methods of management, quality standards, measurement frequency and organizing methods of its results for the quality of materials used in the Project, are to be referred to the particular specifications (tender documents, drawing, question and answer, etc.). However, since CUBiC, ASTM, AWWA and BS are commonly used in the recipient country, these standards are also to be considered.

Quality control of the subsidiary works is conducted based on the Japanese Architectural Standard Specification 5 (Architectural Institute of Japan), the Architectural Common Specification (the Ministry of Land, Infrastructure, Transport and Tourism, Japan), the Architectural Management Guideline (the Ministry of Land, Infrastructure, Transport and Tourism, Japan), and Japanese Industrial Standards.

Points of consideration in order to ensure proper quality of equipment/ machineries procured by the supplier are as follows:

- 1) The consultant will inspect main equipment items prior to ex-factory shipment. Also, the consultant will be responsible for confirming a temporary storage site for equipment prior to deployment, which will prevent degradation of equipment (in containers) due to effects of rain, sun, etc.
- 2) Regarding subsidiary facilities, the consultant shall ensure the submission of monthly working reports and take notice for avoiding inconsistency with design specifications.

2-2-4-6 Procurement Plan

(1) Equipment/ machineries

Since the major equipment/ machineries including cooling equipment and sub-merged FAD under the Project are of Japanese standards, following points are taken into consideration upon their maintenance.

- 1) It is assumed to be necessary to procure equipment/ machineries which have been introduced in tropical areas in the past as they are to be used in the severe environment with severe natural conditions and poor infrastructure of the Caribbean area.
- 2) Closed or half closed types are currently a mainstream for small-scale freezers and others. So that the Project plans to use half-closed types for small-scale equipment while select open types when available.
- 3) As for an electric controlling system, the computer control is not to be used as it cannot be repaired locally. The system that can be repaired locally is to be applied.

(2) Subsidiary Facilities

Since the subsidiary works in this Project are in small scale, a site-mixing method is taken for concreting works. Concrete blocks are produced in St. Vincent. Though reinforcing bars and steel beams are basically imported, materials for constructing small to medium-scaled buildings are locally available. The most of residences use deformed tiles as roofing materials while neither folded-plates using tight-frame with strength nor salinity tolerant materials exists. The usage of caulking necessary for water-proofing construction is not seen at all.

The Project basically plans to use local materials. However, the Japanese products or the products

from third countries are to be considered for the materials for water-proofing works.

2-2-4-7 Operational Guidance Plan

The most sensible technical transfer in this Project is operation techniques of the equipment using HFC (R404a). This includes not only daily operation skills but also skills for periodical overhaul of the equipment. Therefore, the soft component which does not engage in actual assembly and installation works is not good enough. One needs to participate in assembly and installation of equipment as the engineer experienced in actual operational experiences (an engineer from the manufacturer) provides the guidance on operation and indication of points for consideration. Through such technical transfer which one can have firsthand knowledge of an actual assembly and points of consideration from equipment installation, risks that HFC refrigerant inherent are to be removed.

As to conclude, the Project, therefore, does not plan its soft component.

Technical training for maintenance staff includes guidance by engineers from the manufacturer at each stage of: assembly and installation; test operation; and actual operation. The training policies are described below:

- 2-3 operation staff will be trained at each site.
- Training will be conducted at stages: assembly and installation; test operation; and actual operation.
- An entire training period will be for 2 months. Justification for the training period is explained in the Reference 2.

2-2-4-8 Soft Component (Technical Assistance) Plan

As noted in 2-2-4-7, the Project does not plan the soft component.

2-2-4-9 Implementation Schedule

If the Project proceeds to implementation under Japan's Grant Aid scheme, it will be carried out through following steps after signing of the E/N between the two Governments: (1) consultant agreement; (2) detail designing, tender document preparation and approval; (3) tendering and contracting with a supplier for equipment procurement; and (4) procuring equipment and its subsidiary works.

(1) Consultant Agreement

A Japanese consultant will enter into contract with the responsible agency (MOA) to carry out the detail design and supervision of the Project. This agreement is subject to verification by the Government of Japan.

(2) Tender Document Preparation and Approval

After the consultant agreement is verified, the consultant conducts the detail designing based on the Preparatory Survey Report, and prepares tender documents. As for the equipment specifications drafted during the outline design stage, these are reviewed in terms of any changes within St. Vincent that would affect the Project, as well as confirming whether the originally envisioned equipment items are still being manufactured, necessary legislative applications, etc. Specifications are to accordingly be modified if necessary.

After tender documents have been drafted, these are to be presented and explained to the MOA for its approval.

(3) Tendering and Contracting

After approval of tender documents, parties interested in tendering are to be invited within Japan by means of tender notice in a generally circulated newspaper. Interested parties are briefed on the Project and provided with the requisite tender documents. After issuing tender documents, a 45 day period is allocated to interested parties for estimating the cost of equipment procurement. Interested parties are then assembled for open tendering on the Project participated by officials concerned. The tendering process entails an examination of technical documentation submitted by tenderers. Only those tenderers that pass this technical review are eligible for tendering amount evaluation. The lowest tenderer is subsequently nominated for contract negotiation.

If negotiation goes smoothly, the MOA enters into a contract with the nominated contractor for procurement of equipment under the Project.

(4) Procurement of Equipment

After verification of the contractor's contract by the Government of Japan, the contractor begins equipment procurement while the consultant starts its supervision. It is expected to take 4 months for the detail designing and 11 months for the equipment procurement process (see Table 2.7 below).

Table2.7 Project Implementation Schedule

| Months | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
|--------------------------------|---------------------------|---|--------------------------------|--|---|---|---|---|---|----|----|----|
| Implementation Design | (Field Survey) | | | | | | | | | | | |
| | | | | (Works in Japan) | | | | | | | | |
| | | | (Approval of tender documents) | | | | | | | | | |
| | | | | (Tender) | | | | | | | | |
| Implementation/ procurement | (Shop drawings) | | | | | | | | | | | |
| | (Production of equipment) | | | | | | | | | | | |
| | | | | (Subsidiary works, installation, guidance on handling and operation) | | | | | | | | |
| | | | | | | | | | | | | |

2-3 Obligations of Recipient Country

The demarcation between the Japanese and St. Vincent sides under the Project is as described in Section 2-2-4-3. Specifically, obligations of the Government of St. Vincent are shown below.

1) To explain and reach an agreement with facility users regarding inaccessibility to existing cooling equipment during replacement works

For replacing refrigeration equipment/ machineries, works of removal of existing equipment and installation of new equipment will occur. In order to conduct these works, the entire cooling equipment needs to be stopped its operation during the work period. As a consequence, facility users are unable to access to the cooling equipment. The implementing agency, the DOF, needs to explain to facility users regarding this point before the work begins, come up with an alternative measure, and reach to a consensus on stopping the operation of the facility.

2) To clear unnecessary materials within the target sites

Unnecessary materials are to be removed as requested through discussion with concerned parties before the work for equipment installation begins.

3) To remove and store cylinders with wasted refrigerant

Along replacing the cooling equipment, the removal of existing equipment will be conducted. When the work is undertaken, the refrigerant within the existing equipment needs to be removed. The wasted refrigerant will be injected into cylinders by the contractor (supplier). The DOF shall consult and agree with agencies concerning the environment on the method and place for storing the cylinders and remove them accordingly.

4) To remove and store dismantled existing equipment outside of the target sites

Existing cooling equipment, pipes, bulbs and other dismantled materials that are to be removed during the installation work are sorted and stored in an open space near the site by the contractor. They include materials which can still be used. The DOF, therefore, moves and stores these materials in an appropriate place after deciding measures to be taken.

5) To enter into a B/A with a Japanese bank

After the signing of the E/N between the Government of Japan and the Government of Saint Lucia, the Government of Saint Lucia needs to enter into a Banking Arrangement (B/A) with a Japanese bank that includes opening a bank account.

6) To execute A/P and pay commission

The Government of Saint Lucia will have to pay an A/P notification commission as well as a payment commission to the bank with which it has entered into a B/A.

7) To process tax exemption and custom clearance of the products for disembarkation

The smooth procedure for custom clearance and internal transport of the equipment procured under the Grand Aid is necessary.

8) To exempt internal taxes and other taxes over materials/ equipment procured by the contracted contractor in Saint Lucia as well as payment for services

9) To exempt customs duties, internal taxes, value-added tax and other fiscal levies which will be imposed to necessary duties of Japanese nationals

The Government of Saint Lucia will exempt Japanese nationals from customs duties, internal taxes and other fiscal levies which will be imposed in Saint Lucia with respect to the supply of the products and services under the verified contracts on the Project.

10) To accord Japanese nationals for their entry into the recipient country and stay therein for the performance of their work

The Government of Saint Lucia needs to provide necessary measures for Japanese nationals to enter into and stay in the county in order for them to accomplish their services stipulated in the verified contracts on the Project.

11) To maintain and use properly and effectively the equipment provided under the Project

It is necessary that the Government of Saint Lucia allocates the necessary personnel and operational and maintenance budget to ensure the effective utilization and upkeep of the equipment procured under the Japan's Grant Aid.

12) To bear all the expenses, other than those to be borne by the Grant, necessary for construction of the facilities as well as for the transportation and installation of the equipment

2-4 Project Operation Plan

(1) Personnel Plan

Replacing equipment/ machineries by the Project does accompany neither new allocation of personnel nor staff recruitment. However, it is necessary for current maintenance staff to undergo a series of technical training starting from the stage of equipment installation as the work requires converting from current refrigerant to R404a.

(2) Operation and Maintenance Plan

Cooling equipment that the Project engages is restricted to existing equipment/ machineries which to be replaced. Therefore, the same operation and maintenance structure will be applied before and after the Project.

Capital Kingstown's fisheries complex is the main fish distribution center in this country, and managed by NFML (National Fish Marketing Ltd.). The complex's cooling facilities will be kept in good condition by the maintenance staff.

In case of the facilities of Calliaqua, Clifton and Owia, maintenance staff of the FD are engaging in.

In case of Paget Farm and Friendship Bay, those facilities are currently not operated. The FD has decided to operate directly for the Paget Farm and to give a lease for the Friendship Bay by dispatching the maintenance staff in the form of a circuit basis

Refrigerant of above mentioned facilities except Owia will be converted from R22 to R404a by the Project (Owia has been using R404a since its beginning).

It is anticipated these facilities will be well maintained even after the renovation by the Project through providing sufficient technical training during the installation works.

2-5 Project Cost Estimation

2-5-1 Initial Cost Estimation

(1) Costs borne by the St. Vincent side

The estimated costs borne by the St. Vincent side is listed below.

Estimated cost borne by the St. Vincent side: Approx. EC\$ 117.9 thousand (JPY approx. 4.54 million)

Table 2.8 The breakdown of the Project cost borne by the Government of St. Vincent

| Items | Costs | | Remarks |
|---|---------|------------|------------------------------|
| | EC\$ | JPY ('000) | |
| Removal and storage of cylinders filled with refrigerant that to be discarded, existing equipment, dismantled materials and others to the outside of the site | 80,000 | 3,079 | Budget arrangement by the FD |
| Commissions of B/A and A/P | 37,887 | 1,458 | Budget arrangement by MOA |
| Total | 117,887 | 4,537 | |

Remarks: EC\$= JPY38.4830

(2) Estimate conditions

- Time of calculation: An average of 3 months from January 1 to March 31, 2014
- Exchange rate: US\$ = JPY 103.45
US\$ = EC\$2.6882
EC\$ = JPY 38.4830
- Implementation period: One fiscal year. The periods required for detailed design and construction are shown in the working schedule.
- Other: The Project is to be implemented under the Japan's Grant Aid scheme.

2-5-2 Operation and Maintenance Cost

The Project mainly targets replacing degraded equipment/ machineries out of the cooling equipment that has been installed in the past. In other words, there will be no extra cost generated for its operation and maintenance after replacing the equipment/ machineries.

There will be not operation and maintenance costs for submerged-type FAD once they are installed.

Regarding above, it is not necessary for the FD, the implementing agency, to allocate new budget in order to implement this Project.

Chapter 3 Project Evaluation

Chapter 3 Project Evaluation

3-1 Preconditions

To achieve the goals of the Project, the following matters should be completed in advance.

- a) Permission from the relevant environmental agencies with regards to the methodologies and locations to store cylinders filled with waste refrigerant.
- b) Taking measures for smooth executions of custom clearance and tax exemptions which are stipulated for the project implementation by the Japan's Grant Aid.

3-2 Necessary Inputs by Recipient Country

(1) Socio-environmental Approach

Current used refrigerants will be removed from the cooling equipment and collected in cylinders by the Japanese contractor during the installation works. The cylinders are to be transferred to and disposed at the final location by the Government of St. Vincent. It is essential for the FD and relevant environmental agencies to discuss and agree on the disposal methodologies as well as the locations in advance. Even after the Project is completed, the DOF should conduct periodical inspection on storage conditions of these cylinders.

(2) Refrigerant Replacement and Technical Training for the Maintenance Staff

The refrigerant used in existing cooling equipment in St. Vincent is HCFC (R22). To comply with the phase-out year specified in the *Montreal Protocol*, R22 will be converted to HFC (R404a) in this Project. It is critical for the Japanese technicians to provide timely technical training at every stage of equipment installation, test runs, and the start of actual operation.

Even after the completion of the Project, thorough technical transfer should be conducted by the FD in the case that a new maintenance staff is recruited in future.

(3) Collaboration of CARIFICO in Introducing Submerged Type FAD

Japan's technical cooperation, called "CARIFICO", is currently in progress in St. Vincent. The duration is between 2012 and 2017. "CARIFICO" aims to achieve public-private partnership resource management using a floating type FAD. It is desirable to link this Project with "CARIFICO" to see the effect of submerged type FAD introduced in the Project. In general, the installation of a floating type FAD comes cheap but the life is short (half year-2 years), and installation of submerged type FAD is costly but the life is long (10 years). By linking the two projects, cost-effectiveness of both types of FAD could be compared.

(4) Measures to Natural Conditions

The followings are the factors which can negatively affect the Project outputs. Some precautionary measures to prevent negative forces are also listed.

- a) Seawater splashes

The splashes of seawater reach to the property of the Owia Fisheries Center when the Atlantic Ocean is rough, which easily poses the problems of metallic as well as electrical corrosion.

Regular maintenance work, such as washing and/or painting equipment, is necessary for

corrosion control.

b) Hurricanes

St. Vincent is prone to hurricanes with a maximum wind speed of 60 meters a second. The main buildings should be inspected after each hurricane and identify strategies and actions to take to prevent possible damages before the next hurricanes.

3-3 Important Assumption

(1) Influence of Global Climate Change

The main content of the Project is to replace the existing cooling equipment. In this aspect, influences of global climate change might be an important assumption to generate or sustain the Project effect. Because the global climate change may create the change of the sea current movement which induces the change of the route of migratory fishes and might have much decrease of fish catch during the fishing season. In this result, the utilization rate and/or pattern of the fish distribution facilities might be affected.

Further, the project facilities may get damages by a hurricane with extraordinary wind velocity that might be caused by the global climate change.

3-4 Project Evaluation

3-4-1 Relevance

(1) Contribution to achieve overall goals of the mid/long term fisheries development plan

The governmental strategies for fisheries development are clarified in the 2012 budget statement as the “Corporate Plan and Advance Proposal 2013-2015”, including its vision, mid-term strategies and annual top priority action plans.

The fundamental policy for fisheries development is “sustainable utilization and effective development/ management of fisheries resources”. The mid-term strategies contain 13 items in which include development of comprehensive distribution strategies of fisheries products, improvement of fisheries infrastructure, implementation of various surveys for appropriate resources utilization, etc.

The Project aims to improve and maintain the function of fisheries distribution facilities that have been built by Japanese Grant Aid in the past, and to contribute to sustainable use of fisheries resources through promoting proper fisheries management, which serves to achieve the government policy for fisheries development stated above.

(2) Relevance to policies/guideline of assistance by the Government of Japan

In the Assistance Policy to St. Vincent (April, 2014) by the Government of Japan, the fisheries sector is stated as one of important assistance fields (midterm target), and is commented to continue the cooperation for its sustainable development and management of fisheries. In this regards, this Project is relevant to the assistant policy of the Government of Japan, and high in appropriateness since the project aims to improve the fish distribution of St. Vincent and to promote its fisheries management.

3-4-2 Effectiveness

(1) Quantitative impact

Most cooling equipment targeted in the Project is ready to stop functioning due to salt damages as well as aging deterioration. Therefore, the concrete effect of replacing cooling equipment is the same as prolonging the function of cooling equipment which has been operated for another 15 years..

In developing countries, the cooling methodology in fishing/distribution exclusively relies on ice. The effect of replaced cooling equipment can be evaluated by whether they can supply enough ice or not.

Project objective sites have similar fishing patterns except the one in Owia. Cooling equipment that to be replaced are small-scale and have similar capacity for ice production. Therefore, Calliaqua, located near the capital city of Kingstown, is considered to be an appropriate target site for the evaluation.

To quantitatively evaluate whether replaced cooling equipment is operated effectively or not, we have to figure out how much ice is used for monthly landed fish. In general, cooling effectiveness of fresh fish is assessed by ice/fish ratio = 1 as a standard. However, the ice/fish ratio might be under 1 in the project sites because this standard of preserving freshness of fish is not prevalent among fishermen and also the distribution time is relatively short for it is a small country. If it is the case, the baseline at the time of replacement cannot be determined unless actual ice/fish ratio is measured in each site, which unfortunately has to be left in future.

If the ice/fish ratio is actually measured in each site, quantitative measurements can be possible by the following methodologies (See Table 3,1):

- a) Calculate monthly volume of produced ice by monthly cumulative operating hours of the cooling equipment
- b) Calculate average monthly ice/fish ratio by monthly landed fish volume
- c) Compare the monthly ice/fish ratio with the baseline ratio measured at the time of replacement of the cooling equipment

Table 3.1 Quantitative Effect of the Project

| Quantitative Effects | Baseline Value (2014) | Target Value (2018) [3 years after completion] |
|--|-----------------------|---|
| Ice/fish Ratio (Calliaqua) | α | $\alpha \leq$ |
| Registered Number of Fishermen Operating at the point of submerged FAD as their fishing ground | No persons/Year | Total 500 persons/ year |

The following preconditions need to be met for quantitative evaluation of the project effectiveness.

Preconditions :

- a) The maintenance staff should record operating hours in the daily log book. The operating hours should be determined by the cumulative operating time meter installed on the cooling equipment. In addition, the total operating hours should be recorded every month.
- b) The landed volume recording staff should keep the total volume of landed fish every month.
- c) An ice making machine with its capacity of 1 ton/day produces 1 ton of ice during 19.2 operating hours (80 % of 24 hours).

(2) Qualitative Effects

The following Table shows qualitative effects of equipment/ machinery by this Project.

Table 3.2 Qualitative Effects of Equipment/ machinery at each Project site

| Site | Project component | Effects |
|------------------------------|--|--|
| Calliaqua | To replace ice plant, cold storage and chilled room To convert the refrigerant from R22 to R404a | By extending existing cooling capacity for 15 more years, stable supply of fresh fish to surrounding areas will be continued. Ice will continue to be supplied. |
| Paget Farm (Bequia Is.) | To replace ice plant and cold storage To convert the refrigerant from R22 to R404a | By recovering functions of the facility, supply of fresh fish to local areas and the main island will be restored. Ice will continue to be used. |
| Friendship Bay (Canouan Is.) | To replace ice plant, cold storage, and chilled room To convert the refrigerant from R22 to R404a | Same as above |
| Clifton (Union Is.) | To replace ice plant, cold storage and chilled room To convert the refrigerant from R22 to R404a To repair a water tower and large iron door | By recovering functions of the facility, supply of fresh fish to local areas will be restored. Ice will continue to be used. |
| Kingstown | To supply spare parts of existing compressor To replace refrigerated vans | The supply of fresh fish to inland areas will continue to be maintained. |
| Owia | To replace a water reservoir tank (including a sedimentation tank), To replace ice machine and condenser To replacement and relocate fuel supply equipment Updating of a incoming panel | Minimum function for a fish landing site will continue to be secured by restoring the supply of water, fuel and ice. |
| Offshore | To introduce submerged-type FAD | Thoughts for sharing resources will be grown among fishermen and it enlightens them for natural resource management |

[Appendices]

Appendices 1. Member List of the Survey Team

(1) Field Survey for the Outline Design

| | Title | Name | Affiliation |
|----|---|-----------------------|---|
| 1 | Team Leader (1 st period) | Mr. Kenichi Kato | Director, Field Crop Based Farming Group, Rural Development Department, JICA |
| 2 | Team Leader (2 nd Period) | Mr. Takashi Nishimura | Advisor to Field Crop Based Farming Group, Rural Development Department, JICA |
| 3 | Project Manager Operation and Maintenance Management Planning I | Dr. Tamotsu Tomiyama | System Science Consultants Inc. |
| 4 | Operation and Maintenance Management | Mr. Takashi Morimoto | Individual Consultant |
| 5 | Equipment Designing I | Mr. Masakazu Ishii | Icons Inc. |
| 6 | Equipment Designing II | Mr. Masaji Yoshioka | Individual Consultant |
| 7 | Facility Planning / Environment & Social Consideration I | Mr. Hiroataka Koizumi | System Science Consultants Inc. |
| 8 | Facility Planning / Environment & Social Consideration II | Mr. Kentaro Nishiyama | System Science Consultants Inc. |
| 9 | Equipment Procuring Planning / Cost Estimation I | Mr. Michio Tsuji | System Science Consultants Inc. |
| 10 | Construction Procurement/ Cost Estimation II | Mr. Akihiro Hayahara | System Science Consultants Inc. |

(2) Explanation on the Draft Final Report

| | Title | Name | Organization |
|---|---|------------------------|---|
| 1 | Team Leader | Mr. Yoshihisa Masanaga | Deputy Director, Field Crop Based Farming Group, Rural Development Department, JICA |
| 2 | Project Manager Operation and Maintenance Management Planning I | Dr. Tamotsu Tomiyama | System Science Consultants Inc. |
| 3 | Equipment Designing I | Mr. Masakazu Ishii | Icons Inc. |

Appendices 2. Study Schedule

(1) Field Survey for the Outline Design

| | | | Team Leader | Project Manager(PM) /Representative Team I | Team I (St.Lucia, St.Vincent) | | Quantity Surveyor Team | |
|------|--------|-----|---------------------------------|---|---|--|---|--|
| Date | | | Mr. K. KATO Mr. T. NISHIMURA | Mr. T. TOMIYAMA PM/Operation & Maintenance Management Planning I | Mr. Y. ISHII Equipment Designing I | Mr. H. KOZIMI Facility Planning/Environment & Social Consideration I | Mr. M. TSUJI Equipment Procuring Planning/Cost Estimation I | Mr. A. HAYAHARA Construction Procurement/Cost Estimation II |
| 1 | 11-Jan | Sat | | NRT(00:05)→LosA(17:00) LosA(22:27)→NY(06:36) | NRT(14:35) → NY/JFK (13:14) | | | |
| 2 | 12-Jan | Sun | | NY(7:40)→Dom/Las AM (12:31) | NY/JFK(7:30)→Dom/Las AM (12:27) | | | |
| 3 | 13-Jan | Mon | | JICA Office(Rep.Dominica) | Visit & Conference | | DL172 NRT(14:35) → NY/JFK (13:14) | |
| 4 | 14-Jan | Tue | | | | | B6 881 NY/JFK(8:05)→St. Lucia/HN(13:40) | |
| 5 | 15-Jan | Wed | | | | | | |
| 6 | 16-Jan | Thu | | | → St.V(20:30) | | | |
| 7 | 17-Jan | Fri | | Official Meeting (ICR Explanation & Conference in Ministry of AIFERT(St. Vincent) /Fishery Division /Survey of the Facilities of Kingstown Market | | | | |
| 8 | 18-Jan | Sat | | LI 560 St.V (6:00)→ | LI 787 St.V (21:15)→ | | | |
| 9 | 19-Jan | Sun | | | | LI 768 St.L/VIGIE(20:00) → St.V(20:30) | | |
| 10 | 20-Jan | Mon | | | Visit to Fishery Division(St. Vincent), Prep & Scheduling of Survey/Visit of related facilities & stakeholders | | | |
| 11 | 21-Jan | Tue | | | Survey of the Facilities of Kingstown Market | | | |
| 12 | 22-Jan | Wed | | | Survey of the Facility of Calliaqua | | | |
| 13 | 23-Jan | Thu | | | Survey of the Facility of Barrouallie | | | |
| 14 | 24-Jan | Fri | | | Survey of the facility of Chateaubelair | | | |
| 15 | 25-Jan | Sat | | →NRT | Team Meeting | | | |
| 16 | 26-Jan | Sun | | | → St.V(20:30) | Filling | | → St.V(15:40) |
| 17 | 27-Jan | Mon | | | Team Meeting / St.Vincent Island→Union Island | | Team Meeting / Construction & Procurement Survey | |
| 18 | 28-Jan | Tue | | | Survey of the Facilities of Clifton | | Construction & Procurement Survey Hotel: Cobblestone | |
| 19 | 29-Jan | Wed | | | Union Island→Canouan Island /Survey of the Facilities of Friendship Bay | | Survey of Facilities & Equipment | |
| 20 | 30-Jan | Thu | | | Survey of Canouan Island→Bequia Island | | Survey of Facilities & Equipment | |
| 21 | 31-Jan | Fri | | | Survey of the Facilities of Bequia Island | | Survey of Facilities & Equipment | |
| 22 | 1-Feb | Sat | | | Bequia Island→St. Vincent Island | | Survey of Facilities & Equipment | |
| 23 | 2-Feb | Sun | | | Filling | | Filling | |
| 24 | 3-Feb | Mon | | | Survey | Survey of Concerned Regulations & Laws/User Information etc. | | LI 78 St.V(21:15) → |
| 25 | 4-Feb | Tue | | | Meeting with Concerned parties & Stakeholders (St. Vincent) | Visit of related Facilities & Stakeholders | | |
| 26 | 5-Feb | Wed | | | | LI 756 St.V(15:20) → | | |
| 27 | 6-Feb | Thu | | | | | | |
| 28 | 7-Feb | Fri | | | | | | |
| 29 | 8-Feb | Sat | | NRT→NY | | | | |
| 30 | 9-Feb | Sun | | | | | | |
| 31 | 10-Feb | Mon | | | | | | |
| 32 | 11-Feb | Tue | | | →NRT(16:50) | | | |
| 33 | 12-Feb | Wed | | →St.V(20:30) | | 30days | | |
| 34 | 13-Feb | Thu | | Official Meeting/Survey(Kingstown Market)/Conference & Revision of ICR | | Legend | | |
| 35 | 14-Feb | Fri | | Confirmation of Survey Items. Exchange of Minutes (St. Vincent) | | DL : DELTA AIR LINES B6 : JETBLUE AIRWAYS LI : LIAT BA : British Airway | | |
| 36 | 15-Feb | Sat | | Official Meeting | | | | |
| 37 | 16-Feb | Sun | | LI 787 St.V(21:15)→ | | | | →NRT(16:50) |
| 38 | 17-Feb | Mon | | | | TRD/POS : Trinidad & Tobago, Port of Spain, Piarco International Airport | | |
| 39 | 18-Feb | Tue | | | | Dom/Las AM: Rep. Dominica, Las Americas International Airport | | |
| 40 | 19-Feb | Wed | | | | St.L/HN : St.Lucia, Vieux Fort, Hewanorra International Airport | | |
| 41 | 20-Feb | Thu | | | | St.L/VIGIE : St.Lucia, Castries, George F.L. Charles Airport | | |
| 42 | 21-Feb | Fri | | | | NRT : Narita International Airport | | |
| 43 | 22-Feb | Sat | | | | NY/JFK : New York, J.F. Kennedy | | |
| 44 | 23-Feb | Sun | | | | ATL/HFJ : Atlanta Hartsfield-International | | |

16days

31days

44days

Legend 2: Stay of the Survey Teams

| | | | |
|--|---------------|--|------------------------|
| | : St. Vincent | | : Other Countries |
| | : Travel days | | : Republic of Dominica |

(2) Explanation on the Draft Final Report

| Date | Day of the week | Mr. Y. Masanaga Team Leader | Mr. T. Tomiyama PM/Operation & Maintenance Management Planning I | Mr. M. Ishii Equipment Designing I |
|------------------------|-----------------|--------------------------------|---|--|
| 13 th , May | Tue | NRT → NY/JFK | | |
| 14 th , May | Wed | NY/JFK → Antigua → St.L / HN | | |
| 15 th , May | Thu | - | | |
| 16 th , May | Fri | | | |
| 17 th , May | Sat | | | |
| 18 th , May | Sun | Preparation of Minutes | | |
| 19 th , May | Mon | - | | |
| 20 th , May | Tue | → St.V | | |
| 21 st , May | Wed | Official Meeting (St.V) | | |
| 22 nd , May | Thu | Exchange of Minutes (St.V) | | |
| 23 rd , May | Fri | St.V → GND | | |
| 24 th , May | Sat | GND → NY/JFK | | |
| 25 th , May | Sun | NY/JFK → | | |
| 26 th , May | Mon | → NRT | | |

Remarks: St. V: Saint Vincent and the Grenadines, St. L: Saint Lucia, GND: Granada

Appendices 3. List of Parties Concerned in the Recipient Country

| Ministry of Agriculture, Rural Transformation, Forestry, Fisheries and industries (MOA) | | |
|---|--------------------------|---|
| Name | Title | Organization |
| Mr. Raymond Ryan | Permanent Secretary | Ministry of Agriculture, Rural Transformation, Forestry, Fisheries and Industries (MOA) |
| Mrs. Jennifer Howard | Senior Fisheries Officer | Fisheries Division (FD) |
| Mr. Lorenzo George | Fisheries Officer | |
| Mr. Kris Issacs | | |
| Mr. Sylvester Hazel | Fisheries Officer | FD (Bequia Island) |
| Mr. Ernie Brackken | Fisheries Assistant | FD (Owia) |
| Mr. Trovan Ferrari | | FD (Union Island) |
| Mr. Dunstan Johnson | Manager | National Fish Market Ltd.,(NFML) |
| Mr. Jerson Badal | Senior Manager | |
| Mr. Lambert Vitalis | Plant Manage | NFML (Vieux Fort) |
| Mr. Rigie Maxwell | | NFML (Dennery) |
| Barrouallie Fishery Development Cooperative Society Ltd.) | | |
| Mr. Vibert Pierre | Manager | |

| Embassy of Japan in Trinidad and Tobago | | |
|--|------------------|--|
| His Excellency Yoshimasa Tezuka | Ambassador | |
| Mr. Takeshi Koga | Second Secretary | |

| Japan International Cooperation Agency (JICA) | | |
|--|----------------------|--------------------------------|
| Ms. Akiko Oda | Chief Representative | JICA Dominican Republic Office |
| Mr. Naotaka Yamaguchi | Sub-Director | |
| Mr. Nariaki Mikuni | JICA Expert | CARIFICO PROJECT |
| Mr. Mitsuhiro Ishida | | |

Appendices 4. Minutes of Discussions (M/D)

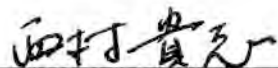
(1) Minute of Discussions on the Survey I

MINUTES OF DISCUSSIONS
ON
THE PREPARATORY SURVEY
FOR
THE PROJECT FOR IMPROVEMENT OF FISHERY EQUIPMENT/MACHINERY
IN
SAINT VINCENT AND THE GRENADINES

The Japan International Cooperation Agency (hereinafter referred to as "JICA") decided to conduct a Preparatory Survey for "the Project for Improvement of Fishery Equipment/Machinery in Saint Vincent and the Grenadines" (hereinafter referred to as "the Project") and sent the survey team (hereinafter referred to as "the Team") to Saint Vincent and the Grenadines, headed by Mr. Takashi Nishimura, Advisor, Rural Development Department, JICA. The Team is scheduled to stay in the country from 16th of January to 15th of February, 2014.

The Team held a series of discussions with officials concerned of the Government of Saint Vincent and the Grenadines (hereinafter referred to as "GOSVG") and conducted field surveys at the study area. As a result of the discussions and the field surveys, both parties confirmed the main items described in the attached sheets.

Kingstown, 14th of February, 2014



Mr. Takashi Nishimura
Leader,
Preparatory Survey Team,
Japan International Cooperation Agency



Mr. Raymond Ryan
Permanent Secretary
Ministry of Agriculture, Rural Transformation,
Forestry, Fisheries and Industries
Saint Vincent and the Grenadines

ATTACHMENT

1. Title of the Project

Both sides confirmed that the title of the Project was “the Project for Improvement of Fishery Equipment/ Machinery in Saint Vincent and the Grenadines”.

2. Objective of the Project

Both sides defined the objective of the Project as to improve fishery product distribution and fisheries management, by upgrading and replacing equipment/machinery and its accompanying facilities that were previously installed by Japan's Grant Aid, as well as, by installing new equipment/machinery responding to new needs for fisheries management.

3. Responsible and Implementing Agency

The responsible agency shall be the Ministry of Agriculture, Rural Transformation, Forestry, Fisheries and Industries.

The implementing agency shall be the Fisheries Division under the Ministry of Agriculture, Rural Transformation, Forestry, Fisheries and Industries.

The organizational chart of the Fisheries Division is shown in Annex-1.

4. Project site

The Project site is shown in Annex 2.

5. Items requested by the Government of Saint Vincent and the Grenadines

After discussion, both sides confirmed the items requested by Saint Vincent and the Grenadines side. They are listed in Annex-3.

6. Japan's Grant Aid Scheme

Saint Vincent and the Grenadines side understood the Japan's Grant Aid Scheme explained by the Team as described in the Annex 4 and shall take the necessary measures as specified in the Annex 5 for smooth implementation of the Project.

7. Further schedule of the Study

- (1) Based on the survey results, JICA will prepare the draft report including outline design of the Project and dispatch a mission in order to explain its contents scheduled tentatively in May, 2014.
- (2) Once both sides agree in principle on the contents of the report, JICA will finalize the report and send it to Saint Vincent and the Grenadines by the end of August, 2014.

8. Environmental and social considerations

In order to ensure that appropriate environmental and social considerations are to be made for the Project, Saint Vincent the Grenadines side agreed to abide by ‘JICA Guidelines for Environmental and Social Considerations’ in addition to the national environmental laws and regulations of Saint Vincent and the Grenadines.

It was affirmed that the Fisheries Division would take charge of conducting the Environmental Impact Assessment and obtain an environmental permission from Saint Vincent and the Grenadines authorities concerned before the implementation of the Project.

9. Other important issues

(1) Official request letter for Grant Aid from Japan

Saint Vincent and the Grenadines side agreed that the GOSVG should submit “Application Form for Grant Aid from Japan” to the Government of Japan (hereinafter referred to as “GOJ”) through the diplomatic channel as soon as possible after this meeting. The list of items requested as Annex-3 should be attached to the application form.



(2) Decision of the final items of the Project

Saint Vincent and the Grenadines side understood the followings:

- a. After this survey, JICA would prepare the outline design and estimate costs of the Project through further studies in Japan.
- b. The GOJ would scrutinize the outline design and costs, taking the Japanese side's budget into consideration.
- c. Through these processes, the Japanese side would decide the final items of the Project.
- d. Therefore, all items listed in Annex-3 might not be assured to be the final items.

(3) Disposal of equipment/machinery/facilities

Saint Vincent and the Grenadines side agreed that if it is necessary to dispose for implementation of the Project any fishery equipment/machinery/facility installed by the previous Japan's Grant Aid, the GOSVG should inform to the GOJ through the diplomatic channel based on the Exchange of Notes (E/N) before disposing it.

(4) Explanation to stakeholders

Saint Vincent and the Grenadines side agreed that the GOSVG should explain to the stakeholders concerned the equipment/machinery/facilities that would be disposed for the Project before starting the Project, and to ensure that they could obtain substitutes.

(5) Undertakings to be taken by GOSVG

Saint Vincent and the Grenadines side understood that the GOSVG should take necessary measures by its own expenses if existing equipment/machinery/facilities should be disposed and/or enough space should be assured for implementation of the Project.

However, both sides agreed that they would explain to their own Government the appropriateness that installation of new equipment/machinery/facilities and disposal of existing equipment/machinery/facilities should be implemented as a work in the Project, if installation and disposal is inseparably related to each other.

END

| | |
|---------|---|
| Annex 1 | Organizational charts |
| Annex 2 | Location of the Project site |
| Annex 3 | List of items requested by the Government of Saint Vincent and the Grenadines |
| Annex 4 | Japan's grant aid scheme |
| Annex 5 | Major undertakings to be taken by each Government |

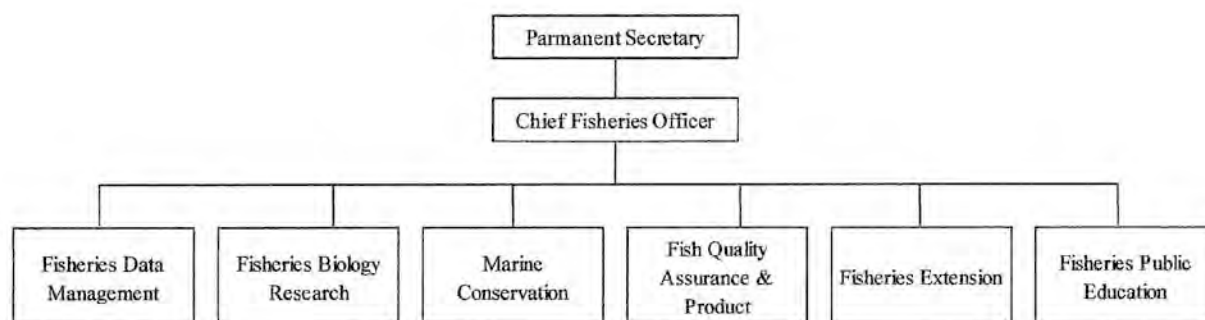


Annex – 1 Organizational Chart

Fisheries Division

Ministry of Agriculture, Rural Transformation, Forestry, Fisheries and Industries

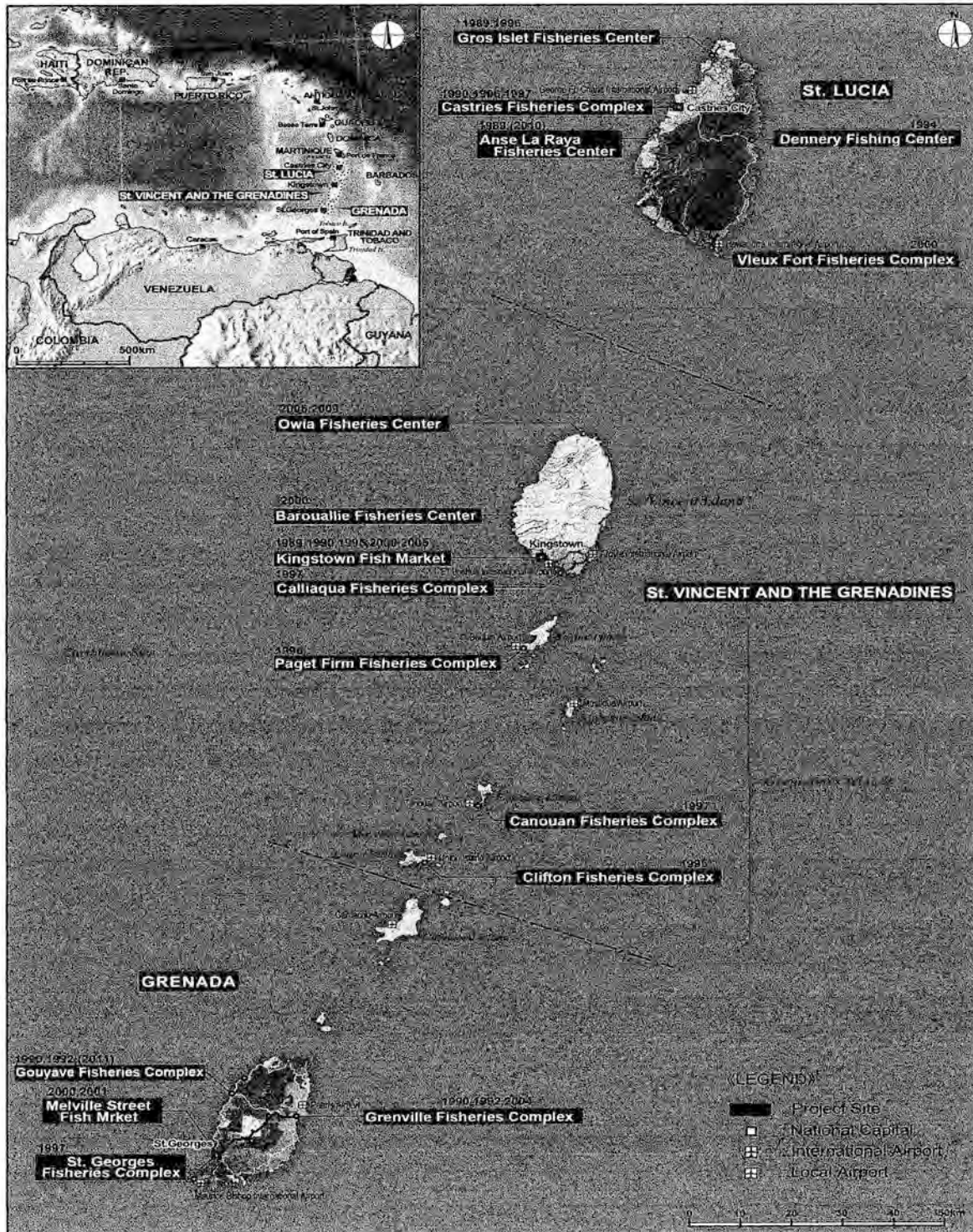
Saint Vincent and the Grenadines



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ANNEX 2 Location of Project Sites



Annex-3 List of Items Requested by the Government of St. Vincent and the Grenadines (1/2)

| No. | Project Site | Name of Previously Executed Project (Completion Year) | | Candidate Component of the Project | Quantity | Discussion Results of the Field Survey (Preparatory Survey for Improvement of Fishery Equipment /Machinery in the Caribbean Region) | Implementing Agency |
|-----|------------------------|--|--------------|---|----------|---|---------------------|
| 1-1 | Calliaqua | The Fishery Complex Construction Project | 1997 | Replacement of the existing ice plant (1 ton/day) and one cold storage and one chilled room. Refrigerant is to be changed from R22 to R404A. | 1 set | Existing refrigeration equipment have reached their mechanical life span. Could be replaced without touching building's main structure. | DOF |
| 1-2 | Paget Farm (Bequia) | Coastal Fisheries Development Project | 1995 | Replacement of existing ice plants (1 ton/day x 2 units) and one cold storage(-10℃), including distribution panel. Refrigerant is to be changed from R22 to R404A. | 1 set | Same as above. | DOF |
| 1-3 | Canouan | The Fishery Complex Construction Project | 1997 | Same as the case of 1-1. Capacity of ice plant is to be 2 ton/day. | 1 set | Same as above. Corrosion by sea wind is strong here. | DOF |
| 1-4 | Clifton (Union Is.) | Coastal Fisheries Development Project | 1995 | Replacement of existing ice plant (1 ton/day x 2 units). Refrigerant is changed from R22 to R404A. Affiliated concrete water tower and the large iron door facing to the sea side are to be repaired. | 1 set | Existing refrigeration equipment have reached their mechanical life span. Could be replaced without touching building's main structure. There are many structural cracks all over the tower. Also some of those are under serious concrete rupture at the base of the tower. The main reinforcement has been corroded. The iron door facing to the sea has almost collapsed, and lost its function against sea wind intrusion. | DOF |
| 1-5 | Kingstown | The Project for Re-Modeling of New Kingstown Fish Market | 2,005 | To supply spareparts for existing refrigeration machines | 1 set | The refrigerant R22 will be continuously used. The mechanical spareparts for existing refrigeration machines are to be supplied. | NFML |
| 1-6 | | | | Replacement of refrigerated van (loading capacity 500 kg) | 2 | Existing two insulated trucks have reached their life span. They needs to be changed to refrigerated types to achieve their role of quality control of fish products. | |
| 2-1 | Canouan & Union Island | The Fishery Complex Construction Project, Coastal Fisheries DevelopmentProject | 1997 1995 | To supply materials for repairing existing rainwater collecting system (pipes, joints and tanks) | 1 set | The rain water collection system in the sea side of the main building has been heavily damaged caused by deterioration of its materials and damages by past cyclones. As the rain water utilization is essential in the outer island, the materials for its repair to be supplied. The repair works is to be done by DOF. | DOF |
| 2-2 | Barroualli | The Fisheries Development Project (phase 1) | 1989 | To expand existing fuel tank from 1,000 gallon to 2,500 gallon, and replacement of dispenser and piping. | 1 set | Present capacity of 1,000 gallon tank is enough only for three days of fishing activities in this center. It is strongly guessed that the rain water intruded into the fuel tank during the early time of the center's commencement caused by the structural maldesign of covering system of the inspection hole. The fuel mixed with this intruded water was supplied to fishing boats and engines of those boats got in troubles. Soon after this fuel supply system was not used by the local fishermen anymore. However they really need stable and sufficient supply of fuel from the center if it is properly supplied. DOF has recently decided to operate the center directly in stead of being managed by the village cooperative. And expansion of the existing tank was requested. | DOF |
| 2-3 | Owia | The Project for the Construction of Owia Fishery Center | 2009 | To remove existing freshwater reservoir tank and install two water tanks on to the roof of the main building. One of them is to be used for a sedimentation tank. | 1 set | The water supply pump has lost its function by the damage of the control panel caused by electric voltage unstability. Accordingly , existing stainless water reservoir tank lost its original function. However, the city water intaken from the mountain near by, can be used directly because its water pressure is sufficiently high (6 atm. pressure). Accordingly, the water supply pump is not in needs. On the other hand, this city water become heavily silted time to time during rainy days. So the water intake system for the center needs a sedimentation tank. | DOF |
| | | | | Replcement of four equipment relating to existing refrigerating system such as refrigerant receiver tank, compressor, condenser and driving motor. | 1 set | The refrigerant tank has been seriously damaged and got leakages caused by electric corrosion. Accordingly, the refrigerant characteristics has been changed. In addition, the compressor to be changed because its life span has been largely shortened caused by the electric voltage unstability. Further, the flake ice machine has oil leakage caused by its crankshaft disorder, and the driving motor has been deteriorated caused by electric unstability. | |
| | | | | Replacement and relocation of existing fuel supply equipment installed to the existing jetty. | 1 set | The fuel supply system installed at the jetty has lost its function caused by sea water corrosion. The system is to be replaced and relocated to the inner area avoiding sea water splash. | |
| | | | | Replacement of existing incoming panel | 1 set | The outdoor incoming panel is intruded by the rain water and is in danger conditions, damaged by sea air. | |

Annex-3 List of Items Requested by the Government of St. Vincent and the Grenadines (2/2)

| | | | | | | | |
|-----|---|---|-----------|---|--------------|---|-----|
| 3-1 | Kingstown (Fort Charlotte) | Not categorized into past projects | | Radar control center : Radar (25kW, 6 ft antenna), Microwave (1 pair), AIS receiver, CCTV camera, Weather station, Power supply unit, UPS and Tower | 1 set | Requested by the permanent secretary of the Ministry. The registration of domestic fishing boats have been completed. Illegal fishing boats were captured time to time when they were found supported by the Coast Guard. The Castries Declaration on IUU was issued among the CARICOM countries in 2010, and its substantial action have been commenced. EU's support such as integrated fishing boat legislation, reform of fishermen's consciousness, is now on-going from the bottom level but its movement is slow. Accordingly, the monitoring of fishing boats by the radar system as a quicker action was requested. The monitoring room and two personnel is being secured. | DOF |
| 3-2 | Union Island | Not categorized into past projects | | Radar monitoring station (Same as 3-1) | 1 set | Same as above. | DOF |
| 4-1 | | Not categorized into past projects | | Submerged-type fish aggregating device (FAD) for 1,500m depth including FRP+ABS float unit, resin+wire coated rope, anchor chain, anchor, radar reflector and beacon light | 2 sets | FAD is requested as one of measurements for the sustainable utilization of fisheries resources. The specification of Japanese type is acceptable. It will be used for assessing its effect, obtaining an indicator for proper utilization of fisheries resources and reform of fishermen's consciousness. | |
| 4-2 | Caribbean side of St. Vincent and Atlantic side of Bequia | The Fisheries Development Project (phase 3) | 1992 | To provide an approx. 14m length cabin-cruiser type multi-purpose boat, 5 persons on board with a cabin for sleeping, 3 to 4 days per trip, for 1) diamondback squid experimental fishing, and 2) survey, deployment and monitoring of FADs. equipped with 1-ton crane and multi-beam echo-sounder (range up to 2,000m) for sea bottom survey and monitoring of fish around FADs. | 1 set | The boat was requested as an essential means for installation of FAD and its monitoring survey. Activities such as test fishing, fisher's training, etc. by existing long liner donated in the past, have been stranded for the past two years caused by its captain's resign. Offer for public subscription for a new captain has been made, and the selection is being processed from plural applicants. Activities of the boat will be commenced soon. The existing boat has been operated annually while the captain was in charge. Its engine is well maintained and starts smoothly. Availability of its spareparts is very difficult nowadays because the type of this engine is sufficiently old. In addition, the hull made from FRP is easily getting cracks and the repair cost is increasing. Its operation seems to be ceased in near future. A boat is expected to enable research and monitoring works in the outerislands and in the Atlantic Ocean side. | DOF |
| 5-1 | MPA in Bequia and Marine Park in St. Vincent | Not categorized into past projects | 2004-2008 | To install artificial reefs for lobster and for fishes | 30 sets each | The experiment of artificial reef installation was executed during the years of 2003 to 2006 by OFCA in Japan. The effect was reported in an international seminar held on Nov. 2006 in St. Vincent. DOF has implemented its monitoring activities time to time until the year 2008 even after the seminar. Request was made to install more artificial reefs in the outerislands and marine protected areas. | DOF |

Remarks: DOF: Division of Fisheries, NFML: National Fisheries Marketing LTD.




ANNEX-4 Japan's Grant Aid

The Government of Japan (hereinafter referred to as "the GOJ") is implementing the organizational reforms to improve the quality of ODA operations, and as a part of this realignment, a new JICA law was entered into effect on October 1, 2008. Based on this law and the decision of the GOJ, JICA has become the executing agency of the Grant Aid for General Projects, for Fisheries and for Cultural Cooperation, etc.

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

1. Grant Aid Procedures

The Japanese Grant Aid is supplied through following procedures:

- Preparatory Survey
 - The Survey conducted by JICA
- Appraisal & Approval
 - Appraisal by the GOJ and JICA, and Approval by the Japanese Cabinet
- Authority for Determining Implementation
 - The Notes exchanged between the GOJ and a recipient country
- Grant Agreement (hereinafter referred to as "the G/A")
 - Agreement concluded between JICA and a recipient country
- Implementation
 - Implementation of the Project on the basis of the G/A

2. Preparatory Survey

(1) Contents of the Survey

The aim of the Preparatory Survey is to provide a basic document necessary for the appraisal of the Project made by the GOJ and JICA. The contents of the Survey are as follows:

- Confirmation of the background, objectives, and benefits of the Project and also institutional capacity of relevant agencies of the recipient country necessary for the implementation of the Project.
- Evaluation of the appropriateness of the Project to be implemented under the Grant Aid Scheme from a technical, financial, social and economic point of view.
- Confirmation of items agreed between both parties concerning the basic concept of the




Project.

- Preparation of an outline design of the Project.
- Estimation of costs of the Project.

The contents of the original request by the recipient country are not necessarily approved in their initial form as the contents of the Grant Aid project. The Outline Design of the Project is confirmed based on the guidelines of the Japan's Grant Aid scheme.

JICA requests the Government of the recipient country to take whatever measures necessary to achieve its self-reliance in the implementation of the Project. Such measures must be guaranteed even though they may fall outside of the jurisdiction of the organization of the recipient country which actually implements the Project. Therefore, the implementation of the Project is confirmed by all relevant organizations of the recipient country based on the Minutes of Discussions.

(2) Selection of Consultants

For smooth implementation of the Survey, JICA employs (a) registered consulting firm(s). JICA selects (a) firm(s) based on proposals submitted by interested firms.

(3) Result of the Survey

JICA reviews the Report on the results of the Survey and recommends the GOJ to appraise the implementation of the Project after confirming the appropriateness of the Project.

3. Japan's Grant Aid Scheme

(1) The E/N and the G/A

After the Project is approved by the Cabinet of Japan, the Exchange of Notes (hereinafter referred to as "the E/N") will be signed between the GOJ and the Government of the recipient country to make a pledge for assistance, which is followed by the conclusion of the G/A between JICA and the Government of the recipient country to define the necessary articles to implement the Project, such as payment conditions, responsibilities of the Government of the recipient country, and procurement conditions.

(2) Selection of Consultants

In order to maintain technical consistency, the consulting firm(s) which conducted the Survey will be recommended by JICA to the recipient country to continue to work on the Project's implementation after the E/N and G/A.

(3) Eligible source country

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



Government of the recipient country or its designated authority deem it necessary, the Grant Aid may be used for the purchase of the products or services of a third country. However, the prime contractors, namely, constructing and procurement firms, and the prime consulting firm are limited to "Japanese nationals".

(4) Necessity of "Verification"

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

(5) Major undertakings to be taken by the Government of the Recipient Country

In the implementation of the Grant Aid Project, the recipient country is required to undertake such necessary measures as shown in ANNEX-5.

(6) "Proper Use"

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

(7) "Export and Re-export"

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

(8) Banking Arrangements (B/A)

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

(9) Authorization to Pay (A/P)

The Government of the recipient country should bear an advising commission of an Authorization to Pay and payment commissions paid to the Bank.

(10) Social and Environmental Considerations

A recipient country must carefully consider social and environmental impacts by the Project and must comply with the environmental regulations of the recipient country and JICA socio-environmental guidelines.

A handwritten signature in black ink, appearing to be the letters 'm' or 'n' in a cursive style.A handwritten signature in black ink, appearing to be the letters 'RJR' in a cursive style.

ANNEX-5 Major Undertakings to be taken by Both Governments

Major undertakings to be taken by both Governments are shown in the table below.

| NO. | Items | To be covered by Grant Aid | To be covered by Recipient Side |
|-----|--|----------------------------|---------------------------------|
| 1 | To secure land | | ● |
| 2 | To clear, level and reclaim the site when needed | | ● |
| 3 | To construct gates and fences in and around the site | | ● |
| 4 | To construct a parking lot (or parking lots) | (●) | ● |
| 5 | To construct roads | | |
| | 1) Within the site | ● | |
| | 2) Outside the site | | ● |
| 6 | To construct the building | ● | |
| 7 | To provide facilities with electricity, water, sewage system and other incidental facilities | | |
| | 1) Electricity | | |
| | a. Wiring the site | | ● |
| | b. Drop wiring and internal wiring within the site | ● | |
| | c. Installation of main circuit breaker and transformer | ● | |
| | 2) Water Supply | | |
| | a. The city water distribution main to the site | | ● |
| | b. The supply system within the site (receiving and elevated tanks) | ● | |
| | 3) Sewage | | |
| | a. City drainage main (for storm sewer and others to the site) | | ● |
| | b. Drainage system (for toilet sewer, ordinary waste, storm drainage and others) within the site | ● | |
| | 4) Gas Supply | | |
| | a. The city gas main to the site | | ● |
| | b. The gas supply system within the site | ● | |
| | 5) Telephone System | | |
| | a. The telephone trunk line to the main distribution frame/panel (MDF) of the building | | ● |
| | b. The MDF and the extension after the frame/panel | ● | |
| | 6) Furniture and Equipment | | |
| | a. General furniture | | ● |
| | b. Project equipment | ● | |
| 8 | To bear the following commissions to the Japanese bank for banking services based upon the B/A | | |
| | 1) Advising commission of A/P | | ● |
| | 2) Payment commission | | ● |
| 9 | To ensure unloading and customs clearance at port of disembarkation in recipient country | | |
| | 1) Marine (Air) transportation of the products from Japan to the recipient country | ● | |
| | 2) Tax exemption and custom clearance of the products at the port of disembarkation | | ● |
| | 3) Internal transportation from the port of disembarkation to the project site | (●) | ● |
| 10 | To accord Japanese nationals, whose services may be required in connection with the supply of the products and the services under the verified contract, such facilities as may be necessary for their entry into the recipient country and stay therein for the performance of their work | | ● |
| 11 | To exempt Japanese nationals from customs duties, internal taxes and other fiscal levies which may be imposed in the recipient country with respect to the supply of the products and services under the verified contracts | | ● |
| 12 | To properly and effectively maintain and operate the facilities contracted and equipment provided under the Grant | | ● |
| 13 | To bear all the expenses, other than those to be covered by the Grant, necessary for construction of the facilities as well as for the transportation and installation of the equipment | | ● |

(B/A: Banking Arrangement, A/P: Authorization to pay)

(2) Minutes of Discussions on the Survey II (Explanation of Draft Report)

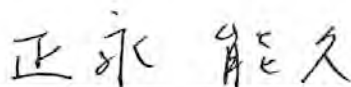
MINUTES OF DISCUSSIONS
ON
THE PREPARATORY SURVEY
FOR
THE PROJECT FOR IMPROVEMENT OF FISHERY EQUIPMENT/MACHINERY
IN
SAINT VINCENT AND THE GRENADINES
(EXPLANATION OF DRAFT REPORT)

Japan International Cooperation Agency (hereinafter referred to as "JICA") dispatched the Preparatory Survey Team on "the Project for Improvement of Fishery Equipment/ Machinery in Saint Vincent and the Grenadines" (hereinafter referred to as "the Project"). Based on the results of the survey, JICA prepared the draft report of the Project.

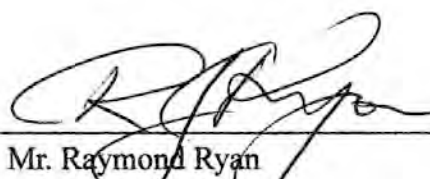
In order to explain and to discuss with the authorities concerned to the Government of Saint Vincent and the Grenadines (hereinafter referred to as "GOSVG") about the components of the draft report, JICA sent a Preparatory Survey Team (hereinafter referred to as "the Team") to Saint Vincent and the Grenadines (hereinafter referred to as SVG) from 21st to 22nd of May, 2014 headed by Mr. Yoshihisa MASANAGA, Deputy Director, Rural Development Department, JICA.

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

Kingstown, 22nd of May, 2014



Mr. Yoshihisa MASANAGA
Leader,
Preparatory Survey Team,
Japan International Cooperation
Agency



Mr. Raymond Ryan
Permanent Secretary
Ministry of Agriculture, Rural
Transformation, Forestry, Fisheries and
Industries
Saint Vincent and the Grenadines

ATTACHMENT

1. Components of the draft report

The GOSVG agreed and accepted the components of the draft report explained by the Team including obligations of the recipient country which are mentioned in the Chapter three (3) of the draft report. It is understood that further request of change in the Project components shall not be considered; however, the components of the Project are still subject to change depending upon the result of the tender for contractor.

2. Japan's Grant Aid Scheme

The GOSVG reconfirmed its understanding of the Japan's grant aid scheme and major undertakings of each Government as described in the Annex 4 and 5 of the Minutes of Discussions signed on 14th February, 2014.

3. Further schedule of the survey

JICA will complete the final report in accordance with the confirmed items and send it to the GOSVG by the end of August, 2014.

4. Estimated cost of the Project to be borne by Japan's Grant Aid

4-1. Estimated cost of the Project

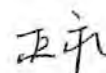
The Team provided the estimated cost of the Project as described in the Annex 1.

4-2. Confidentiality

The GOSVG affirmed that the estimated cost of the Project, together with other information related to the Project such as facility design drawings and specifications of equipment, shall not be released to any outside parties before conclusion of all the contract(s) for the Project since they are confidential information that is concerned with the tender.

5. Environment and Social Considerations

In order to ensure that appropriate environmental and social considerations are to be made for the Project, the GOSVG agreed to abide by 'JICA Guidelines for Environmental and Social Considerations' in addition to the national environmental laws and regulations of SVG.



6. Other Relevant Issues

6-1. Timely fulfillment of obligations of the recipient country

It was assured that GOSVG shall take necessary measures to fulfill those obligations listed below with due observation of respective time limit.

(1) Disposal of equipment/machinery/facilities

The GOSVG agreed that if it is necessary to dispose for implementation of the Project any fishery equipment/machinery installed by the previous Japan's Grant Aid, the GOSVG should inform the GOJ through the diplomatic channel based on the Exchange of Notes (E/N) before disposing it.

(2) Explanation to stakeholders

The GOSVG agreed that the GOSVG would explain to the stakeholders concerned the equipment/machinery/facilities that would be disposed for the Project before starting the Project, and to ensure that they could obtain substitutes.

(3) Arrangement of smooth VAT exemption measures for the Project

The GOSVG agreed to take note to establish smooth VAT exemption measures for the Project by the time of commencement of the Project works.

(4) Proper action to provide an overnight storage services for landed fish

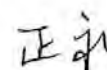
The GOSVG agreed to take proper measures of temporary fish storage services for fish vendors and fishermen when necessary during installation works by the Project.

(5) Information of Submerged FADs positions

The GOSVG agreed to inform to the Team the geographical positions of planned FADs by the end of May, 2014.

(6) Condensers for cold storage and chilled room in Oiwa Fisheries Center

The Japanese side explained that two condensers attached with a cold storage and a chilled room in Oiwa Fisheries Center would not be included in the Project.



ANNEX

Annex 1 Estimated Project Cost to be borne by Japan's Grant Aid

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Appendices 5

App.5-1 Service Life of Refrigeration Facilities

| Type of Component | Service life maintained in Japan, etc.<1 (Years) | | | Service life maintained under sever conditions such as Carib. Area, etc.<2 (Years) | | | | Measurements to elongate life span |
|----------------------------------|--|---------|-----|--|---------|-----|-----------------------------------|--|
| | Usual <3 | Good <4 | Bad | Usual <5 | Good <6 | Bad | Good after proper installation <7 | |
| Plate type ice machine | 12 | 15 | 10 | 10 | 12 | 7 | 15 | To maintain pipes for water showering(periodical washing by anti-silica detergent) |
| Flake type ice machine | 15 | 20 | 10 | 12 | 15 | 7 | 20 | Blade adjustment, speed reducer's oil exchange |
| Open type compressor | 15 | 20 | 10 | 12 | 15 | 7 | 20 | Periodical oil exchange and overhaul |
| Semi-closed type compressor | 10 | 12 | 7 | 10 | 12 | 7 | 12 | Periodical oil exchange and testing of insulation resistance |
| Air cooling condenser | 12 | 15 | 5 | 10 | 12 | 3 | 15 | Proper selection of material, usage of copper fin and exterior coating by SUS, periodical inspection |
| Water cooling compressor | 12 | 15 | 7 | 10 | 12 | 5 | 15 | Proper selection of material, usage of exterior coating and pump by SUS, periodical inspection |
| Other equipment | 20 | 20 | 10 | 15 | 20 | 10 | 20 | Periodical inspection and touching up |
| Indoor electric control panel | 15 | 2 | 10 | 10 | 12 | 7 | 20 | Proper selection of setting sit, periodical testing of insulation resistance |
| Outdoor electric panel | 10 | 15 | 7 | 7 | 10 | 5 | 15 | Proper selection of material, exterior coating by SUS, periodical inspection |
| Motors | 10 | 15 | 7 | 7 | 10 | 5 | 15 | Application of AVR to keep constant voltage, periodical testing of insulation resistance |
| Three phase transformer | 15 | 20 | 10 | 10 | 15 | 7 | 20 | Periodical testing of insulation resistance, touching up |
| Piping for refrigerant and water | 12 | 15 | 10 | 10 | 12 | 7 | 15 | Periodical inspection and touching up |
| Prefabricated panel | 15 | 20 | 10 | 12 | 15 | 7 | 20 | Proper selection of material, interior and exterior coating by SUS |

Remarks<1: Located far from the coast and the site with sufficient infrastructure

<2: Located heavily influenced sea condition and the site without sufficient infrastructure

<3: Maintained by trained maintenance staff

<4: Periodical maintenance by the manufacturer

<5: Maintenance works currently conducted in the Caribbean area

<6: Maintenance works by trained maintenance staff according to the operation manual

<7: Provided with proper material and installation and maintained by trained maintenance staff

App.5- 2 Specialists' View on Appropriate Period for Maintenance Staff's Training on Ammonia Refrigerating Facilities

(1) Basic Precautions for Handling Each Refrigerant

| Refrigerant | Ammonia | R-404a | R-22 | Remarks |
|-----------------------------|-------------------------|---------------|---------------|------------------------------|
| Ozone depletion coefficient | 0 | 0 | 0.055 | - |
| Global warming coefficient | 0 | 3920 | 1810 | Assumed CO ₂ as 1 |
| Poison designation | Poison | non | non | - |
| Bad smell | Stink | non | non | - |
| Flammability | Ignition point 651°C | Not flammable | Not flammable | - |
| Boiling point | -33°C | -40.8°C | -49°C | - |

(2) Important point of maintenance

| Refrigerant | Ammonia | R-404a | R-22 |
|--|--|--|---------------------|
| 1)Preparation for working | Prepare ammonia gas mask | Nothing special | Same as on the left |
| 2)Ventilation and safety apparatus | To keep sufficient ventilation and to take mind the evacuation route in the case of ammonia leakage. | Not to neglect ventilation to avoid accident caused by lack of oxygen since this gas has no smell. | Same as on the left |
| | Put on goggles and gloves | Same as on the left | Same as on the left |
| 3)Valve operation | To close a high receiver liquid valve. | Same as on the left | Same as on the left |
| | Confirm if the refrigerant has been recovered from the repaired portion. | Same as on the left | Same as on the left |
| 4)Working position | To take a windward position from a working point. | Same as on the left | Same as on the left |
| 5)Procedure of releasing a valve | To start taking off a bolt positioning far from the body. | Same as on the left | Same as on the left |
| | To confirm not remaining any ammonia by releasing slightly the bolt/screwed type tightener | Same as on the left | Same as on the left |
| 6)Procedure after removing a valve | To purge the air from the repaired portion by a vacuum pump. | Same as on the left | Same as on the left |
| 7)Leakage check | To check ammonia leakage from the repaired portion by ammonia test paper. | To check gas leakage from repaired portion by a gas sensor | Same as on the left |
| 8)Valve operation after repair working | To open the valve gradually positioned opposite side from a high pressure liquid receiver | Same as on the left | Same as on the left |
| 9)Checking operating condition | To check temperature and pressure of the system. | Same as on the left | Same as on the left |

[Comments on Handling and Management of Different Refrigerants]

- a) As described in the Table above, the maintenance methodologies of ammonia refrigerant are almost the same as other refrigerants. The handling precautions specifically needed for ammonia is to wear an “ammonia mask” in case of leakage.
- b) Ammonia refrigerants are easy to detect even very small leakages. However, fluorocarbon

refrigerants can be dangerous when used in a closed space as they are odor-free. The fluorocarbon refrigerants cannot be considered as an easy-to-maintain refrigerant as they require leakage detection regularly.

- c) R-404a, a mixed refrigerant, is also a difficult one to handle. When there is a leakage, the mixture ratio of remained content is altered. The residue should be removed and the whole refrigerant ends up needing to be replaced.

(3) Strategies for Foreseeable Accidents and the Prevention

| Refrigerant | Ammonia | R404a | R22 |
|---|--|--|-----|
| 1) SERIOUS ACCIDENT | | | |
| This accident happens specialized in the ammonia liquid pump system. This system is not applied to the Project. | | | |
| Low temp. liquid blockade accident | Almost all the death accident by an ammonia system are caused by those of the low temp. ammonia liquid blockade. Once happened, it usually results in an serious accident. | The low temp. liquid blockade by R-404a or/an R22 does not result in a death accident, but still a serious accident. | |
| Cause of the accident | The accident happens in the pipe portion between the discharge check valve of the refrigerant liquid pump and the electric magnetic valve. When the low temperature liquid refrigerant is fully confined in this pipe, the inner pressure is quickly increased, and then large volume of liquid refrigerant spouts caused by destruction of valves, etc. | | |
| Prevention of the accident | A relief valve is installed onto the pipe between the discharge check valve of the refrigerant liquid pump and electric magnetic valve, and the spout pipe of this relief valve is connected to the low receiver. | | |
| 2) ANOTHER TYPE OF ACCIDENT | | | |
| More than 90% of accidents of refrigeration for equipment/machineries are caused by refrigerant leakages; | | | |
| Causes of refrigerant leakage accident | 18%-miss-operation and/or check error; 12%-poor flange clamping; 12%-damages of mechanical sealing; 10%-imperfect of valve ground sealing; 9%-Poor installation management; 9% poor management of idle facilities; 7%-damaged by earthquake; 7%-damaged by deterioration; 5% -exterior corrosion of pipes; 10%-and others | | |
| Prevention of the accident | Implementation of routine maintenance works enables to prevent refrigerant leakage accident. Followings are to be: 1) To provide operation/instruction manual, equipment list, checklist on important operations and operation record. 2) To educate maintenance staff on the machine operation and preservation to take proper and quick actions once an accident is happened. 3) To check items of foreseeable dangers before starting operation. | | |

(4) Ammonia specific maintenance

[Drain Removal]

When the mixture of ammonia gas and the leaked compressor oil discharged from the compressor remains in the low-pressure side of ice machines, ice-making function declines. When the same problem occurs in freezers, it does not drop or takes longer to drop to the specified temperature. Either way, the cooling capacity will be compromised. The scheduled drain removal, therefore, is the essential maintenance for refrigeration systems to function properly.

The built up drain after the heat exchange should be collected into an oil drum and removed from the drum after the ammonia gas is fully evaporated. Without the drum, it is extremely difficult to work on drains because of the strong odor. In this Project, the drum will be installed to all the systems with ammonia refrigerant to prevent the problem as much as possible.

The steps for drain removal are:

- 1) Make a quarter turn for the drain valve to open and discharge the drain into the oil drum. Make 1 and a half rotation when there is a big stack of drain.
- 2) When ammonia liquid and the gas are completely discharged into the oil drum, shut off the valve.
- 3) Open the suction valve of the oil drum and let ammonia evaporate. Leave the valve open until the suction pipe cools down to the room temperature.
- 4) Check that the suction pipe is at the room temperature and double check with the pressure meter of the oil drum to determine all ammonia is out of the oil drum. Make sure the pressure level does not increase after the suction valve is shut up. Then, remove the drain from the oil drum. Meanwhile, drain left in the drum does not harm the cooling system.

(5) A View on the appropriate period for local maintenance staff's Training

It should not be particularly difficult for technicians who have serviced R-22 cooling systems for many years to service ammonia equipment. They would only need to learn distinctive characteristics of ammonia refrigerants and adequate safety measures, which can be covered in short training programs. Past experiences in African countries suggests that 3-month technical training can effectively provide practical knowledge and skills on ammonia equipment. Installing the oil drum itself prevents problems with the drain removal, the most important maintenance work of all, and enables the technicians to service the equipment properly and safely.