NO

Department of Agriculture
Republic of the Philippines

BASIC DESIGN STUDY REPORT
ON
THE PROJECT
FOR
ESTABLISHMENT OF LABORATORY FACILITIES FOR ADVANCED AQUACULTURE TECHNOLOGIES
IN
THE REPUBLIC OF THE PHILIPPINES

AUGUST 2001

JAPAN INTERNATIONAL COOPERATION AGENCY
CRC OVERSEAS COOPERATION Inc.

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PREFACE

In response to a request from the Government of the Republic of the Philippines, the Government of Japan decided to conduct a basic design study on the Project for Establishment of Laboratory Facilities for Advanced Aquaculture Technologies and entrusted the study to the Japan International Cooperation Agency (JICA).

JICA sent to the Philippines a study team from January 29 to February 23, 2001.

The team held discussions with the officials concerned of the Government of the Philippines, and conducted a field study at the study area. After the team returned to Japan, further studies were made. Then, a mission was sent to the Philippines from May 27 to June 7, 2001 in order to discuss a draft basic design, and as this result, the present report was finalized.

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

I wish to express my sincere appreciation to the officials concerned of the Government of the Republic of the Philippines for their close cooperation extended to the teams.

August, 2001

Kunihiko Saito
President
Japan International Cooperation Agency

August, 2001

Letter of Transmittal

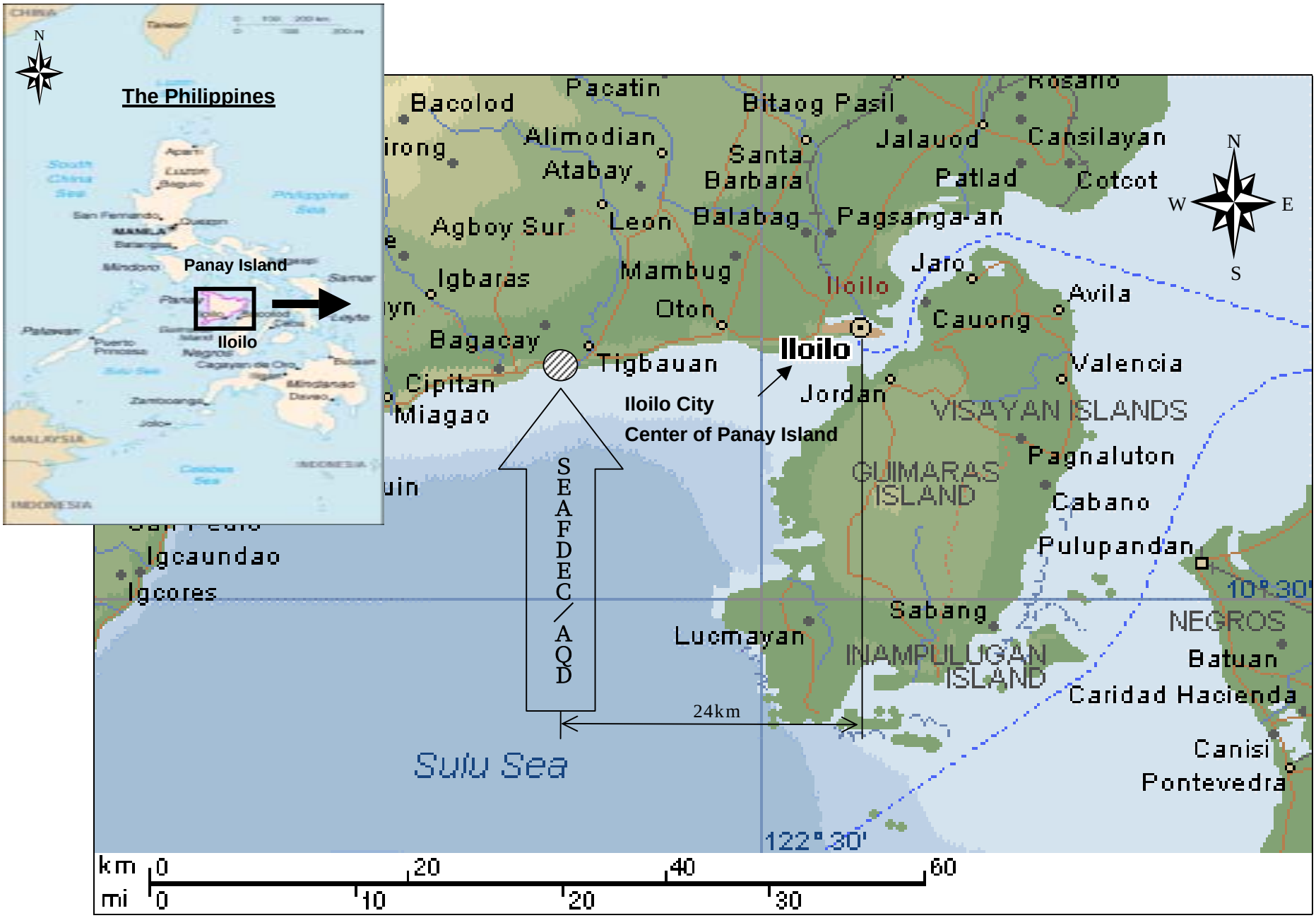
We are pleased to submit to you the basic design study report on the Project for Establishment of Laboratory Facilities for Advanced Aquaculture Technologies in the Republic of the Philippines.

This study was conducted by CRC Overseas Cooperation Inc., under a contract to JICA, during the period from January 22, 2001 to September 18, 2001. In conducting the study, we have examined the feasibility and rationale of the project with due consideration to the present situation of the Republic of the Philippines and formulated the most appropriate basic design for the project under Japan's grant aid scheme.

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

Very truly yours,

Kohsuke SHIMAZU
Project manager,
Basic design study team on
the Project for Establishment of Laboratory
Facilities for Advanced Aquaculture Technologies
in the Republic of the Philippines
CRC Overseas Cooperation Inc.



Project Site – SEAFDEC/AQD

PERSPECTIVE VIEW OF ENCLOSED WET LABORATORY

THE PROJECT FOR ESTABLISHMENT OF LABORATORY FACILITIES FOR ADVANCED AQUACULTURE TECHNOLOGIES IN THE REPUBLIC OF THE PHILIPPINES

Abbreviation

ICC	Investment Coordinating Committee
ADB	Asian Development Bank
AVR	Automatic Voltage Regulator
CNC	Certificate of Non Coverage
DA/BFAR	Department of Agriculture/Bureau of Fisheries and Aquatic Resources
DOST	Department of Science and Technology
DNA	Deoxyribonucleic Acid
DTI	Department of Trade and Industry
FAO	Food and Agriculture Organization of the United Nations
FPLC	Fast Protein Liquid Chromatography
FRMP	Fisheries Resource Management Project
FRP	Fiber-Reinforced Plastics
FSP	Fishery Sector Program
GDP	Gross Domestic Product
HACCP	Hazard Analysis Critical Control Point
IFBHPDC	Integrated Fish Broodstock and Hathery Project Demonstration Complex
JICA	Japan International Cooperation Agency
NEDA	National Economic and Development Authority
OECF	Overseas Economic Cooperation Fund
PCR	Polymerase Chain Reaction
PIS	Public Investment Staff
PPRMD	Project Packaging and Resource Mobilization Division
PTAC	Philippines Technical and Administrative Committee
RC	Reinforced Concrete
RDC	Regional Development Council
RI	Radio Isotope
RNA	Ribo Nucleic Acid
SEAFDEC/AQD	Southeast Asian Fisheries Development Center/Aquaculture Department
SEM	Scanning Electron Microscope
TEM	Transmission Electron Microscope
UPS	Uninterrupted Power Supply
USAID	The United States Agency for International Development
WSSV	White Spot Syndrome Virus

Contents

CONTENTS

Chapter 1

Background of the Request

Chapter 1 Background of the Request

1-1 Background of the Request

The Republic of the Philippines is an island state on the western Pacific, laying between 5° North Latitude and 18° North Latitude, south of Taiwan. Topographically, it consists of about 7,100 islands, large and small, extending for about 1,850km from north to south, situating on the northeast of the Malay Archipelago, southeast part of the Asian Continent. The land area is about 300,000 square kilometres, of which 96% are occupied by eleven major islands including Luzon, Mindanao, and Cebu.

The population of the Philippines is some 75.3 million (2000), of which some 15 million are living in the Metropolitan area of Manila. The Malayan people account for 95% of the national population, of which 92% are Christians and 4% are Muslims. The official language is English, though Tagalog is generally used at home life. English is taught at school. The Philippines became independent as a republic with presidency in 1965. Following the resignation of President J. Estrada, Vice-President G. Arroyo was inaugurated as the 14th President of the Philippines in January 2000.

The general situation of the state economy is summarised as follows.

Under F. V. Ramos Administration (1992-98), the real growth rate of GDP continued to increase steadily from 0.3% in 1993 to 5.7% in 1996, and 5.2% in 1997 through the economic policies including sound finance, deregulation, privatisation, liberalisation of trade and investment, and introduction of foreign capital, with the macro economy being maintained.

The Asian money crisis caused by Thailand baht crash in July 1997 affected the Philippine peso. Also, because of aggravation of the inflation, worsening financial balance, and stagnation of agricultural production due to El Nino, the year of 1998 recorded a minus growth (-0.6%) since 1991.

The growth rate of economy recovered to 3.3% due to recovery of agriculture section. In spite of slowdown in agriculture production, the year of 1999 achieved the growth rate of 3.9% due to significant growth of the manufacturing section, increased private expenditure, and improved export.

The Government of the Philippines estimate the 2001 growth rate of economy at 3.8% to 4.3%. In order to keep this economic growth on track, recovery of confidence

due to stabilisation of political condition, introduction of foreign money, rehabilitation of finance, and reform of economic structure will be problems awaiting solution.

The 1998 GDP of the Philippines was $83.3 billion, and $1,160 per capita. The recent growth rate of GDP is about 2% a year, and the sectional contribution to GDP is as follows; manufacturing and construction account for 30%, agriculture and fisheries 17.5%, finance and services 16%, trade 14%, Government and public 10%, and others 13%. Thus the role of the primary sector such as agriculture and fisheries is very important.

The details of this 17.5% consist of 10.4% of agricultural products, 2.7% of fisheries products, 2.3% of stock-farming, 1.5% of poultry, 0.1% of forestry, and 1.3% of others. The fishery is an important industry in the country.

In employment, agriculture/fisheries employ 40% (35% by agriculture/ stock-farming and 5% by fisheries), government 20%, services 18%, manufacturing/ construction 15%, and others 7%. The fishery employing some 1.03 million people is playing a very important role in this sense.

The 1999 national budget consisted of Ph. Peso 478.5 billion of revenue and PhP 590.4 billion of expenditure, resulting in revenue deficiency of PhP 111.9 billion. The national situation of the economy is rather severe.

In 1999, the Government of Philippines announced the Medium-Term Philippine Development Plan (MTFMDP) 1999-2004, aiming mainly at “alleviation of poverty and correction of regional differences” through economic growth.

In virtue of several national development plans, the number of poor families (with earnings less than expenses necessary for minimum living standard), accounting for about 40% of whole households of the country in 1988 has decreased to 32% in 1997. The current MTFMDP 1999-2004 puts emphasis successively on annihilation of poverty through sustainable development based on uniform social growth, aiming at reduction of this figure of 32% to 25-28% by 2004 through in particular the development of rural economy consisting mainly of agriculture, fisheries, and stock-farming, which employ about 39% of whole workforce.

The Philippines EEZ covers about 2.2 million square kilometres. Its western area has nutrient-rich upwellings and is one of the most productive area with various stocks in the world. Hence the Philippines is one of the world leading fishery states and its fishery is an important industry accounting for 5% of both GDP and employment. The fishery is divided into three categories of commercial fishery, municipal fishery, and aquaculture.

The total production is about 2.8 million tons, with 920 to 950 thousand tons for each fishery. The Philippines fishery is not only an important source of animal protein but also a source of foreign exchange earning through export of tuna, shrimp, and seaweed, amounting to $500 million (1999). The Government has been striving to formulate and implement various development plans to utilise the marine resources sustainably and effectively and thus to realise the responsible fishery as a fishery state. The annual per capita consumption of fish product of the Philippines is as large as 36kg and about 94% of total yield are consumed domestically. However, the population increased by 11.4% for the recent five years (1995-2000), whereas a rate of increase of fishery production is keeping on only 4.7%, which situation demands a stable increase of productivity of the fishery for the future.

Under these conditions, the development of fisheries, as well as other major industries, is given an important role to supply animal protein to the people, to earn foreign exchange, to create employment necessary for establishing a firm economic foundation of the country.

In order to assist this fisheries development, Japan has extended successively three Grant Aid programs, that is the “Enlargement Training of the Fisheries Techniques” (1979), the “Foundation of the Educational Institute of Freshwater Aquaculture” (1981), and the “Development of Moron District Fisheries” (1983), and these projects have produced excellent results in organisation of coastal municipal fishermen, improvement of productivity in aquaculture, improvement of fisheries-related infrastructure, and preservation of coastal environment and so on.

However, it may safely be said that the development of the Philippines fishery is now on the earliest stage towards “realisation of responsible fisheries,” and there lie piles of impediments including alleviation of poverty in artisanal fishing communities scattered on the coastal area of the whole country. Continuous efforts to self-reliance therefore are essential from now on.

The Philippines aquaculture has a long tradition, producing milkfish, oyster, and mussel for domestic market and black tiger shrimp and seaweed for export, with a stable increasing rate of 4.2% (1989-1999). Its recent yearly yield is over 900 thousand tons, catching up with the ones of commercial fishery and coastal municipal fisheries. From the viewpoint of resources situation, a significant increase of production of coastal fisheries cannot be anticipated and an increase of commercial fisheries is estimated to be few. Expectation of an increase of aquaculture production through improved technique is

great.

Meanwhile, in spite of its steady growth, aquaculture is facing the following problems.

1) Deterioration of water of culture ponds due to apparently feed inputs,
2) Outbreak of shrimp disease, and
3) Lowering of productivity of carrageenan from seaweed.

Also other problems are coming up to the surface, and concerns about their impact on cultured fish, indigenous species, surrounding environment, ecosystem and so on are being raised. The Department of Agriculture (DA) and its Bureau of Fisheries and Aquatic Resources (BFAR) formulated the "Fisheries Development Program 1994-2004" to address problems through implementation of the following projects.

1. Promotion of productivity of aquaculture within ecological limit.
2. Production and stocking of quality fish broodstock, seed, and fingerling.
3. Countermeasures against problems on black tiger shrimp aquaculture, particularly shrimp diseases.
4. Fish health management project.
5. Sea cage farming project.
6. Seaweed production enhancement project.
7. Fisheries quarantine.

The core research organisation of aquaculture in various fisheries development projects of the Philippines is the Southeast Asian Fisheries Development Center/Aquaculture Department (SEAFDEC/AQD), financed by the governmental budget plus Japan's contribution. Its performance as an aquaculture institute is on an international level.

The SEAFDEC/AQD has carried out studies for the establishment of aquaculture technique on the front line of aquaculture research in the Southeast Asia for 30 years since its foundation. As a result, it was rewarded with good fruits in establishing culture/production technique of important species such as milkfish, black tiger shrimp, grouper, sea bass, shellfish, seaweed, and other seedlings. In addition to these problems, now the SEAFDEC/AQD is requested to address new problems such as fish feed development suitable for each species and their breeding stages, prevention against disease, dosage standard of antibiotics, culture production control, and preservation of

environment.

Though there is some room to conduct traditional culture methods to address these problems, early application of innovative techniques is essential to solve them. Biotechnology framing the foundation of these researches has made rapid progress for the past 10 to 15 years, and the fields such as genetic engineering, cell fusion, reproduction control, growth acceleration, rapid diagnosis of fish diseases, vaccine development, and fish feed engineering have progressed with giant strides. The SEAFDEC/AQD has manpower and executing capability enough to push researches and technical development in these advanced fields forward.

However, at present the SEAFDEC/AQD has the following constraints in the facilities and equipment except the best brains.

1) Researches in biotechnology has made progress through efficient study using modern apparatuses and manuals, but almost all of the equipment and materials of the SEAFDEC/AQD are more than ten years old and not suitable for modern researches.
2) The building of laboratory is also more than 30 years old, and lack of airtightness and constant temperature due to worn-out ceiling, windows, and doors hampers the function and durability of precision devices.
3) Putting many loads on one electrical outlet was conducted in the laboratory as various apparatuses have been introduced. Wiring became also superannuated. A fire has broken out due to an electric leakage 5 years before.
4) An unstable power supply, frequent breakdowns, and fluctuation of voltage cause troubles on operation of research devices and computers.

Under these conditions, the Project aiming at the removal of constraints in aquaculture researches, the enhancement of research level, the establishment of biotechnology research system, and promotion of project-related researches in the Philippines fisheries development programs through providing suitable equipment and materials with the core aquaculture institute SEAFDEC/AQD is expected to contribute greatly to solution of problems in the aquaculture industry. Furthermore, it is clear that the results will be useful for the development of aquaculture in the Southeast Asia region.

In order to address problems in the Philippines fisheries, the Government formulated the “Project for Establishment of Laboratory Facilities for Advanced Aquaculture Technologies” for the core aquaculture research institute, SEAFDEC/AQD, aiming at

research, development, and distribution of new aquaculture technologies, and requested the Government of Japan to extend a Grant Aid for its implementation.

Responding to this request, the Government of Japan confirmed its appropriateness as Grant Aid program after investigation, and decided to execute the basic design study.

1-2 Outline of the Request and its Main Components

1-2-1 Outline of the Request

The Request is outlined to renovate the existing Nutrition Research Building of the SEAFDEC/AQD, to provide necessary equipment and materials, and to construct a new Enclosed Wet Laboratory so as to contribute to solution of problems in the aquaculture industry in the Philippines through the improvement of the research level and the establishment of the biotechnology research system. Also it is expected to contribute to the development of aquaculture in the Southeast Asia region through application and distribution of the results

1-2-2 Main Components

The followings are the contents of the original request. These are reviewed at the site survey of the Basic Design Study, and modified as seen in Table 2-2-1 on page 2-6 and "2-3-4 Basic Design" on page from 2-55 to 2-74 finally.

Table 1-2-2 Contents of Request

Requested facilities and equipment	Size and Quantity	Remark
1. Facilities		
1) Renovation of Nutrition Research Building	Renovation of the inside of the building：1 set	Renovation of the 2nd floor
2) Newly construction of rearing facility	10 tons round water tank×12 1ton experimental tank×24 Animal house：1 room	
3) Radio Isotope laboratory	1 set	In the Nutrition Research Building
4) Microalgae laboratory	1 set	Ditto
5) Septic tank	1 set	
2. Equipment Equipment for Endocrinology, Genetics, Microbiology, Fish Feed Technology, and Algal Biotechnology research.	Approximately 90 kinds of items	Equipment for biotechnology research

*The facilities and equipment to be provided by the Project are to be owned by DA.

Chapter 2

Contents of the Project

Chapter 2 Contents of the Project

2-1 Objectives of the Project

2-1-1 Background

In 1999, the Government of Philippines announced the Medium-Term Philippine Development Plan (MTFMDP) 1999-2004, aiming mainly at “alleviation of poverty and correction of regional differences” through economic growth.

In virtue of several national development plans, the number of poor families (with earnings less than expenses necessary for minimum living standard), accounting for some 40% of whole households of the country in 1988 has decreased to 32% in 1997. The current MTFMDP 1999-2000 Plan have placed emphasis successively on annihilation of poverty through a sustainable development on uniform social growth, aiming at reduction of this figure of 32% to 25-28% by 2004 through in particular the development of rural economy consisting mainly of agriculture, fisheries and stockbreeding, which employ about 39% of whole workforce.

Agriculture is the biggest industrial section in the Philippine, and its production consists of farm products (53.5%), fishery products (20.2%), poultry (13.4%), and livestock products (12.9%); fishery products are the most important products only second to farm products. The Philippines, like Japan, encircled by the seas, is an archipelago country consisting of various islands more than 7,000, and one of prominent fishing countries in the world. The fishery sector is playing an important role in the Philippines economy, occupying about 5% of both GDP and employees of the country. The fishery is divided into three categories of commercial fishery, municipal fishery, and aquaculture. The total yield is about 2.8 million tons, dividing into three categories each 920 to 950 thousand tons. The fishery of the Philippines is not only an important source of animal protein but also a source of foreign exchange earning through export of such as tunas, shrimps, and seaweed, amounting to US$ 500 million in 1999. The Government has been striving to formulate and implement various development plans in order to utilise the marine resources sustainably and effectively, and an annual per capita consumption of fish product is as large as 36kg, consuming about 94% of total production domestically. However, the population increased by 11.4% during recent 5 years (1995-2000), whereas a rate of increase of fisheries production is keeping on only 4.7%, which situation demands a stable increase of productivity of the fishery for the future.

Under these conditions, the development of fisheries is given an important role to supply animal protein to the nation, to earn foreign exchange, to create employment for establishing a firm economic foundation.

In order to assist this fisheries development, Japan has extended Grant Aid programs, that is “Construction of Research Vessel 1979”, and “Establishment of Freshwater Aquaculture Training and Laboratory Complex, Freshwater Aquaculture Center Central Luzon State University 1981”, and these projects have produced excellent results in organisation of coastal municipal fishermen, fostering aquaculture research workers, improvement of fisheries-related infrastructure, preservation of coastal environment, and so on.

However, the development of Philippines fisheries is now in the earliest stage towards “realisation of responsible fisheries”, and there lie piles of impediment problems such as alleviation of poverty in artisanal fishing communities scattered on the coastal areas of the whole country. Continuous efforts to self-reliance therefore are essential from now on.

The mariculture industry of Philippines has a long tradition, producing milk fish, oyster, and mussel for domestic use and black tiger shrimp and seaweed for export, with an increasing rate of 4.2% (1989-1999). Its recent yield is over 900 thousand tons, catching up with the ones of commercial fishery and coastal municipal fisheries. Since significant increase of production in coastal fisheries and commercial fisheries cannot be anticipated due to resources situation, increase of production of aquaculture through improved technique is greatly expected.

Meanwhile, in spite of a steady growth of aquaculture, such constraints as deterioration of water of culture ponds due to apparently feed inputs, outbreak of shrimp disease, lowering of productivity of carrageenan from seaweed are coming up to the surface, which situation is raising some concern about impact on culturing fish, indigenous species, surrounding environment, ecosystem, and so on. The Department of Agriculture (DA) and its Bureau of Fisheries and Aquatic Resources (BFAR) formulated MaKaMASA the “Fisheries Development Program 1999-2004” to cope with these problems through implementation of the following projects, concerning aquaculture.

1) Promote production-intensifying but cost-reducing technologies within ecological limits
2) Produce quality fish broodstock, seeds, and fingerlings
3) The problems encountered by the prawn industry , particularly the shrimp diseases

4) Fish health management
5) Sea cage farming project
6) Seaweed development project
7) Fisheries quarantine

The Government of Philippines formulated a project for the establishment of laboratory facilities for advanced aquaculture technologies at the Southeast Asian Fisheries Development Center/Aquaculture Department (SEAFDEC/AQD), a core institution concerning aquaculture researches, aiming at research study, development, and distribution of new aquaculture technologies through implementation of these projects, in order to address problems in the fisheries, and requested the Government of Japan to extend a Grant Aid for its implementation.

The Project is to be implemented jointly BFAR and SEAFDEC/AQD.

2-1-2 Objectives of the Project

The Project site is situated at Tigbauan, Panay Island, the 6th largest island in the country, 25km far from Iloilo City with an international airport. The site covers an area of 40ha facing the beach, stretching 900m west to east and 600m north to south. A national road passes through the site west to east, and on the south side (seaside) of the road rearing ponds and laboratory facilities are located, while on the north side (inland) there are necessary housing facilities. Also the headquarters of AQD is on the north side and Dumangas Brackishwater Station is located on the inland area. On Guimaras Island on the other side of the Iloilo Strait there is Igang Station with the marine fishpen facilities. The SEAFDEC/AQD, one of the leading international research institutions, is playing an important role of guidance and extension services in aquaculture in accordance with the fisheries administration policy of the Government of Philippines. Total stuffs are numbered by 310, of which about 60 persons are researchers experienced field service more than 2 years after graduation of the master's course. Also more than 20 researchers have a doctor's degree. Its research activities are as follows;

Table2-1-2　Activities of　SEAFDEC/AQD

Research Department and Researching Species	
（Research Dept.） ・Breeding ・Nursery ・Feed Development ・Ecology and Farming System ・Fish Health ・Socioeconomics	（Researching Species） ・Marine and Brackishwater Fishes： Milkfish, Grouper, Snapper, Seabass, Rabbitfish ・Freshwater Fishes：Tilapias, Native Catfish ・Crustaceans：Tiger shrimp, Mudcrab, Shrimps ・Molluscs：Abalone, Window-pane oyster, Oyster ・Seaweeds：*Gracilaria* spp. *Kappaphycus alvarezii* ・Ornamental Fishes：Seahorse
Main Researching Activities	
Tiger shrimp：Development of Pond – reared broodstock. Improvement of larval quality through nutrition.　Health management. Milkfish　：Refinement of broodstock management Grouper　：Improvement of hatchery and nursery techniques Mudcrab　：Development of broodstock and hatchery techniques. Molluscs　：Refinement of spawning and hatchery techniques. Seaweeds　：Development of seed production technology.	

The SEAFDEC/AQD has carried out studies for the establishment of aquaculture technique on the front line of aquaculture research in the Southeast Asia for 20 years since its foundation. As a result it was rewarded with good fruits in establishing culture/production technique of important species such as milkfish, black tiger shrimp, grouper, sea bass, shellfish, seaweed, and other seedlings. And now, the institution is requested to address various problems such as fish feed development suitable for each species and their breeding steps, prevention against disease, dosage standard of antibiotics, culture production control, and protection of environment. In spite of some room to conduct traditional culture methods, early application of innovative techniques is necessary to solve these problems.

Biotechnology framing the foundation of these researches has made rapid progress for the past 10 years. It is a matter of common knowledge that genetic engineering, cell fusion, reproduction control, growth acceleration, rapid diagnosis of fish disease, vaccine development, and fish feed engineering have progressed with giant strides. The SEAFDEC/AQD has manpower and executing capability to study these advanced fields. Further improvement of the capability of the SEAFDEC/AQD by providing with modern equipment and materials contributes surely to solve various problems in aquaculture industry as well as develop high aquaculture technologies in the Philippines and other Southeast countries.

However, at present the SEAFDEC/AQD has the following constraints in the facilities and equipment except the best brains.

1) Almost all of the equipment and materials of the SEAFDEC/AQD are more than 10 years old and not suitable for modern researches.
2) The building of laboratory is also more than 30 years old, and a lack of its airtightness and constant temperature hampers the function and durability of precision devices.
3) Putting many loads on one electrical outlet was conducted in the laboratory with the introduction of equipment. Wiring became also superannuated. A fire has broken out due to an electric leakage 5 years before.
4) An unstable power supply, frequent breakdown, and fluctuation of voltage cause troubles on operation of research devices and computers.

Under these conditions, the Project aims at the removal of constraints in aquaculture researches and the establishment of laboratory facilities for advanced aquaculture technologies by providing suitable equipment and materials with the SEAFDEC/AQD. The Project will promote the various researches planned by the Philippines side as well, and its results will contribute to the development of aquaculture in the Southeast Asia region.

2-2 Basic Concept of the Project

2-2-1 Contents of the Request

The original request of the Philippines, mutual agreement at the site survey, and final analysis are as follows;

Table 2-2-1 Contents of Request and Mutual Agreement

Original request (July 1997)	Request confirmed at the site survey (February 2001)	Result of final analysis
A. Responsible Ministry Department of Agriculture (DA)	A. Responsible Ministry Department of Agriculture (DA)	No changes
B. Project site Tigbauan , Iloilo Panay Island	B. Project site Tigbauan , Iloilo, Panay Island	No changes
C. Implementing Agency BFAR and SEAFDEC/AQD	C. Implementing Agency BFAR and SEAFDEC/AQD	No changes
D. Requested facilities and equipments 1. Facilities 1) Renovation of the 2nd floor of Nutrition Research Building	1. Facilities 1) Renovation of the 2nd floor of Nutrition Research Building -Cutting off the drafts (sash, floor, ceiling) -Improvement of lighting -Securing supply of rated power, countermeasures against breakdown -Replacing working tables	On the investigation of the traffic line the followings are added. ・Change 3 partition panel ・Replacing 7 doors ・Ten working tables are to be replaced.
2) Newly construction of a rearing facility -Including rearing tanks and experimental tanks -Rearing facilities -Animal house	2) Enclosed wet laboratory ・Hatchery/Nursery rooms ・Seaweeds room ・Experimental tanks ・Drainage system for chlorine and UV	The facility stated in the Minutes of Discussion is for the future plans, of which the items with the top priority are provided(1,200m^2) . The animal house is desirous to be placed near the existing house and, from the standpoint of cost, the Philippines side shall renovate the existing house, supplying only equipment (animal cages) by the Project.
3) RI labo. is to be attached to the Nutrition Research Building	3) RI labo. is to be constructed separately.	An alternative methods (fluorecent material) shall be provided and the construction of the RI labo. is not included in the Project.
4) Microalgae labo. is to be attached to the Nutrition Research Building	4) Renovation of the Microalgae labo. is in the another building.	Renovation of the Microalgae labo. is cancelled due to minor expenses by the Philippines side.
5) Septic tank	5) Septic tank -Daily foul water is to be drained through the septic tank. (for the Enclosed wet labo.)	No changes
2. Equipment Equipments for Endocrinology, Genetics, Micro-biology, Fish feed and Algal biotechnology	2. Equipment Equipments for Endocrinology, Genetics, Microbiology, Fish feed technology and Algal biotechnology	A thorough examination was made to adjust research theme, the project of development plan and the requested equipment. The results are shown on Table 2-3-3 (7).

(Note) The facilities and equipment s to be provided by the Project are to be owned by DA.

2-2-2 Basic Policy

(1) Current situation of the fishery

In 1999, total fish production was about 2.8 million tons, distributed to 3 main fisheries almost equally, 920 to 950 thousand tons. The Philippines fishery is not only a source of animal protein but also a source of foreign exchange earning, amounting to US$ 500 million through export of tuna, shrimp, and seaweed, playing an important role in the state economy. Fish consumption in the Philippines is relatively high at 36 kg/person/year, and about 94% of total production are used domestically. It is noted that fish production grows at an annual rate of 4.7% for the past 5 years while total population increase at a rate of 11.4%. It is obvious that there is a gap in supply vis-à-vis demand, and this is the reason why an increase of productivity of fishery is demanded for the future. Aquaculture industry of the Philippines has a long tradition, producing milkfish, oyster, and mussel for domestic use and black tiger shrimp and seaweed for foreign market, growing at an annual rate of 4.2% (1989-1999). A recent yield of aquaculture production is over 900 thousand tons, catching up with the ones of commercial fisheries and municipal fisheries. Figure 2-2-2 below shows the development of production of commercial fisheries, municipal fisheries, and aquaculture from 1975 to 1999 and target production in a fisheries development plan 1999 onward.

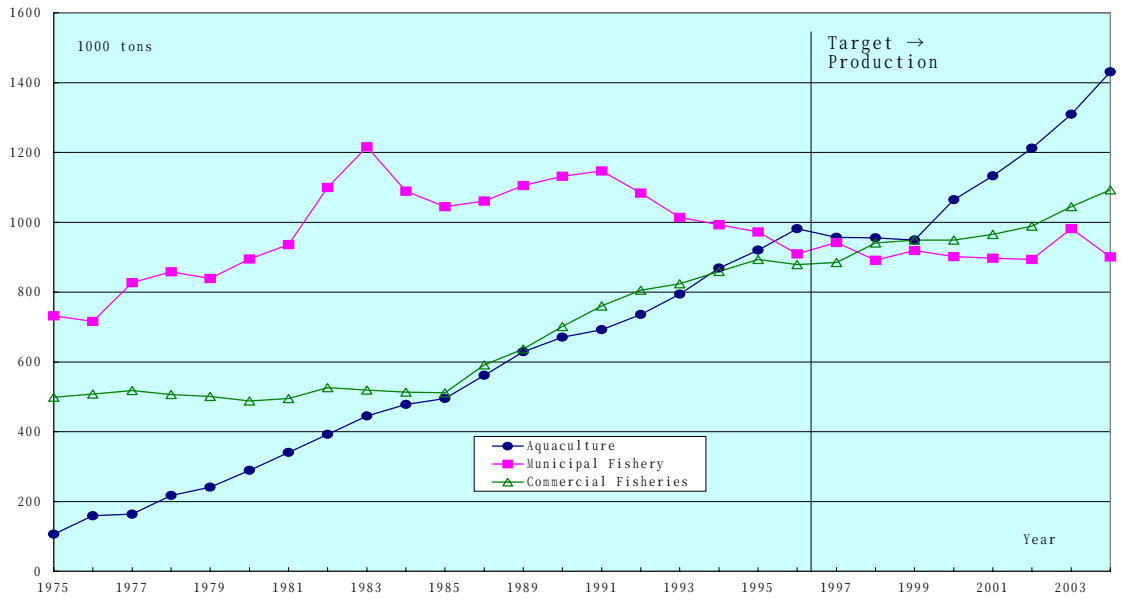


Fig. 2-2-2 Development of Production of Each Fishery and Target Production

From the viewpoint of fishery resources, increasing production of both coastal fisheries and commercial fisheries cannot be expected and an increase of aquaculture production is heavily desired. However, the Philippines aquaculture at present is faced with various problems such as spreading of viral disease of shrimp, shortage of natural seeding of milkfish, and lowering of useful component of seaweed, and Burreau of Fisheries and Aquatic Resources (BFAR) of Department of Agriculture (DA) and Southeast Asian Fisheries Development Center/Aquaculture Depart (SEAFDEC/AQD) are jointly working to solve these problems.

(2) Status of SEAFDEC/AQD

The implementing agency of the Project is the BFAR of DA and SEAFDEC/AQD, an international research institution.

Though not belonging to the Government of Philippines, the SEAFDEC/AQD participate in national programs from drafting to execution in coordination with the Philippines Technical and Administrative Committee (PTAC), playing practically a central role in programs on aquaculture researches, transfer of technologies, and public relation. The PTAC is committee presided by the Secretary of DA and consists of the Undersecretary of DA, the Director of BFAR, the Chief of SEAFDEC/AQD, and the Dean of Fisheries Faculty of Philippine University.

According to the Fisheries Development Program 1999-2004 (BFAR publication), the function and responsibility of each organisation in the fisheries programs are determined as follows;

1) BFAR

The BFAR will serve as the implementing agency of the MaKaMASA-Fisheries Program nationwide and that the Bureau Director will act as the Program Director. The Bureau shall oversee program implementation, ensure proper coordination among program implementors, prepare overall workplan and budget and monitor projects and activities, in coordination with the Local Government Units and other concerned agencies.

2) SEAFDEC/AQD

This regional body will be responsible for the promotion, implementation, and coordination of aquaculture fisheries research relevant and appropriate in the fisheries sector development in the region, provide technical assistance, develop human resources

and disseminate and exchange information on aquaculture.

(3) Necessity of biotechnology laboratories

The SEAFDEC/AQD has continued the research studies in aquaculture in the tropical zone with technical assistance of Japan and fulfilled the function as research and training center in the region since the foundation in 1973. It has contributed to the development of aquaculture in the Philippines as well as Southeast Asia region by successful black tiger shrimp and milkfish culture, and again is expected to play the central role as core institution in aquaculture projects in the region. One of the contributions made by the situation to the Southeast region is training for aquaculture. In 1999 the institution received 559 trainees, of which 15% came from the Southeast Asia countries.

The SEAFDEC/AQD has mainly studied the improvement in traditional culture techniques, but a new age has come in biological approach with the development of world-wide biotechnology. New biological researches must be conducted with new methods adopted biotechnology. Thus the need of the introduction of biotechnology laboratories into the institution became pressing. Besides continuing researches with conventional techniques, the institution has to address problems impossible to solve with traditional methods by the introduction of modern biotechnology. Necessary laboratories are for four new fields, (1) molecular endocrinology/genetic, (2) molecular microbiology, (3) algal biotechnology, and (4) fish feed technology.

Biotechnology is a new biology born as a result of the establishment of gene biology through genetic code-breaking in 1961-1966, and presents common principles in various living things such as bacteria, plant, and animal. The technology can produce new lives which are non-existent in the natural world.

Main Biotechnology

Micro-organism	Gene recombination, Bioreacter
Plant (Algae)	Tissue culture , Cell fusion, Gene recombination
Fish	Triploidy, Femininity development, Clone, Gene recombination

In Japan, new culture researches applying biotechnology instruments started about 15 years ago. Recently the researching methods have come into common use through the introduction of manuals, and anyone can participate in researches with biotechnology. Without this technology it is impossible to address acute viremia, the most serious disease

in the Philippines. Identification of virus and production of vaccine with biotechnology are essential to control viral disease. Fish or plant breeding can be expected through this technology. Biotechnology makes it possible to produce hormone in large quantities. From the viewpoint of the trend of biological researches in the world, therefore, providing biotechnology laboratories is the course of natural tendency. Gene manipulation and cell fusion unavailable in the natural world will be able to apply for aquaculture. Mortality rate of fingerlings of grouper is high during metamorphosis, and application of hormone at this stage can reduce this rate. But hormone exists in the nature world in extremely small quantities, and the collection of natural hormone is a cost-consuming work required a lot of labor. In Japan, since the price of growth hormone was as very expensive as several hundreds thousands per mg, application being restricted for scientific researches, the method to extract growth hormone from a pituitary gland of young yellowtail was developed. Its pituitary gland contains hormone of about 1% of its wet weight, and its 70% can be extracted. Since wet weight of a pituitary gland is about 20mg, growth hormone of 70mg can be collected from 10g pituitary gland obtained from 500 young yellowtails. In the Philippines, since it is impossible to collect such great quantities of large fish, they have to depend upon biotechnology for production of growth hormone. Micro-organisms can biosynthesise growth hormone when genes of growth hormone are spliced into genes of micro-organisms.

Table 2-2-2 shows practicable works in the New Laboratory and related project.

Table 2-2-2 (1) Works Practicable in the Biotech-Laboratory and Related Projects and Programs

Name of Laboratory	Works practicable(◎) or impracticable (▼) with conventional methods	Works practicable in the Biotech-laboratory（◎）	Related projects
Molecular Endocrinology/ Genetics Laboratory	（Growth hormone） ◎Collecting GH（pituitary gland）from other animals ▼Mass production of GH （Gene） ◎Raise rapid growing strains by selecting culture for many generations. ▼Identification of useful character to grow rapidly and disease-resistant. ▼Maintenance of culture species with gene diversity(environment-resistant)	◎Mass production of GH ◎Control of maturation and spawning ◎Improvement of productivity with acceleration of growth. ◎Production of good quality larvae. ◎Genetic identification of useful character and its utilization. ◎Identification of gene diversity and aquaculture development using such strains.	☐ Promote production-intensifying technology within ecological limits ☐ Produce quality fish broodstock, seeds and fingerling. ☐ Improve productivity of aquaculture ☐ Fish Health Management
Molecular Microbiology Laboratory	(Bacteria) ◎Detection and identification of pathogenic bacteria after long culture ▼Identification of pathogenic bacteria with DNA inspection (Virus) ▼Diagnosis of viral disease of shrimp ▼Production of cultured cell for culture of virus ▼Production of vaccine	◎Rapid diagnosis with DNA inspection ◎Identification and diagnosis of virus with gene inspection and an electron microscope ◎Production of cultured cell with gene manipulation ◎Production of vaccine with molecular microbiology	☐ Fisheries Quarantine ☐ Fish Health Management ☐ Operation Sagip-Sugpo, to address the problems encountered by the prawn industry, particularly the shrimp diseases.

Table 2-2-2 (2) Works Practicable in the Biotech-Laboratory and Related Projects and Programs

Name of Laboratory	Works practicable(◎) or impracticable (▼) with conventional methods	Works practicable in the Biotech-laboratory（◎）	Related projects
Fish Feed Technology Laboratory	◎Staged improvement of conventional feed input ▼Rapid microanalysis of many kind of materials ▼Appending resistant component to feed	◎Rapid microanalysis of nutriments ◎Development of efficient feed with combination of analysed raw materials and reduction of production cost ◎Development of immunity invigoration material and reduction of mortality rate by use of feed added such material	☐ Promote production-intensifying technology within ecological limits ☐ Fish Health Management
Algal Biotechnology Laboratory	◎Improvement of aquaculture techniques with staged improvement of traditional methods through experiences ▼Prevention of deterioration of quality of seaweed ▼Long storage of useful seeds	◎Improvement of quality with identification of genetic superior strain ◎Increase of production with seedling from useful strain ◎Storage of gamates and spores with superior character and distribution of seedling of good quality ◎Development of species useful for environmental purification	☐ Seeweeds Development Project

(4) Problems that the SEAFDEC/AQD is now confronted with

At present the SEAFDEC/AQD is faced with the following constraints and is desirous of rapid solution for necessary biotechnological research studies for the future.

1) Problems in the laboratory facilities

a) Electricity

- Since wiring was not systematic, putting many loads on one outlet is found everywhere and the panel board and wiring is are ill-balanced. A fire caused by an electric leakage broke out 5 years before.
- Public power from Iloilo city, 25km away, is unstable; frequent breakdowns and fluctuation of voltage.
- Backup generators are less serviceable; No 1 generator become obsolete and No2 and 3 are out of order.

b) Laboratory building

- No airtightness due to superannuation and poor materials of windows, doors, and ceiling.
- Humid and poor ventilation indoors due to the superannuated air-conditioning system.
- Keeping cleanness is difficult because flooring materials become superannuated.
- There are dangerous rooms like cellars with only one door.

Note: The site of SEAFDEC/AQD is on the beach, and humid winds with salt are blowing. In the rainy season from July to September southerly winds (from the seaside) are prevailing. Also a typhoon attacks frequently in this season. Humidity inside rooms due to poor airtightness injures the function and durability of equipment.

Airtightness is important specially to a fish disease laboratory. Though pathogenic bacteria can be cultured on artificial culture medium, virus can be cultured only on cultured cells. Since these cells are very weak, they must be treated under an aseptic condition. The international standard also regulates going in and out the room to prevent bacteria from penetrating (P-2 level physical containment); cloths and footwear must be changed. Since the SEAFDEC/AQD is an international institution and publishes papers at international level, the equipment plan shall be made in accordance with the

international standard.

In a genetic laboratory PCR devices are used. In the case where bacteria in the air attach to test materials, gene of this bacteria is determined as the gene of test materials. The test is of course conducted in a clean bench, and a room has to be kept clean on the whole. Thus the airtightness of a gene laboratory is also essential.

In the Philippines, the temperature of over 30℃ and the humidity of over 90% are not uncommon. From the viewpoint of equipment maintenance, an air conditioning system is necessary to keep the indoor temperature at about 28℃. Also a system to remove dampness is necessary.

2) Equipment and materials

- Almost of all equipment and materials are 10 to 15 years old.
- Replacement of old devices does not go forward due to funding difficulty.
- The introduction of new equipment and devices is behind as compared Japan, which commenced to introduce them in 1980s.
- Working tables are not efficient due to poor design.

3) Rearing facility

a) Lack of isolation facility

An isolation facility for safe treatment and segregation of sick fish and prevention of contamination on surroundings is necessary.

b) Lack of separated demonstration facility

A separately-built rearing facility is necessary. Fish, shrimp, and seaweed for experiment of genetic manipulation, cell fusion, growth hormone test, etc. are bred here, and their results and safety are also demonstrated.

4) Necessity of the Enclosed Wet Laboratory

Fish health in intensive culture is a world-wide concern. Conventional approach is not useful for solution of the problem and this is the reason why biotechnology and molecular biology are highlighted. The results of these researches must be demonstrated and verified at a certain facility, and its facility has to be built independently to prevent pathogenic organisms leaking. (There are two methods of containment; physical containment and biological containment)

The proposed biotech laboratory covers all of important species for aquaculture in the Philippines; that is fish (milk-fish, grouper, and bream), crustacean (black tiger shrimp and swimming crab), and seaweed (Eucheuma muricatum and sewing thread). Since these species cannot be bred mixedly, three separate facilities are necessary.

Also a facility to breed diseased fish safely is necessary. Challenge tests (infection tests) are also conducted here. The facility must not contaminate the surroundings. Inspection and quarantine are essential to prevent pathogenic bacteria from penetrating on importation of living fish and shellfish. Since the Philippines have no such system, a research facility to establish a inspection system, that is, an isolation facility capable of testing dangerous pathogens (Enclosed Wet Laboratory), is necessary. .

Researches of the proposed laboratories cover all of important species in the Philippines, and its importance is recognised by not only fish farmers but also a lot of people. Requested equipment and materials are appropriate for this purpose. Production of black tiger shrimp was reduced by half from 5 years before due to country-wide diffusion of disease, and fish farmers have an eager desire for rapid development of an effective counter measure. The urgency of the Project is very high.

(5) Basic policy of construction/equipment and materials

1) Facility component

A. Renovation of 2nd floor of the Nutrition Research Building

The Nutrition Research Building is some 28 years old. Durability of the main structure is still enough, but, from the viewpoint of space, the 2nd floor has many problems to fulfil its function as laboratory using modern precise equipment/devices. The SEAFDEC/AQD planed to provide 5 laboratories for new subjects to study, Molecular Microorganism Laboratory, No. 1 and No. 2 Fish Feed Technology Laboratories, Algal Biotechnology Laboratory, and Molecular Endocrinology/Genetics Laboratory, and one spare room.

Each laboratory has an almost equal environmental condition and space, and the layout plan was judged to be appropriate.

The SEAFEC/AQD has conducted research activities corresponding to subjects to study and changes of the researching equipment and instruments since its foundation. But, at the present time when almost of all equipment for research study became to be high-performance instruments equipped with plenty of electronic parts, several defects

were found in the laboratories, and it was judged to be necessary to renovate the 2nd floor of the Nutrition Research Building.

Research studies must be continued during renovation works. On planning, the 2nd floor of the Building is divided into the blocks, and each lock is to be renovated by turns in 3 months, and then each temporary laboratory transferred to the 3rd floor will return back to the renovated block so that research studies can be resumed immediately. Before the main works, existing floor, ceiling, working tables, partition panels, and piping/wiring must be removed. The policy of the Grant Aid requires that the preparation of temporary laboratories and transferring works are to be borne by the Philippines side, but since delay of timing of removal is apt to disturb the main works, removing works shall be included in the main works. Transferring/returning back works of research function are to be borne by the Philippines side.

B. Installation of an elevator

After renovation, all laboratories are placed on the 2nd floor and the 3rd floor is use as an annexed facility. Scent and descent of staffs therefore will be conducted only between the first floor and the 2nd floor. And the Building has a good staircase of 1.5m wide (rise=150mm, thrad=300mm) at both ends of west and east sides. At the Basic Design Study meeting the Philippines side requested the installation of an elevator on the basis of the following reasons.

- Staffs' daily use.
- Taking in and out of gas cylinders every two weeks.
- Taking in and out of heavy materials once a year.

Installation/maintenance cost of an elevator and these reasons ware examined, and it was concluded that as for reason (a), one can go down or up the staircase during waiting the elevator, and in the cases of (b) and (c) the staircase or balcony (and a large forklift) can be used. Hence the provision of elevator was rejected.

C. Isolation facility (Enclosed Wet Laboratory)

Fish, crustacean, and algae treated with genetic manipulation, cell fusion, or hormone treatment at each laboratory are bred, verified, and demonstrated here. This is an essential facility to achieve research programs of each laboratory, forming a link in the chain of biotechnology research studies.

The Enclosed Wet Laboratory will be used by each laboratory as follows;

a) Crustacean Hatchery/Nursery

Mainly black tiger shrimp and other species (swimming crab, grooved tiger prawn, white shrimp) are treated for breeding, identification of beneficial line group through genetic study, and other research program. The facility will be used mainly by the Genetics Laboratory (4 study groups) and designed with biological containment.

b) Fish Hatchery/Nursery

Milk-fish, grouper, and sea bream are mainly handled for breeding, identification of useful line group through genetic study, and other research program. The facility is to be used by the Endocrinology/Genetics Laboratory (7 study groups).

c) Seaweed Culture Room

Eucheuma muricatum, sewing thread, and green laver are mainly treated for breeding, identification of beneficial line group through genetic study, and other research program. The Algal Biotechnology Laboratory (4 study groups) will use the facility.

d) Infection House

Infection experiment is conducted, and also fish or shrimp infected with disease are brought in and bred here. P-2 level physical containment is needed. The Molecular Microbiology Laboratory (4 study groups) will conduct research study anti-disease measure, process of disease, effect of medicine, rapid diagnosis, and so on at this facility.

D. RI (Radio Isotope) laboratory

RI is utilized for (1) measurement of radio immunity, (2) tracing, (3) DNA analysis, and (4) auto-radiographing. Utilisation except (2) can be substituted with other methods using fluorescent material, though sensitivity is rather low, and utilisation as tracer is comparatively limited with no effect on progress of research study. Thus, considering safety and difficulty of maintenance, this facility was cancelled.

E. Renovation of the micro-algae laboratory

Since the laboratory is now operating independently, urgency of renovation is not high. Also the renovation area is as small as 180m, and the engineering section of SEAFDEC/AQD can cope with the renovation work. Thus this work shall not be

included in the Project.

F. Renovation of the Animal house

A newly-built animal breeding facility was at first requested. The site survey revealed that the facility is serviceable with small renovation and its works can be conducted with the engineering section. But the equipment and materials necessary for increasing animals shall be provided.

2) Equipment and materials

The Philippines aquaculture industry is, as a source of animal protein, expected to increase its production to meet the demand of the people. But the industry has now several problems and constraints, and to allow it to answer to the expectation, it must upgrade research study by introduction of new technology, that is, biotechnology.

The Project shall provide recognised basic equipment and materials necessary for the biotechnology researches, based on the performance of Japan for more than 10 years.

2-3 Basic Design

2-3-1 Design Concept

The basic design concept of the proposed facilities consists off 6 components; that is, Management Plan, Layout Plan, Facility Plan, Equipment and Materials Plan, Implementation Plan, and Local Conditions.

(1) Management Plan

The responsible Ministry of the Project is the Department of Agriculture (DA) and its implementing Agencies are BFAR and SEAFDEC/AQD. Construction work and delivery of equipment and materials are conducted within the premise of SEAFDEC/AQD. The SEAFDEC/AQD is the key institution of aquaculture research in the Philippines. The institution is undertaking the necessary researches to solve problems of the Philippines aquaculture industry, and its results are distributed in the country through DA-BFAR and also to member states of SEAFDEC/AQD agreement through training.

The SEAFDEC/AQD has fulfilled its function as the research and training center concerning aquaculture in the tropical area under technical assistance of Japan since its foundation. It contributed, and is contributing, to the development of aquaculture in the Southeast Asia Region by development and distribution of farming techniques of black tiger shrimp and milk fish. At present the SEAFDEC/AQD employs 25 researchers having a doctor's degree and 51 researchers having a master's degree, and they are publishing their results of researches in international fisheries journals. The SEAFDEC/ADQ is equipped with various experimental equipment from basic research to study for commercialisation, an unparalleled research institution in the Southeast Asia.

The level of research study is very high, and almost all doctor researchers has experiences of experimental study of biotechnology in Japan or USA. It is expected that the equipment and materials to be provided by the Project are fully utilised.

(2) Layout Plan

1) Renovation of second floor of the Nutrition Research Building

At the time of the site survey, renovation work of the Molecular Microbiology Laboratory in the southeast block on the 2nd floor of the Nutrition Research Building has just been completed, and the researchers have commenced undertaking to conduct research studies on the basis of newly decided subjects of study. The 2nd floor of the

Building is divided into three blocks with 2 passage running west to east, and 6 laboratory zones can be prepared when each block is separated north to south. That each of 6 laboratory zones has equal environmental condition is confirmed at the site survey.

Thus the layout plan designed by the SEAFDEC/AQD side was judged to be appropriate, and the following 5 laboratories shall be renovated under the Project.

1. Molecular Microbiology Laboratory
2. Fish Feed Technology Laboratory (1)
3. Fish Feed Technology Laboratory (2)
4. Algal Biotechnology Laboratory
5. Molecular Endocrinology/Genetics Laboratory

2) Layout Plan of Enclosed Wet Laboratory

Based on the result of the topographical survey, it was decided that the Enclosed Wet Laboratory is to be constructed at a site on a gentle slope elevated to north, 70m wide north to south, the north end being bounded with a slightly elevated cliff.

Stable seawater supply is essential for each hatchery/nursery requiring plenty of seawater. A settling tank and a reservoir tank shall be placed on the higher ground at the north end of the site. Also small reservoirs shall be installed to supply sterile seawater to the Fish Hatchery/Nursery and Crustacean Hatchery/Nursery.

Waste water from facilities shall be treated with disposal tank installed on the lower ground at the south side.

(3) Facility Plan

1) Facility Plan of the 2nd Floor of Nutrition Research Building

A. Renovation of 2nd Floor of Nutrition Research Building

Table 2-3-1 shows the current condition and renovation plan of Laboratories.

Table 2-3-1 Renovation Plan of the 2nd Floor of Nutrition Research Building

Item	Current condition	Renovation plan
Prevention of dust and insect		
Furniture	Sash on the south side has no problem with steel being replaced with aluminium. Steel sashes on the north side are corroded.	Nineteen sets of steel doors and windows, extending for 76m, on the north side shall be replaced with aluminium to prevent precision instruments from being exposed to draft.
Floor	Plastic tiles are partly off. Deteriorated adhesive, dirty joints.	Replacing with seamless acid proof vinyl sheet. Floors of Fish Feed Technology laboratories shall be covered with ceramic tile.
Ceiling	Wood wool ceiling is deteriorated. Not regulated due to frequent inspection. Dust on the ceiling drops inside.	Whole ceiling shall be replaced with rock wool board on veneer sheet and light iron bed. Inspection hole with aluminium frame is installed.
Partition board	Partition for darkroom must be newly installed.	Partition work for 6m shall be executed with concrete block.
Air conditioning and ventilation		
Air conditioner	Original central system was changed to sectional system, with window cooler setting inside each room. Some rooms without cooler. Direct inflow of the outside air through cracks in fixture.	Following the newly-renovated Molecular Microbiology Labo., maintenance-easy sectional system consisting of air-conditioners with simple filter shall be applied. Ten of existing 31 air-conditioners shall be changed and 30 ones shall be newly provided.
Ventilation	Some ceiling exhaust fans are installed, but connection with exhaust ducts is not enough.	Additional 15 fans are to be supplied. Air ducts to the rooftop shall be renovated wholly.
Enforced ventilation	Draft chamber and instruments requiring exhaust are connected to exhaust ducts, but end connection on the rooftop is bad.	Exhaust ducts are to repaired. Connection with new draft chamber and fume hood shall be executed.
Illumination		
Lighting fixture	Flush type wooden lighting fixture is fixed deeply on the ceiling, and lighting effect is partly as well as poor.	Taking advantage of whole renovation of ceiling, proper lighting fixture shall be installed.
Power supply		
Power supply to the new laboratories	Power is supplied from the public utility in Tigbauan. Breakdowns, sometimes for several hours, are 3 times at average in month. Fluctuation of voltage is +10%. Voltage regulator and emergency generator are used, but laboratory work is sometimes disturbed.	200KVA generator system shall be installed newly for emergency power supply to the new laboratories.
Electric piping and wiring	Electric piping and wiring are in utter confusion beyond the national standard. A fire started due to leakage some years before.	Overall renovation of electric piping/wiring is to be executed. A distribution board with UPS shall be installed in each block.
Layout of the equipment		
Laboratory table	At the middle of laboratory table is a wall with several sets of piping for hot water, fresh water, seawater, air, gas, and sterilised water, and almost of them are useless except 4 sets for fresh water. Table itself is superannuated and also inconvenient.	The wall at the middle of the table shall be removed, and 10 tables are to be replaced, except in the Molecular Micro-organism Lab. and spare room. Piping for fresh water shall be buried under the floor. Draining pipe of each sink is to be connected to existing steel drainpipe.

2) Facility plan of the Enclosed Wet Laboratory

A. Infection House

The Infection House is a facility for development of countermeasure against disease of crustacean and large or small fish. Waste water from experimental tanks in each room shall be collected through the drainage way in each room, and shall be led and treated in a sterilized apparatus to be pathogen free, after sterilization, led to disposal tank.

To prevent various germs from penetrating, a clothing-change room and a tub for washing feet shall be installed at the entrance of the House and a tub for washing feet shall be again placed at the entrance of each room. An air-conditioner shall be installed to keep air inside clean.

B. Crustacean Hatchery/Nursery, Fish Hatchery/Nursery, Seaweeds Culture Room

In each Facility, research in spawning and larvae breeding under environmental control is executed by species. Each Facility is to be constructed independently, and seawater tanks suitable for the purpose shall be provided. In the Crustacean Hatchery/Nursery and Fish Hatchery/nursery, in particular, the sterile seawater reservoirs shall be installed, and also a seawater circulation system is to be introduced so that parameter of the rearing water to be kept in the same level during each research study.

C. Toilet and storage

The Laboratory is constructed at the site on the north side of the national road. On this side, only the breeding water tank of the IFBHPDC (Integrated Fish Broodstock and Hatchery Pond Complex) stands and there is no toilet facility. Since the number of researchers and staffs working here will increase with the construction of the Laboratory, necessary toilet facility must be constructed. The ratio of facilities for men and for women is planned to be 1:1, and the floor with no difference in level and easy access shall be considered.

D. Common use facility

- Aeration system

  An aeration system is essential for breeding fish. The system shall be provided to the Laboratory on the whole.

- Waste water disposal tank

Waste water from each Facility is to be settled in this tank.

(4) Equipment and Materials Plan

The Project was requested to address disease which is of frequent occurrence in aquaculture and as well as environmental degradation by introduction of biotechnology, instead of conventional approach, thus to sustain environment-friendly aquaculture. The basic concept of provision of the equipment and materials is as follows;

1. Equipment and materials that have been long utilised in many research institutions in the world.
2. Basic equipment and materials that have an established reputation in performance, durability, and stability.
3. The ones that AQD's researchers have experience in utilisation for research study before.
4. The ones with few record of performance or up-to-date ones are not provided.

Equipment and materials requested at top priority were the ones concerning DNA, followed by basic analysis instruments (liquid chromatography, spectrophotometer, fume hood, clean bench, microscope, etc.). The former is not special high-tec instruments, which have already been introduced in Japan more than 10 years before, basic ones necessary for biotechnology, and the latter, which is for speedy experiment, frequent utilisation, and making keep long, has been used by several AQD's researchers. Both meets the above-mentioned conditions.

The 20 subjects of study presented by each laboratory are anticipated to take a rather long time, 5 to 10 years, to obtain results, and 37 researchers are in charge of them. Also detailed lists of yearly expendables of each Laboratory and statements on frequency in use of each instrument were submitted. To support research activities, the budget was appropriated for each Laboratory.

Seeing that all of activities are performed systematically, it will be not apprehended that valuable instruments provided under the Project are kept idle or become unserviceable due to poor maintenance.

(5) Implementation Plan

In the implementation of the Project, the following concept is to be applied in accordance with the intention of Japan's Grant Aid Program.

To promote smooth execution of the Project, further efforts shall be made to achieve mutual understanding through full exchange of opinions between the Department of Agriculture, the Bureau of Fisheries and Aquatic Resources and other related authorities of the Government of the Philippines, and contractors and the consultant.

The Project site is owned by the Government and managed by BFAR and SEAFDEC/AQD. At the renovation work of the 2nd floor of Nutrition Research Building, taking minimising interference to other Laboratories, securing a temporary space for research study, transfer of research function, and other various matters caused by removal of the existing parts of the Building during the construction work into consideration, the method of construction to minimise works at the spot shall be applied. Also an explanation shall be given to the SEAFDEC/AQD so that they can have sufficient time to address transfer/return of Laboratory function, and the consent shall be obtained.

The construction works at the site are executed mainly using human power instead of heavy construction machinery. This must be considered in planning the construction schedule.

(6) Local Conditions

1) WID (women in development)

Half of about 350 SEAFDEC/AQD staff including researchers are women, reflecting the national character of the Philippines. It was confirmed that there is no sexual discrimination in employment in the Philippines and consideration for the weak is given prominence at the existing research and housing facilities. The man's toilet and woman's one shall be planned at the ratio of 1:1

2) Environment-related matters

The renovation work of Nutrition Research Building has no effect on the environment outside of the SEAFDEC/AQD. Meanwhile ongoing research studies must not be stopped inwardly, and a temporary facility for each block to be renovated must be prepared to transfer the Laboratory's function, and then after completion of renovation work, the Laboratory must return back immediately and the next temporary facility must be prepared. The transfer/return back work is to be borne by the Philippines side, and, in order to promote both the main Project work and the Philippines-borne work for each block, it is necessary to consult and discuss fully the construction schedule submitted by the Contractor with SEAFDEC/AQD, and works must be executed under the consent of

SEAFDEC/AQD.

In constructing the Enclosed Wet Laboratory, technical consideration for prevention of noise caused by construction machinery and weather damage by typhoon must be taken. Furthermore the following environmental consideration shall be taken.

- Waste water from the Infection House is sterilized to be pathogen free, after sterilization, before connecting to the waste water disposal tank.
- Cutting living trees shall be not done as possible.
- Toilet sewage is drained to the sea after treatment with the disposal tank.
- Waste seawater after experiments and researches is drained to the sea after thorough settling and separating treatment in the disposal tank.

2-3-2 Design Conditions

(1) Natural condition

1) Natural condition survey

Assigned work at the Project site

a) Topographical survey

b) Soil analysis

2) Survey and its result

1 Date of consignment contract February 1, 2001

2 Duration of work February 1 to 20, 2001

3 Result of survey

A topographical survey was taken in an area of 100 + 100m at the proposed construction site of the Enclosed Wet Laboratory, and at two spots within this area manual boring and plate load test were conducted. The site is a gentle slope elevated from the south side at which a national road is running to the north side bounded with a cliff, and covered by almost flat grassland west to east.

Surface soil of grassland is dark grey clay mixed with silt and followed by grey clay mixed with gravel to -1.21m. According to the plate load test at 2 spots, each 2 points, the settlement was only 6.01mm at maximum for 30.45 tons/m^2. It was therefore judged that the bearing capacity of soil is enough for the planned maximum load of 2.5 ton/m^2 of the proposed building.

Special weather condition is not found here, but typhoon attacks at average 3.2 times during the year. In 1994, a typhoon attacked Iloilo city, Panay Island, giving damage with the maximum wind speed of 259km/h (80m/sec). This makes it necessary for the

structural plan to take the wind load into consideration.

3) Application of the survey result

Though Tigbauan, the Project site, did not experienced directly the 1994 typhoon, it is sure to be subject to the influence of typhoon. The Philippines structural design standard shows the wind load of 147kg/m^2 (10m high from the ground) at the wind speed of 150km/h (41.7m/sec). This value causes uneasiness for the above-mentioned wind-speed of 259km/h (80m/sec), and the Japan's standard of 190kg/m^2 shall be applied.

Tigbauan is situated at the earthquake occurrence zone-2 in the country, and applicable standard shear coefficient C is 0.11, compared of 0.2 of Japan. This value shall be applied because of no record of serious damage by earthquake for the past 10 years.

The Enclosed Wet Laboratory shall be planned under consideration for wind, earthquake, and salt pollution. The spread foundation method is applied, and sufficient soil character and bearing capacity of soil was confirmed by the survey.

(2) Notice for the procurement of the equipment

The most serious cause of mechanical troubles happen at the SEAFDEC/AQD is accident of instrument due to extraordinary fluctuation of voltage and the next is damage electric circuit due to salt sea breezes. From the standpoint of protection of the equipment and instruments, renovation of the 2nd floor of Nutrition Research Building is essential.

To address these electric accidents, AVR (automatic voltage regulator), UPS (uninterruptible power supply), and emergency generator shall be provided. UPS shall be of 220V single phase, 110V single phase, and 60HZ.

2-3-3 Determination of Scale

(1) Determination of scale of the Facility Plan

1) Renovation of 2nd floor of Nutrition Research Building

Outline of the renovation are given in the Table below.

Table 2-3-3 (1) Renovation plan of each Laboratory

Name of labo.	Air tightness	Air-conditioner	Working table	Partition	New Door	Flooring	Window	Containment level
ME/GEN	A	New	3	1	3	New	New	P-2
MM	A	—	—	—	2	—	—	P-2
FFT	B	New	6	1	3	New	New	P-1
AB	B	New	1	3	4	New	New	P-1
Other	—	—	—	—	—	—	—	—

(Other related work)

a) Electric wiring of the 2nd floor is wholly installed (including Analysis Room).

b) Besides electric wiring works, ceiling is partly replaced except the Molecular Microbiology Laboratory, which have finished renovation work, and the spare room.

c) One emergency generator (200KVA) and its distribution board are provided.

d) In planning basic design, consideration for dust prevention, insect proofing, air conditioning, ventilation, proper illumination, stable power supply, proper layout of equipment shall be taken.

2) Determination of scale of the Enclosed Wet Laboratory

A. Number and size of rearing tank at Enclosed Wet laboratory

The scale of the Fish Hatchery/Nursery and Crustacean Hatchery/Nursery shall be determined in such way that each research group can stock and study its target fish or crustacean in tanks separately. Number of target fish or crustacean to be stocked shall be order of 5,000 to 10,000, instead of such small number as 100 to 200, applicable for commercial operation directly, so that the research study can contribute to development project of aquaculture industry of the country, and tanks capable of handling this large quantity of living things shall be provided . The area of each facility is determined base on the number of tanks, associated drainage equipment, and passage between rows of tanks. The number of target living things to be bred in each tank is decided based on the standard number of breeding larvae (Table 2-3-3 (2) and (3)), depending on growth

stage of larva, subject to the above-mentioned order of number.

As for the Seaweeds Culture Room, the number of tanks is determined so that each research group can utilise two or three tanks, with the space between culture lines leaving at 0.5 to 1.0m, for each species.

In the Infection House, the tank is planned to not give stress to fish (the diameter of it is to be four times longer than the length of fish so that some 20cm long fish can swim round freely) and shield the light.

B. Distribution of water

Consumption of seawater in the Laboratory is planned at 750 ton/day, based on Table 2-3-3 (4).

C. Raw seawater supply to the site

Raw seawater of 750 ton/day (31 ton/hour) is to be supplied on the responsibility of SEAFDEC/AQD.

D. Distribution in the site

Raw seawater received in site flows in the following order.

Receiving → Settling Tank (120 ton capacity) → pumping → Pressure Rapid Filter (20 ton/hour × 2 sets) → Reservoir Tank (400 ton capacity) → each Rearing Facility → Sterilization(Infection House) → Dust treatment tank → drainage

a) Settling Tank

Raw seawater flows first into the Settling Tank (120 ton capacity, concrete-made). Muddy sand with heavier specific gravity settles in the Tank. The sedimentation speed of particles of 10 micron in water is 0.07cm/sec, settling at the bottom 2m deep for one hour. To light a burden of the Filter, the settling hour is to be some 3 hours so that sand less than 10 micron can settle. Based on the volume of seawater and the settling hour, the size of the Tank is planned to be 120 ton capacity, actual settling capacity of 93 ton.

Table 2-3-3 (2) Stocking Rate of Black Tiger Larvae

Days	Stage	Body Length	Standard Stocking Rate/m^3	Life Style	Activities	Remarks
1	Egg		200,000	Average Fecundity 600,000eggs/spawner		
2	N1,2,3	0.32mm	200,000	Feeding diatom		Phytoplankton feeder
3	N4,5,6			Planktonic Life		
4	Z1	0.91mm				
5	Z2					
6	Z3					
7	M1	3.4mm	100,000	Feeding rotifer		Change to zoo-plankton feeder
8	M2				Change rearing	
9	M2	4.4mm			tank	
10	M3					
11	P1	5mm	50,000	Grow to shape of adult		
12	P2					
13	P3					
14	P4					
15	P5	5mm	20,000	Start demersal life	After P5 stage, change rearing tanks everyday to keep good water quality	Prepare spare tanks to change always
16	P6					
17	P7					
22	P12		10,000			
30	P20	10mm	5,000			
45	P35	20mm	2,000	Young shrimp for release		
Regend： N：Nauplius larvae, Z：Zoea larvae M：Mysis larvae, P：Post larva					1,2,3… show metamorphosis stage of larvae	

Source：Rearing Report of Black Tiger Larvae in Tunkan Fisheries Institute in Taiwan（1986）

Table 2-3-3(3) Stocking Rate of Grouper Larvae

Days	Stage	Body Length	Standard Stocking Rate/m^3	Life Style	Activities	Remarks
1	Egg		40,000			Feeding rotifer
2	Hatch out	1.8mm	40,000			
3	Mouth opening	2.7mm	40,000	Formation of mouth	Start	
10		4mm	20,000		feeding	
20		6mm	10,000			
50	Metamorphosis	25mm	5,000	Change of shape		
57	Fry	30mm	4,000			Grow to the shape of adult fish
65		40mm	2,000	Body weight 1g		
80		60mm	1,000	Body weight 3g	For release	

Source：Larvae Production of Grouper, Overseas Aquaculture Study Committee in Japan （1996）

The following table “Outline of the Enclosed Wet Laboratory” is based on the data from tables 2-3-3-(2), 2-3-3-(3) and2-3-3-(5).

Table 2-3-3(4)　Outline of the Enclosed Wet Laboratory

Name of Facilities	Crustacean Hatchery/Nursery	Fish Hatchery/ Nursery	Seaweed Culture Room	Infection House
Laboratories in charge	Genetics	Molecular Endocrinology/ Genetics	Algal Biotechnology	Molecular Biotechnology
1.Rearing Tanks				
Size of the Tanks	10－1,000L	20－5,000L	1,200L	50－250 L
Quantity of the Tanks	93	69	34	88
2.Space to place Tanks				
Rearing　Tanks	158m^2	165m^2	144m^2	126m^2
Reservoir	12m^2	6m^2	—	—
Passage	30m^2	29m^2	56m^2	30m^2
Sampling room				36m^2
Store room				18m^2
（Sub total）	200m^2	200m^2	200m^2	210m^2
3.Quantity of Seawater /day	27 tons	190 tons	490 tons	39 tons
（Total quantity of SW）				(746 tons)

（Note）Detailed contents of the each facilities are shown in the Table 2-3-3(5) “Facilities of the Enclosed Wet Laboratory”

Table 2-3-3 (5) –1　Facilities of the Enclosed Wet Laboratory

1) Crustacean Hatchery／Nursery Room

Facilities	Stocking Stages or Utilization	Size of the Tanks	Quantity of the Tanks for each Study Group	Stocking Rate/Tank	Total Q'ty of Tanks	Space for Tanks	Total Volume of tanks	Change Rate of Water /Day	Quantity of Water/Day
Spawning Tanks	Spawning/Hatching out	300L	2～3 tanks	60,000	12 tanks	28m^2	3.6 tons	1 time	3.6 tons
Larval Rearing Tanks	Zoea/Mysis	100L	8～15 tanks	10,000	48 tanks	36 m^2	4.8 tons	1 time	4.8 tons
Larval Rearing Tanks	Post-Larva 1－20	250L	2～5 tanks	12,500	15 tanks	28 m^2	3.2 tons	1 time	3.2 tons
Nursery Tanks	Post-Larva 20 － Juvenile	1,000L	2～4 tanks	5,000	12 tanks	48 m^2	12.0 tons	1 time	12.0 tons
Multipurpose Tanks	Spawners and others	500L	1～2 tanks	10	6 tanks	18 m^2	3.0 tons	1 time	3.0 tons
Reservoir (1) (2)	Reserving filtered water and sterilizing	5tons 5tons	For Zoea and Mysis For Post larva		1 tanks 1 tanks	6 m^2 6 m^2			
Passage etc.						30 m^2			
Total						200 m^2			26.6 tons

2) Fish Hatchery／Nursery Room

Facilities	Stocking Stages or Utilization	Size of the Tanks	Quantity of the Tanks for each Study Group	Stocking Rate/Tank	Total Q'ty of Tanks	Space for Tanks	Total volume of tanks	Change Rate of Water /Day	Quantity of Water/Day
Incubation Tanks	Incubation	250L	1～3tanks	10,000	12 tanks	21m^2	3.0tons	1 time	3.0 tons
Larval Rearing Tanks	Larval rearing	500L	3～8tanks	5,000	48 tanks	90m^2	24.0 tons	1/4 time	6.0 tons
Raceway Tanks	Juvenile rearing	5,000L	0～1tanks	10,000	3 tanks	48m^2	15.0 tons	12 times	180.0 tons
Intensive Rotifer Tanks	Culturing rotifer for larval stage food	200L	For every groups		6 tanks	6m^2	1.2 tons	1 time	1.2 tons
Reservoir	Reserving filtered water and sterilizing	5tons	For every tanks		1 tanks	6m^2			
Passage etc.						29m^2			
Total						200m^2			190.2 tons

Table 2-3-3 (5) –2　Facilities of the Enclosed Wet Laboratories

3) Seaweed Culture Room

Facilities	Stocking Stages	Size of the Tanks	Quantity of the Tanks for each Study Group	Stocking Rate/Tank	Total Q'ty of Tanks	Space for Tanks	Total volume of tanks	Change Rate of Water /Day	Quantity of Water/Day
Cultivating Tanks	Culturing Seaweed	1,200L	5～10 tanks	Two rows	34 tanks	144 m^2	40.8 tons	12 times	490 tons
Passage etc.						56 m^2			
Total						200 m^2			490 tons

4) Infection House

Facilities	Stocking Species or Utilization	Size of the Tanks	Quantity of the Tanks for each Study Group	Stocking Rate/Tank	Total Q'ty of Tanks	Space for Tanks	Total volume of tanks	Change Rate of Water /Day	Quantity of Water/Day
Big Fish Room	Big fish	250L	1～4 tanks	5	18 tanks	54m^2	4.5 tons	4 times	18.0 tons
Small Fish Room	Small fish	50－100L	4～8 tanks	20	35 tanks	36m^2	2.6 tons	4 times	10.4 tons
Crustacean Room	Shrimp and crab	50－100L	4～8 tanks	50	35 tanks	36m^2	2.6 tons	4 times	10.4 tons
Sampling/ Working Room	Sampling and working					36m^2			
Storage	Storage for chemicals and implements					18m^2			
Hallway						30m^2			
Total						210m^2			38.8 tons

(Note)　Study Group：Each laboratory consists of three(3) or four(4) study groups .

b) Pressure Rapid Filter (FRP-made, hollow tower type, 20 ton/hour capacity)

In order to rear larvae for experiment safely, suspended organic particles (eggs and larvae of other living things) and mud particles that not settle normally must be removed from the water. The Pressure Rapid Filter that is to be provided is capable of removing over 95% of suspended particles of more than 20 micron.

To prevent clogging of the Filter, backwashing treatment (flushing water of about 15 tons conversely to wash out clogging particles on filter medium) must be conducted once a day when seawater is clear and several times a day when seawater became muddy due to winds and waves. This operation will take about 20 minutes. Also the equipment must be fully stopped for some 10 days a year for periodical inspection, but it will also be possible to conduct this maintenance work in the intervals of research activities. Taking into consideration the operation/maintenance of the equipment and the days where seawater becomes heavily turbid, two sets of 20 ton/hour capacity Pressure Filter shall be installed to ensure required water of 31 ton/hour.

Another type of filter is the gravity type. This type of filter needs a wider installation area since a biofilter (micro-organism filter tank) must be attached. Running cost consists of mainly of electricity during pumping. Since both types require pumping system, though its installation position is different, there is no big difference in terms of cost. The table below shows a comparison.

Table 2-3-3 (6) Comparison of pressure filter and gravity filter

	Pressure filter	Gravity filter
Filtering water volume	Mass filtering practicable	Difficult for mass filtering
Filtering capacity	Large	Less than pressure type
Installation cost	Same as gravity type	Wholly same as pressure type
Maintenance	Once a year	Almost no need
Suitableness for the Project	High	Lower than pressure type

c) Reservoir Tank (Concrete-made, 400 ton capacity)

The Reservoir Tank keeps filtered seawater, ensures stable supply of clean water, even during power breakdown and also for backwashing water for filter.

◎Continuous supply of rearing water during power failure

The electric situation here is poor and power supply is cut off once or twice a week. The Project shall plan to provide a 400-ton tank capable of supplying water of 35 ton/hour for half a day. During power failure, this supply of water as well as aeration

(using backup power of Nutrition Research Building) are conducted.

◎Stable supply of rearing water

Stable supply of rearing water, in both quality and quantity, can be expected by providing this Reservoir Tank. The larger Tank can ease bad effect on rearing fingerlings by rapid dropping of salinity due to heavy rain.

d) Water supply to each Facility

□ Crustacean Hatchery/Nursery

The Facility aims at spawning and larvae rearing of crustaceans. Rearing water is usually filtered seawater, which is supplied from the large reservoir tank, but depending upon the subject of study or rearing period, highly sterilised water (by chemical treatment) is used. In that case, seawater is pumped up to the small reservoir tank (FRP, 5 ton vol.) and sterilised. In case of crustacean, the water in the tank become filthy due to spawning or metamorphosis and centralised whole exchange of water must be made. The capacity of reservoir tank thus must be larger than the one of rearing tank, compared to the case of fish rearing, and two sets of 5 ton capacity rearing tank shall be provided so that whole volume exchange of 12 ton capacity breeding tank can be made with water supply of 1.2 ton/hour.

A water circulating system was requested to keep such parameters as seawater temperature and salinity constant during a certain period in breeding test, nutrition test, or hormone test so that the results of test cannot be misled by changes of environmental conditions. Utilisation of the circulating system makes it possible to prevent changes of temperature and water quality from affecting the result of study. The system is necessary to a research institution as SEAFDEC/AQD. Since the system is used for a certain period for each row of breeding tanks, the scale is planned to be of as minimum as possible. The system consists of a small pump and filter, aiming to remove ammonia nitrogen, not saving quantities of water, and not affecting required quantities of breeding water.

Since waste water of this Facility needs no sterilisation, it is led directly to the disposal tank and is discharged to the sea after excretions and leftovers of feed are settled.

☐ **Fish Hatchery/Nursery**

Rearing water is usually filtered water which is supplied from the large Reservoir tank. For the same reason as the case of crustaceans, the reservoir tank is to be provided, but since there is no need of whole exchange of breeding water, only one tank is to be provided. Drainage of waste water is same as the case of crustacean facility.

☐ **Seaweeds Culture Room**

Culture water, usually filtered water, is supplied from the larger Reservoir Tank. In case of seaweeds culture, seaweeds absorb the nourishment from breeding water, and the culture water flows away. Since research study using sterilised culture water is not conducted, the small reservoir tank and circulation system are not installed. Waste water is led directly to the disposal tank.

☐ **Infection Room**

The water to be used here must be sterilised water to prevent growth of bacteria. For this, the filtered water from the Reservoir Tank is re-filtered again through a tube type filter placed at the entrance of the Room, removing microscopic floating particles, and then sterilised with UV (ultra violet) sterilizer. Since the required quantities of sterilised water is around 1.6 ton/hour according to Table 2-3-3 (5), the equipment capable of handling this quantity of water shall be installed. Waste water from this Facility must be sterilised before discharging to the waste disposal tank because of the possibility of containing harmful bacteria and virus. The sterilising system using ozone or electrolyte, which is being used for diseased fish handling at the SEAFDEC/AQD, is planned. After sterilisation, the pathogen free waste is discharged to the waste disposal tank.

☐ **Toilet and Storage room**

The Laboratory is constructed at the site on the north side of the national road. On this side, only the IFBHPDC (Integrated Fish Broodstock and Hatchery Pond Complex) stands and there is no toilet facility in this building. With the Project, the number of personnel working here will increase. One toilet facility shall be constructed, one for men and one for women. Also a storage room for spare breeding tanks, piping materials, maintenance equipment and tools, etc., with an area of 16m^2, shall be

constructed, adjoining to the toilet. The area of the facility containing the toilet and storage room shall be 50m^2.

The lot on the west of the facility will be reserved for a working shed in case of enlargement of building.

(2) Determination of scale of the equipment

Proposed research activities and equipment

The outline of proposed research activities and equipment for each laboratory is as follows.

1) Molecular Endocrinology (Molecular Endocrinology/Genetics Laboratory)

The unavailability and high cost of naturally occurring hormones hinders their use in aquaculture, though hormones have been used over 20 years ago.
Thus, there is a need for large scale production of these hormones by new advanced method of molecular biology.

(A) Usual method for the production of purified natural hormones from hypophysis.

Homogenize hypophysis with buffer and centrifuge	(70.Homogenizer,19-21.Centrifuge)
↓	
Separation by gel filtration.	(gel filtration columns, peristaltic pumps)
↓	
Purification by HPLC or FPLC	(52.FPLC and HPLC system)
↓	
Confirmation of the purified hormone by electrophoresis	(46.Electrophresis for protein)

(B)New advanced method for the production of recombinant growth hormones and other peptide hormones.

		Extraction		Rreverse transcriptase	
Growth hormones	→	mRNA	→	cDNA	→
30.Concentrator vacufuge		19-21.Centrifuge		40.DNA sequencer	↓
55-56.Freezer		26.Clean bench Biological		76.Image analyzer	↓
116.Refrigerator		67.Gel transfer system		77.Incubator low temp	↓
		70.Homogenizer		106.Gel documentation	↓
		77.Incubator low temp		122.Spectrophtometer UV-VIS	↓
		80.Incubator		127.Thermal cycler	↓
		135.UV crosslinker		141. Water bath	↓

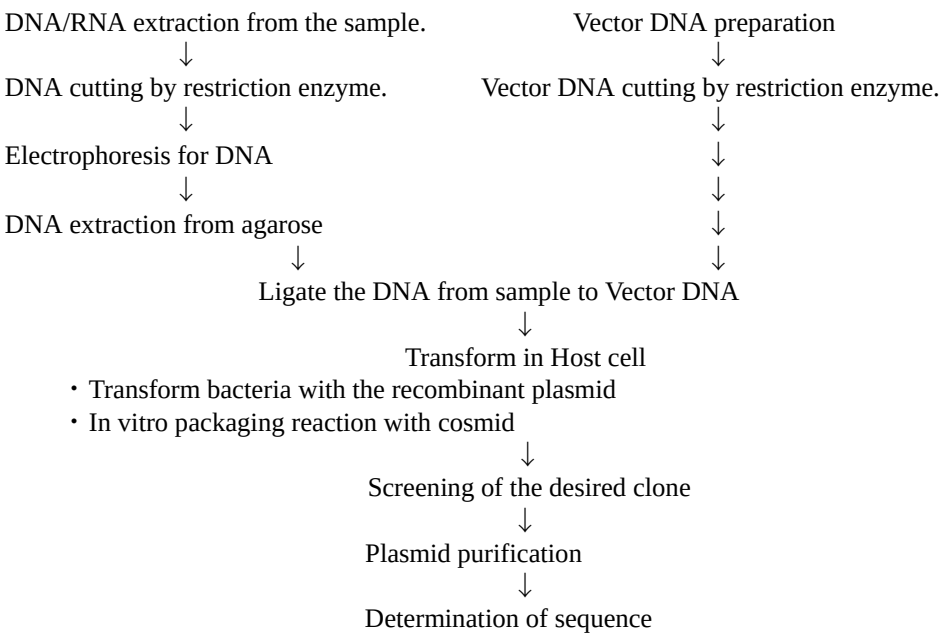
Analysis	←	Incubation by Fermentor	←	Transfer to expression systems ←
		50.Fermentation equipment		81.Incubator with shaker

Requested equipments from Molecular Endocrinology/Genetics Laboratory

4	Amino acid sequencer	45	Dryer, freese dryer	90	Microinjection work station
5	Aspirator pump	46	Electrophresis for DNA	94	Microscope epi-flourescence & DIC
6	Autoclave	47	Electrophresis SDS-page	101	Oven microwave
8	Balance analytical	52	FPLC system	105	PH meter
9	Balance field	55	Freezer -40℃	106	Chem/Gel documentation system
13	Biorotator	56	Freezer -85℃	108	Pipete 20ul
14	Block heater	63	Gel drying system	115	Peristaltic pump
19	Centrifuge micro refri.	66	Gel filtration columns	116	Refrigerator standard
20	Centrifuge refri.	67	Gel transfer system	122	Spectrophtometer UV-VIS
26	Clean bench Biological	68	Gel transfer system mini	127	Thermal cycler
28	Cold cabinet	70	Homogenizer	131	Ultrafiltration apparatus
30	Concentrator vacufuge	71	Hot plate/stirrer	132	Ultrasonic cleaner
31	Cooling blocks	72	HPLC	134	UPS
39	Distilling apparatus	73	Hybridization oven	135	UV crosslinker
40	DNA sequencer	80	Incubator without shaker	140	Vortex mixer
42	Dot blot system	81	Incubator with shaker	141	Water bath
44	Dry ice maker	86	Laser flatbed scanner	143	Water purification syst.

2) Genetis (Molecular Endocrinology/Genetics Laboratory)

The outline of DNA/cDNA cloning and genetic analysis:



Equipment needed:
6.Autoclave, 14.Block heater, 19-20.Centrifuge, 26.Clean bench Biological, 40.DNA sequencer, 46.Electrophresis for DNA, 55-56.Freezer, 73.Hybridization oven, 80.Incubator without shaker 106.Chem/Gel documentation system, 122.Spectrophtometer UV-VIS, 127.Themal cycler

Requested equipments from Molecular Endocrinology/Genetics Laboratory

4	Amino acid sequencer	45	Dryer, freese dryer	90	Microinjection work station or Electroporation system
5	Aspirator pump	46	Electrophresis for DNA	94	Microscope epiflourecence & DIC
6	Autoclave	47	Electrophresis SDS-page	101	Oven microwave
8	Balance analytical	52	FPLC system	105	PH meter
9	Balance field	55	Freezer -40℃	106	Photodocumenta-tion system
13	Biorotator	56	Freezer -85℃	108	Pipete 20ul
14	Block heater	63	Gel drying system	115	Peristaltic pump
19	Centrifuge micro refri.	66	Gel filtration columns	116	Refrigerator standard
20	Centrifuge refri.	67	Gel transfer system	122	Spectrophtometer UV-VIS
26	Clean bench Biological	68	Gel transfer system mini	127	Thermal cycler
28	Cold cabinet	70	Homogenizer	131	Ultrafiltration apparatus
30	Concentrator vacufuge	71	Hot plate/stirrer	132	Ultrasonic cleaner
31	Cooling blocks	72	HPLC	134	UPS
39	Distilling apparatus	73	Hybridization oven	135	UV crosslinker
40	DNAsequencer	80	Incubator without shaker	140	Vortex mixer
42	Dot blot system	81	Incubator with shaker	141	Water bath
44	Dry ice maker	86	Laser flatbed scanner	143	Water purification syst.

3) Molecular Microbiology Laboratory

Polymerase chain reaction method（PCR method）:
Peculiar genes in the target bacteria and virus even of very small quantity can be detected by PCR.
White spot virus syndrome (WSSV) which has strong virulence to black tiger shrimp can be detected early by this method.
This rapid and sensitive technique will be used in the early detection of several diseases in aquaculture.

Sample
↓
Extraction of DNA
↓ (Mixture)
4 bases of DNA
Primer
DNA polymerase
↓
Denaturation by heat stimulation
2 strands of DNA will separate
(95℃, 2-5 minutes)
→→→→→The primer anneals to the DNA strand
↑ (30-65℃, 40 sec.) ↓
↑ 30 cycles ↓
↑ ↓
Denaturation by heat stimulation ← ← The DNA polymerase synthesize 2 chains of
2 chains of DNA separate each one chain DNA (72℃, 40 sec.)
(95℃, 40 sec.) ↓
By 30 cycles we can get more than one billion same DNA
↓
Product Confirmation by Electrophoresis.

Equipment needed ;
6.Autoclave, 8-11.Balance, 14.Block heater, 19-20.Centrifuge, 26.Clean bench, 39.Distilling apparatus, 40.DNA sequencer, 46-47.Electrophoresis, 55-56.Freezer, 70.Homogenizer, 73.Hybridization oven, 106.Photodocumentation system, 120.Scanning electron microscope SEM, 126.TEM, 122-123.Spectorophotometer, 127.Thermal cycler, 128.Thermpmixer, 131.Ultrafiltoration apparatus

Requested equipments from Molecular Microbiology Laboratory

2	Air shower	73	Hybridization oven	119	Safety shower station
13	Biorotator	77	Incubator low temp	120	Scanning electron microscope SEM
14	Block heater	82	Iron sputter	124	Stereo microscope
16	Carbon coater	83	Isolation hood	126	Scanning electron microscope TEM
23	Chemiluminescent apparatus	91	Microscope brightfield	127	Thermal cycler
27	CO2 incubator	92	Microscope camera system	128	Thermomixer
32	Critical point dryer	93	Microscope inverted	129	Tool kit
33	Dehumidifier	94	Microscope flourescence	130	Ultra microtome
37	Dessicator electronic	95	Microscope with video camera system.	132	Ultrasonic cleaner
45	Dryer, freeze dryer	96	Microscope with phase contract	137	UV sterilizer for water
48	Elisa plate reader	99	Orbital shaker	138	Vacuum pump
51	Fiber optic illuminator	104	Ozone generator		
69	Glass knife maker	107	Pipette 8-ch		

4) Algal Production Technology Laboratory

The outline of Plotoplast fusion and cell mutagenesis to produce new individuals.

① Isolation of plotoplast
Material→Cutting→Enzyme→Centrifuge→Enzyme→Filtration→ Centrifuge

↓

② Fusion of plotoplast
(Suspension in culture media)

↓

③ Culture of cell fusion

↓

④ Selection of cell
(Cultivation in culture media)

↓

Rebirth of cell

Needed equipments :
6.Autoclave, 21Centrifuge refrigerated, 27.CO2 incubator, 54-56.Freezer, 85.Laminar flow cabinet, 91-93.Microscope, 95.Microscope with video camera system, 124.Stereo Microscope

Requested equipments from Algal Production Technology Laboratory

1	Air blower	46	Electrophoresis for DNA	100	Oven general purpose
5	Aspirator pump	51	Fiber optic illuminator	101	Oven microwave
6	Autoclave	53	Fraction collector	102	Oven small
7	Autoclave small	54	Freezer –150℃	104	Ozone generator
8	Balance analytical	56	Freezer –85℃	105	PH meter
9	Balance field	57	FT infrared spectrometer	108	Pipette 20ul
10	Balance toploading 3kg	60	Gas analyzer	117	Refrigerator two door
11	Balance microbalance	61	Gas chromatograph	118	Rotary evaporator
12	Bioreactor	64	Gel filtration macro	122	Spectrophotometer UV-VIS
17	Carts	65	Gel filtration ultra	124	Stereo microscope
18	Carts with jack	71	Hot plate/stirrer	125	Support jack
21	Centrifuge refrigerated.	72	HPLC	134	UPS
22	Chemical cabinets	76	Image analyzer	138	Vacuum pump
24	Chromatography refrigerated.	85	Laminar flow cabinet	139	Viscosity meter
27	CO2 incubator	87	Light meter w/data logger & PC atta.	140	Vortex mixer
29	Computer	95	Microscope with video camera system	141	Water bath
39	Distilling apparatus	96	Microscope with phase contract	144	Working table
41	DO meter	98	Nuclear magnetic resonance spec.		

5) Feed Technology Laboratory

1) There is a necessity of extruded pellet machine:
The dry pellet made now in the laboratory is breakable and has low digestibility as compared with the extruded pellet that is very popular among the fish farmers. The setting up of extruder machine is indispensable in light of the plans to make test diets with hormones.

2) The ingredient of fish feed except domestic and imported fish meal:
Animal ingredient : Blood meal, Meat born meal, Scrap squid, Shrimp head meal.
Vegetable ingredient : Soybean meal, Rice bran, Copra meal, Cowpea meal (legume), Leaf meal, Cassava flour, Sweat potato, wheat flour.

3) The price of pellet : For tiger shrimp : 38-46 pesos / kg.
For milk fish/ tilapia : 11-25 pesos / kg.
For grouper / mud crab : artificial pellet under development; trash fish is presently used.

4) Needed equipment for Feed Technology Laboratory :

Preparation : 6.Autoclave, 8-11.Balance, 19-20.Centrifuge, 28.Cold cabinet, 30.Concentrator vacuum, 34.Desiccator, 39.Distilling apparatus, 43.Drum dryer, 45.Freeze dryer, 58.Fume Hood, 70.Homogenizer, 74.Hydrolab multiple probe, 100.Oven, 105.pH meter, 132.Ultrasonic cleaner, 133.Ultrasonic disintegrator, 136.UV sterilizer, 140.Vortex Mixer, 143.Water purification system., 144.Working table.

Analysis : 26.Clean bench Biological, 47.Electrophresis SDS-page, 53.Fraction collector, 63.Gel drying system, 67.Gel transfer system, 71.Hot plate/stirrer, 72.HPLC, 75.Latroscan, 83.Isolation hood, 89.Micro filtration setup, 97.Monitor for atomic Absoration spect, 99.Orbitalshaker, 122.Spectrophtometer UV-VIS, 123.Spectrophotometer fluorescence, 141.Water bath, 142.Water bath with shaker.

Fermentation/Incubation: 50.Fermentation equipment, 78-81.Incubator
Feed making : 49.Feed extruder machine
Stock of sample : 55-56.Freezer
Stock of additives : 28.Cold cabinet, 116.Refrigerator

Requested equipments from Feed Technology Laboratory

6	Autoclave	45	Dryer, freeze dryer	89	Micro filtration setup
8	Balance analytical	47	Electrophoresis SDS-page	97	Monitor for atomic absorption spectrophotometer.
9	Balance field	49	Feed extruder machine	99	Orbital shaker
15	Bottle top dispenser	50	Fermentation equip.	100	Oven general purpose
17	Carts	53	Fraction collector	101	Oven microwave
20	Centrifuge refri.	58	Fume hood	103	Oven vacuum drying
22	Chemical cabinets	62	Gas chromatograph	105	PH meter
25	Chromatography setup	63	Gel drying system	122	Spectrophotometer UV-VIS
26	Clean bench Biological	67	Gel transfer system	123	Spectrophotometer. Fluorescence
28	Cold cabinet	70	Homogenizer	132	Ultrasonic cleaner
29	Computer	71	Hot plate/stirrer	133	Ultrasonic disintegrator
30	Concentrator vacuum	72	HPLC	134	UPS
34	Dessicator cabinet	74	Hydrolab mult. probe	136	UV sterilizer
35	Dessicator jar	75	Latroscan	140	Vortex mixer
36	Dessicator vacuum	78	Incubator hot air	141	Water bath
38	Dewar flask	79	Incubator temp. gradient	142	Water bath with shaker
39	Distilling apparatus	81	Incubator with shaker	143	Water purification syst.
43	Drum dryer	83	Isolation hood	144	Working table

2) Procurement plan of equipment

The following is the procurement plan of main equipment and materials

A. Necessity of animal cage

Development of vaccine starts from culture of pathogenic virus or bacteria and production of an antibody through such laboratory animals as rabbit and mouse. To breed laboratory animals cleanly and safely and gather blood, the widespread auto-washing shelf type animal case is to be selected.

In order to prevent animals from biting each other and protect against disease, it is necessary to breed one rabbit in one cage, and, in case of mouse, one to 3 mice in one cage. For research in one pathogenic bacteria two rabbits are necessary at the least, and, in case of mouse, 5 to 6 mice are required because blood quantities to be gathered are small.

The SEAFDEC/AQD intends to research 5 kind of disease germ such as vibrio disease and viral disease. As for rabbit, since one rabbit is bred in one cage and 2 rabbits are necessary for one kind of germ, 10 cages (for 10 rabbits) are to be provide. In case of mouse, 5 to 6 mice are necessary for one kind of pathogenic bacterial and 2 to 3 mice can be bred in one cage, and thus 10 cages capable of breeding 30 mice shall be provided.

Main merits brought by the development of vaccine are as follows.

- Antibiotic has usually no effect on viral disease. Once the disease breaks out, animal group infected with disease must be isolated and destroyed by fire, causing a huge loss. The development of vaccine makes it possible to prevent viral disease.
- As for bacterial disease, vaccine is the only remedy against a disease on which antibiotic has no effect.
- Decrease of disease saves cost of feed and seeding.
- Expensive chemicals become to be unwanted and chemical-resistant bacteria can be annihilated.

B. Necessity of CO_2 incubator

At the Algae Biotechnology Laboratory tissue culture, cell fusion culture, and spore culture of algae can be executed with such conditions as luminous intensity, temperature, density, nutrition, salinity, etc. changing.

At the Micro-algae research laboratory

This laboratory is responsible for distribution of seeding of plant plankton to near hatcheries, but it is difficult to conduct axenic culture of single species under the current condition of air conditioning and artificial light. Continuous stable supply of healthy and pure plant plankton (single species) is desired earnestly. Since research study is carried out with conditions changing, 4 incubators at least are necessary for one kind of algae. Each laboratory researches 2 kind of algae, and 16 incubators in total are requested for both laboratories. Since various useful species can be studied with research period changing, 8 sets of incubator, minimum requirements, are provide.

C. Isolation Hood

This is a clean bench of portable type. It can prevent termination by the air, and is useful for pre-treatment for PCR (polymerase chain reaction) or separation of germs. An ultraviolet lamp is installed inside the box type container, which is generally introduced to biotechnology-related laboratories.

Experiments that the SEAFDEC/AQD has planned lately have often a positive reaction (wrong positive reaction) caused by contamination, and so it is necessary to carry out pre-treatment using the Isolation Hood, and keep necessary instruments and utensils inside the Hood. The utilisation of this apparatus is of very wide range, including tissue treatment before cell culture, and it is used sometimes for various purposes. But the purpose of the proposed apparatus is restricted, such as for cell culture or research in bacteria, and cannot be used in common due to possible contamination. Total 3 sets of Isolation Hoods, one set for bacteria research, another for pre-treatment for PCR at the MM Labo., and one set for research in yeast fungus at the FFT Labo.

D. Dry ice maker

Dry ice is not available in Iloilo city. The requested dry ice maker is easy handling one.

Material for making dry ice can be purchased in the city. When the dry ice maker is provided, Laboratories can produce dry ice easily. Dry ice is used for instantaneous freezing of samples. Fine samples can be put on dry ice or can be frozen by alcohol dry ice. Samples for oxygen measurement, hormone measurement, and micro-analysis, etc. are must be frozen in an instant (freezing in a freezer causes degeneration), and since

liquid nitrogen useful for instant freezing is not available Iloilo the only method is to use dry ice. Also dry ice is used as freezing agent in lyophilization and for transport of freezing sample between Laboratories, having various uses.

E. Two types of electron microscope and its property

SEM and TEM have different purpose respectively and their subjects of investigation are also completely different, and cannot be substituted with each other.

a) SEM

SEM investigates "surface" microscopic structure of living thing or tissue, instead of "internal structure." It is used to investigate surface tissues or organ structures such micro organism as parasite for identification or research in its function. As for aquatic life, it is used to analyse the surface structure of the intestines or gills and their function and to investigate a state of propagation of bacteria on these organs. These researches cannot be substituted for TEM. SEM makes it easy to observe organs or tissues to investigate directly (or after simple treatment). Also its brilliance is several times as brighter as the optical microscope. At the SEAFDEC/AQD it will be used as follows;

- Identification of parasite and investigation of function of its organ
- Observation of a state of propagation of bacteria and probiotic on the surface of tissue.
- Investigation of function of gill or feeding organ of shellfish, shrimp, and crab.
- Research in microscopic surface structure of algae and red tide plankton.

b) TEM

TEM is a microscope to observe and investigate the "internal structure" of tissue and cell. It cannot observe the surface structure, and is used to investigate the structure of cell organ (nucleus, Golgi's body, mitochondria, hormone granule, etc.), function itself of cell and tissue, or condition of function. The magnifying power is very high. This makes it possible to observe the structure and function of micro-organism such as virus, and is essential for identification and observation of virus. Also it is used for observation of generation of hormone and its development. Since the objective must be cut extremely thin pieces, TEM cannot use easily like SEM. It will be utilised at the SEAFDEC/AQD as follows.

- Final diagnosis of viral disease of shrimp and marine fish.
- Identification of new virus.
- Research in physiology and ecology of virus in the cell

- Identification of hormone production cell and investigation of function of the cell.

These microscopes are connected closely with ongoing subjects to research at the SEAFDEC, but not exist at Panay Island. Once provided, they can be used by Philippines University or other universities as well as researchers and students from foreign countries.

The following Table is the details of the equipment and materials.

2-3-3 (7) Equipment Plan

Item No.	Equipment name	Object	Clasification	Condition							Required quantity					Priority				Qty	Analysis in Japan Laboratry					Total	Explication
				ME & GEN	MM	AB/ SW	AB/ MA	FFT	Other	Reason of no used (quantity)	ME & GEN	MM	AB/ SW	AB/ MA	FFT	AA	A	B	C		ME & GE	MM	AB/ SW	AB/ MA	FFT		
1	Air blower	To supply oxgen to water tank											1						1	1						0	It is easy and effective for Seafdec/Aqd to provide this equipment for oneself.
2	Air shower	To protect entrance of bacteria into the culture room										1				1				1		1				-	Provide new one by construction work
3	Animal Cages	To rear rabbit and rat for production of vaccines	New									20					20			20		20				20	For rabbit and rat, prepare 10 cages for each. See page 1-47
4	Amino acid sequencer	For analysis of amino acid.									1								1	1						0	Not urgent.
5	Aspirator Pump	For use during tRNA extraction,DNA extraction from agarose gel,plasmid purification,etc.	New		1						1		1	1			3	2		5	1		1	1		3	For basic equipment
6	Autoclave (big)	For sterilization of tips tubes and media etc.	New/Supply	1	2	1		1			1		1	2	1		5			5	1		1	1	1	4	There are very frequency of use. It takes 2-3 hours for one time at least. So to use them effectively, it is needed to make a reservation. With increasing of experiments, it should be provided two equipments in each laboratory.
7	Autoclave (small)	The same as above					1 (1)			Superannuated introduced 1985			1	1				2		2						0	Using effectively above autoclave, instead of this equipment
8	Balance Analytical	To measure weight of chemicales and samples.	New/ Renewal/ Supply		1	2	2	1 (1)	(1)	Superannuated introduced 1978	1		1	1	2		5			5	1		1	1	1	4	It is important to use effectively balances of Balance Room in Fish Feed Technology Laboratory.
9	Balance Field	To measure weight of samples	New				1 (1)			Superannuated introduced 1994	1		1		2		3	1		4		1	1		1	3	It is important to use effectively balances of Balance Room in Fish Feed Technology Laboratory.
10	BalanceToploadong 3kg	To measure weight of samples	New					1 (1)		Superannuated introduced 1993			1	1			2			2			1	1		2	There are long distance between Algal and Microalgal laboratory,so needed 2 equipments.
11	Balance Microbalance	To measure weight of samples	Renewal		1		1	(1)		Superannuated introduced 1984	1				1			1	1	2					1	1	It is important to use effectively balances of Balance Room in Fish Feed Technology Laboratory.
12	Bioreactor	For calture of microalge with large scale												4				4		4				0		0	Not urgent.
13	Biorotator	For preparation of fish and crustacean samples for histology and electron microscope	New			1						1						1		1		1				1	For basic equipment
14	Block heater	For use in temperature-controlled incubations of microcentrifuge tubes (e.g.. Ligation or unwinding of DNA)	Supply	1	1						1	1				2				2	1	1				2	For protection of contamination of bacteria, equipmentes must be provided in each laboratory.
15	Bottle Top Dispenser	To dispense reagents and chemicals													5			5		5						0	It is easy and effective for Seafdec/Aqd to provide this equipment for oneself.

2-3-3 (7) Equipment Plan

Item No.	Equipment name	Object	Clasification	Condition							Required quantity					Priority				Qty	Analysis in Japan Laboratry					Total	Explication
				ME & GEN	MM	AB/ SW	AB/ MA	FFT	Other	Reason of no used (quantity)	ME & GEN	MM	AB/ SW	AB/ MA	FFT	AA	A	B	C		ME & GE	MM	AB/ SW	AB/ MA	FFT		
16	Carbon coater	For TEM										1				1				1						0	Not urgent.
17	Carts	For carring heavy materiales											1	1	5			7	2	9						0	It is easy and effective for Seafdec/Aqd to provide this equipment for oneself.
18	Carts with jack	For carring heavy materiales											1						1	1						0	It is easy and effective for Seafdec/Aqd to provide this equipment for oneself.
19	Centrifuge (Micro Refrigerated)	Centrifugation using microcentrifuge tubes (e.g. tRNA extraction, DNA extraction from gel, plasmid purification, purification of DNA for sequencing, etc.)	New		1			(1)		Superannuated introduced 1985	1					1				1	1					1	For basic equipment
20	Centrifuge (Refrigerated)	For larger scale centrifugation (e.g. for procipitation of inclusion bodies during preparation of recombinant hormones)	New/ Renewal		1	1		1 (1)		Superannuated introduced 1982	1				1	3				3	1				1	2	The experiment needs centrifuge will be dobled, so it should be provided two equipments.
21	Centrifuge Refrigerated (750ml)	The same as above			1			(1)		Superannuated introduced 1985				1				1		1						0	Not urgent.
22	Chemical cabinets	For storage reagents			6	(8)	2 (7)	3 (4)		Superannuated			8	7	4		15	4		19						0	It is easy and effective for Seafdec/Aqd to provide this equipment for oneself.
23	Chemiluminescent apparatus	For initial screening of different bacterial species in culture media	New									1					1			1		1				1	There are no substitute for this equipment
24	Chromatography refrigerator	Cold cabinet storage for chemicals and stock cultures	New										1	1		2				2			1	1		2	There are no suitable substitute for this equipment
25	Chromatography set-up	Chromatography system													1	1				1						0	Not urgent.
26	Clean Bench (Biological Safty)	To expelimente safly in laboratory	New								1				1	2				2	1				1	2	For more safly experiment
27	CO_2 incubator	For algal culture under the several light and temperature conditions	New									1	8	8		16	1		1	18		1	4	4		9	18 incubators are requested, but it is so many for one time. See page 1-47.
28	Cold Cabinet	For storage of chemicales	New		2						1				1	3				3	1				1	2	Many high price reagents must be stocked under good conditione.
29	Computer	Data manegemante											1	1	4			4	2	6						0	It is easy and effective for Seafdec/Aqd to provide this equipment for oneself.
30	Concentrator vacufuge	For lyophilization of small amounts of samples (e.g. purified plasmid, precipitated DNA, etc.)	New		1						1				1	3				3	1				1	2	Two laboratories(ME&GEN and FFT) can not use this equipment together, so provided 2 ones.
31	Cooling blocks	For incubations using microcentrifuge tubes (e.g. during ligation,etc.)	New		1						1						1			1	1					1	For basic equipment
32	Cold Dry appratus	To substitute for Dritical point dryer for SEM	New									1					1			1		1				1	Indispensable for SEM

2-3-3 (7) Equipment Plan

Item No.	Equipment name	Object	Clasification	Condition							Required quantity					Priority				Qty	Analysis in Japan Laboratry					Total	Explication
				ME & GEN	MM	AB/ SW	AB/ MA	FFT	Other	Reason of no used (quantity)	ME & GEN	MM	AB/ SW	AB/ MA	FFT	AA	A	B	C		ME & GE	MM	AB/ SW	AB/ MA	FFT		
33	Dehumidifier	For protection of moisture-sensitive equipments like SEM and TEM	New									2						2		2		2				-	New one by construction work.
34	Dessicator cabinet	To maintein equipment dry conditiones	New												1			1		1					1	1	For protection of contamination of bacteria..
35	Dessicator Jar	The same as above.													2			2		2						0	It is easy and effective for Seafdec/Aqd to provide this equipment for oneself.
36	Dessicator Vacuum	The same as above.													1			1		1						0	To subsutitute for another dessicators
37	Dessicator Electronic	For protection of moisture-sensitive equipments like camera and chemical/reagents like dye	New									2					2			2		2				2	For preservtion of dry material (reagents and pigments) and equipmente (e.g. camera) under good conditiones, it is needed two equipments
38	Dewar Flask	For fresh sample stocks													1			1		1						0	It is easy and effective for Seafdec/Aqd to provide this equipment for oneself.
39	Distilling apparatus	To make distilling water for experiments	New		1		1				1		1		1		1	1	1	3			1		1	2	With increasing of expeliments, the distilling water is in short supply. Each laboratory should have one apparatus.
40	DNA/RNA Sequencer	For sequencing DNA (e.g. determining sequences of cloned DNA fragments, etc.)	New								1					1				1	1					1	Basic equipment for PCR
41	DO meter	To measure desolved oxgen in water				1							1						1	1						0	To subsutitute for Hidrolab multiple probe
42	Dot blot system	For qualitative determination of protein content in samples/or used in tandem with immunoblotting	New								1					1				1	1					1	Indispensable for qualitative analysis of hormones
43	Drum dryer	To dry flak food	New												1		1			1					1	1	Indispensable for dry flak food
44	Dry ice maker	To freeze small sample quickly	New								1						1			1	1					1	Freezer can not be substituted. See page 1-48
45	Dryer freeze dryer	For freeze drying bacterial isolates, fungus, yeasts and PCR primers	New/ Renewal					1 (1)		Superannuated introduced 1989	1	1			2	2		2		4		1			1	2	It is dispensable for FFT laboratory. So one for MM laboratory, another one for FFT laboratory.
46	Electrophoresis for DNA	For analysis of DNA	New		2						10		2			12				12	10		2			12	Only 20 salples can be treated by one time. To analyze many sample efectively, it will be needed 10 equipments at leaste. To avoid contamination, use them separatly in each laboratory.
47	Electrophoresis for SDS-Page	For separation of proteins by molecular size (applications in protein purification)	New								2				1	3				3	2				1	3	There are many samples to analyze, one resercher use 2-3times/week, so it is needed 3 equipments.

2-3-3 (7) Equipment Plan

Item No.	Equipment name	Object	Clasification	Condition							Required quantity					Priority				Qty	Analysis in Japan Laboratry					Total	Explication
				ME & GEN	MM	AB/ SW	AB/ MA	FFT	Other	Reason of no used (quantity)	ME & GEN	MM	AB/ SW	AB/ MA	FFT	AA	A	B	C		ME & GE	MM	AB/ SW	AB/ MA	FFT		
48	ELISA plate reader	To analysis DNA, proteins	New									1						1		1		1				1	Instead of no using RI,this equipment is indispensable.
49	Feed Extruder or extrusion machine	To make extruder pellet for new diet experiment	Supply					1							1	1				1					1	1	This machine is new and advanced type and useful for experiment.
50	Fermentation equipment	For culture of cell and bacterias	New												1	1				1					1	1	Needed to process and improve nutrient quality of feed ingredient.
51	Fiber Optic Iiinminator	For addition more light for stereo microscope	New									1	1	1			2	1		3		1	1	1		3	This is a useful accesary for stereo microscope to observar samples more clear.
52	FPLC system	For purification of recombinant hormone preparation(e.g. anion exchange chromatograhy)	New								1					1				1	1					1	It is imposible to use another equipment for protein fefine.
53	Frection Collector	To collect fractions from chromatography	New										1		1	2				2			1		1	2	Indispensable for each HPLC.
54	Freezer, -150℃	For gamete preservation of algae,fish and crustaceans	New										1				1			1			1			1	Indispensable to preserve gamets for long time
55	Freezer, -40℃	For storage of sample	New		1			1			1					1	1			2	1					1	For presevation of many sample.
56	Freezer, -85℃	For storage of sample	New/Supply		2	1	1	2	(1)	Superannuated introduced 1983	1		1	1		1		2		3	1			1		2	There are many samples to preserve,so each laboratory need 2 freezers.
57	FT Infrared Spectrometer	For characterization of algal extracts e.g. methyoxyl, sulfates, pyruvic acid etc.	New										1				1			1			1			1	Indispensable to analyze the essence extracted from algal for pharmaceutical and other industrial uses.
58	Fume Hood	To expelimente safly in laboratory	Renewal					2 (2)		Superannuated introduced 1975					3	5				5					2	2	By renewing two equipments, it will be able to continure
59	Gammer cunter	For quantification of radioactivity (e.g. RIAs using gamma emitter labels)														1				1						0	Not urgent.
60	Gas analyzer	To measure C02, N2 gas in water											1						1	1						0	Not urgent.
61	Gas chromatograph	For detection of the presence and determination of pesticides in the sample	New					2 (1)		Superannuated introduced 1983			1				1			1			1			1	There is one in FFT Laboratory, but it is needed another for detection of pesticides in AB Laboratory.
62	Gas chromatograph (GC-MS)	For identification and analysis of unknown compounds extracted from samples													1		1			1						0	This is very sensitive and useful equipment, but there are another type of Gas- chromatographies, so it is no need to supply this equipment urgently.
63	Gel drying system	To dry gel.	New								1				1	1			1	2	1					1	For basic equipment

2-3-3 (7) Equipment Plan

Item No.	Equipment name	Object	Clasification	Condition							Required quantity					Priority				Qty	Analysis in Japan Laboratry					Total	Explication
				ME & GEN	MM	AB/ SW	AB/ MA	FFT	Other	Reason of no used (quantity)	ME & GEN	MM	AB/ SW	AB/ MA	FFT	AA	A	B	C		ME & GE	MM	AB/ SW	AB/ MA	FFT		
64	Gel filtration macro	For large molecules	New										1			1				1			1			1	Indispensable for HPLC.
65	Gel filtration ultra	For small morecules	New										1			1				1			1			1	Indispensable for HPLC.
66	Gel filtration columns	For gel filtaration chromatography. Usually for initial separation of proteins according to molecular size.	New								3					3				3	3					3	Indispensable for HPLC.
67	Gel transfer system	For use for transferring proteins from the gel to nitrocellulose membrane (e.g. immunoblotting)	New								1				1	2				2	1				1	2	To avoid contamination, needed 2 systems.
68	Gel transfer system (mini)	The same as above.	New								1					1				1	1					1	Only two gel can be treated one time,so it is needed one more for ME&GEN laboratory.
69	Glass knife maker	To make knife for microtome	New									1				1				1		1				1	For TEM
70	Homogenizer	For initial processing of tissue samples (e.g. prior to extradtion or DNA or tRNA)	New		1						1				1		2			2	1				1	2	For homogenization it is indispensable.
71	Hot plate/stirrer	For mixing and crushing to pieces with heat	New								2		1		1		5		1	6	2				1	3	It takes not short time to analyze,so it is needed some more equipments especially for ME&GEM laboratory. SW and FFT laboratory must use one together.
72	HPLC	For analysis of proteins,vitamines and enzyme	Supply					3			1		1		1	1		2	1	4					1	1	For analysis of protein and vitamina, it must be used exsiting equipment efectively in FFT laboratory together. For analysis of enzyme,new one should be provided.
73	Hybridization oven	For temperature-controlled incubators to allow hybridization of probes in DNA embeded in membranes	New/Supply		1						1	1				3				3	1	1				2	To protect contamination of bacteria, it is needed for each ME&GEN and MM laboratory.
74	Hydrolab multiple probe	To monitor environmental factors	New												1		1			1					1	1	Indispensable to mesure enviaramental factors.
75	Iatroscan	For analysis of fat in feed ingredient, feed, fish and crustaceas.	New												1	1				1					1	1	To avoid contamination, needed 2 systems.
76	Image analyzer	To analyze illuminative pigment	New										1				1			1						1	To substitute equipment for RI.
77	Incubator low temperature	For incybating bacterial and fungal cultures	New			2						1					1			1		1				1	For basic equipment
78	Incubator hot air	For incubation of cell and bacterias			2			2 (1)		Superannuated introduced 1983					1			1		1						0	To use another incubator effectively

2-3-3 (7) Equipment Plan

Item No.	Equipment name	Object	Clasification	Condition							Required quantity					Priority				Qty	Analysis in Japan Laboratry					Total	Explication
				ME & GEN	MM	AB/ SW	AB/ MA	FFT	Other	Reason of no used (quantity)	ME & GEN	MM	AB/ SW	AB/ MA	FFT	AA	A	B	C		ME & GE	MM	AB/ SW	AB/ MA	FFT		
79	Incubator temperature gradient	For incubation of cell and bacterias	New												1	1				1					1	1	For enzyme work
80	Incubator	For incubation of cell and bacterias	New		1						1						1			1	1					1	For cloning DNA
81	Incubator with shaker	For use in bacterial cultures (e.g. amplification of bacteria carrying plasmid with inserted/cloned DNA fragment)	New								1				1		1	1		2	1					1	For cloning DNA
82	Iron sputter	For SEM	New									1					1			1		1				1	For SEM
83	Isolation Hood	For protection from contamination the isolation of bacteria and fugus during subculture	New/Supply					1				3			1	1	3			4		2			1	3	See page 1-48
84	Isotope Detector	For Radio asotope														2				2						0	Not urgent.
85	Laminar flow cabinet	To expelimente safly in laboratory	New		4								2	2		4				4			2	2		4	Four equipment are needed for 6 researcer, so student and assistant must use when they does not using.
86	Laser flatbed scanner	Attachment of computer									1					1				1	1					0	It is easy and effective for Seafdec/Aqd to provide this equipment for oneself.
87	Light meter w/data logger	To measure illuminance in algal culture	Renewal			(1)				Broken			1				1			1			1			1	Renewal
88	Liquid scintillation countar	For quantification of radioactivity (e.g. RIAs using beta emitter labels)														1				1						0	Not urgent.
89	Micro filtration set-up	For filtration of bacterias etc.	New												1		1			1					1	1	For basic equipment
90	Microinjection woek station	For introducing DNA into embryos									1								1	1						0	Not urgent.
91	Microscope Brightfield	For observation of tissue etc.	New									2					2			2		2				2	For protection of contamination, one is for cell culture room and the other is for bacteria culture room.
92	Microscope Camera system	To take a photografy of sample through microscope	New									3					3			3		2				2	Accesary for above equipments
93	Microscope Inverted	For observation of cultured cell etc.	New			1	1		2 (1)	Superannuated introduced 1989		1					1			1		1				1	For MM laboratory
94	Microscope Flouresscence	For observation of tissue etc. by using flouresence	New						(1)	Superannuated introduced 1987	1	1				1	1			2	1	1				2	For substitute equipment for RI, it is indispensable.

2-3-3 (7) Equipment Plan

Item No.	Equipment name	Object	Clasification	Condition							Required quantity					Priority				Qty	Analysis in Japan Laboratry					Total	Explication
				ME & GEN	MM	AB/ SW	AB/ MA	FFT	Other	Reason of no used (quantity)	ME & GEN	MM	AB/ SW	AB/ MA	FFT	AA	A	B	C		ME & GE	MM	AB/ SW	AB/ MA	FFT		
95	Microscope video camera system	To capture video images of histological slides and fixed samples like parasites	New									1	1			1	1			2			1			1	For recording of cell calture etc.
96	Microscope with phase contract	For observation of tissue ect. by using light and shade	New			1			1			1		1		1	1			2		1				1	SW and MA laboratory must use one together. To protect contamination of bacteria, it is needed another one for MM laboratory.
97	Monitor for Atomic Absoration Spect.	Monitor	Supply					(1)		Only monitor broken					1	1				1					1	1	Renewal
98	Nuclear Magentic Resonance spec.	For odentification of unknown compounds and molecular structures of new compounds extracted from alge.											1					1		1						0	Not urgent.
99	Rotary evaporator	To separate compounds e.g. Pesticides	New/ Supply			1	1	1				1			1		3			3		1			1	2	For experimente of
100	Oven general purpose	For drying samples	New/ Renewal		1			(1)		Superannuated introduced 1975			1	1	1		4			4			1	1	1	3	For basic equipment
101	Oven microwave	For melting agarose or gelatin			2			1			1		1	1	1			4		4						0	It is easy and effective for Seafdec/Aqd to provide this equipment for oneself.
102	Oven small	For drying samples			1			(1)		Superannuated introduced 1976			1	1				2		2						0	To substutute for Oven general purpose
103	Oven Vacuum Drying	For drying samples	Renewal					(1)		Superannuated introduced 1976					1		1			1					1	1	Renewal
104	Ozone generator	For disinfection of sea water	New									1		1		1	1			2		1		1		1	For disinfection of sea water for MA laboratory
105	pH Meter	To measure pH.	New		2	2 (1)	2 (1)	1		Superannuated introduced 1975,1991.	1		1	1	1		4			4	1					1	New for ME&GEM Laboratory.
106	Photodocumentation System	To photograph DNA information on the gel	New		1						1					1				1	1					1	For basic equipment
107	Pipette eight channel pipetter	To measure and pour reagents	New									2					2			2		2				2	Indispensable for effective experiment
108	Pipette 20ul	To measure and pour reagents			2						3		1				6			6						0	It is easy and effective for Seafdec/Aqd to provide this equipment for oneself.
109	Pipette 5ml	To measure and pour reagents			2												2			2						0	Not urgent.
110	Pipette 2.5ul	To measure and pour reagents			2						2						3			3						0	It is easy and effective for Seafdec/Aqd to provide this equipment for oneself.
111	Pipette 200ul	To measure and pour reagents			2						3		1				6			6						0	The same as above

2-3-3 (7) Equipment Plan

Item No.	Equipment name	Object	Clasification	Condition							Required quantity					Priority				Qty	Analysis in Japan Laboratry					Total	Explication
				ME & GEN	MM	AB/ SW	AB/ MA	FFT	Other	Reason of no used (quantity)	ME & GEN	MM	AB/ SW	AB/ MA	FFT	AA	A	B	C		ME & GE	MM	AB/ SW	AB/ MA	FFT		
112	Pipette 1000ul	To measure and pour reagents			2						3		1				6			6						0	The same as above
113	Pipette repeater	To measure and pour reagents															2			2						0	Not urgent.
114	Plastic sealer	To seal samples																1		1						0	Not urgent.
115	Peristaltic pump	To determinate quantity of reagents	New		2						3						3			3	3					3	Two for gel filtalation, another one for FPLC
116	Refrigerator standard	For preservation of reagents and samples	New		2						1						1			1	1					1	For basic equipment
117	Refrigerator two door	For preservation of reagents and samples	New		2								1	1			2			2			1	1		2	For basic equipment
118	Rotary evaporator	For extraction of ingredient from liquid sample	New					1 (1)		Superannuated introduced 1983			1	1		1	1			2			1	1		2	For extraction of pesticides
119	Saftey shower station	For emargent accident	New									1					1			1		1				1	For basic equipment
120	Scanning Electron Microscope	For observation of	New									1				1				1		1				1	See page 1-49
121	Shower	To clean up the body															1			1						0	Not urgent.
122	Spectrophotometer UV-VIS	For quantification of proteins or nucleic scids (DNA or RNA) in samples and ather applications	New/ Supply		1	1	1	2 (2)	(1)	Superannuated introduced 1975	1		1		1	3				3	1		1			2	For hormones quantitative analysis and algal qualitative analysis
123	Spectrophotometer flourescence	For analysis of enzyme which can not be measured by above Spectrophotometer	New												1	1				1					1	1	To improve bioavailability of feedstuffs through fermentation and enzyme technology
124	Stereo Microscope	For obsevation of microscopic matter	New/ Renewal			1 (1)	2 (1)			Reflective mirror and screw broken		2	1	1			4			4		2	1	1		4	For basic equipment
125	Support jack	For adjustment of level of equipmente											2						2	2						0	It is easy and effective for Seafdec/Aqd to provide this equipment for oneself.
126	TEM	For observation of virus	New									1				1				1		1				1	See page 1-49,50
127	Thermal cyler	For amplification of target DNA	Supply	1	1						1	1					2			2	1	1				2	With increasing of DNA expeliments, one more equipment should be provieded.
128	Themomixer	For PCR use	New									1					1			1		1				1	For basic equipment
129	Tool Kit	For maintenance of equipment										1					1			1						0	It is easy and effective for Seafdec/Aqd to provide this equipment for oneself.
130	Ultra Microtome	To make a ultra microtome	New									1				1				1		1				1	For TEM

2-3-3 (7) Equipment Plan

Item No.	Equipment name	Object	Clasification	Condition							Required quantity					Priority				Qty	Analysis in Japan Laboratry					Total	Explication
				ME & GEN	MM	AB/ SW	AB/ MA	FFT	Other	Reason of no used (quantity)	ME & GEN	MM	AB/ SW	AB/ MA	FFT	AA	A	B	C		ME & GE	MM	AB/ SW	AB/ MA	FFT		
131	Ultrafiltratin apparatus	For HPLC	New								1					1				1	1					1	For basic equipment
132	Ultrasonic Cleaner	To clean up equipment sensitively	New								1	1			1		3			3	1	1			1	3	For needed more sensitive expeliment, it is necessary to use this equipment
133	Ultrasonic disintegrator	To disintegrat sample by ultrasonic	Supply				1	1							1		1			1					1	1	For basic equipment
134	UPS	To protect the damage of equipment from the stoppage of electoric supply	New		2						1	1	3	2	1	9				9	1		1	1	1	-	Provide new one by construction work
135	UV Crosslinker	To fix DNA	New								1					1				1	1					1	For production of hormones
136	UV Sterilizer	To maintain an asepsis	Renewal				1	1 (1)		Superannuated introduced 1989					1			1		1					1	1	Renewal
137	UV Sterilizer	To disinfect rearing water	New									6				6				6		6				6	Provide new one by construction work
138	Vacuum pump	To transfer liquid	New									1	1				2			2		1	1			2	For basic equipment
139	Viscosity meter	To measure viscosity of algal	New										1					1		1			1			1	For basic equipment
140	Vortex Mixer	To mix liquid in small tube momentary	New		1						3		1	1	3		8		2	10	3		1	1	3	8	Desiable to supply every researcher,
141	Water bath	For extraction and determination of some compounds needs higer temperature	New/ Supply		1	1		1			3		1		1		5			5	3		1		1	5	For enzyme work
142	Water bath with shaker	For extraction and determination of some compounds needs several temperature conditiones	New		1										1		3			3					1	1	For enzyme work
143	Water Purification System	To make pure water for cell culture	New		1						1				1	1		1		2	1					1	For needed more sensitive expeliment, it is necessary to use this equipment
144	Working table	For experiments	Renewal										8	3	3		11	3		14	3		1		6	10	Renewal by construction work
145	MCID	To analyze illuminative pigment									1					1				1						0	Not urgent.
146	Time Resolve Flourescence Immuno Assay	To analyze illuminative pigment	New								1										1					1	To substitute equipment for RI.
147	Flow Cytometer	To isolate cell concerned immunity by its function	New								1										1					1	To substitute equipment for RI.

2-3-4 Basic Design

(1) Facility Plan

1) Renovation of the 2nd floor of Nutrition Research Building

The tables below show the removal works and renovation plan of the 2nd floor of Nutrition Research Building

Table 2-3-4 (1) Removal works at the 2nd floor of Nutrition Research Building

	No.1 Block		No.2 Block		No.3 Block	
	MM (partial enovation)	**FFT-1** (total renovation)	**AB** (total renovation)	**FFT-2** (total renovation)	**ME/GEN** (total renovation)	**Other** (partial renovation)
Finish						
Floor	———	Removal of plastic tile				———
Ceiling	———	Removal of wooden backing and wood wool cement board				———
Exp. Table Central Side	———	3 sets 24m	3 sets 12m	3 sets 16m	3 sets 20m	———
Air conditioning system						
Air Con.	———	Removal of disabled equipment				———
Ventilation	———	Removal of ventilating fan and duct on the ceiling				———
Water piping	———	Removal of all existing piping				———
Electric equipment						
Lighting apparatus	———	Removal of all existing lighting apparatus				———
Piping and wiring	———	Removal of wiring and piping concerning outlet, source of air-conditioning, emergency power source, fire alarm, telephone, interphone				———
Emergency power source	Removal of existing trunk line of emergency power source only	————				———

Table 2-3-4 (2) Renovation works at the 2nd floor of Nutrition Research Building

	No.1 Block		No.2 Block		No.3 Block	
	MM (partial renovation)	**FFT-1** (total renovation)	**AB** (total renovation)	**FFT-2** (total renovation)	**ME/GEN** (total renovation)	**Other** (partial renovation)
Finish work						
Flooring	———	Ceramic tile	Chemical-resistant vinyl sheet	Ceramic tile	Chemical-resistant vinyl sheet	———
Ceiling finish	———	Light iron backing, rock wool, sound-absorbing board				———
Wool finish	———	EP painting on the wall				———
Exp. Table Central Side	———	3sets 20m	1 set 14m	3sets 8m	3sets 20m	———
Air conditioning system						
Air conditioner	———	Change and new installation of hanging type air conditioner				———
Ventilation	———	Supply of OA, installation of ceiling fan (including duct)				———
Forced ventilation	———	Connection with the equipment which associates exhaust (including duct)				———
Water piping	Installation of freshwater main pipe only	Installation of fresh water piping and connection to the existing drainage piping for newly-installed experimental tables.				Same as MM lab.
Electric equipment						
Lighting apparatus	Installation of main wiring and connection to existing apparatus	Provision of 2 sets of 40 W apparatus with cover				Installation of main wiring of lighting apparatus
Piping and wiring	Outlet and source for air-conditioning,					
Fire alarm, telephone, interphone	Installation, piping and wiring					Branch wiring only
Emergency power source	Installation of generator for 2nd floor of Nutrition Research Building					
	Main wiring of emergency power source only	Securing exclusive line to experimental equipment from emergency power source				Same as MM labo

New trunk line of electricity to the 2nd floor of Nutrition Research Building will be connected to the existing branch box. New generator house(RC 80m^2) will be constructed attaching the existing generator house to installing 220kva generator and transformer.

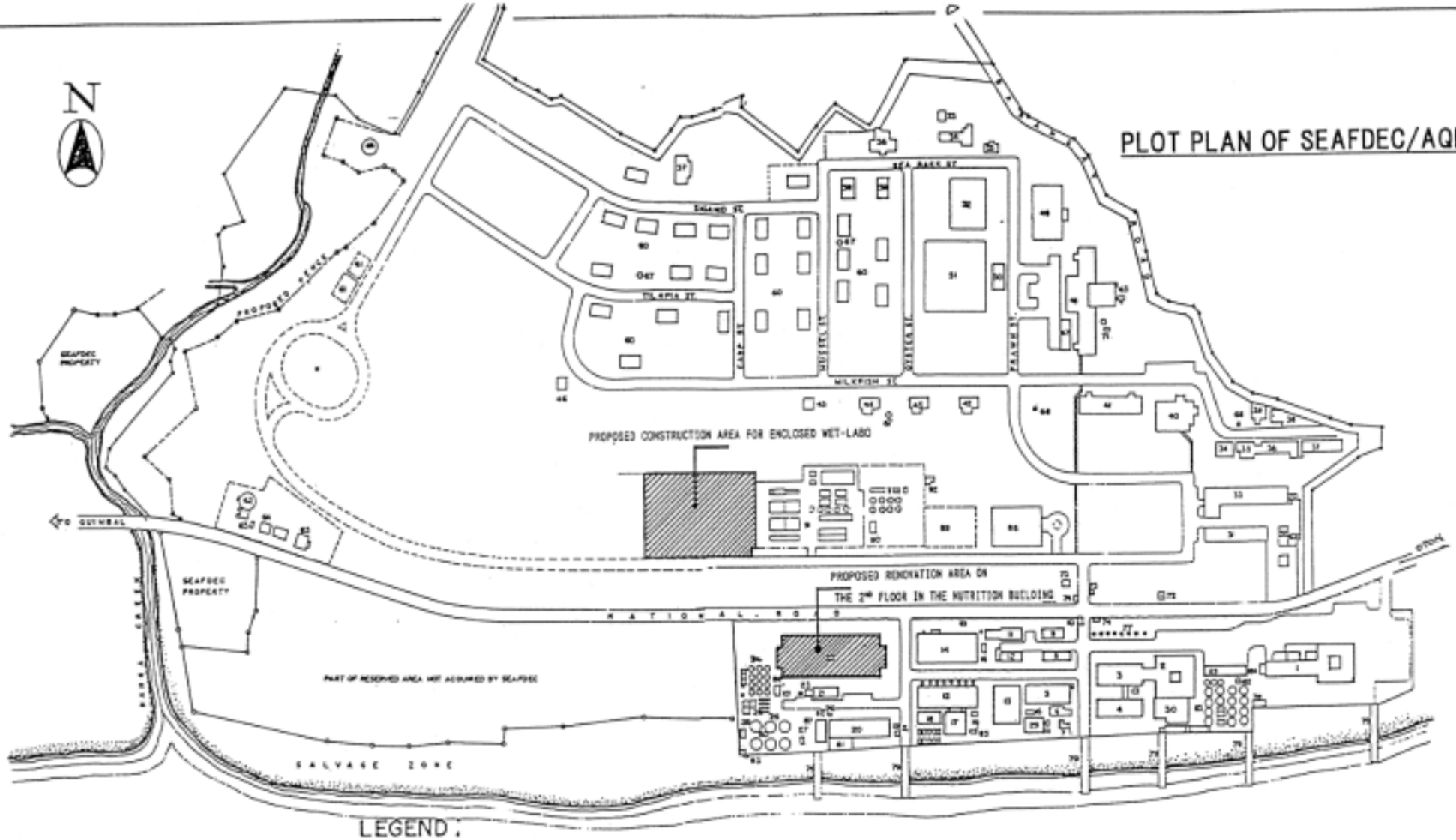
2) Design concept of the Enclosed Wet Laboratory

The design concept of the Enclosed Wet Laboratory is outlined as follows.

A. Seawater treatment facilities	Settling tank：RC structure 120 ton Rapid filter：20 ton/hr × 2 sets Reservoir tank：RC structure 400 ton with cover Pump/blower room：CB structure 21m^2 flat room Waste disposal tank：280 ton × 2 sets
B.Construction	
a) Infection House	RC structure 210m^2 flat house Roof : RC structure Water supply/drainage facility, electric equipment, easy filtering equipment, UV sterilising equipment for rearing water 1.6 ton/hr Waste water treatment 40 ton/day, Tanks, Piping, Air blower, Electric system, Air con.
b) Crustacean hatchery/nursery	RC structure 200m^2 flat house Roofing with FRP materials on galvanised steel truss Tanks, Piping, Air blower, Electric system Water recirculating system, ventilating equipment Seawater reservoir 5 ton×2 sets
c) Fish hatchery/nursery	RC structure 200m^2 flat house Roofing with FRP materials on galvanised steel truss Tanks, Piping, Air blower, Electric system Water recirculating system, ventilating equipment Seawater reservoir 5 ton× 1 set
d) Algal culture room	RC structure 200m^2 flat house Roofing with FRP materials on galvanised steel truss CB wall Tanks, Piping, Air blower, Electric system
e) Toilet/storage	RC structure 50m^2 flat house Freshwater supplying and draining, Electric system

Removal and Renovation Plans of the 2nd floor of Nutrition Research Building, Layout Plan of Enclosed Wet Laboratory, and Plans, Elevations, and Sections of Infection Room, Crustacean Hatchery/Nursery, Fish Hatchery/Nursery, Seaweeds Culture Room, and Toilet/Storage Room are shown on the following pages.

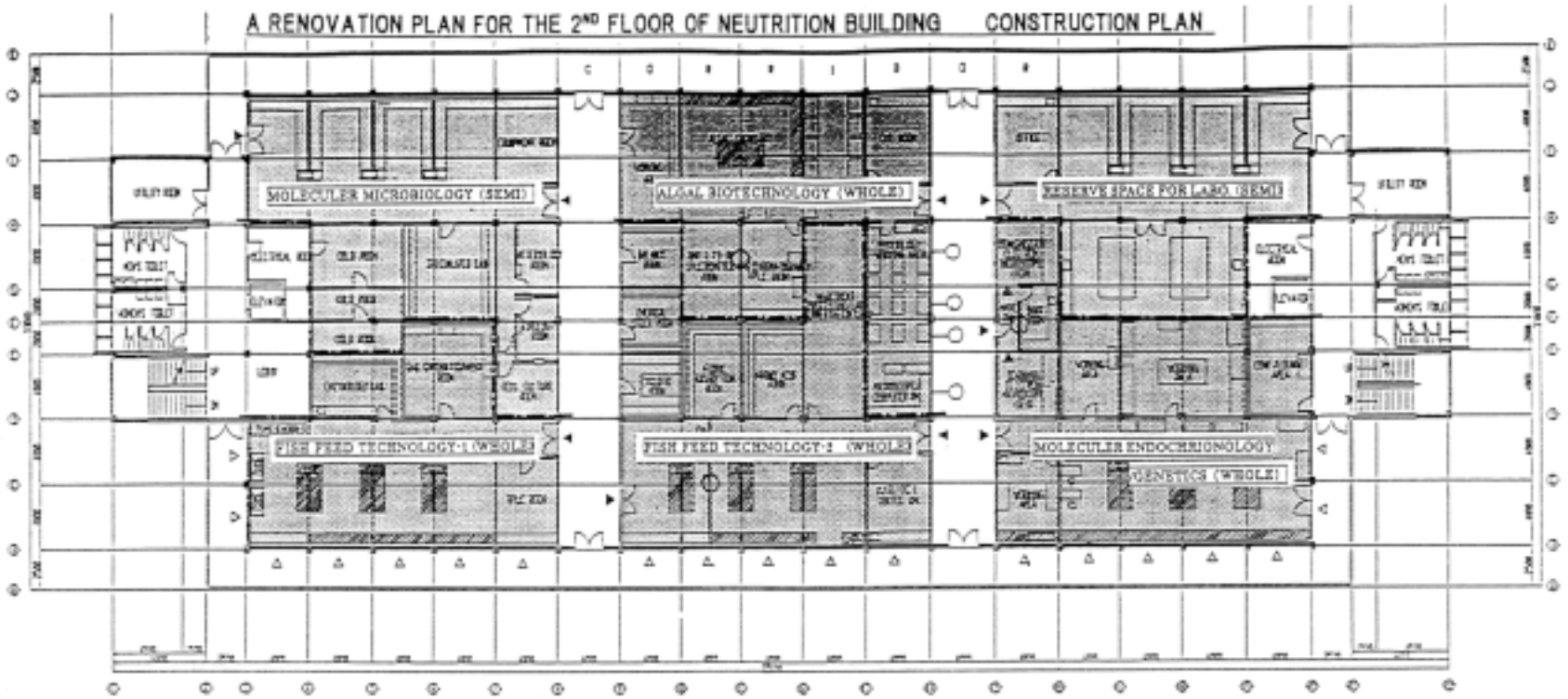
PLOT PLAN OF SEAFDEC/AQD



LEGEND :

1 ADMINISTRATION BUILDING
2 RESEARCH BUILDING
3 LABORATORY BLDG. I
4 LABORATORY BLDG. II
5 WET LABORATORY BLDG.
6 PUMP HOUSE
7 FILTER TANK
8 FIELD LAB. BLDG.
9 SCIENTIFIC SUPPLY HOUSE
10 MAIN GATE
11 PHYCOLOGY WET LAB.
12 FEED PREPARATION
13 NURSERY PONDS
14 BIG HATCHERY
15 OPEN HATCHERY BLDG.
16 ELEVATED SEAWATER TANK
17 ALGAL TANK
18 GENETIC LAB. BLDG.
19 ROOTS BLOWER HOUSE
20 WET LAB. EXTENSION
21 POWER HOUSE
22 NUTRITION BUILDING
23 INCINERATOR HOUSE 4.50 KVA
24 PRAWN HATCHERY
25 GROUND RESERVOIR
26 GRAETHEAN HATCHERY
27 ELEV. CONC. TANK
28 SETTLING BASIN
29 PRE-FILTER SEAWATER TANK
30 FINFISH HATCHERY
31 LIBRARY BUILDING
32 MEDICAL
33 TRAINING & EXTENSION
34 GARAGE EXTENSION
35 MECH. REF & AC REPAIR SHOP
36 MOTORPOOL
37 CARPENTRY SHOP
38 WARE HOUSE
39 ENGINEERING SECTION
40 CAFETERIA
41 DORMITORY
42 EXECUTIVE HOUSE
43 GUEST HOUSE-1
44 GUEST HOUSE-2
45 SINGLE DETACHED
46 SECURITY BARRACKS
47 SOCIAL HALL
48 APARTMENT BUILDING
49 CONC. TENNIS COURT
50 CLUB HOUSE
51 SHELL TENNIS COURT
52 BASKETBALL COURT
53 KFI SHOP BUILDING
54 KFI INTERMEDIATE SCHOOL BLDG.
55 KFI SCHOOL STAGE
56 KFI PRIMARY SCHOOL BLDG.
57 KFI KINDER SCHOOL BLDG.
58 GUEST HOUSE 3
59 GUEST HOUSE 4
60 STAFF HOUSES
61 SANITARY LAND FILL
62 SURGE TANK
63 TRANSFORMER BARRING
64 MARINE PUMP HOUSE
65 CLEAR WELL
66 ELEVATED STEEL TANK
67 FILTER TANK
68 3 PET. DISCONNECTING SWITCH
69 CAR SHED
70 INCINERATOR HOUSE 220 KVA
71 PUMP & FRESHWATER FILTER HOUSE
72 FEEDER STATION
73 SECURITY GUARD HOUSE
74 WAITING SHED
75 GUARD HOUSE
76 ELEV. SEAWATER TANK
77 FLAG POLE
78 CONC. ELEV. WATER TANK
79 JETTY
80 6-UNIT H & CONC. TANK
81 WELL/DEC HARDWARE
82 STOCK ROOM
83 ALGAL TANK
84 STACK BAR
85 PRE-FILTERED SEAWATER SUPPLY
86 ALGAL HOUSE
87 SEAWEEDS HATCHERY
88 MUSEUM BUILDING
89 PLANT NURSERY
90 FVE OFFICE

A RENOVATION PLAN FOR THE 2ND FLOOR OF NEUTRITION BUILDING CONSTRUCTION PLAN



WHOLE RENOVATION AREA

SEMI RENOVATION AREA

DOORS & WINDOWS

△ RE-PLACE TO ALMINUM WINDOWS AND DOORES AFTER THE DEMORISH OF EXISTING ONE

▲ SHOWS NEW ALMINUM DOOR

PARTITION WALL

SHOWS NEW PARTITION WALL W/CONCRETE BLOC

CLOSE A EXISTING OPENING W/CONCRETE BLOCK

INSTALLATION OF NEW LABO. TABLE

		BLOCK-1		BLOCK-1		BLOCK-1	
		MOLECULAR MICRO BIOLOGY (SEMI)	FISH FEED TECHNOLOGY-1 (WHOLE)	ALGAL BIOTECHNOLOGY (WHOLE)	FISH FEED TECHNOLOGY-2 (WHOLE)	RESERVE SPACE (SEMI)	MOLECULER ENDOCRINIONOLOGY (WHOLE)
FINISHING	FLOOR	———	CERAMIC TILE	MATHEMICAL VINYL SHEET	CERAMIC TILE	———	MATHEMICAL VINYL SHEET
	CEILING	———	LUMBER WOOD, BOARD W. LSS	LUMBER WOOD, BOARD W. LSS	LUMBER WOOD, BOARD W. LSS	———	LUMBER WOOD, BOARD W. LSS
	PAINT ON WALL		E.P PAINT ON WALL	E.P PAINT ON WALL	E.P PAINT ON WALL		E.P PAINT ON WALL
	INSTALLATION OF LABO.TABLE	———	INSTALLATION OF ISLAND TABLE & 20M OF SEMI LABO. TABLE	INSTALLATION OF ISLAND TABLE & 11M OF LABO. TABLE	INSTALLATION OF ISLAND TABLE & 14M OF LABO. TABLE	———	INSTALLATION OF ISLAND TABLE & 20M OF LAB. TABLE
A/C WASHHART	INSTALLATION OF LABO.TABLE	———	INSTALLATION OF A/C WALL MOUNTED TYPE & DEFUMIDIFIRE	INSTALLATION OF A/C WALL MOUNTED TYPE & DEFUMIDIFIRE	INSTALLATION OF A/C WALL MOUNTED TYPE & DEFUMIDIFIRE	———	INSTALLATION OF A/C WALL MOUNTED TYPE & DEFUMIDIFIRE
	AIR SUPPLY	———	SUPPLY OF D/A, INCLUDING FAN & DUCT	SUPPLY OF D/A, INCLUDING FAN & DUCT	SUPPLY OF D/A, INCLUDING FAN & DUCT	———	SUPPLY OF D/A, INCLUDING FAN & DUCT
	EXHAUST	———	INSTALLATION OF EXHAUSTING FAN, CONNECTION WITH EXPERIMENTAL EQUIPMENT	INSTALLATION OF EXHAUSTING FAN, CONNECTION WITH EXPERIMENTAL EQUIPMENT	INSTALLATION OF EXHAUSTING FAN, CONNECTION WITH EXPERIMENTAL EQUIPMENT	———	INSTALLATION OF EXHAUSTING FAN, CONNECTION WITH EXPERIMENTAL EQUIPMENT
	WATER SUPPLY/ DRAIN	MAIN LINE OF FRESH WATER (WITHOUT CONNECTION TO EXISTING TAP)	MAIN LINE OF FRESH WATER/DRAIN WITH CONNECTION	MAIN LINE OF FRESH WATER/DRAIN WITH CONNECTION	MAIN LINE OF FRESH WATER/DRAIN WITH CONNECTION	MAIN LINE ONLY	MAIN LINE OF FRESH WATER/DRAIN WITH CONNECTION
ELECTRIC EQUIPMENT	LIGHTING FIXTURE	INSTALLATION OF MAIN LINE, CONNECT WITH EXISTING LIGHTING FIXTURE	NEW 4 S. FLOURESENT LIGHTING FIXTURE W/COVER	NEW 4 S. FLOURESENT LIGHTING FIXTURE W/COVER	NEW 4 S. FLOURESENT LIGHTING FIXTURE W/COVER	———	NEW 4 S. FLOURESENT LIGHTING FIXTURE W/COVER
	WIRING (PIPING)	WIRING FOR LIGHTING, OUTLET, A/C FIRE ALARM/PHONE/WATER PHONE	WIRING FOR LIGHTING, OUTLET, A/C FIRE ALARM/PHONE/WATER PHONE	WIRING FOR LIGHTING, OUTLET, A/C FIRE ALARM/PHONE/WATER PHONE	WIRING FOR LIGHTING, OUTLET, A/C FIRE ALARM/PHONE/WATER PHONE	MAIN LINE ONLY MAIN LINE ONLY	WIRING FOR LIGHTING, OUTLET, A/C FIRE ALARM/PHONE /WATER PHONE
	POWER SUPPLY OF EMERGENCY	INSTALLATION OF NEW POWER LINE, GENERATOR W/HOUSE, UPS	INSTALLATION OF NEW POWER LINE GENERATOR W/HOUSE, UPS	INSTALLATION OF NEW POWER LINE & GENERATOR W/HOUSE, UPS	INSTALLATION OF NEW POWER LINE & GENERATOR W/HOUSE, UPS	INSTALLATION OF NEW POWER LINE & GENERATOR W/HOUSE, UPS	INSTALLATION OF NEW POWER LINE & GENERATOR W/HOUSE, UPS

CRC OVERSEAS COOPERATION Inc.

DESIGN:

DRAWN:

APPROVED:

PROJECT TITLE: THE PROJECT FOR ESTABLISHMENT OF LABORATORY FACILITIES FOR ADVANCED AGRICULTURE TECHNOLOGIES IN THE REPUBLIC OF THE PHILIPPINES

OWNER:

SCHEMATIC DESIGN:

APPLICATION DOCUMENT:

CONSTRUCTION DOCUMENT:

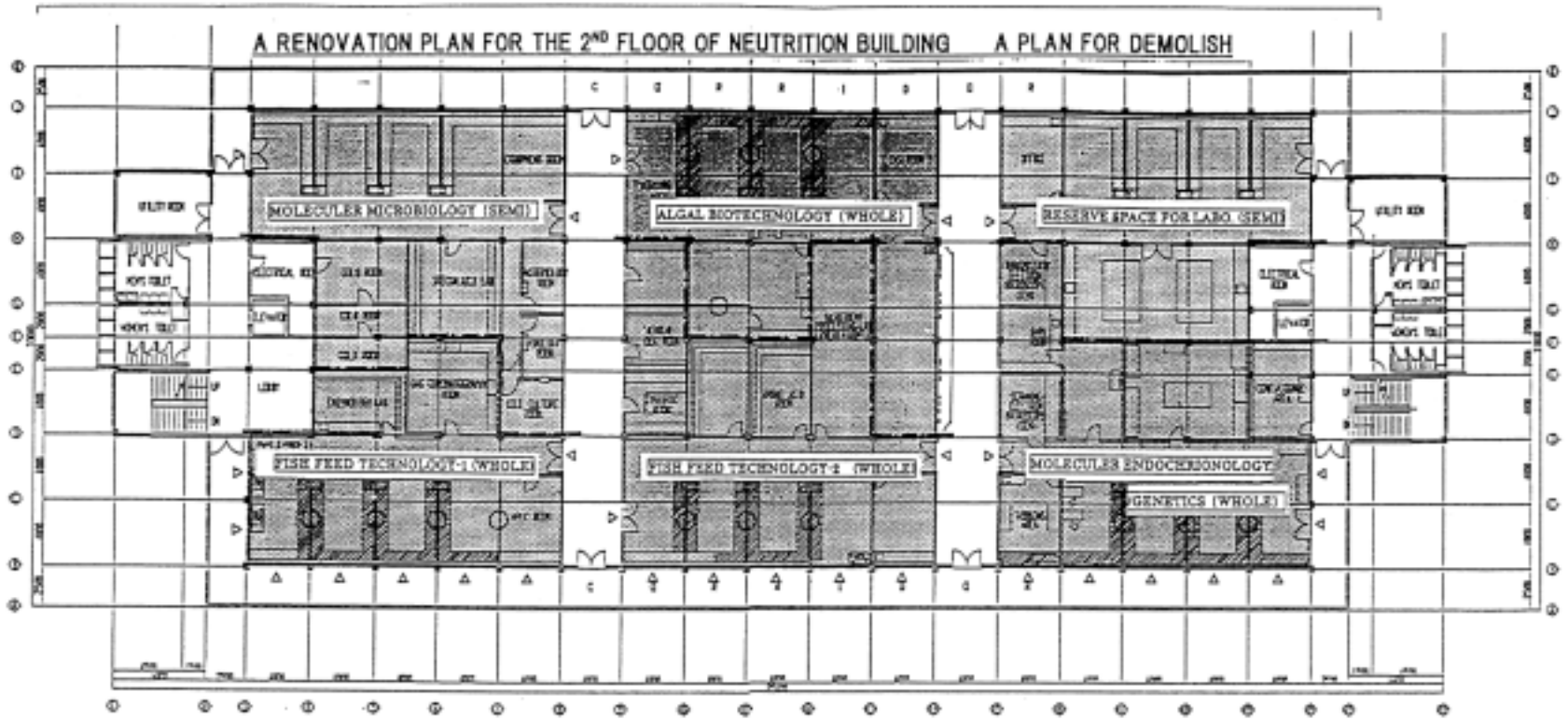
SHEET CONTENTS: A RENOVATION PLAN FOR 2ND FLOOR OF NUTRITION BLDG [A CONSTRUCTION PLAN]

JOB NO.

DWG. NO. 2

SCALE

A RENOVATION PLAN FOR THE 2ND FLOOR OF NEUTRITION BUILDING　A PLAN FOR DEMOLISH



SEMI RENOVATION AREA

WHOLE RENOVATION AREA

REPLACE EXISTING PARTITION WALL

REPLACE EXISTING STEEL SASHES

REPLACE EXISTING WOODEN WINDOWS

REPLACE EXISTING LABO. TABLES

		BLOCK-1		BLOCK-2		BLOCK-3	
		MOLECULAR MICRO BIOLOGY (SEMI)	FISH FEED TECHNOLOGY-1 (WHOLE)	ALGAL BIOTECHNOLOGY (WHOLE)	FISH FEED TECHNOLOGY-2 (WHOLE)	RESERVE SPACE (SEMI)	MOLECULER ENDOCRIONOLOGY (WHOLE)
FINISHING	FLOOR	———	DEMOLISH OF PLASTIC TILE	DEMOLISH OF PLASTIC TILE	DEMOLISH OF PLASTIC TILE	———	DEMOLISH OF PLASTIC TILE
	CEILING	———	DEMOLISH OF EXISTING CEILING MATERIAL W/FOUNDATION	DEMOLISH OF EXISTING CEILING MATERIAL W/FOUNDATION	DEMOLISH OF EXISTING CEILING MATERIAL W/FOUNDATION	———	DEMOLISH OF EXISTING CEILING MATERIAL W/FOUNDATION
	DEMORISH OF LABO.TABLE	———	DEMOLISH OF 3 CENTER LABO TABLE AND 2EA OF SIDE TABLE	KLISH OF 3 CENTER LABO TABLE AND OF SIDE TABLE	KLISH OF 3 CENTER LABO TABLE AND OF SIDE TABLE	———	DEMOLISH OF 3 CENTER LABO TABLE AND 2EA OF SIDE TABLE
A/C MACHINARY	EXISTING A/C	———	REPLACEMENT OF TROUBLED A/C	REPLACEMENT OF TROUBLED A/C	REPLACEMENT OF TROUBLED A/C	———	REPLACEMENT OF TROUBLED A/C
	FAN AND AIR DUCT	———	DEMOLISH OF EXISTING FAN AND DUCT	DEMOLISH OF EXISTING FAN AND DUCT	DEMOLISH OF EXISTING FAN AND DUCT	———	DEMOLISH OF EXISTING FAN AND DUCT
	SUPPLY & WASTE WATER PIPE	———	DEMOLISH OF WATER AIR, GAS, ,SEA WATER PIPE LINE	DEMOLISH OF WATER AIR, GAS, ,SEA WATER PIPE LINE	DEMOLISH OF WATER AIR, GAS, ,SEA WATER PIPE LINE	———	DEMOLISH OF WATER AIR, GAS, ,SEA WATER PIPE LINE
ELECTRIC EQUIPMENT	LIGHTING FIXTURE	———	REPLACEMENT OF EXISTING LIGHTING FIXTURE	REPLACEMENT OF EXISTING LIGHTING FIXTURE	REPLACEMENT OF EXISTING LIGHTING FIXTURE	———	REPLACEMENT OF EXISTING LIGHTING FIXTURE
	WIRING	———	DEMOLISH OF WHOLE KIND OF ELECTRIC WIRING	DEMORISH OF WHOLE KIND OF ELECTRIC WIRING	DEMOLISH OF WHOLE KIND OF ELECTRIC WIRING	———	DEMOLISH OF WHOLE KIND OF ELECTRIC WIRING
	POWER SUPLY OF EMARGENCY	DEMOLISH OF EXISTING WIRING FOR EMARGENCY LINE	———	———	———	———	———

CRC OVERSEAS COOPERATION Inc.

DESIGN:

DRAWN:

APPROVED:

PROJECT TITLE: THE PROJECT FOR ESTABLISHMENT OF LABORATORY FACILITIES FOR ADVANCED AGRICULTURE TECHNOLOGIES IN THE REPUBLIC OF THE PHILIPPINES

LOCATION:

OWNER:

APPROVED BY:

SCHEMATIC DESIGN:

APPLICATION DOCUMENT:

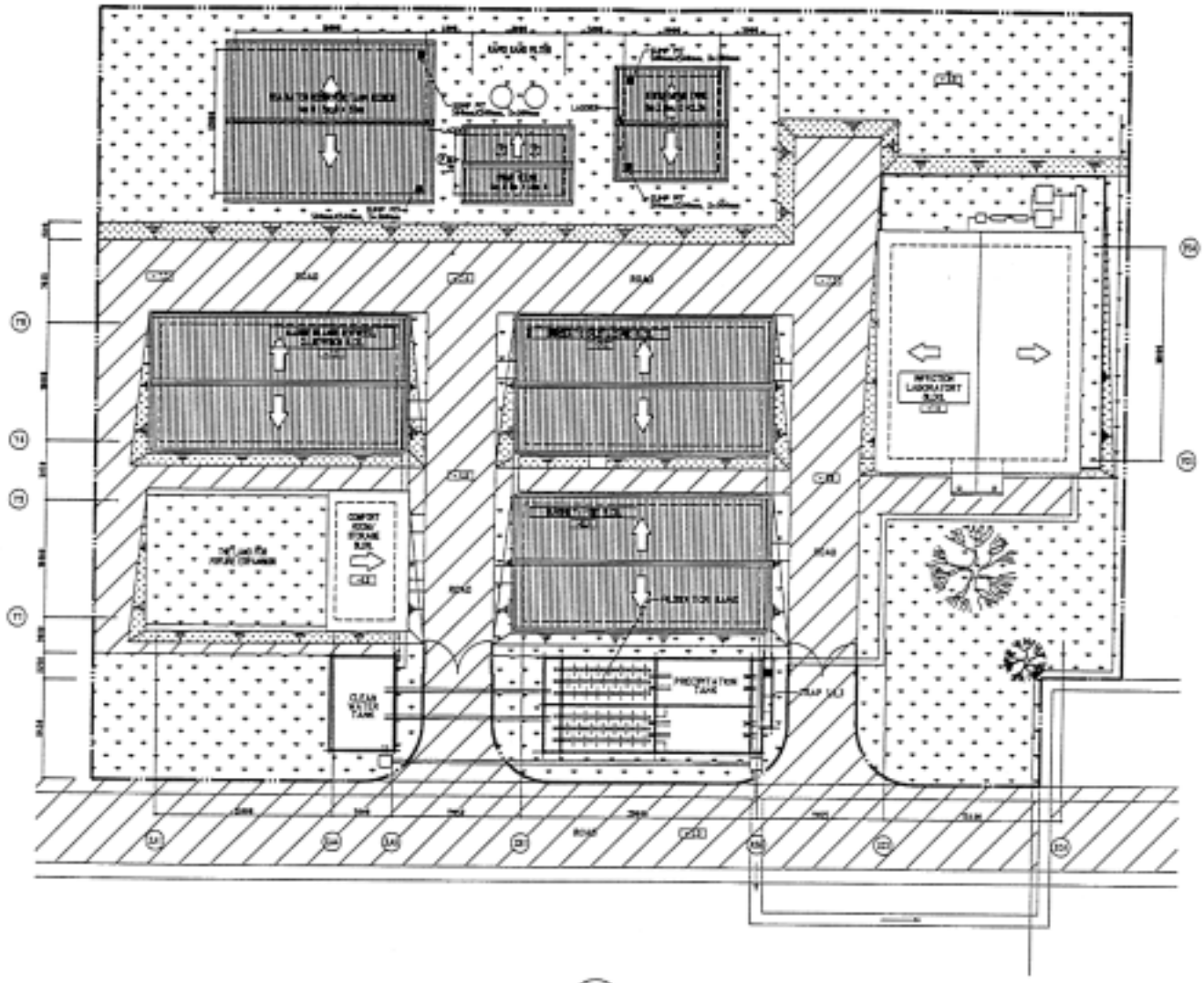
CONSTRUCTION DOCUMENT:

SHEET CONTENTS: A RENOVATION PLAN FOR 2ND FLOOR OF NUTRITION BLDG [& PLAN FOR DEMOLISH]

JOB NO.

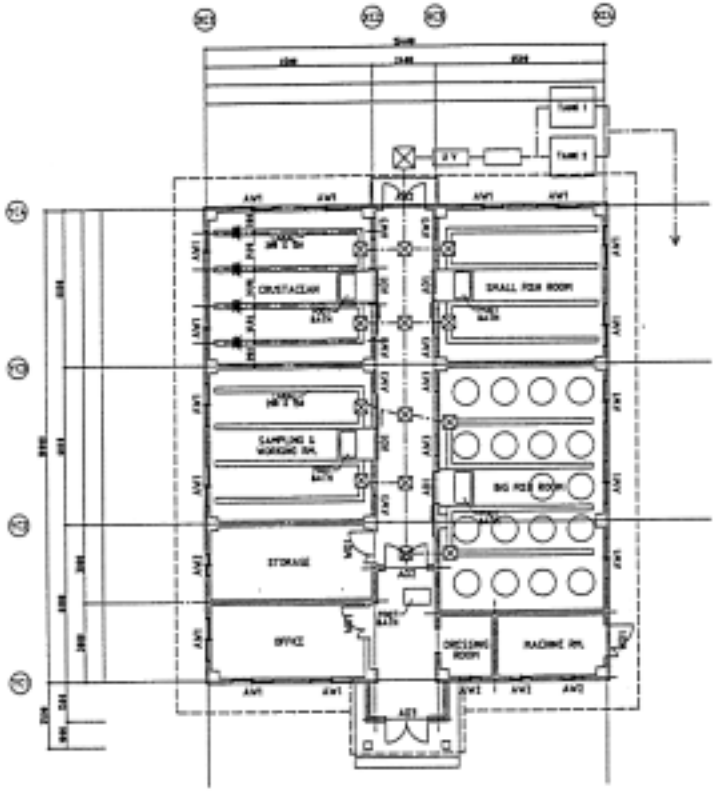
DWG. NO. 3

SCALE 2-60

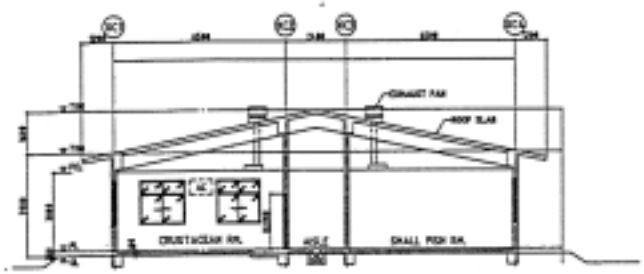


1 SITE ROOF PLAN

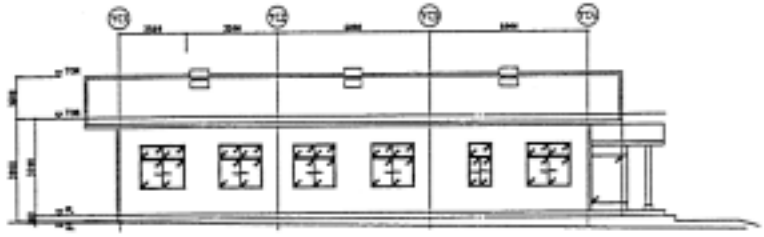
CRC OVERSEAS COOPERATION Inc.	DESIGN	DRAWN	PROJECT TITLE: SEAFDEC	OWNER:	SCHEMATIC DESIGN	SHEET CONTENTS: SITE ROOF PLAN	JOB NO.
	CHKD.	APPROVED	LOCATION: ILOILO		APPLICATION DOCUMENT		DWG. NO. A - 01
	DATE				CONSTRUCTION DOCUMENT		SCALE 1 : 200



1 FLOOR PLAN



2 CROSS SECTION



2 LEFT-SIDE ELEVATION

CRC OVERSEAS COOPERATION Inc.	DESIGN:	DRAWN:	PROJECT TITLE: SEAFDEC	OWNER: -	SCHEMATIC DESIGN:	SHEET CONTENTS: INFECTION LABORATORY BUILDING FLOOR PLAN, ELEVATION &SECTION	JOB NO.	
	PROF.: / REG. NO.: / TEL: / FAX NO.: / DATE: / PLACE:	APPROVED:	LOCATION: BOHOL		APPLICATION DOCUMENT:		DWG. NO.	A - 02 5
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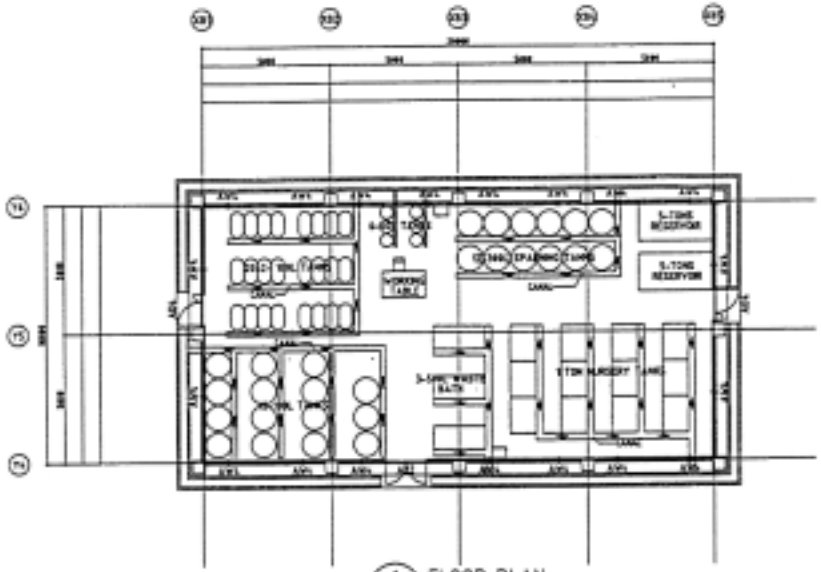
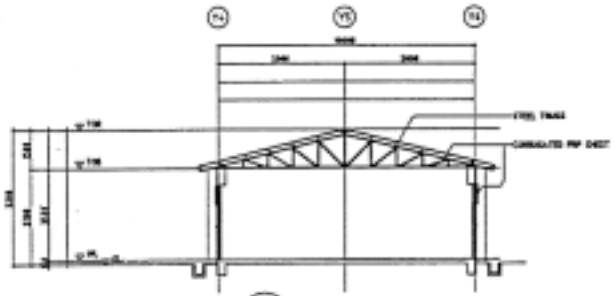
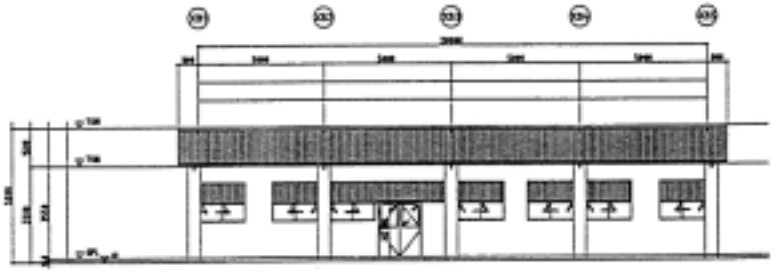


1 FLOOR PLAN

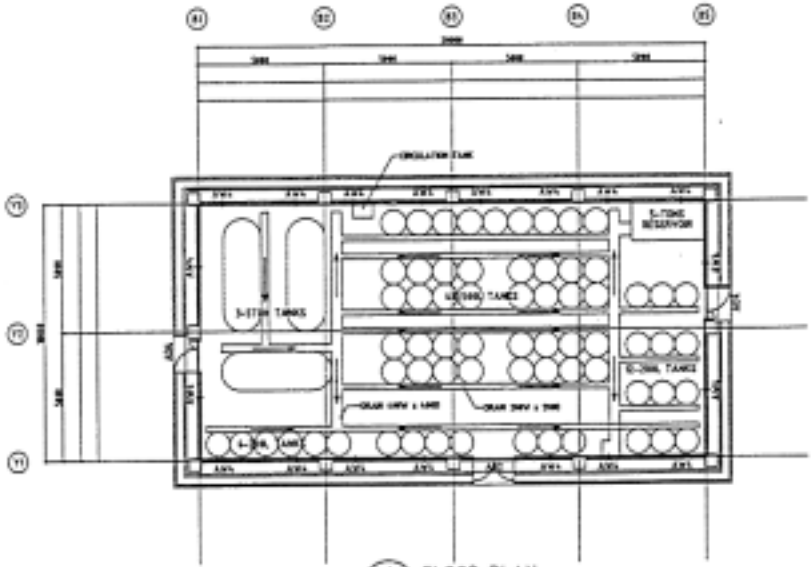


3 CROSS SECTION



2 SOUTH SIDE ELEVATION

CRC OVERSEAS COOPERATION Inc.	DESIGN:		DRAWN:	PROJECT TITLE: SEAFDEC	OWNER: -	SCHEMATIC DESIGN:	SHEET CONTENTS: NURSERY (CRUSTACEAN) BUILDING FLOOR PLAN, ELEVATION & SECTION	JOB NO.	
	PROJ.	SYS. NO.				APPLICATION DOCUMENT:		DWG. NO.	A - 53 6
	DES. NO.	DATE:	APPROVED:	LOCATION: ILOILO		CONSTRUCTION DOCUMENT:		SCALE	1 : 100 2-63
	CH.	PLOTS:							



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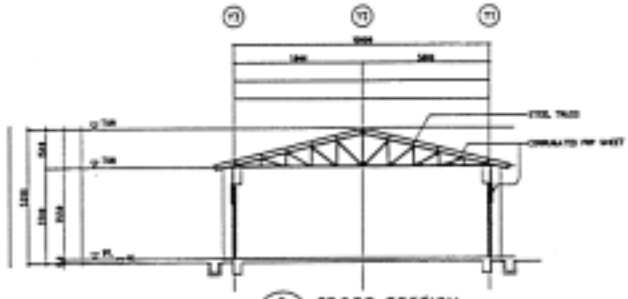

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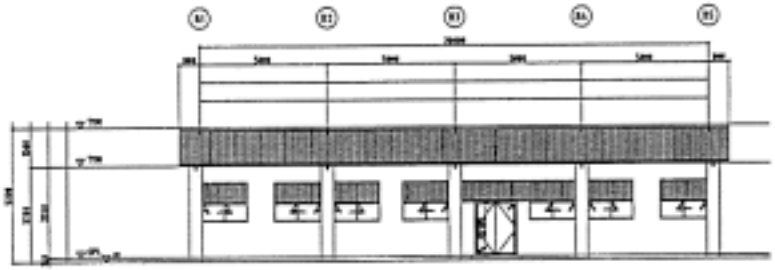

2 SOUTH SIDE ELEVATION

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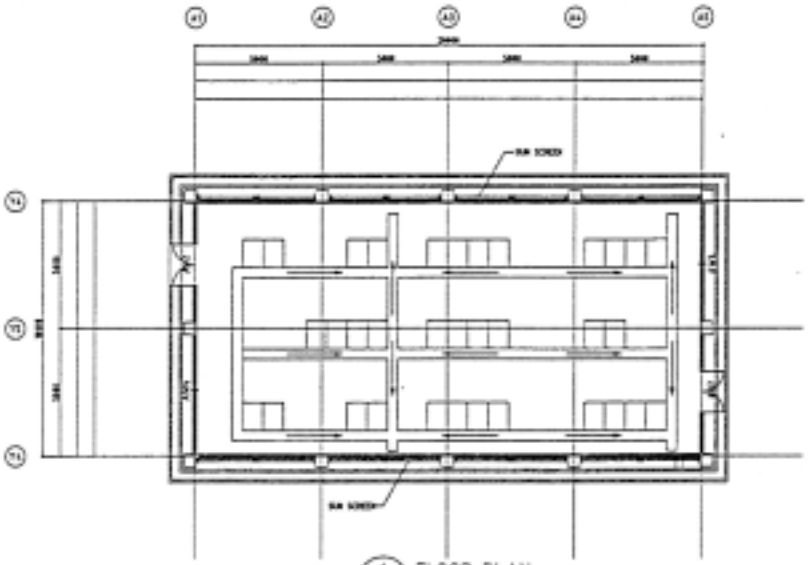

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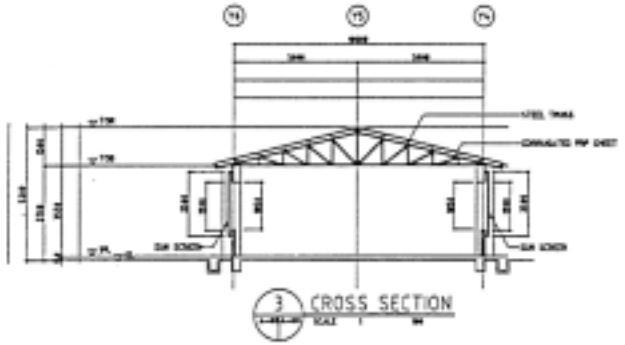

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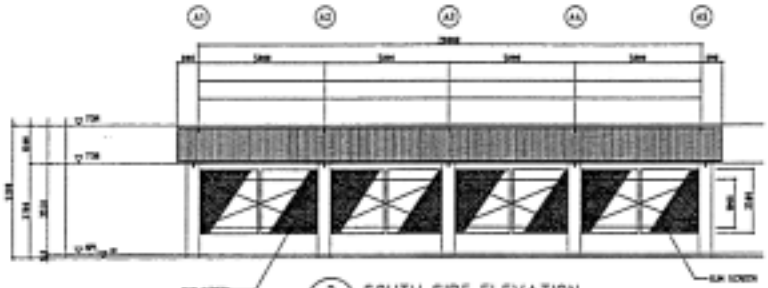

2 SOUTH SIDE ELEVATION

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	CHKD: / REG. NO.: / CAD: / PTR NO.: / DATE: / PLACE:	APPROVED:	LOCATION: BANUA		APPLICATION DOCUMENT:		DWG. NO.: A – 03
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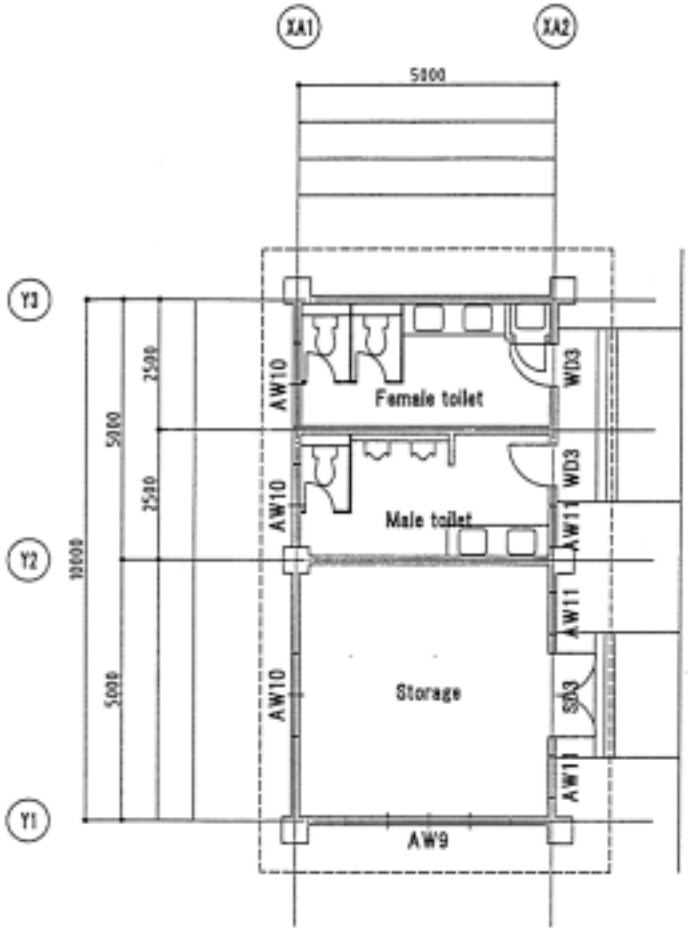
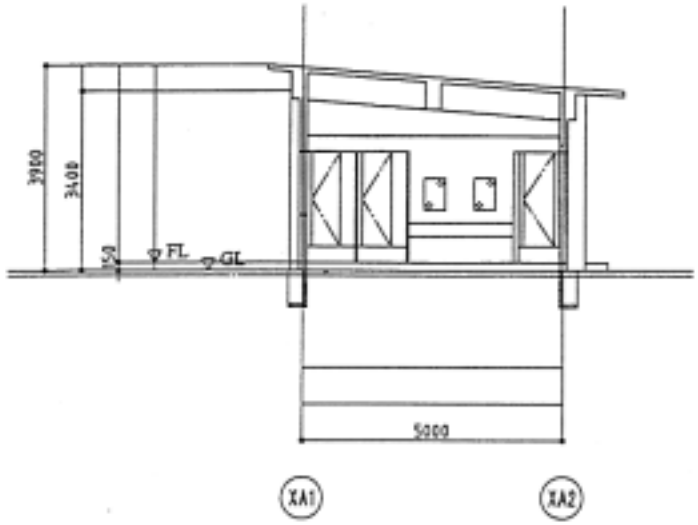
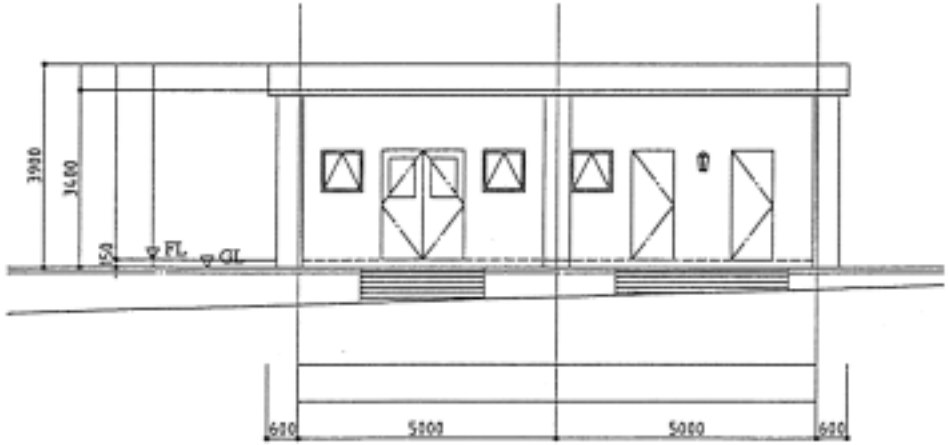


FLOOR PLAN
SCALE 1/100



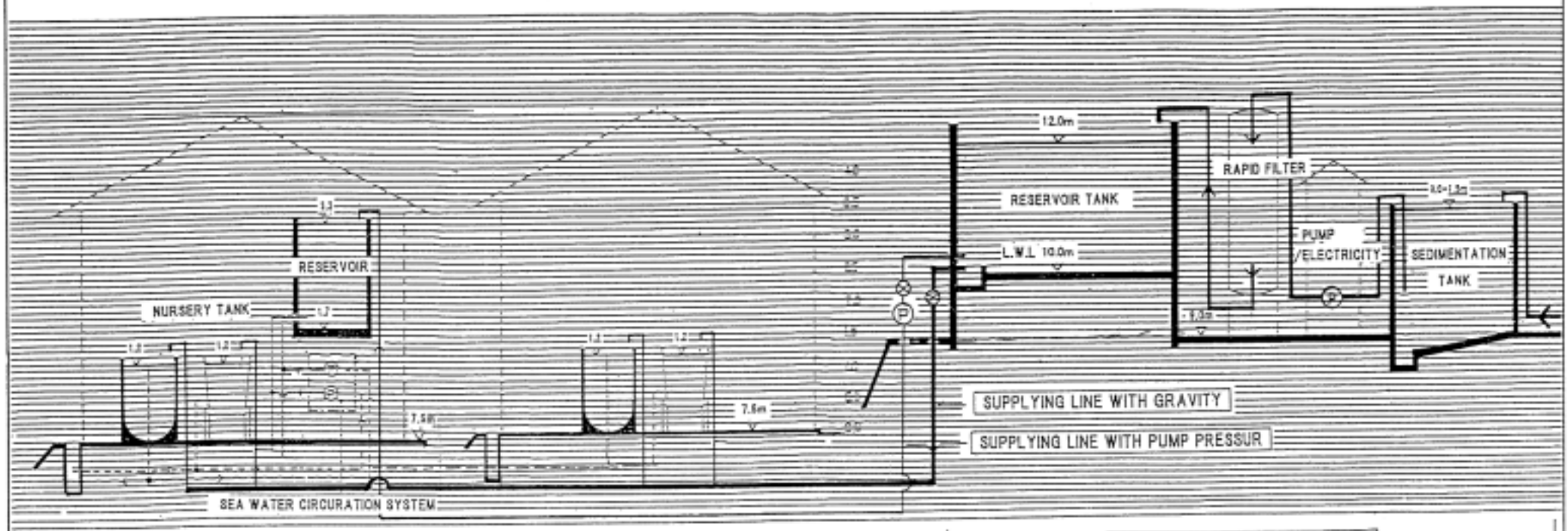
CROSS SECTION
SCALE 1/100



FRONT ELEVATION
SCALE 1/100

CRC OVERSEAS COOPERATION Inc.	DESIGN	DRAWN	PROJECT TITLE: SEATOEC	OWNER:	SCHEMATIC DESIGN	SHEET CONTENTS: COMFORT ROOM/ STORAGE	JOB NO.
	CHECKED	APPROVED	LOCATION: SUBIC		APPLICATION DOCUMENT		DWG. NO. A - 04
					CONSTRUCTION DOCUMENT		SCALE 1 : 50

A DIAGRAM OF SEA WATER SUPPLYING SYSTEM



NURSERY/CRUSTACEAN BLDG. 7.5m

NURSERY/FIN-FISH BLDG. 6.8m

INFECTION ROOM BLDG. 種 7.6m

NURSERY/SEA WEED BLDG. 7.5m

CRC OVERSEAS COOPERATION Inc.	DESIGN:	DRAWN:	PROJECT TITLE: SEAFDEC	OWNER: -	SCHEMATIC DESIGN:	SHEET CONTENTS: SEAWATER SUPPLYING SYSTEM	JOB NO.
	DWN'D: PTR. NO.	APPROVED:	LOCATION: BAKO		APPLICATION DOCUMENT:		DWG. NO. A-15 10
	REG. NO: DATE:				CONSTRUCTION DOCUMENT:		SCALE: NTS
	CHK: PLACE:						

(2) Equipment Plan

The specifications of equipments are following.

Item No.	Equipment Name	Specification
1	Animal cages	Material: Stainless steel Number of cages: 10 pcs. for rat and 10 pcs. for rabbit Rack: For accommodating cages; with automatic washing device by timer, Size of cage : 250×380×180mm approx. (rat), 350×500×400mm approx. (rabbit)
2	Aspirator Pump	Water circulation type by aspirating pump Air displacement: 16 liter/min. approx. Capacity of bath: 10 liter approx.
3	Autoclave	Inner dimension : 300dia. X 670depth mm approx., Temperature: 120℃ max., microcomputer controlled, function of dry/self-diagnostic to be equipped., supplied with wired rack
4	Balance Analytical	Top loading electronic balance Capacity:310gm, readability: 0.1mg
5	Balance Field	Top loading type spring scale. Weighing range: 3 to 5kg. Readability: 10gm
6	Balance Toploading 3kg	Top loading electronic balance. Capacity: 3,000gm approx. Readability : 100mg
7	Balance, Microbalance	Micro balance. Capacity: 20gm approx. Readability : 1 micro gm
8	Biorotator	Rotating speed: 0.5 to 5rpm approx. Inclination range: 0 to 90° Timer to be equipped. Holder: for test tubes and erlenmeyer flasks
9	Block Heater	Temp. range: 100℃ max., With temp. controller. Complete with assorted heating blocks
10	Centrifuge (Micro Refrigerated)	Max. speed: 12,000 to 15,000rpm approx. Max. centrifugal force: 13,000 to 20,000xg approx. Applicable tubes: 1.5ml × 16. With timer
11	Centrifuge (Refrigerated)	Max. speed : 22,000rpm approx. Max. centrifugal force : 40,000xg approx. Analog or digital control panel. Rotor: for 10ml, 50ml and 100ml
12	Chemiluminescent apparatus	Lumi-counter. Sample vial : 2ml approx. Digital display
13	Chromatography refrigerated	Operating temperature : 4℃ approx. Capacity : 1,000 liter approx.
14	Clean Bench (Biological Safety)	Dimension: W1,200×D500×H2,000mm approx. Class IIA type. With sterilizing lamp and fluorescent lamp

Item No.	Equipment Name	Specification
15	CO_2 Incubator	Capacity: 80 liter approx. Heating method: Air-jacket or water-jacket type Temp. control : PID control CO_2 control : On-Off (0 to 20% vol approx.)
16	Cold Cabinet	For low temp. storage of sample and chemicals. Temp. : 4℃ approx. Capacity : 400 to 500 liter
17	Concentrator, Vacufuge	Vacuum centrifugal evaporator. Application : concentration of DNA/RNA/Nucleic Acid, etc. Temperature : adjustable Speed : 1,400rpm approx. With angle rotor
18	Cooling blocks	Cooling material : Pertier element Temp. : 4℃ approx. Applicable tube : 0.5ml
19	Desiccators Cabinet	Material : Clear acrylic resin Inner dimension : 300×300×500mm approx. Shelf : 3 pcs.
20	Desiccators, Electronic	Inner dimension : 600×720×1,570mm Ultimate RH: 25% lowest. Automatic recycling of silica gel. Equipped with hygrometer.
21	Distilling Apparatus	Double distillation. Capacity : 4 liter/hr approx. Trap for preventing contamination
22	DNA/RNA Sequencer	DNA sequencer for 96 well micro-plate. Complete with analysis software (windows). Control on PC screen
23	Dot plot system	Bio-dot microfiltration device. Applicable for 96 well micro-plate.
24	Drum dryer	Used to drying for feed raw material, Dry room dimension: 600W×500D×500Hmm, Power input: 3.0KVA, usable temp. range: room temp.+10℃～200℃
25	Dry ice maker	Economical type Dry Ice Making Equipment. Producing capacity : 6 to 10 cubes/min. Gas: Liquid CO_2
26	Dryer, Freeze dryer	Trap temperature: -70℃ approx. Capacity: 4 liter/batch. Air-cooled condenser. Number of port: 8. Manifold for flasks. Dray chamber for petri dish and vials to be provided.
27	Electrophoresis for DNA	Multi sample submarine horizontal electrophoresis apparatus. Number of sample : 96 max. Size of tray : 25×15cm approx. Complete with power supply
28	Electrophoresis for SDS-Page	Vertical type protein electrophoresis apparatus. Gel size : 80×70mm approx. Required time for SDS-Page : 50 min. approx. Complete with power supply

Item No.	Equipment Name	Specification
29	ELISA plate reader	Wavelength range: 340 to 655nm Applicable plate : Flat bottom U-bottom and V-bottom microplate
30	Feed extruder or extrusion machine	Feed production extruder. Capacity: 20kg/hr approx. Pellet size : 3 to 8mm. Assortment of dice or grinder. Type: Twin screw extruder Power output : approx. 20KW Overall dimension :1,700L×660W×1,600Hmm
31	Fermentation equipment	For microbiology. Water-jacket type. Chamber size : 2 to 5 liter approx. Complete with control equipment and sensors.
32	FPLC system	Protein purification low temperature liquid chromatograph. Pump : 40ml/min. approx. Adjustable in 0.01ml/min. increment. Monitor: UV monitor. Applicable for various columns. Complete with valves for gradient mixer/buffers.
33	Freezer, -150℃	Temp.: -150℃ Capacity : 120 liter approx. Upright or horizontal type.
34	Freezer, -40℃	Temp.: -40℃ Capacity : 400 liter approx. Upright type.
35	Freezer, -85℃	Temp.: -85℃. Capacity : 300 liter approx. Upright or horizontal type.
36	FT Infrared Spectrometer	Wavelength range: 7,800 to 350/cm approx. Single beam. Complete with analysis softwares
37	Fume Hood	Bypass type. Dimension: 1,500×750×2,000mm approx. Complete with lamp, gas, faucet, drain and receptables.
38	Gas Chromatograph	Detector : ECD. Gas flow control. Computer control of operation. Complete with data processing and control softwares/PC.
39	Gel drying system	Applicable gel size : 150×150mm approx. Temp.: 90℃ max. With timer
40	Gel transfer system	For protein and nucleic acid blotting. Protein blotting: Tank type trans-blotting apparatus. Applicable ges size: full to mini size. Capacity: 2 to 3 gels. Nucleic acid blotting: Vacuum blotting. Applicable gel size: 20×25cm approx.
41	Gel transfer system (mini-transbolt)	Protein blotting apparatus. Mini type. Applicable gel size : 7.5×10cm approx. Capacity: 2 gels or more. Cooling device to be included.
42	Homogenizer	Speed: 8,000 to 24,000rpm approx. Shaft: 10mm dia. approx. Complete with stand, clamp and bosshead.
43	Hot Plate/Stirrer	With heating programme. Plate size: 150×150mm approx.
44	HPLC	Detector: Fluorescent and/or UV detector Computer controlled operation. For analysis of protein, vitamin and enzyme.

Item No.	Equipment Name	Specification
44.1	Fraction collector	Fraction method: Time and volume. Setting range: 1 to 999
44.2	Gel filtration (macro)	Gel filtration standard for HPLC. Molecular size : 1,300 approx.
44.3	Gel filtration (ultra)	Gel filtration standard for HPLC. Molecular size: 600,000 approx.
44.4	Gel filtration columns	Column for above gel filter
44.5	Ultrafiltoration apparatus	Disc filter for pre-treatment of HPLC sample. Autoclavable. Size: 25mm approx. (bore size 0.45 micro and 5 micron), Each pack of 50 or more
45	Hybridization Oven	Temp. range: ambient to 80℃ Shaking speed : 60rpm approx. variable. Digital display. Shaking platform : 230×230mm approx.
46	Hydrolab, multiple probe	Field type water quality measuring instrument. Measuring element: pH, Conductivity, Temp., Turbidity and DO. Digital display. Sensor: Combination type. With 2m cable.
47	Latroscan	Thin layer auto detection chromatography. Detector: FID. Calculation/quantitation integrator and PC for data processing.
48	Image Analyzer	Micro observation image analysis equipment: Software and Hardware for image measurement. Image input: Digital camera or video. Image analysis: comparison measurement of area/length/number of colony. Composition: Image input device/stage control device/ image analysis device and microscope controller.
49	Incubator, low temperature	Temp. range: -10 to +50℃ Capacity : 100 liter approx. Digital PID control
50	Incubator temperature gradient	Temp. range: 5 to 50℃ Chamber: 120 liter approx. (40 litre×3) Temp. control: constant temperature control Illumination: 40W fluorescent lamp Illumination control: On-off
51	Incubator w/o shaker	Temp. range: ambient to 60℃ Capacity: 80 liter approx. Digital PID control
52	Incubator with shaker	Temp. range: 15 to 70℃ approx. Shaking speed and width: adjustable Shaking platform: 400×300mm approx. Holder: Spring net type
53	Isolation Hood	Table top type. Laminar air flow: vertical Main filter: HEPA filter Collection efficiency: 99.9% or better Air velocity: $10m^3$/min. approx.

Item No.	Equipment Name	Specification
54	Laminar flow cabinet	Electronic air flow control. Dimension : 1,200×750×2,000mm approx.
55	Light meter with data logger & PC atta.	Water lux meter for measurement in waterweed cultivation.
56	Micro filtration set-up	Microbiology sterility filtration unit. For 3 samples.
57	Microscope Brightfield	Research trinocular microscope. Total magnification: 40x to 1,000x. Anti-mold treatment
57.1	Microscope Camera system	Auto-exposure. 35mm film camera
58	Microscope Inverted	For fluorescence/phase contrast observation. Objectives: 10x, 20x, 40x and 60x. With camera port.
59	Microscope, Florence	For fluorescence microscopic observation. Total magnification: 40x to 1,000x Anti-mold treatment. With camera.
60	Microscope, with video camera system	Color video equipment for microscope. Complete with video camera, monitor, etc.
61	Microscope with phase contract	For phase contrast observation. Total magnification: 40x to 1,000x. Anti-mold treatment
62	Monitor for Atomic absoration spect.	For Shimadzu AA-6800
63	Orbitial shaker	Shaking platform: 200×300mm approx. Shaking speed and width: adjustable Holder : Spring net type
64	Oven (general purpose)	Natural convection. Temp. range: 40 to 260℃ Capacity: 80 liter approx. Digital display and setting.
65	Oven, Vacuum Drying	In-built vacuum pump in a unit. Capacity: 27 liter approx. Temp. range: 40 to 250℃. Digital display/setting
66	Ozone generator	Ozone generating capacity: 1.8kg/day approx.
67	pH Meter	Table top type. Measurement of pH/mV/℃. Digital display
68	Photodocumentation System	Composition: Dark room, UV transilluminator, DDC camera, PC and software. Applicable sample gel size: 25cm approx.
69	Pipete, eight channel pipetter	Volume adjustable 8 channel pipette. Capacity: 5 to 50 micro liter.
70	Pristatlic pump	Flow rage: 10 to 1,500ml/hr approx. Flow control accuracy: 2% or less Applicable tube size: 3 to 6mm
71	Refrigerator, standard (10ft3)	Capacity: 300 liter (240 liter for refrigerator/60 liter for freezer). Temp., range: 2 to 14℃

Item No.	Equipment Name	Specification
72	Refrigerator, two door	Capacity: 300 liter (240 liter for refrigerator/60 liter for freezer). Temp., range: 2 to 14℃, 2-door type
73	Rotary evaporator	Flask volume: 1 liter. Rotation speed: 20 to 180rpm approx. Auto jack. With water bath
74	Scanning Electron Microscope (SEM)	Magnification: 300,000x approx. Accelerated voltage: 30kV approx. Secondary electron image: 3.5nm approx. Sample size: 150mm dia. max.
74.1	Iron sputter	Freeze-drying instrument for samples containing moisture/water.
74.2	Dry freezer	For sample preparation for SEM
75	Spectrophotometer UV-VIS	UV-VIS spectrophotometer. For DNA/RNA/Protein quantitation. Wavelength: 200 to 1,000nm approx.
76	Spectrophotometer, fluorescence	For measurement of vitamin/enzyme. Scanning wave length: 220 to 900nm approx. Measuring wavelength: 220 to 750nm approx.
77	Stereo Microscope	Zoom type stereomicrosocpe. Zoom: 6x approx. Total magnification: 100x approx.
77.1	Fiber Optic Illuminator	Cooled spot illumination. Light intensity control. Two illuminating probes.
78	TEM	Accerelation voltage: 100kV approx. Resolution: 0.4nm at high contrast approx. Magnification: 500,000 approx.
78.1	Glass knife maker	For glass microtome knife production. To be applicable for No. 130.
78.2	Ultra Microtome	For microscopic sample preparation. Cutting window: 0.2 to 14mm Cutting speed: 0.05 to 100mm/sec. Approx. Control: 1nm to 15 micro mm
79	Thermal Cycler	Block: For 96×0.2ml tube or 8×12 PCR plate With gradient control
80	Thermomixer	Temp. range: ambient to 90℃ Shaking speed: 300 to 1,400 times/min. Shaking width: 3mm approx. Block for 1.5ml tubes
81	Ultrasonic disintegrator	Capacity: 5 liter approx. With temperature control
82	Ultrasonic Cleaner	For dispersing DNA/cell. Output 400W approx. With controller.
83	UV Crosslinker	Wavelength range: 300 to 312nm approx. Size: 200×200mm approx., Digital display and setting.

Item No.	Equipment Name	Specification
84	UV Sterilizer	UV sterilizing box. Inner dimension: 330×300×170mm approx. UV lamp: 6W×2 approx.
85	Vacuum pump	Oilless direct drive vacuum pump for lab equipment
86	Viscosity meter	For viscosity measurement of waterweed. Complete with assortment of measuring spindle.
87	Vortex Mixer	For stirring of small volume. Plate size : 60mm dia. approx. Shaking speed: 2,000 to 3,000 rpm approx.
88	Water Bath	Temp. range: ambient to 90℃ Capacity: 20 liter approx. With lid
89	Water Bath with shaker	Temp. range: ambient to 90℃ Capacity: 20 liter approx. Shaking speed: 150 times/min. approx.
90	Water Purification System	Wall-mount or table top type. Filter: Activated carbon and ion exchange cartridge. Pure water capacity: 1 liter/min.
91	Time Resolve Flourescence Immuno Assay	Composition: Main unit, plate washer, plate shaker, PC and reagent. Sample load: manual Measuring range: 340 to 700nm
92	Flow Cytometer	Type: Analyzer type. Laser: Air cooled 4 color type. Complete with PC and analysis software

2-4 Implementation System of the Project

2-4-1 Organization

(1) Implementing system of the Philippines side

-Responsible Ministry: Department of Agriculture

-Implementing Agency: DA-BFAR and SEAFDEC/AQD

-Managing Body: DA-BFAR and SEAFDEC/AQD

1) Department of Agriculture

The Department of Agriculture is responsible for planning and execution of policies concerning agriculture, forestry, and fisheries in the Philippines. The Project-related authority is the PPRMD (Project Development Service, Project Packaging and Resource Mobilisation Division), which takes charge of budget and, if necessary, ICC procedure.

BFAR is in charge of fisheries administration and extension services to fisherfolk.

2) BFAR

In BFAR, in particular, the sections in charge of R&D (research & development) and aquaculture have relation to the Project. The section in charge of aquaculture is carrying out research study in fish-disease and extension services of prevention of disease, and cooperates with SEAFDEC/AQD in these fields.

3) SEAFDEC/AQD

The SEAFDEC is an international institution, whose site, building, personnel expenses, management expenditure, etc. are borne by the host state, the Philippines. At present SEAFDEC/AQD participates in formulating development plans concerning aquaculture and is an arm agency of research study in fishery in fisheries development programs. It is now studying in health management of shrimp and development of larval rearing of grouper, and others.

2-4-2 Management Budget of the Project

(1) Introduction stage of the Project

-Expenditure necessary for introduction of the Project

Necessary budget is secured by the Department of Agriculture.

Items	DA	SEAFDEC/AQD
Banking commission	○	
Charge of VAT (value added tax) on contracting	○	
Securing the Project site and temporary site for the construction works		○
Connection with seawater, fresh water, electricity, telephone Budget Procedure	○	○
Exemption of import tax	○	

(2) After completion of the Project

The operation and management of the facilities delivered are conducted by SEAFDEC. Part of joint research study cost with BFAR is borne by DA.

Items	DA	SEAFDEC/AQD
Ownership of facility/equipment and materials	○	
Responsibility of Maintenance/management		○
Utilization cost of facilities/equipment Utilization by DA-BFAR Utilization by SEAFDEC	○	○

2-4-3 Technical Level of Staff and Maintenance/Management Plan of Facility

Maintenance/management of the facilities/equipment and materials provided by the Project are carried out by staffs of BFAR and SEAFDEC/AQD. Staff of BFAR will be send to SEAFDEC/AQD which is better equipped for this purpose.

(1) Facility management

Engineering Section of the SEAFDEC/AQD is in charge of the facilities management. Since the Section is now managing the seawater intake facilities, aquaculture tanks, etc. properly with appropriated budget, there is no problem technically on the management of the facilities to be provided by the Project.

(2) Equipment/materials management

All equipment and materials bought by the SEAFDEC are registered and controlled strictly by the financial section; any information, from name of seller to repair record, can

be obtained immediately through computer. Researchers are handling their apparatuses and devices carefully, and, according to hearing survey from instrument dealers, it was confirmed that there happened no trouble about equipment due to wrong operation by researchers. The requested equipment and materials are the ones that researchers have experienced in handling, and there will be no problem on the management of the equipment and materials if full explanation is given on the delivery of them.

(3) Relation between DA, DA-BFAR and SEAFDEC/AQD

Though not belonging to the Department of Agriculture, the SEAFDEC/AQD is playing substantially a central role in research and technical development in the aquaculture in the country, under co-ordination with DA-PTAC (Philippine Technical and Administrative Committee). The PTAC is a committee organised to make perfect liaison between the DA and SEAFDEC, presided by the Secretary of DA and consisting of the Undersecretary of DA, the Director of BFAR, and the Chief of SEAFDEC/AQD, the Dean of Fisheries Faculty of Philippine University.

(The most important project on aquaculture)

In 2000, the BFAR commenced a national project to control WSSV (White Spot Syndrome Virus disease), as one of the most important projects in fisheries development, aiming at annihilation of disease of shrimp in the Philippines. The DA, DOST-PCAMRD, DTI-BETF, PFDA, and SEAFDEC/AQD participated in this project. The project intends to formulate and execute a national strategy to control WSSV with the knowledge of WSSV extending.

(SEAFDEC/AQD co-operation with BFAR projects)

In 2000, demonstration tests of “environment-friendly shrimp aquaculture technology” developed by SF commenced at the Brackishwater Station/Training Center of BFAR. This activity is one of technology transfer promotion programs in the joint mission of BFAR and SF (JTPFM), and trains BFAR’s technical staff for aquaculture at 2 culture ponds in the Lala Station of BFAR.

Besides, spawning of milkfish, crab culture in mangrove area, and marine fishpen culture of quality fish are conducted at 4 Stations of BFAR.

Chapter 3

Management Plan

Chapter 3 Management Plan

3-1 Implementation Plan

3-1-1 Implementation Concept

In the implementation of the Project, the following concept shall be applied in accordance with the intention of Japan's Grant Aid Program

Efforts shall be made to achieve mutual understanding through exchange of opinions between authorities concerned, that is, DA, DA-BFAR, SEAFDEC/AQD, and contractors and the consultant in order to promote smooth implementation of the Project.

The proposed construction site is owned by the Government of the Philippines and controlled by SEAFDEC/AQD. In the construction works, at the renovation work of the 2nd floor of Nutrition Research Building, taking influence to other Laboratories, securing temporary spaces, transfer of research function, and other various matters caused be removal of the existing components of the Building during construction work into consideration, the method of construction to minimise works at the spot shall be applied. Also a full explanation shall be given to SEAFDEC/AQD so that they can have sufficient time to address transfer/return of Laboratory function, and the consent shall be obtained.

The equipment and materials will be imported and passed the customs at Iloilo port after transhipment at Manila, and transported to the Project site by truck.

In construction work, countermeasure necessary for prevention of noise caused by construction machinery shall be taken, though there no big source of noise in the work.

Concerning quality control of the Project, special regard shall be to the following.

1) Countermeasure for salt damage

Since the construction site is subject to salt damage, salt-resistant equipment and materials shall be selected and procured. Also galvanizing work shall be strictly supervised. The equipment and materials shall be stored or cured attentively to prevent salt-damage.

2) Monitoring of base concrete

Concrete to be used for building foundation and building frame must be under strict quality control. The upper limit of alkali silica content ($300g/m^3$) in aggregate must be

checked, and washing aggregate and measuring workability shall be conducted in casting concrete. These checking shall be conducted periodically in the period of construction work to implement works carefully.

3) Quality control and performance test of the equipment

Research instruments and generator-related apparatuses are subject to factory inspection and working test shall be executed after installation. In installing work of the equipment at the site, the completion inspection and performance test by technical experts shall be executed in the presence of the resident supervisor. On the delivery, necessary advice shall be given to operators of SEAFDEC/AQD.

Research instruments are to be procured in Japan or the third countries. Taking procurement of parts and aftercare service in the country into consideration, instruments of sound quality shall be procured.

3-1-2 Precautions in Implementation Work

The following precautions shall be taken in planning concrete implementing plans based the above concept.

1) Typhoons attack in October, November, and December concentratedly. Renovation works within doors are not affected, but the construction work of the Enclosed Wet Laboratory shall be planned to avoid this season.
2) The Project site is situated within the premises of the existing SEAFDEC/AQD. Consideration for safety management of construction work and separation of traffic lines must be taken in order not to disturb ongoing research activities.
3) Renovation work of 2nd floor of Nutrition Research Building has no effect to give influence on the environment outside of the SEAFDEC/AQD, but ongoing research studies must not be stopped inwardly. Therefore, securing temporary space, transferring, and removal work for each block to be renovated must be carefully planned, and, after completion of renovation, the Laboratory must return back immediately to prepare the next temporary space.

These works are to be borne by the Philippines side, and, in order to promote both the main Project work and the Philippines-borne work for each block, it is necessary to consult and discuss fully the working schedule presented by the Contractor with SEAFDEC/AQD side, and works must be done under the consent of the SEAFDEC/AQD.

During the construction of Enclosed Wet Laboratory, technical consideration for prevention of noise caused by construction machinery and weather damage by typhoon shall be taken.

Furthermore, the following environmental precautions shall be taken.

- Waste water from the Infection house shall be disinfected to pathogen free before connecting to the waste water disposal tank.
- Cutting living trees shall not be done as possible.
- Toilet sewage shall be drained to the sea after treatment in the septic tank.
- Waste seawater after experiments and researched shall be drained after through settling and separating treatment in the disposal tank.

3-1-3 Scope of Works

The works to be borne by the Philippines side are as follows. Renovation of the third floor of Nutrition Research Building and levelling work of the proposed construction site must be completed before the Project starts.

Table 3-1-3 Undertakings to be borne by the Philippines side

1) Securing and levelling the site of Enclosed Wet Laboratory
2) Renovation of the 3rd floor (office room) of Nutrition Research Building
3) Transfer of the existing equipment and materials of the 2nd floor to the 3rd floor renovated office room
4) Intake of seawater and fresh water to the site of Enclosed Wet Laboratory.

3-1-4 Consultant Supervision Plan

The basic concept and precautions of the Plan are as follows.

(1) To promote smooth execution of the Project, the Consultant shall enhance contact with the DA, the responsible Ministry, and the DA-BFAR and SEAFDEC/AQD, the implementing agencies, as the works advance. In particular, the schedule and specifications on securing and levelling the proposed site, intake of seawater and fresh water, and transfer of the equipment and materials that exist in the Nutrition Research Building must be fully discussed before the construction work commences, from the standpoint of possible interference with the works of Japanese side.

(2) Prior to commencement of construction work, the Consultant shall examine the execution plans and shop drawings submitted by the Contractor and judge the appropriateness of the temporary work plans, progress schedules, quality control plans, construction method, etc.

(3) On the completion of the Project, and during the works if necessary, the Consultant shall check the contents of works in conformity with the designed specifications, and give proper instructions to the Contractor when modifications are required.

(4) The comprehensive execution management of the construction work shall be carried out by the Consultant who is stationed at the site.

3-1-5 Procurement Plan

Main and auxiliary structural materials to be use for works of foundation and building frame shall be procured locally as possible, and locally-proven construction method shall be applied. Taking availability of parts and aftercare services into consideration, the research instruments and installations of sound quality are to be procured in Japan or the third countries.

Gravel and rubble for aggregate, concrete blocks, cement, reinforcing bars, plywood, electric materials, and piping materials are available locally. Light gauge steel is available locally, but heavy shape steel must be imported due to scanty kinds.

Building materials for construction work (cement, reinforcing bars, wooden frames, metal frames, etc) are obtained locally. Some kinds of construction machinery are available at Iloilo, and special machinery can be procured at Manila or Cebu.

Table 3-1-5 Procurement List

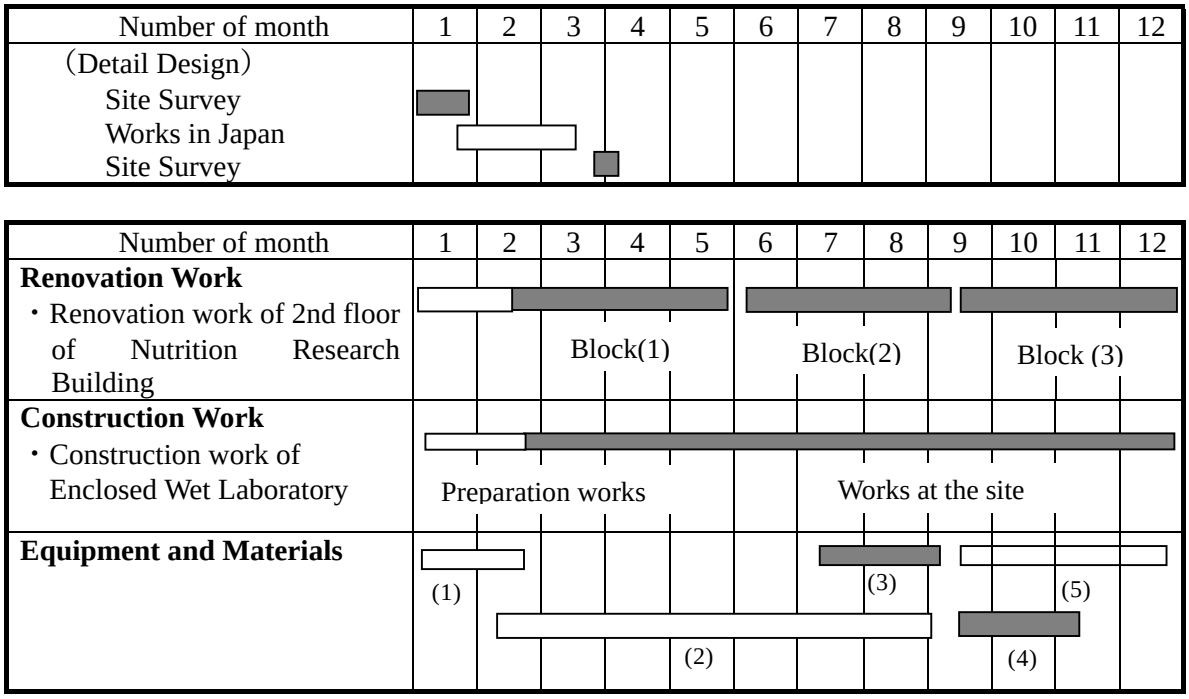
Items	Procuring method
① Construction machinery	
General construction machinery	Local procurement
② General construction materials	Local procurement, Japan, or 3rd countries
③ Machinery	
Research instruments	Philippines, Japan, or 3rd countries
Installations (generators, airconditioners, pumps, etc.)	Local procurement or Japan
Small reservoir, tanks	Local procurement

3-1-6 Implementation Schedule

The implementation plan is basically planned as one year project in accordance with the Japan's Grant Aid Program. It is considered to be proper that the renovation of work of Nutrition Research Building shall be executed in parallel with the construction of Enclosed Wet Laboratory.

The renovation of 2nd floor of Nutrition Research Building is not heavy because the building frame construction work is not included, but research activities must not be stopped. Thus, the Schedule are planned as follows and obtained the consent of the SEAFDEC/AQD side, that is, the 2nd floor is to be divided in 3 blocks; the period of renovation works for each block is decided to be 3.5 months; and whole period of renovation works is 10.5 months. The construction of the Enclosed Wet Laboratory can be completed in this period. Taking 1.5 months for preparation work, the whole construction period is 12 months.

The following is the Implementation Schedule of the Project



Note : (1)Preparation, approval, (2) Production, procurement,
(3) Transportation of equipment to be installed, (4) Transportation, (5) Installation, operation test

Figure 3-1-6 Implementation Schedule

All construction works are executed on land, and the bearing capacity of soil at the proposed construction site is sufficient. There is no necessity for pile works.

3-1-7 Undertakings to be Taken by the Philippines

Table below shows the undertakings to be taken by the Philippines and Japan respectively.

Table 3-1-7 Division of undertakings

Contents	Japan	Philippine
1. Securing the site		○
2. Renovation of 2nd floor of Nutrition Research Building	○	
3. Construction of the Enclosed Wet Labo.	○	
4. Procurement of the Equipment	○	
5. Transfer of equipment of 2nd floor of Nutrition Research Building		○
6. Renovation of 3rd floor of Nutrition Research Building (arranging office room)		○
7. Importation and customs clearance Transportation to the site Tax exemption and customs clearance	○	○ ○
8. 10% VAT		○
9. Appropriate and effective management and maintenance of facilities granted by Japan's Grant Aid		○
10. Bearing all the expenses other than those of to be borne by the Grant, necessary for construction of facilities as well as for transport and installation of furniture and equipment		○
11. All the procedure of application for approval concerning construction works		○

3-2 Cost Estimation

3-2-1 Cost to be Borne by the Philippine Side

Cost to be borne by the Philippine side is estimated at about Ph.P 31 million, and its details are as follows.

Table 3-2-1 Cost to be borne by the Philippine side

Items	Unit	Unit Price	Amount (1,000)	
		Ph. Peso	Ph. Peso	Japanese Yen
Enclosed Wet Laboratory			*(5,340)*	*(13,777)*
Levelling Sites	3400 m^2	150	510	1,316
Construction of access road	110 m	18,000	1,980	5,108
Intake of seawater	Complete	1,050,000	1,050	2,709
Intake of freshwater	Complete	50,000	50	129
Drainageway to sit	100 m	5,000	500	1,290
Electric wiring to site	Complete	450,000	450	1,161
Telephone wiring	Complete	200,000	200	516
Fence	240 m	2,500	600	1,548
Nutrition Research Building			*(3,000)*	*(7,440)*
Renovation of 3rd floor office	Complete	3,000,000	3,000	7,440
Others			*(22,681)*	*(58,517)*
Banking commission, etc.			400	1,032
VAT (10%)				
VAT for the total cost of Construction works			22,010	56,786
VAT for the total cost of local installation engineers			271	699
Total			***31,021***	***80,034***

(Note) Exchanging rate (Average rate of the latest 6months, August 2001)

Ph.Peso 1 .00＝2.58 J.Yen USD1.00＝47.50 peso

3-2-2 Management Expenses

(1) Budget of SEAFDEC/AQD and management cost of the New Laboratories

The budget (2000) of SEAFDEC/AQD is some Ph.P 290 million, of which Ph.P 150 million (52%) is appropriated to research section, while remains to management section, and the amount has been increasing on PhP basis, though constant on dollar basis, for the past 5 years. With the new laboratory system, the subjects of study, new or continuous, are to be adjusted. The subjects of study presented by each Laboratory are discussed and adjusted at a committee consisting of 5 members. Based on the adjustment the budget is appropriated to each Laboratory. The budget of SEAFDEC/AQD is large that the subjects of study planned by new biotechnology Laboratories will be surely carried out.
Table below shows the revenue and expenditure of SEAFDEC/AQD.

Table 3-2-2 (1) Revenue & Expenses of SEAFDEC/AQD The Years 1996 to 2001

(unit: Ph.P 1,000)

Item	1996	1997	1998	1999	2000*	2001**
A. Revenue						
Philippines Government	166,799	199,660	198,251	221,728	221,728	233,274
Japanese Government	23,902	23,890	21,695	16,569	16,367	15,648
Grants	5,085	7,558	7,215	4,794	39,723	38,064
Others	6843	21,320	12,487	14,234	15,343	16,997
Total	**202,629**	**252,428**	**239,648**	**257,325**	**293,161**	**303,983**
B. Expenses						
Salaries & others	115,195	141,827	121,960	147,891	138,482	141,244
Materials and supplies	8,761	12,425	15,083	15,188	25,491	30,992
Rent,light and water	7,648	8,210	9,989	11,325	21,874	27,415
Transprotation,travel	7,411	9,230	9,475	9,518	13,823	16,688
Expenses for experts	8,544	9,588	8,959	5,339	6,650	6,336
Repairs and maintenance	2,932	2,637	2,926	4,848	8,338	10,728
Others	44,325	40,123	54,641	56,638	58,373	70,578
Total	**194,816**	**224,040**	**223,033**	**250,747**	**273,031**	**303,981**

＊Provicional, ＊＊Estimated

(2) Estimation of research cost for each Laboratory and Enclosed Wet Labo.

(Estimation of research studies cost for four new Biotechnology Laboratories and Enclosed Wet Laboratory)

Preconditions for calculation.

a) Labor cost subject to budget is not calculated.

b) Electric rates, expendables, and repairing cost are included.

c) Electric rates are calculated on the basis of consuming electricity of installations

operation rate = 60%

Yearly consuming electricity = Total capacity × 60% × 24 hours × 365 days

Electric rates = Ph.P 0.85/KWH

d) Water rates are not included due to self-supplying

e) Consumables cost is based on the estimate of each Laboratory

f) Repairing cost is calculated at 2 times of 2000 actual results due to increasing installations and instruments.

Table 3-2-2(2) Estimation of Research Studies Cost for New Laboratories & Facilities

(unit: PhP 1,000)

	ME/ GEN	MM	AB	FFT	Enclosed Wet Labo.	Total	Budget of Research Div.(2000)
(Management cost)							
Electric rates	399	557	462	776	1,162	3,356	15,000
Consumables	2,250	3,500	4,000	1,000	1,500	12,250	15,800
Repairs & Mainte.	400	400	400	400	800	2,400	1,575
(Total)	**3,049**	**4,457**	**4,862**	**2,176**	**3,462**	**18,006**	**32,375**
(Base of calculation)							
Electric rates							
Equipment: New	67.5kw	64.2kw	65.6kw	61.2kw	250kw	508.5kw	
Existing	— kw	38.4kw	5.1kw	46.6kw	—	90.1kw	
Total	**67.5kw**	**102.6kw**	**70.7kw**	**107.8kw**	**250kw**	**598.6kw**	
Air con. Dehumid.	21.8kw	22.1kw	32.6kw	65.9kw	10kw	152.4kw	
Total electric capacity	89.3kw	124.7kw	103.3kw	173.7kw	260kw	751.0kw	
Average operation rate	53.6kw	74.8kw	62.0kw	104.2kw	156kw	450.6kw	
Electric capacity/Y	469	655	543	913	1,367	3,947	(1,000kwh)
Yearly electric cost	399	557	462	776	1,162	3,355	1,000P hP

（Note）Exchange Rates : US$1.00＝Ph.Peso 47.89（May 2001）

After the next page shows SEAFDEC/AQD Programs and Projects 2001 – 2005.

Aquaculture Department Programs and Projects 2001 – 2005

Program I. Broodstock management and seed quality improvement of cultured species

Sub-program 1. Broodstock management

1.1. Egg quality improvement of marine and freshwater fish through nutritional enhancement - CONTINUING

1.2 Environmental and hormonal manipulation for controlled breeding and growth enhancement of marine and freshwater fish - NEW

1.3 Genetic characterization of farmed species - NEW

1.4 Improvement of breeding strategies and strain selection for selected species - CONTINUING

Sub-program 2. Development of improved technologies in fish and crustacean hatchery production

1.5 Hatchery and Nursery husbandry techniques - CONTINUING

1.6 Larval requirements and physiology - CONTINUING

1.7 Verification of hatchery techniques - CONTINUING

1.8 Alternative live food - CONTINUING

Program II. Development of sustainable aquaculture systems

Subprogram 1. Development of Environmental-friendly Aquaculture Technologies

2.1. Nutrient budgets of semi-intensive and intensive fish and crustacean pond culture systems - NEW

2.2. Feed and waste management in cage culture of marine and freshwater fish - NEW

2.3. Development of efficient pond and cage designs - NEW

2.4 Development of culture systems for marine and brackishwater species (to include development of bioremediation strategies for pond and coastal waters) - CONTINUING

2.5. Conservation and sustainable utilization of resources for aquaculture - NEW

2.6. Socio-economics and policy issues in coastal and open water aquaculture – NEW

Subprogram 2. Development of nutritionally efficient and environment-friendly feeds

2.7 Requirements of marine and freshwater fish for nutritionally limiting nutrients - CONTINUING

2.8 Development of environment-friendly feeds with minimum amount of fish meal – CONTINUING

Program III. Screening of new species for aquaculture - NEW PROGRAM

3.1 Reproductive biology of candidate aquaculture species

3.2 Food and feed requirements of new species for aquaculture

3.3 Studies on growth and physiological requirements of candidate species for aquaculture

3.4 Genetic diversity of selected indigenous or endangered species

Program IV. Development of strategies for stock enhancement (NEW PROGRAM)

4.1 Adoption of breeding and hatchery production technologies of commercially important mollusks and echinoderms – CONTINUING (some activities are on-going while new studies will be started beginning 2002)

4.2 Development of strategies for release and stock enhancement of appropriate species – NEW (planned for 2002-2005)

Special Program

I. Japanese Trust Fund Projects – CONTINUING

A. Mangrove-friendly shrimp culture project (until 2003)

B. Aquaculture disease management (until 2003)

B.1 Establishment and standardization of diagnostic methods

B.2 Biology and pathogenesis of disease agents

B.3 Disease prevention and control

B.4 Establishment of evaluation methods for residual chemicals in aquaculture products

II. BFAR-SEAFDEC Collaborative Program

A. Development of appropriate technologies for use of lakes - CONTINUING
B. Strain improvement of commercially important seaweeds - NEW
   B.1 Development of improved strains of Eucheuma and Gracilaria through biotechnology
   B.2 Assessment of improved cultivars for growth, culture characteristics and quality of carageenan and agar
   B.3 Field/on-farm verification of improved strains
C. Commercialization and promotion of developed technologies – CONTINUING ACTIVITY

Chapter 4

Project Effect and Recommendation

Chapter 4 Project Effect and Recommendation

4-1 Project Effect

By implementing of the Project, the following effect is expected.

According to the improvement of the aquaculture biotechnology, key problems of the sector will be solved. And substantially increase of aquaculture production will be obtained by higher productivity of the farming. Therefore, fish production from aquaculture will be able to meet the increasing fish demand of the growing population. Also, people in the mountain district will be able to procure fresh fish as animal protein source by introduce and extension of farming of the new technologies.

Higher productivity of the farming will lead to increase farmers' income and their living conditions will be expected to improve. Also, increase of the production of high value species, Black Tiger, Grouper and Seaweeds, will activate export to other country and will ensure to improve trade balance in the Philippines.

Furthermore, utilization of the advanced equipment of the Project for collaboration research studies with national and international organizations, institutes and universities will make benefits to the Philippines and other countries in Asia.

The following presents expected effect to the important cultured species that can be achieved with the establishment of the Advanced Aquaculture Laboratories.

(1) MILKFISH

1) Increased production of good quality fry through improved broodstock and larval nutrition.
2) Consistent and year-round production of eggs and fry from selected broodstock and through hormonal or environmental manipulation of the breeding cycle of this fish.
3) Cost-efficient production of milkfish through improved feed formations. The present fishmeal content of commercial feed is 20－35%. Improved feed formulation that include about 5% or less of fishmeal will bring down the production cost by at least 20% and will ensure that milkfish will be affordable to the majority of the population.
4) Over-all increase in milkfish production from 170,000 MT to the target 300,000 MT by year 2010 can be achieved with the application of information derived from studies on controlled breeding and improved seed production and grow-out technologies.

(2) TILAPIA

1) Result of studies using conventional mass selection techniques to improve growth rates indicate 10% in growth after four generations. With the aid of DNA-based molecular marker techniques, selection for specific traits such as faster growth and disease resistance can be accelerated.
2) Farmers will also be able to apply appropriate broodstock management techniques if the genetic variability of their broodstock is known. Maintaining a genetically diverse stock will ensure sustained production of good quality fry and improve production efficiency of culture systems.
3) The development of faster growing tilapia stocks that grow to 400g or better will open markets for export of this fish to countries that prefer semi-processed (forzen fillet) products. Results of DNA-based mass selection for faster growing strains can be expected within five years of the genetic selection program for this fish.

(3) GROUPER, and SNAPPER

1) Present survival rate of grouper and snapper in the hatchery is less than 3%. Information on the nutrient requirements broodstock and fry, digestive physiology, and appllication of techniques to enhance metamorphosis and growth in larvae and fry will improve survival rates of these species. Improvement of survival rates to at least 10% will make hatchery production economically viable since fry and fingerlings of these species command high market pieces. The availability of hatchery reared fry will encourage more farmers to engage in grouper and snapper culture increasing revenues from export of high-value species. This will also relieve pressure on the wild fry fishery and prevent destruction of fragile ecosystem such as coral reefs where fry and juveniles of these species are gathered usually using destructive methods.
2) Farmers presently feed fish-by-catch to grouper and snappers. Available commercial grow-out feeds are either expensive or not accepted by the fish. Commercial diets also contain more than 40% protein largely derived from fishmeal. Development of diets using alternative protein sources to replace fishmeal and improving bioavilability of nutrients contained in these diets through fermentation technology will substantially lower feed cost and will reduce pollution effect of unassimilated feeds and wastes from fish farms.
3) Diseases often occur in grouper resulting in great economic loss to farmers. Development of molecular diagnostic tools that can detect early signs of diseases will

prevent spread of the disease and assure farmers of good harvest.

(4) RABBITFISH

1) Biotechnology will be employed for production of large quantities of reconbinant rabbitfish GH and IGF-I and various methods of delivering these growth-promoting hormones into the fish will be developed and tested. These will include slow-release capsules or incorporation of the hormones in the diet as food additives. Methods will also be developed to increase the biological half-life of the recombinant hormones by fusion to other protein such as albumin in order to enhance their potential efficacy in promoting growth rate. If we could simulate the natural diurnal increases in circulating GH levels in the fish, we expect to be able to see increases in growth rates of up to 50%. Increasing growth rates will also translate to the reduction of the normal culture period to reach marketable size. The results obtained and the methodologies developed and applied will advance and improve rabbitfish and aquaculture in the Philippines. These methodologies may also be applied to other commercially important aquaculture species as well.

(5) SEAWEEDS

1) The development of genetically improved strains of *Kappaphycus and Eucheuma* will increase the commercial production of these species and ensure sustainable livelihood for thousands of seaweed farmers. The use of biotechnological methods in the development of new strains will cut short the time required to produce these strains. With the available techniques, new strains can be developed and its growth potential assessed within 3-5 years.

(6) TIGER SHRIMP

1) Shrimp farmers often lose their stocks when diseases occur during culture and after substantial farm inputs have been invested thus losing considerable amounts of money in process. With the diagnostic tools that will be developed for early identification of viral diseases, farmers will be able to select disease-free fry that can be stocked in their ponds ensuring reliable harvest.
2) The availability of good quality fry produced from a well-designed genetic selection program that are relatively disease resistant and exhibit faster growth rates will further encourage the recovery and further growth of the shrimp farming industry.

3) Since the tiger shrimp industry contributes significantly to export earnings, further growth will ensure economic benefits to the country.

4-2 Recommendations

In order to enhance the effective utilization of facilities after the completion of the Project, the Philippine side shall address the followings.

(1) Formation of new system for biotechnology research

It is needed to organize new formation for biotechnology research to utilize effectively introducing new equipment by the Project.

(2) Periodical inspection and maintenance of instruments

Serviceable life of instruments subject to salt sea breezes depends upon usual inspection and maintenance. The instruments provided by the Project, like the existing installations, must be inspected and maintained periodically to keep good conditions. In particular, such installations as emergency generators installed out of doors require special consideration. For this purpose, it is necessary to organize a responsible team for each Laboratory.

(3) Consideration for environment

Special consideration for environment shall be taken due to stocking diseased fish or gene analysis of fish. Concerning this subject, every one of researchers and related persons must take care strictly to avoid disperse to the outside. It is necessary to form a system to confirm the details of experiment and operation.

(4) Distribution of results of research to fisherfolk

The results of researches shall be published and distributed as usual to fisherfolk through DA-BFAR and SEAFDEC/AQD, and budget necessary for this activity shall be secured.

(5) Countermeasure against power failure

As a countermeasure against power failure, the emergency generator and UPS are provided. All researchers and staffs must be careful so that switching can be executed smoothly.

(6) Dehumidification

Humidity is the most deadly foe to research instruments. Avoid careless opening of doors or excessive air-cooling. In particular, lens of precise microscope develop mold with humidity.

(7) Interior reservoir tanks in the Enclosed Wet Laboratory

The tanks are used at need. Though no problem for continuous utilization, the tanks must be kept dry to prevent bacteria from developing when they are not used.

Appendices

Appendices 1　Member List of the Survey Team

(1) Basic Design Study

1	Akira NAKAMURA	Team Leader	Deputy Director, Project Coordination and Monitoring Division, Grant Aid Management Department, Japan International Cooperation Agency (JICA)
2	Kazuo HIRAISHI	Technical Advisor	Deputy Director, Office of Overseas Fisheries Cooperation, Fisheries Agency
3	Makoto IMAMURA	Project Coordinator	Forth Project Management Division, Grant Aid Management Department, Japan International Cooperation Agency (JICA)
4	Kohsuke SHIMAZU	Project Manager/ Aquaculture Research Planning	CRC Overseas Cooperation Inc.
5	Yuji NEMOTO	Laboratory Equipment Planning	CRC Overseas Cooperation Inc.
6	Kaname MOTOKI	Architect Planning/Natural Condition Survey	CRC Overseas Cooperation Inc.
7	Masakazu ISHII	Construction and Procurement Planner	CRC Overseas Cooperation Inc.

(2) Draft Basic Design Study

1	Akira NAKAMURA	Team Leader	Deputy Director, Project Coordination and Monitoring Division, Grant Aid Management Department, Japan International Cooperation Agency (JICA)
2	Manabu BABA	Technical Advisor	Office of Overseas Fisheries Cooperation, Fisheries Agency
3	Seiju IMAI	Project Coordinator	Technical Personnel Development Division, Institute for International Cooperation (IFIC), Japan International Cooperation Agency (JICA)
4	Kohsuke SHIMAZU	Project Manager/ Aquaculture Research Planning	CRC Overseas Cooperation Inc.
5	Yuji NEMOTO	Laboratory Equipment Planning	CRC Overseas Cooperation Inc.
6	Kaname MOTOKI	Architect Planning/Natural Condition Survey	CRC Overseas Cooperation Inc.

Appendices 2　Survey Schedule

(1) Basic Design Study

No.	Date		Activities	Accommodation
1	1/29	Mon.	(∗, A, B, C, D) Narita → Manila PM: Courtesy call on the Embassy of Japan in Philippines and JICA Philippines Office	Manila
2	1/30	Tue.	AM: (∗, A, B, C, D) Courtesy call on vice minister of the Ministry of Agriculture PM: (∗, A) Discussion with BFAR Discussion with NEDA (B) Equipment Agency (C, D) Sign contract of Natural Condition Survey	Manila
3	1/31	Wed.	AM: (∗, A, B, C, D) Manila → Iloilo PM: Discussion with SEAFDEC/AQD over inception report, questionnaire and schedule	Iloilo
4	2/01	Thu.	(∗, A) Discussion with SEAFDEC/AQD Confirmation of the equipments and facilities Preparation of natural condition survey	Iloilo
5	2/02	Fri.	(∗, A) AM: Explanation of the content of the request (∗, A) PM: Discussion of the minutes (B) Confirmation of the equipments (C, D) Confirmation of the facilities Preparation of natural condition survey	Iloilo
6	2/03	Sat.	(∗, A) Preparation of the Minutes of Discussion (B) Survey of equipments Meeting with the survey team	Iloilo
7	2/04	Sun.	(∗, A, B, D) Igang Marin Substation Dumangas Brackishwater Station (C) Review of collected data	Iloilo
8	2/05	Mon.	(∗, A) Discussion over new requests PM: Discussion and signing of M/D (DA, USEC, SEFADEC) (B, C) Confirmation of facilities (D) Estimate survey	Iloilo
9	2/06	Tue.	(∗, A, D) Iloilo → Manila	Iloilo
10	2/07	Wed.	Manila : (∗, A) Meeting at DA PM Signing M/D (Chief of BFAR) Report to the Embassy of Japan (D) Collecting data of weather and estimation Iloilo : (B) Equipment survey (C) Construction survey	Manila Iloilo
11	2/08	Thu.	(∗) Report to JICA (∗) Manila → Narita (A, D) Manila → Iloilo (B) Equipment survey (C) Construction survey	Iloilo

(∗) Official Team　(A) Project Manager/Aquaculture Research Planning　(B) Laboratory Equipment Planning
(C) Architect Planning/Natural Condition Survey　(D) Construction and Procurement Planner

Consultant only

No.	Date		AM / PM	Accommodation
12	2/09	Fri.	AM: (A, C, D) Inspection of improved parts (B) Discussion of equipments PM: (A, D) Collection of fisheries statistic data (B, C) Discussion of improvement and equipment	Iloilo
13	2/10	Sat.	AM: (A, B, C, D) Team Meeting SEF site survey and harbor survey PM: (C, D) Management of natural condition survey	Iloilo
14	2/11	Sun.	AM: Meeting PM: (C, D) Management of natural condition survey (A, B, C, D) Equipment research	Iloilo
15	2/12	Mon.	AM: Adjustment of schedule with SEAFDEC (A) Hearing and survey of drainage disposal (B) Discussion of specification of electron microscope PM: (A) Meeting with the SEAF accountant (B) Reconsideration of equipment priority (C, D) Estimate research in Iloilo	Iloilo
16	2/13	Tue.	AM: (A, B) Hearing from the trainee (C) Research of the generation and electric supply (D) Harbor division in Iloilo (A) Research of financial situation PM: (A, B, C) Confirmation of each laboratory and its improvement (D) Research of Iloilo harbor and marine transportation Completion of natural condition survey	Iloilo
17	2/14	Wed.	AM: (A, C) Confirmation of improvement (B) Discussion of equipment specification (D) Research of land transportation in Iloilo PM: (A, B, C) Confirmation of each laboratory and its improvement (D) Research of land transportation in Iloilo	Iloilo
18	2/15	Thu.	AM: Research of the existing laboratory animal breeding room (A) Hearing of the budget of SEAFDEC/AQD PM: Discussion of isolation facility Preparation for the interim report	Iloilo
19	2/16	Fri.	AM: Submit interim report (A, C) Discussion of the present situation and necessity of the emergency generator (B) Research of the equipment specification (D) Research of accommodation during construction PM: (A, B, C) Discussion of isolation facility : hatching and nursery Discussion of construction schedule (D) Research of the breeding tank manufacturer	Iloilo
20	2/17	Sat.	AM: Team Meeting PM: (A, C) Video research of the improvement of laboratory (B, D) Research of the breeding tank manufacturer	Iloilo
21	2/18	Sun.	AM: (C, D) Iloilo → Manila (A, B) Review of the collected data PM: (A, B) Confirmation of the incomplete survey	Manila Iloilo
22	2/19	Mon.	AM: (A) Survey of the breeding tanks and it's situation Discussion and estimation of the expense of the recipient country (B) Confirmation of the existing equipments (C, D) Estimate research Collecting weather data PM: (A) Discussion and estimation of the expense of the recipient country (B) Confirmation of the facilities and equipment (C) Research of the construction company and collecting weather data	Manila Iloilo
23	2/20	Tue.	AM: (A) University of the Philippines Visayas College of Fisheries (B) Final confirmation of the equipment (C, D) Estimate research PM: Final discussion with SEAFDEC/AQD (C, D) Research of construction in the Philippines	Manila Iloilo

No.	Date		AM	PM	Accommodation
24	2/21	Wed.	AM: (A, B) Iloilo → Manila (C, D) Estimate research Collect estimate from the construction company PM: (A, C, D) Discussion at DA (B) Meeting with the equipment agency		Manila
25	2/22	Thu.	AM: (A, D) Final meeting with the client of the natural condition survey (B) Equipment research (C) Nuclear laboratory PM: (A, D) Report to the Embassy of Japan and JICA (B) Equipment research (C) Construction survey		Manila
26	2/23	Fri.	AM: Review of the collected data PM: Manila → Narita		

(A) Project Manager/Aquaculture Research Planning (B) Laboratory Equipment Planning
(C) Architect Planning/Natural Condition Survey (D) Construction and Procurement Planner

(2) Draft Basic Design Study

No.	Date		Activities	Accommodation
1	5/27	Sun.	(A, B, C) Narita → Manila Manila → Iloilo	Iloilo
2	5/28	Mon.	(L, ∗) Narita → Manila Courtesy call to the Embassy of Japan and JICA Office (A, B, C) Explanation of DB/D Report to SEAFDEC/AQD	Iloilo /Manila
3	5/29	Tue.	(L, ∗) Courtesy call to DA, BFAR and NEDA Explanation of DB/D (A, B, C) Explanation of DB/D Report to SEAFDEC/AQD Discussion of construction equipments and facilities	Iloilo /Manila
4	5/30	Wed.	(L, ∗) Manila → Iloilo (L, ∗, A, B, C) Explanation of DB/D report to SEAFDEC/AQD, BFAR and DA Discussion of construction equipments and facilities	Iloilo
5	5/31	Thu.	(L, ∗, A, B, C) Discussion with SEAFDEC/AQD	Iloilo
6	6/1	Fri.	(L, ∗, A, B, C) SEAFDEC/AQD (Discussion of Minutes of Discussion)	Iloilo
7	6/2	Sat.	(L, ∗) Iloilo → Manila (A, B, C) Research of harbor and central market in Iloilo	Iloilo /Manila
8	6/3	Sun.	(L, ∗) Review of collected data (A, B, C) Consideration of the draft report (L, ∗, A, B, C) Interim meeting	Iloilo /Manila
9	6/4	Mon.	(L, ∗, A) Signing of Minutes of Discussion (B, C) Research of aquaculture (∗) Report to the Embassy of Japan (A, B, C) Report to SEAFDEC/AQD	Iloilo /Manila
10	6/5	Tue.	(L, ∗) Report to JICA Office (∗) Manila → Narita (A, B, C) Confirmation of contents of discussion Iloilo → Manila	Manila
11	6/ 6	Wed.	(L) Manila → Narita (A, B, C) Collection of BFAR data Discussion with DA	Iloilo
12	6/7	Thu.	(A, B, C) Manila → Narita	

(∗) Official Team (JICA:1, FA:1) (L) Team Leader (A) Project Manager/Aquaculture Research Planning
(B) Laboratory Equipment Planning (C) Architect Planning/Natural Condition

Appendices 3　List of Party Concerned in the Recipient Country

Organization and Title	Name
Department of Agriculture : DA	
Undersecretary	Mr. Cesar M. Drilon, JR.
Director, Project Development Service	Ms. Cecilia Q. Astilla
DA/PPRMD : Project Package and Resource Mobilization Division	
Chief, Project Development Service	Ms. Zenaida M. Villegas
PPMRD	Mr. Takahiro Ota (JICA Expert)
PPRMD, Project Development Officer	Ms. Susan V. de Guzman
DA/BFAR	
Director	Mr. Malcom I. Sarmiento, Jr.
Chief, Policy Research and Planning	Ms. Cecilia G. Reyes
Chief, Inland Fisheries and Aquaculture Division	Mr. Nelson A. Lopes
SEAFDEC/AQD	
Chief	Mr. Rolando R. Platon, Ph.D.
Deputy Chief	Mr. S. Ito (JICA Expert)
Head, Research Division	Ms. Clarissa L. Marte, Ph.D.
Fish Disease Expert	Mr. Yasuo Inui, Ph.D. (JICA Expert)
Head, Engineering Section	Mr. Salvador Rex A. Tillo
Head, Budget-Cashiering Section	Ms. Nelda R. Ebron
External Affairs Officer (Manila)	Mr. C.V. Recio
Scientist, Research Division	Ms. Evelyn Grace T. de Jesus, Ph.D.
	Mr. Felix G. Ayson, Ph.D.
	Mr. Leobert D. de la Peña, Ph.D.
	Ms. Ann. Ponce, Ph.D.
	Ms. Maria Rovilla Luhan, Ph.D.
	Ms. Ilda Borlongan, Mas. of Scie.
	Ms. Nerissa Diaz Salayo, Ph.D.
Architect, Engineering Section	Mr. Noli L. Patino
NEDA : National Economic and Development Authority	
Senior Economic Development Specialist	Ms. Rosalina G. Almendral
Department of Finance, Bureau of Customs	
Custom Officer, Iloilo	Ms. Sedy G. Pabiona
University of Philippine , College of Fisheries, Leganes Iloilo	
Blackish Water Aquaculture Center	Prof. Liberato V. Laureta, Ph.D.
Embassy of Japan	
First Secretary (Agriculture)	Mr. Eiji Ueno
JICA Philippines Office	
Resident Representative	Mr. Hideo Ono
Assistant Resident Representative	Mr. Shin Katsumata

Appendices 4　Minutes of Discussion

MINUTES OF DISCUSSIONS
ON
THE BASIC DESIGN STUDY
ON
THE PROJECT FOR
ESTABLISHMENT OF LABORATORY FACILITIES
FOR ADVANCED AQUACULTURE TECHNOLOGIES
IN
THE REPUBLIC OF THE PHILIPPINES

In response to a request from the Government of the Republic of the Philippines (hereinafter referred to as "the Government of the Philippines"), the Government of Japan decided to conduct a Basic Design Study on the project for Establishment of Laboratory Facilities for Advanced Aquaculture Technologies(hereinafter referred to as "the Project") and entrusted the study to the Japan International Cooperation Agency (hereinafter referred to as "JICA").

JICA sent to the Philippines the basic design study team (hereinafter referred to as "the Team"), which is headed by Mr. Akira NAKAMURA, Project Coordination and Monitoring Division, Grant Aid Management Department, JICA, and is scheduled to stay in the country from 29 January to 23 February, 2001.

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

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

Iloilo, 5 February, 2001

Akira NAKAMURA
Leader
Basic Design Study Team
JICA

Cesar M. DRILON, JR.
Undersecretary, Department of Agriculture
SEAFDEC Council Director for the
Philippines

Witnessed by

Malcolm I. SARMIENTO, JR.
Director
Bureau of Fisheries and
Aquatic Resources

Rolando R. PLATON
Department Chief
Aquaculture Department of the Southeast
Asian Fisheries Development Center

ATTACHMENT

1. **Objective**

The objective of the Project is to improve and enhance the research activities in the field of aquaculturethrough improvement of the laboratory facilities and supply of appropriate research equipment.

2. **Project Site**

The site of the Project is at Tigbauan Main Station of Aquaculture Department of the Southeast Asian Fisheries Development Center (SEAFDEC/AQD) in Iloilo as shown in Annex-1.

3. **Responsible and Implementing Agency**

(1) The Responsible Agency is the Department of Agriculture (DA)

(2) The Implementing Agencies are the Bureau of Fisheries and Aquatic Resources (BFAR) and SEAFDEC/AQD.

4. **Items requested by the Government of the Philippines**

After discussions with the Team, the items described in Annex-2.1, 2.2, 2.3 ,2.4, and -3 were finally requested by the Philippine side. JICA will assess the appropriateness of the request and will recommend to the Government of Japan for approval.

(1) The facility plan are presented in Annex-2.1, 2.2, 2.3, 2.4.
- 2.1 : Renovation of the 2nd floor of existing Nutrition Building.
- 2.2 : Construction of Enclosed Wet Laboratory (formerly "Contained Aquarium")
- 2.3 : Construction of Radio Isotope Laboratory
- 2.4 : Renovation for Microalgae Laboratory

(2) The equipment list is presented in Annex-3.

However, final components of the Project will be decided after further study.

5. **Japan's Grant Aid Scheme**

5-1. The Philippine side has understood the Japan's Grant Aid Scheme explained by the Team, as described in Annex-4.

5-2. The Philippine side will undertake the necessary measures, as described in Annex-5, for smooth implementation of the Project, as a condition for the Japanese Grant Aid to be implemented.

6. **Schedule of the Study**

6-1. The consultants will proceed with further works in the Philippines until 22 February, 2001.

6-2. JICA will prepare the draft report in English and will dispatch a mission around May, 2001 to explain its contents.

6-3. In case the contents of the report is accepted in principle by the Government of the Philippines, JICA will complete the final report and send it to the Government of the Philippines by August, 2001.

7. **Other relevant issues**

Both parties have clarified the following ;

7-1. By virtue of the territorial jurisdiction of the host government for SEAFDEC/AQD, the Government of the Philippines retains ownership of the land, buildings and other fixed assets.

7-2. The Government of the Philippines represented by DA will have the ownership of equipment and facilities which will be provided under the Grant Aid.

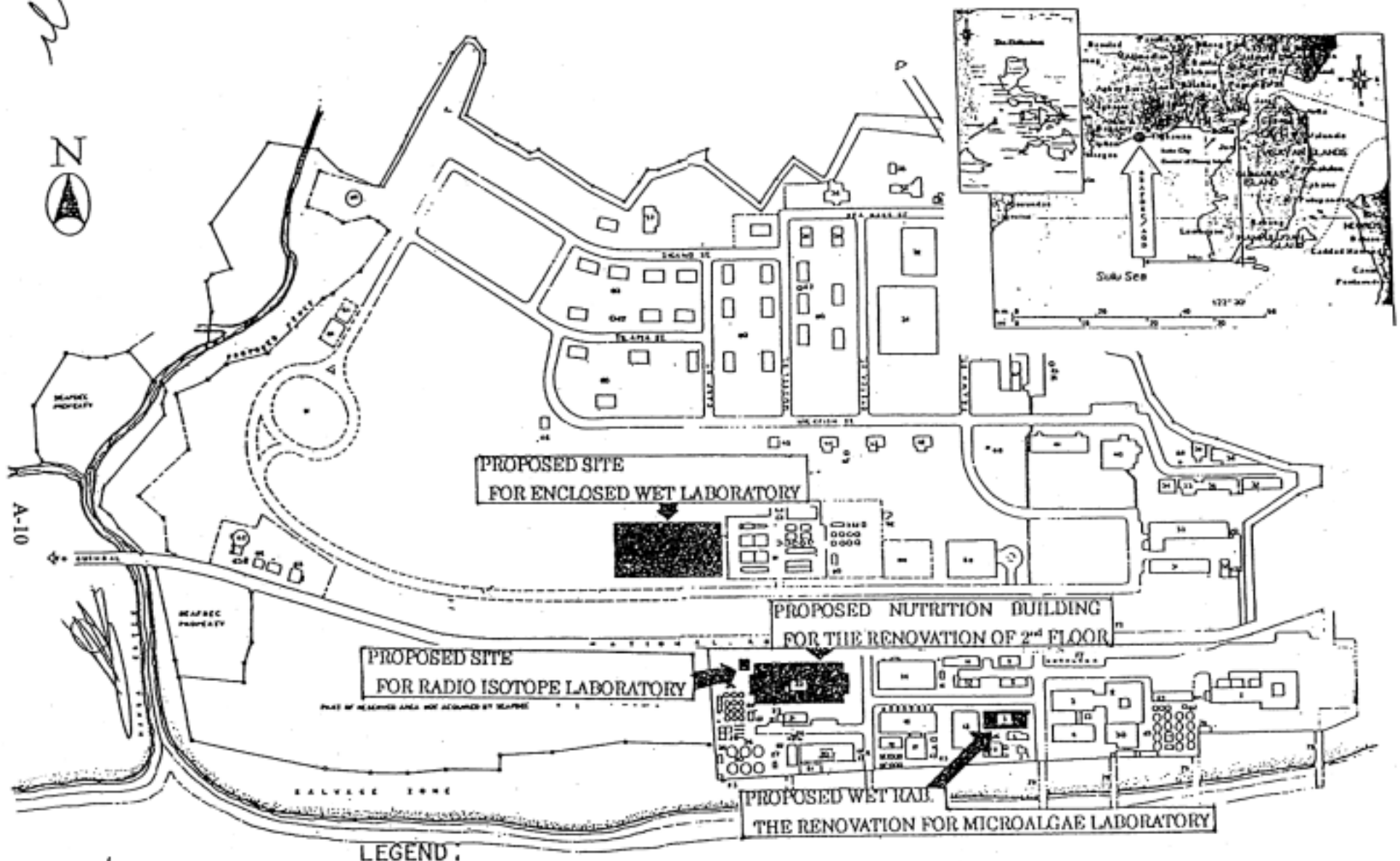
7-3. BFAR and SEAFDEC/AQD shall jointly implement related research activities consistent with Fisheries Development Plan maximizing the utilization of the facilities and equipment provided by the Grant Aid.

7-4. The Philippine side will secure the necessary budget and personnel for implementation of the Project and for operation/maintenance of the equipment and facilities.

7-5. DA is responsible for the arrangement of Value-Added Tax (VAT) imposed on Japanese Nationals with respect to the payment carried out for and the income accruing from the supply of the products and services under verified contract.

7-6. The Philippine side understands that in case the approval of Investment Coordination Committee (ICC) is necessary for the Project, DA and other relevant agencies will take the necessary measures timely to prepare and deliver the requirements for ICC (including ECC, if necessary).

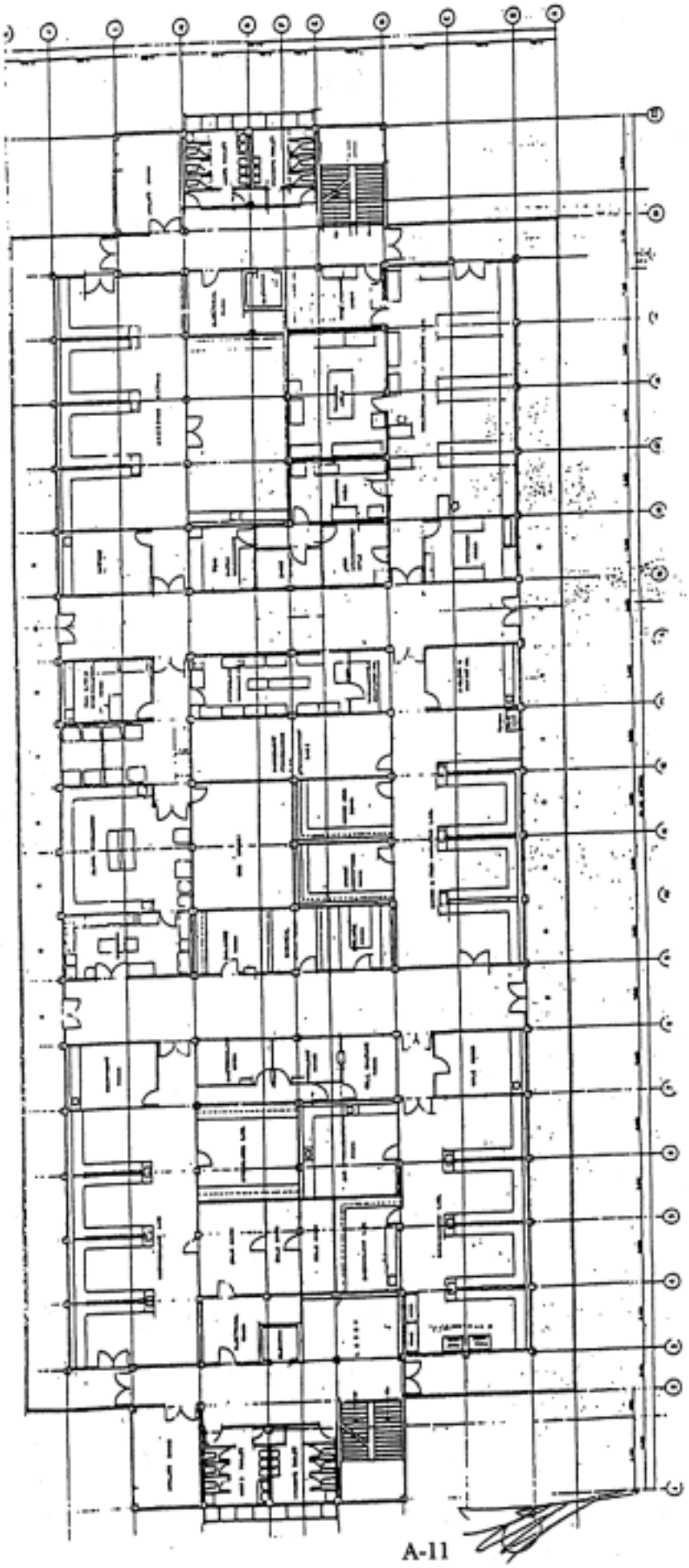
7-7. The Philippine side explained that the requested renovation of the 2nd floor of the existing Nutrition building by Japanese side meant 1) provision of stable power supply, 2) air-tightness, 3) air-conditioning, 4) ventilation and 5) flooring for each laboratory. The Philippine side explained that these works were indispensable to operate and maintain the equipment under the appropriate condition.



LOCATION AND SITE MAP

ANNEX-1

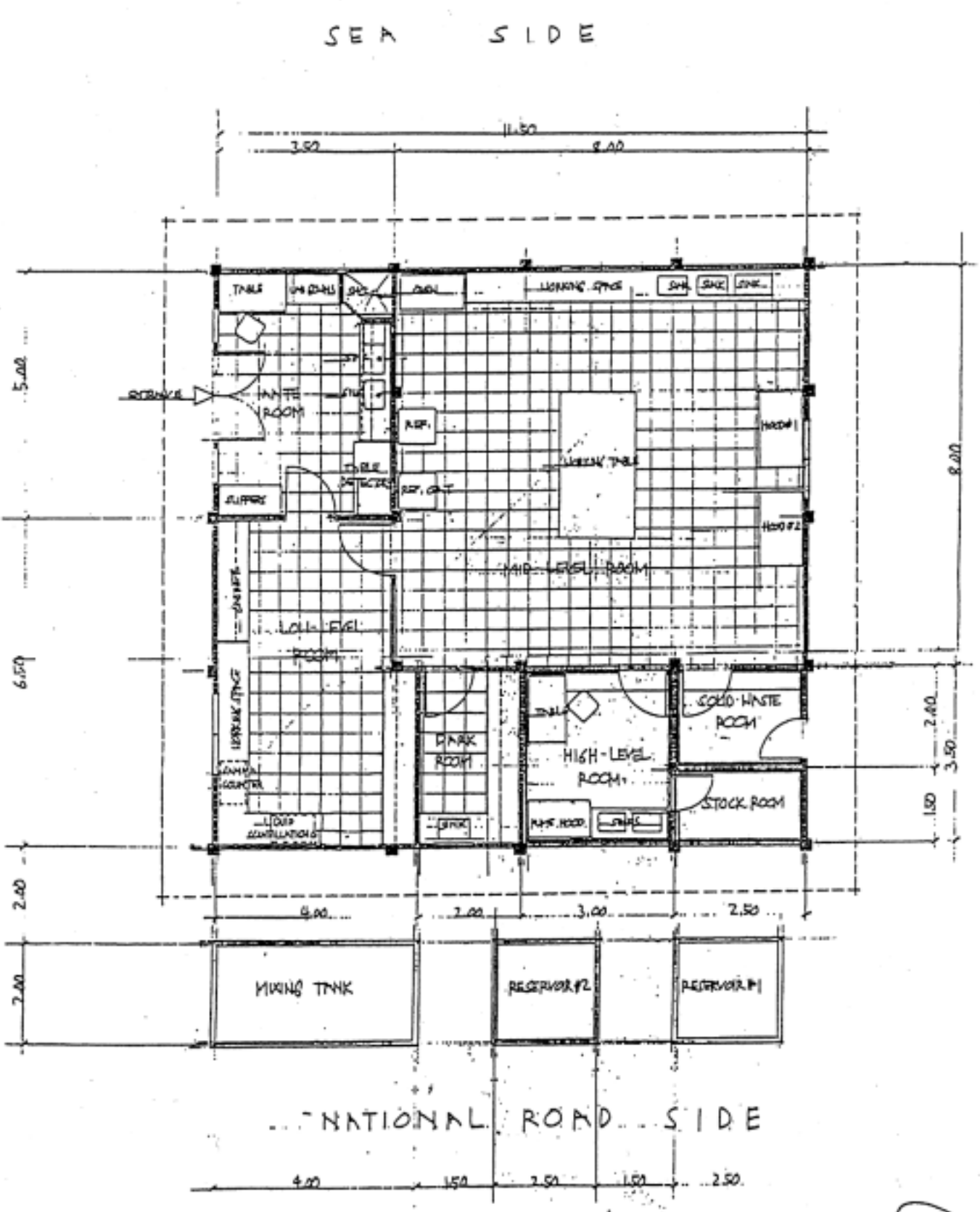
ANNEX-2.1



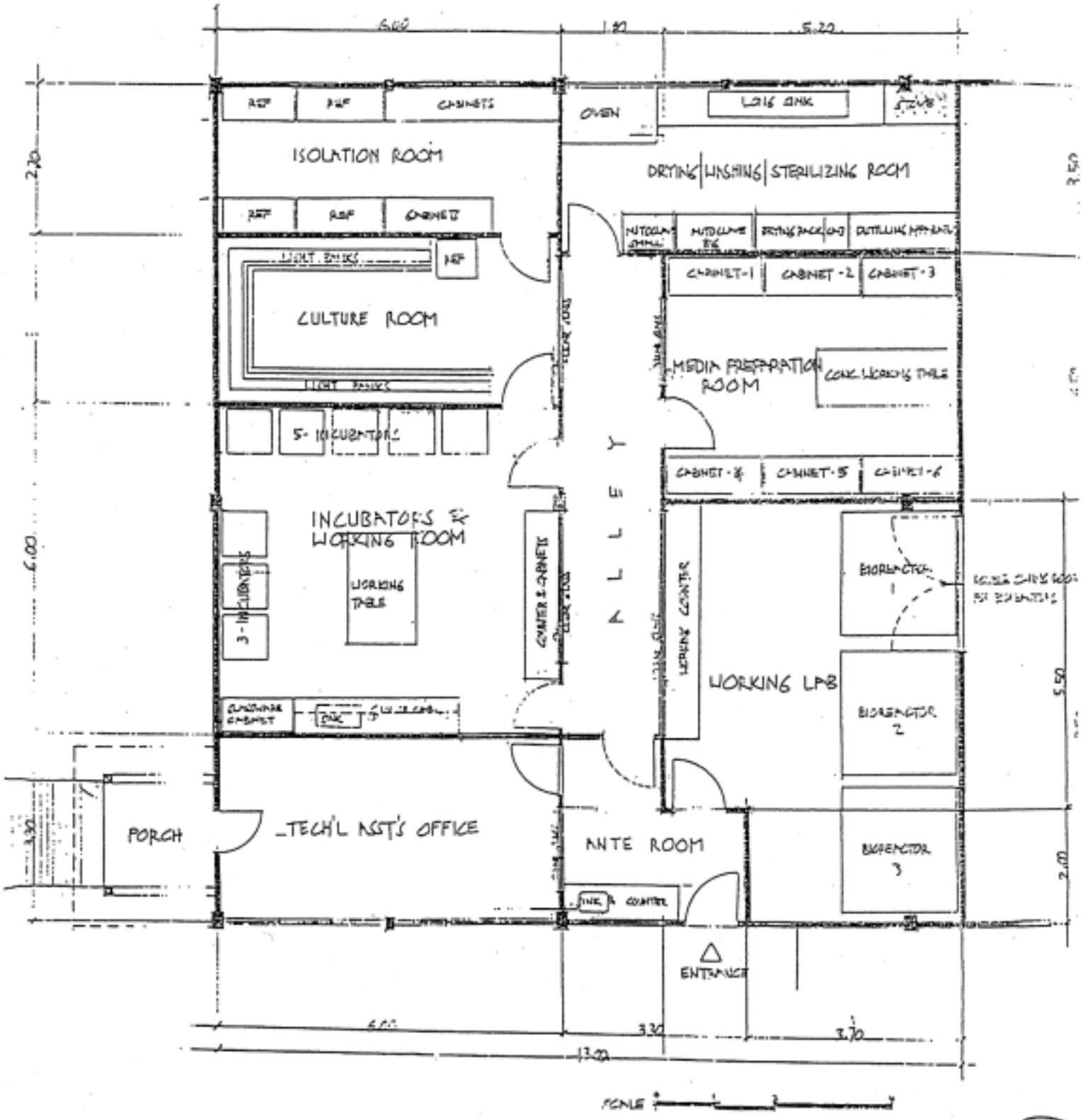
RENOVATION PLAN FOR 2ND FLOOR OF NUTRITION BLDG.

ANNEX-2.2

PLAN OF ENCLOSED WET LABORATORY



PLAN OF RADIO ISOTOPE LABORATORY



RENOVATION PLAN FOR MICROALGAE LABORATORY

EQUIPMENT PLAN

Number	Equipment	Total	Quantity								Remarks
			ME &GEN		MM		AB		FFT		RI		
							SW		MA				
			P	Units	P	Units	P	Units	P	Units	P	Units	
1	Air blower	1					C	(1)					
2	Air shower	1			A	(1)							
3	Amino acid sequencer	1	C	(1)									
4	Apirator Pump	5	A	(1)			B	(1)	B	(1)		A	(2)
5	Autoclave (big)	6	A	(1)			A	(1)	A	(2)	A (2)		
6	Autoclave small	2					B	(1)	B	(1)			
7	Balance Analytical	5	A	(1)			A	(1)	A	(1)	A (2)		
8	Balance Field	4	A	(1)			B	(1)			A (2)		
9	Balance Toploading 12kg	1					C	(1)					
10	Balance Toploading 3kg	2					A	(1)	A	(1)			
11	Balance, Microbalance	2	B	(1)							A (1)		
12	Bioreactor	5	B	(1)					B	(4)			
13	Biorotator	1			B	(1)							
14	Block Heater	2	A	(1)	A	(1)							
15	Bottle Top Dispenser	5									B (5)		
16	Cabinets	15					A	(8)	A	(7)			
17	Carbon coator	1			A	(1)							for TEM
18	Carts	9					C	(1)	C	(1)	B (5)	A	(2)
19	Carts with jack	1					C	(1)					
20	Centrifuge (Micro Refrigerated)	1	A	(1)									
21	Centrifuge (Refrigerated)	3	A	(1)							A (1)	A	(1)
22	Centrifuge, Refrigerated (750 ml)	1							B	(1)			
23	Chemical cabinets	4									B (4)		
24	Chromatography refrigerator	4					A	(1)	A	(2)	A (1)		
25	Chromatography set-up	1									A (1)		
26	Clean bench	1									A (1)		
27	Clean Bench (Biological Safety)	1	A	(1)									
28	CO2 Incubator	18			C	(1)	A	(8)	A	(8)		A	(1)
29	Cold Cabinet	3	A	(1)							A (1)	A	(1)
30	Computer	6					C	(1)	C	(1)	A (4)		
31	Concentrator, Vacufuge	3	A	(1)							A (1)	A	(1)
32	Cooling blocks	1	A	(1)									
33	Critical point dryer	1			B	(1)							for SEM
34	Dehumidifier	2			B	(2)							for SEM

Number	Equipment	Total	Quantity						Remarks
			ME &GEN	MM	AB		FFT	RI	
35	Dessicator Cabinet	1					B (1)		
36	Dessicator Jar	2					B (2)		
37	Dessicater Vacum	1					B (1)		
38	Dessicator, Electronic	2		A (2)					
39	Dewar Flask	1					B (1)		
40	Distilling Apparatus	3	C (1)		A (1)		B (1)		
41	DNA/RNA Sequencer	1	A (1)						
42	DO meter	1			A (1)				
43	Dot blot system	1	A (1)						
44	Drum dryer	1					B (1)		
45	Dryer, Freeze dryer	3	A (1)	B (1)			A (1)		
		1					B (1)		
46	Electrophoresis for DNA	12	A (10)		A (2)				MINI-GEL
47	Electrophoresis for SDS-Page	3	A (2)				A (1)		
48	ELISA plate reader	1		B (1)					
49	Feed extruder or extrusion machine	1					B (1)		
50	Fermentation equipment	1					A (1)		
51	Fiber Optic Illuminator	3		B (1)	A (1)	A (1)			
52	FPLC system	1	A (1)						
53	Fraction Collector	2			A (1)		A (1)		
54	Freezer, -150℃	1			A (1)				
55	Freezer, -40℃	2	A (1)					A (1)	
56	Freezer, -85℃	3	A (1)		B (1)	B (1)			
57	FT Infrared Spectrometer	1			A (1)				
58	Fume Hood	5					A (3)	A (2)	
59	Gamma Counter	1						A (1)	
60	Gas analyzer	1			C (1)				
61	Gas Chromatograph	1			A (1)				with gas electron capture detector
62	Gas Chromatograph (GC-MS)						C (1)		mass spectrometer
63	Gel drying system	1	A (1)						
64	Gel filtration (macro)	1			A (1)				
65	Gel filtration (ultra)	1			A (1)				
66	Gel filtration columns	3	A (3)						
67	Gel transfer system	2	A (1)				A (1)		
68	Gel transfer system (mini-transblot)	1	A (1)						
69	Glass knife maker	1		A (1)					For TEM
70	Homogenizer	2	A (1)				A (1)		

Number	Equipment	Total	Quantity								Remarks
			ME &GEN	MM	AB		PFT	RI			
71	Hot Plate/Stirrer	6	A (2)		C (1)		A (1)	A (2)			
72	HPLC	4	A (1)		B (1)		A (1)	C (1)			
73	Hybridization oven	3	A (1)	A (1)				A (1)			
74	Hydrolab, multiple probe	1			A (1)						
75	Latroscan	1					A (1)				
76	Image Analyzer	1			A (1)						
77	Incubator ,low temperature	1		A (1)							
78	Incubator (hot air)	1					A (1)				
79	Incubator (temperature gradient)	1					B (1)				
80	Incubator (without shaker)	1	A (1)								
81	Incubator (with shaker)	2	A (1)				B (1)				
82	Iron sputter	1		B (1)							For SEM
83	Isolation Hood	4		A (3)			A (1)				
84	Isotope Detector	2						A (2)			
85	Laminar flow cabinet	4			A (2)	A (2)					
86	Laser scanner	1	A (1)								
87	Light meter w/ data logger & PC atta	1			A (1)						
88	Liquid Scintillation Counter	1						A (1)			
89	Micro filtration set-up	1					A (1)				
90	Microinjection Work Station	1	C (1)								
91	Microscope Brightfield	2		A (2)							
92	Microscope Camera system	3		A (3)							Atachment
93	Microscope Inverted	1		A (1)							
94	Microscope, Flouresecence	1		A (1)							
95	Microscope, with video camera system	2		A (1)	A (1)						
96	Microscope with phase contract	2		A (1)		A (1)					
97	Monitor for Atomic absoration spect.	1					A (1)				Only monitor
98	Nuclear Magnetic Resonance spec.	1			B (1)						
99	Orbital shaker	3		A (1)			A (1)	A (1)			
100	Oven (general purpose)	4			A (1)	A (1)	A (1)	A (1)			
101	Oven, microwave	4	A (1)		A (1)	A (1)	B (1)				
102	Oven, small	2			B (1)	B (1)					
103	Oven, Vacuum Drying	1					A (1)				
104	Ozone generator	1				A (1)					
105	pH Meter	4	A (1)		A (1)	A (1)	A (1)				
106	Photodocumentation System	1	A (1)								
107	Pipete, eight channel pipettor	2		A (2)							

Numbe	Equipment	Total	Quantity						Remarks
			ME &GEN	MM	AB		FFT	RI	
108	Pipette 20 ul	6	A (3)		A (1)			A (2)	
109	Pipette 5 ml	2						A (2)	
110	Pipette 2.5 ul	3	A (2)					A (1)	
111	Pipette 200 ul	6	A (3)		A (1)			A (2)	
112	Pipette 1000 ul	6	A (3)		A (1)			A (2)	
113	Pipette repeater	2						A (2)	
114	Plastic sealer	1						A (1)	
115	Peristaltic pump	3	A (3)						
116	Refrigerator, standard (10ft3)	1	A (1)						
117	Refrigerator, two door	2			A (1)	A (1)			
118	Rotary evaporator	2			A (1)	A (1)			
119	Safety shower station	1		A (1)					
120	Scanning Electron Microscope	1		A (1)					
121	Shower	1						A (1)	
122	Spectrophotometer	2	A (1)		A (1)				
123	Spectrophotometer UV-VIS	1					A (1)		with recorder
124	Spectrophotometer, fluorescence	1					A (1)		
125	Stereo Microscope	7	A (3)	A (2)	A (1)	A (1)			
126	Support jack	2			C (2)				
127	TEM	1		A (1)					
128	Thermal Cycler	2	A (1)	A (1)					
129	Thermomixer	1		A (1)					
130	Tool Kit	1		A (1)					
131	Ultra Microtome	1		A (1)					For TEM
132	Ultrafiltration apparatus	1	A (1)						
133	Ultrasonic Cleaner	3	A (1)	A (1)			A (1)		
134	Ultrasonic disintegrator	1					A (1)		
135	UPS	6	A	A	A	A	A	A	Each labo.
136	UV Crosslinker	1	A (1)						
137	UV Sterilizer	1					A (1)		
138	UV sterilizer for water	6		A (6)					
139	Vacuum pump	1			A (1)				
140	Viscosity meter	1			B (1)				

Number	Equipment	Total	Quantity								Remarks
			ME &GEN	MM	AB				FFT	RI	
141	Vortex Mixer	10	A (3)		C (1)	C (1)			A (3)	A (2)	
142	Water Bath	5	A (3)		A (1)				A (1)		
143	Water Bath with shaker	3							A (1)	A (2)	
144	Water Purification System	2	A (1)						B (1)		
145	Working table	14			A (8)	A (3)			B (3)		

Note

Legend:

P - priority :

A - indispensable

B - useful if available or old unit available but needs replacement

C - not for immediate use

Laboratories:

ME - Molecular Endocrinology

GEN - Genetics

AB - Algal biotechnology

MM - Molecular Microbiology

FFT -Fish Feed Technology

RI - Radioisotope Laboratory

Japan's Grant Aid Scheme

1. Japan's Grant Aid Procedures

(1) The Japan's Grant Aid Program is executed by the following procedures.
Application (Request made by a recipient country)
Study (Preparatory Study / Basic Design Study conducted by JICA)
Appraisal & Approval (Appraisal by the Government of Japan and Approval by the Cabinet of Japan)
Determination of Implementation (Exchange of Notes between the both Governments)
Implementation (Implementation of the Project)

(2) Firstly, an application or a request for a project made by the recipient country is examined by the Government of Japan (the Ministry of Foreign Affairs) to see whether or not it is suitable for Japan's Grand Aid. If the request is deemed suitable, the Government of Japan entrusts a study on the request to JICA (Japan International Cooperation Agency).

Secondly, JICA conducts the Study (Basic Design Study), using a Japanese consulting firm. If the background and objective of the requested project are not clear, a Preparatory Study is conducted prior to a Basic Design Study.

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

Fourthly, the Project approved by the Cabinet becomes official when pledged by the Exchange of Notes signed by the both Governments.

Finally, for the implementation of the Project, JICA assists the recipient country in preparing contracts and so on.

2. Contents of the Study

(1) Contents of the Study
The purpose of the Study (Preparatory Study/Basic Design Study) conducted on a project requested by JICA is to provide a basic document necessary for appraisal of the project by the Japanese Government. The contents of the Study are as follows;

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

for project implementation,

b) to evaluate appropriateness of the Project for the Grant Aid Scheme from a technical, social and economical point of view,

c) to confirm items agreed on by the both parties concerning a basic concept of the project,

d) to prepare a basic design of the project,

e) to estimate cost involved in the project.

Final project components are subject to approval by the Government of Japan and therefore may differ from an original request.

Implementing the project, the Government of Japan requests the recipient country to take necessary measures involved which are itemized on Exchange of Notes.

(2) Selecting (a) Consulting Firm(s)

For smooth implementation of the study, JICA uses (a) consulting firm(s) registered. JICA selects (a) firm(s) through proposals submitted by firms which are interested. The firm(s) selected carry(ies) out a Basic Design Study and write(s) a report, based upon terms of reference made by JICA.

The consulting firm(s) used for the study is (are) recommended by JICA to a recipient country after Exchange of Notes, in order to maintain technical consistency.

(3) Status of a Preparatory Study in the Grant Aid Program

A Preparatory Study is conducted during the second step of a project formulation & preparation as mentioned above.

A result of the study will be utilized in Japan to decide if the Project is to be suitable for a Basic Design Study

Based on the result of the Basic Design Study, the Government would proceed to the stage of decision making process(appraisal and approval) .

It is important to notice that at the stage of Preparatory Study, no commitment is made by the Japanese side concerning the realization of the Project in the scheme of Grant Aid Program.

3. Japan's Grant Aid Scheme

(1) What is Grant Aid?

The Grant Aid Program provides a recipient country with non reimbursable funds needed to procure facilities, equipment and services for economic and social development of the country under the following principles in accordance with relevant laws and regulations of Japan. The Grant Aid is not in a form of donation or such.

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

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

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

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

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

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

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

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

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

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

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

(7) Proper Use

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

(8) Re-export

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

(9) Banking Arrangement (B/A)

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

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

Major Undertakings to be taken by Each Government

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 roads		
	1) Within the site	●	
	2) Outside the site		●
5	To construct the building	●	
6	To provide facilities for the distribution of electricity, water supply, drainage and other incidental facilities		
	1)Electricity		
	a.The distributing line to the site		●
	b.The drop wiring and internal wiring within the site	●	
	c.The 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/or elevated tanks)	●	
	3)Sea Water Supply		
	a.Sea water distribution main to the site		●
	b.The supply system within the site	●	
	4)Drainage		
	a.The city drainage main (for storm, sewer and others) to the site		●
	b.The drainage system (for toilet sewer, ordinary waste, storm drainage and others) within the site	●	
	5)Gas Supply		
	a.The city gas main to the site		●
	b.The gas supply system within the site	(●)	(●)
	6)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	●	
	7)Furniture and Equipment		
	a.General furniture		●
	b.Project equipment	●	
7	To bear the following commissions to a bank of Japan for the banking services based upon the B / A		
	1) Advising commission of A / P		●
	2) Payment commission		●
8	To ensure prompt unloading and customs clearance at the port of disembarkation in recipient country		
	1) Marine(Air) transportation of the products from Japan to the recipient country	●	
	2) Tax exemption and customs clearance of the products at the port of disembarkation		●
	3) Internal transportation from the port of disembarkation to the project site	(●)	(●)

9	To accord Japanese nationals whose services maybe required in connection with the supply of the products and the services under the verified contract such facilities as maybe necessary for their entry into the recipient country and stay therein for the performance of their work		●
10	To exemptJapanese nationals fromcustomsduties, internal taxes and other fiscal levies which maybe imposedin the recipient country with respect to the supply of the products and services under the verified contract		●
11	To maintain and use properly and effectively the facilities constructed and equipmentprovided under the Grant Aid		●
12	To bear all the expenses, other than those to be borne by the Grant Aid, necessary for construction of the facilities as well as for the transportation and installation of the equipment		●

MINUTES OF DISCUSSIONS
ON
THE BASIC DESIGN STUDY
ON
THE PROJECT FOR
ESTABLISHMENT OF LABORATORY FACILITIES
FOR ADVANCED AQUACULTURE TECHNOLOGIES
IN
THE REPUBLIC OF THE PHILIPPINES
(EXPLANATION ON DRAFT REPORT)

In January 2001, the Japan International Cooperation Agency (JICA) dispatched a Basic Design Study Team on the project for Establishment of Laboratory Facilities for Advanced Aquaculture Technologies (hereinafter referred to as "the Project") to the Republic of the Philippines (hereinafter referred to as "Philippines"), and through discussions, site surveys, and technical examination of the results in Japan, JICA prepared the draft report of the study.

In order to explain and to consult the Philippine side on the components of the draft report, JICA sent to the Philippines the Draft Report Explanation Team (hereinafter referred to as "the Team"), headed by Mr. Akira NAKAMURA, Deputy Director, Project Coordination and Monitoring Division, Grant Aid Management Department, JICA, from May 28 to June 5, 2001.

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

Manila, June 4, 2001

Akira NAKAMURA
Leader, Draft Report Explanation Team
JICA

Cesar M. DRILON, JR.
Undersecretary, Department of Agriculture
SEAFDEC Council Director for the Philippines

Witnessed by

Malcolm I. SARMIENTO, JR.
Director
Bureau of Fisheries and Aquatic Resources

Rolando R. PLATON
Department Chief
Aquaculture Department of the
Aquaculture Department of the Southeast Asian
Fisheries Development Center

ATTACHMENT

1. Components of the Draft Report

   The Philippine side agreed and accepted in principle the components of the draft report as explained by the Team.

2. Japan's Grant Aid System

   The Philippine side understood the Japan's Grant Aid Scheme and the necessary measures to be taken by the Government of the Philippines as explained by the Team and described in Annex 4 and 5 of the Minutes of Discussions signed by both parties on February 5, 2001.

3. Schedule of the Study

   JICA will complete the final report in accordance with the confirmed items and send it to the Government of the Philippines around August, 2001.

4. Other Relevant Issues

   4-1. By the virtue of the territorial jurisdiction of the host government for SEAFDEC/AQD, the Government of the Philippines retains ownership of the land, buildings and other fixed assets.

   4-2. The Government of the Philippines represented by The Department of Agriculture (DA) will have the ownership of equipment and facilities which will be provided under the Grant Aid.

   4-3. The Philippine side accepted the exclusion of the following components from the scope of the Project.

   (1) Construction of the Radio Isotope Laboratory,
   (2) Renovation of the Microalgae Laboratory, and
   (3) Construction of the Animal House.

   4-4. The Philippine side will secure the necessary budget and personnel for implementation of the Project and for operation/maintenance of the equipment and facilities.

4-5. DA is responsible for the arrangement of Value-Added Tax (VAT) imposed on Japanese Nationals with respect to the payment carried out for and the income accruing from the supply of the products and services under the verified contract. DA will coordinate with Department of Budget and Management for the release of VAT payment to be provided under Section 13 of the General Provisions or the Foreign-Assisted Projects Support Fund of the 2002 General Appropriations Act.

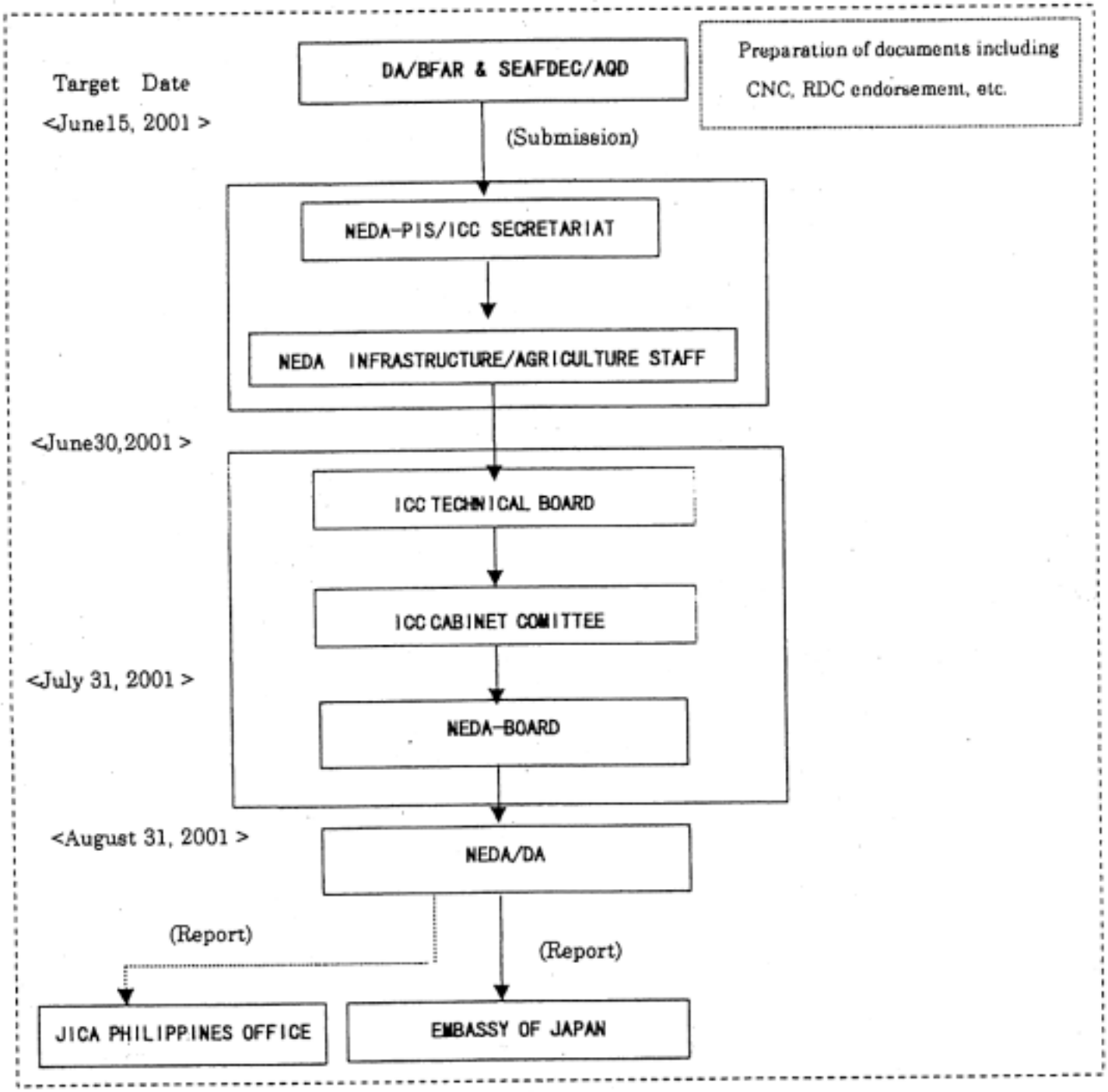
4-6. The Philippine side understood that DA and other relevant agencies would take the necessary measures immediately to prepare and deliver the requirements for Investment Coordinating Committee (ICC) (including Certificate of Non Coverage and endorsement from the Regional Development Council) following the schedule in ANNEX-1.

4-7. Both sides confirmed that the following matters are required to be executed by the Philippine side prior to the commencement of the renovation/construction work of the Project.

(1) to secure and level the site of the Enclosed Wet Laboratory,
(2) to install electric power to the site of the Enclosed Wet Laboratory,
(3) to secure an access road to the site,
(4) to introduce water distribution pipe to the site, and
(5) to prepare a temporary laboratory space for the replacement of laboratory room during construction term of the nutrition building.

ANNEX-1

WORK PROCESS FLOW FOR APPROVAL OF ICC



ICC :INVESTMENT COORDINATING COMMITTEE

NEDA :NATIONAL ECONOMIC AND DEVELOPMENT AUTHORITY

DA/BFAR :DEPARTMENT OF AGRICULTURE/BUREAU OF FISHERIES AND AQUATIC RESOURCES

PIS :PUBLIC INVESTMENT STAFF

CNC :CERTIFICATE OF NON COVERAGE

RDC : REGIONAL DEVELOPMENT COUNCIL

SEAFDEC/AQD :SOUTHEAST ASIAN FISHERIES DEVELOPMENT CENTER/AQUACULTURE DEPARTMENT

AMENDMENT OF
MEMORANDUM OF AGREEMENT
For the Establishment of Laboratory Facilities for Advanced Aquaculture Technologies dated July 1, 1999 by and between the SEAFDEC and the Department of Agriculture

This Amendment to the above-captioned Memorandum of Agreement by and between:

The Southeast Asian Fisheries Development Center, Aquaculture Department (hereinafter to as SEAFDEC/AQD) with offices at Tigbauan, Iloilo and herein represented by its Chief, **ROLANDO R. PLATON,**

and

The Department Of Agriculture (hereinafter referred to as DA) an agency of the Philippine Government with offices at Elliptical Road, Diliman, Quezon City and herein represented by its Secretary, **LEONARDO Q. MONTEMAYOR,**

WITNESSETH

WHEREAS, Article III on Ownership, of the original of the above-captioned Memorandum of Agreement provides as follows:

1. All movable assets (e.g. equipment, materials and supplies, furniture, etc.) utilized within the proposed Laboratory Facilities for Advance Aquaculture Technologies shall be considered assets of SEAFDEC/AQD,

2. All fixed assets (e.g. buildings, equipment, improvements, etc.) shall become the property of the SEAFDEC/AQD at the expiration of this Agreement.

3. The land where the facilities are located shall remain as property of SEAFDEC/AQD.

WHEREAS, SEAFDEC/AQD and DA agree to amend the foregoing articles on ownership;

NOW, THEREFORE for and in consideration of the aforementioned premises, SEAFDEC/AQD and the DA mutually agree to amend the said article as follows:

ARTICLE III. OWNERSHIP

All movable assets (e.g. equipment, materials and supplies, furniture, etc.) and fixed assets (e.g., buildings, equipment, etc.) provided under the proposed Laboratory Facilities for Advanced Aquaculture Technologies shall be considered assets of DA.

Article I, II, IV and V of the original Memorandum of Agreement shall remain as is and the same (MOA) shall form an integral part of this Amendment.

This Amendment to the above-captioned memorandum of agreement shall take effect upon the signing thereof by both parties.

IN WITNESS WHEREOF the parties affix their signature this day of May 2001.

LEONARDO Q. MONTEMAYOR
Secretary
Department of Agriculture

ROLANDO R. PLATON
Chief
SEAFDEC/AQD

WITNESS:

CESAR M. DRILON, JR.
Undersecretary for Fisheries
Department of Agriculture

CLARISSA L. MARTE
Head, Research Division
SEAFDEC/AQD

Appendices 5　Cost Estimation Borne by the Recipient Country

Items	Unit	Unit Price	Amount (1,000)	
		Ph. Peso	Ph. Peso	Japanese Yen
Enclosed Wet Laboratory			*(5,340)*	*(13,777)*
Levelling Sites	3400 m^2	150	510	1,316
Construction of access road	110 m	18,000	1,980	5,108
Intake of seawater	Complete	1,050,000	1,050	2,709
Intake of freshwater	Complete	50,000	50	129
Drainageway to sit	100 m	5,000	500	1,290
Electric wiring to site	Complete	450,000	450	1,161
Telephone wiring	Complete	200,000	200	516
Fence	240 m	2,500	600	1,548
Nutrition Building			*(3,000)*	*(7,440)*
Renovation of 3rd floor office	Complete	3,000,000	3,000	7,440
Others			*(22,681)*	*(58,517)*
Banking commission, etc.			400	1,032
VAT (10%)				
VAT for the total cost of Construction works			22,010	56,786
VAT for the total cost of local installation engineers			271	699
Total			**31,021**	**80,034**

(Note) Exchanging rate (Average rate of the latest 6months, August 2001)

Ph.Peso 1 .00＝2.58 J.Yen　　USD1.00＝47.50 peso

Appendices 6　Result of Survey Data

II. RESULTS OF TEST

Data were plotted on settlement vs. time and settlement vs. pressure graph. Load test follows ASTM D1194 procedure for static load test for footing. Results of the test are as follows:

LOAD TEST NO.	MAX. PRESSURE ($tons/m^2$)	SETTLEMENT (mm)
PLT-1A	30.482	4.35
PLT-1B	30.482	5.25
PLT-2A	30.482	3.83
PLT-2B	30.482	6.01

DIOSDADO A. UREÑA C.E.
General Manager

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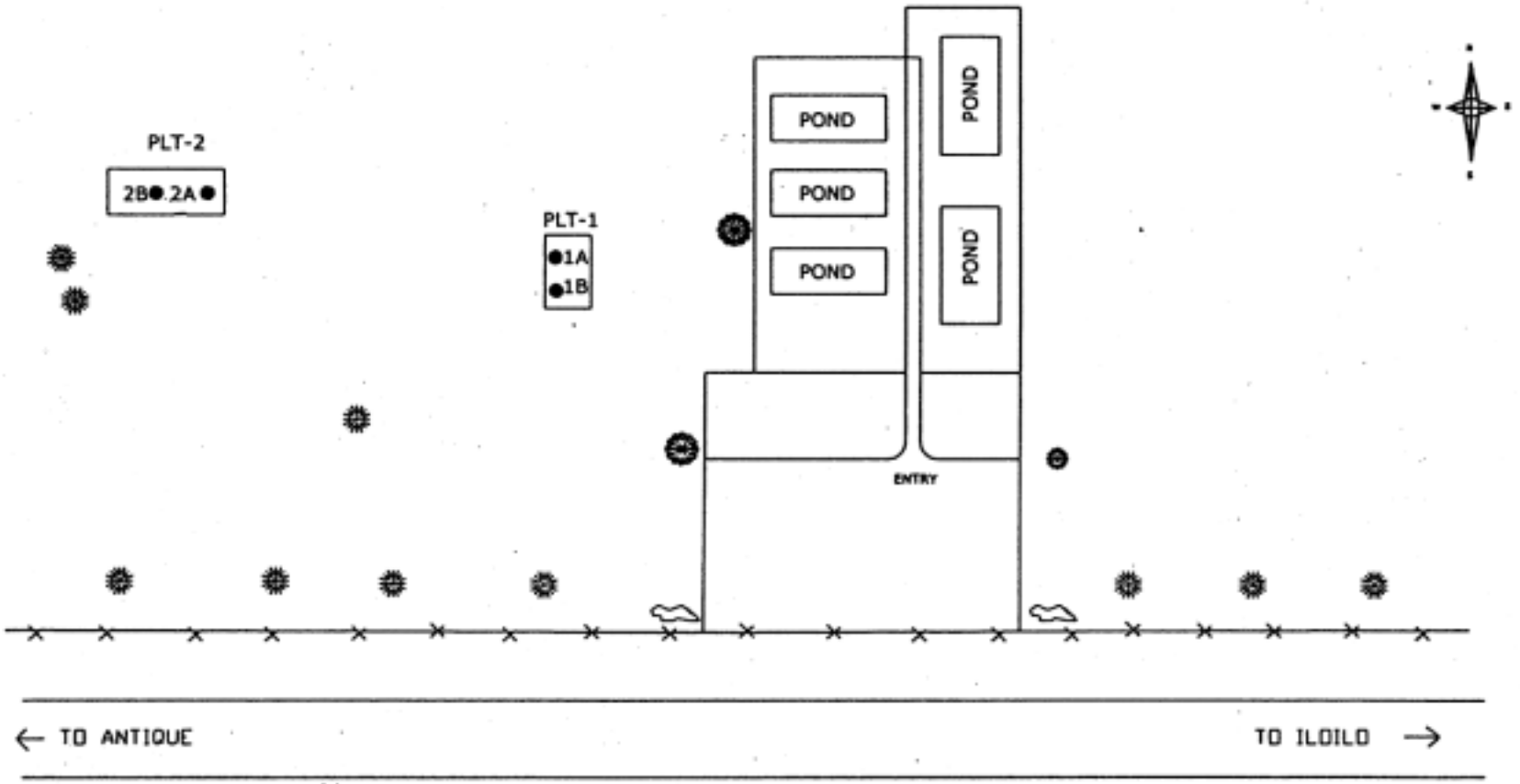

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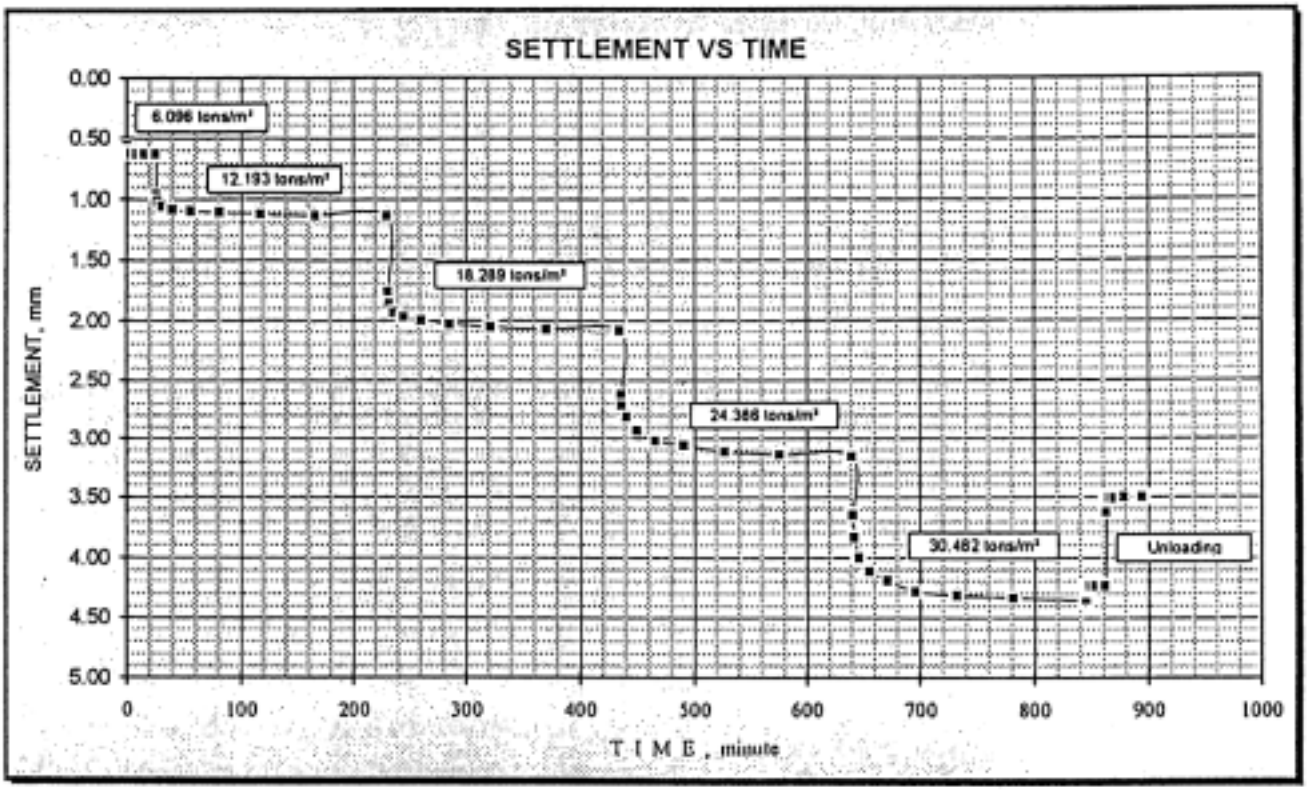
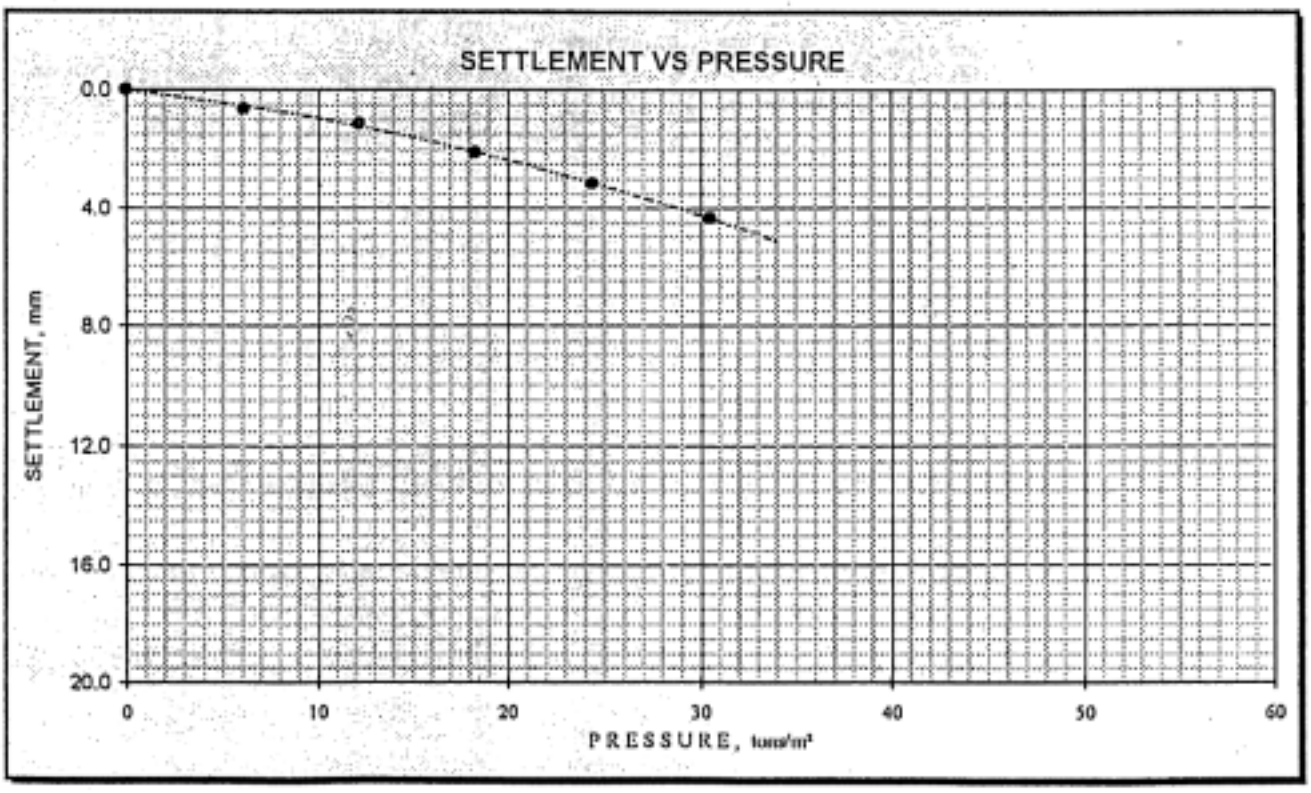
GEOTECHNICS PHILIPPINES, INC. 119 Sauyo Road, Novaliches, Quezon City	PROJECT TITLE PROPOSED SEAFDEC/AQD LABORATORY TIGBAUAN, ILOILO	CERTIFIED BY DAMASINO ANTIQUA JR. PROJECT SUPERVISOR EMILIO T. REBAYA GROUP MANAGER	ELIZABETH G. MERCADO LABORATORY MANAGER MA. ALICIA BARCELONA-ATOY QUALITY CONTROL MANAGER	SHEET NO. 1/1
	SHEET CONTENTS PLATE LOAD LOCATION PLAN			





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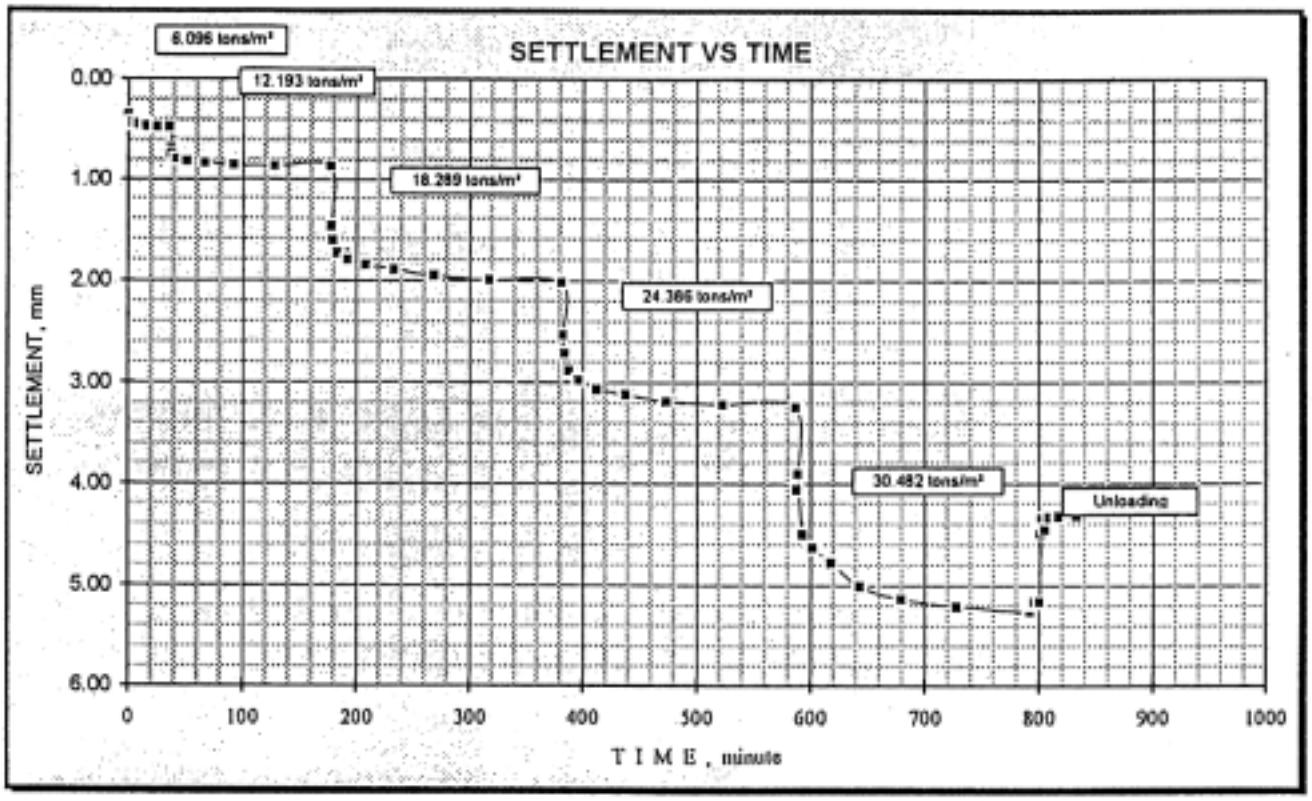

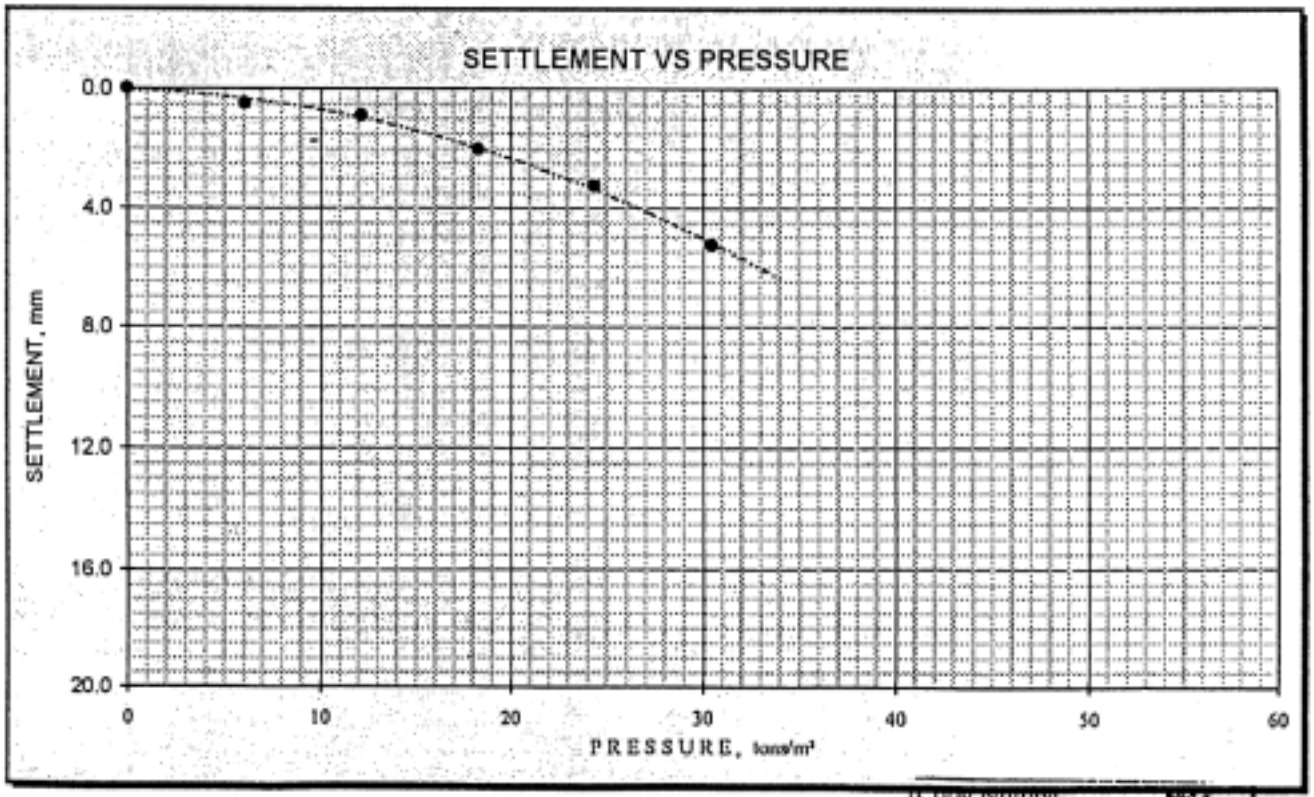

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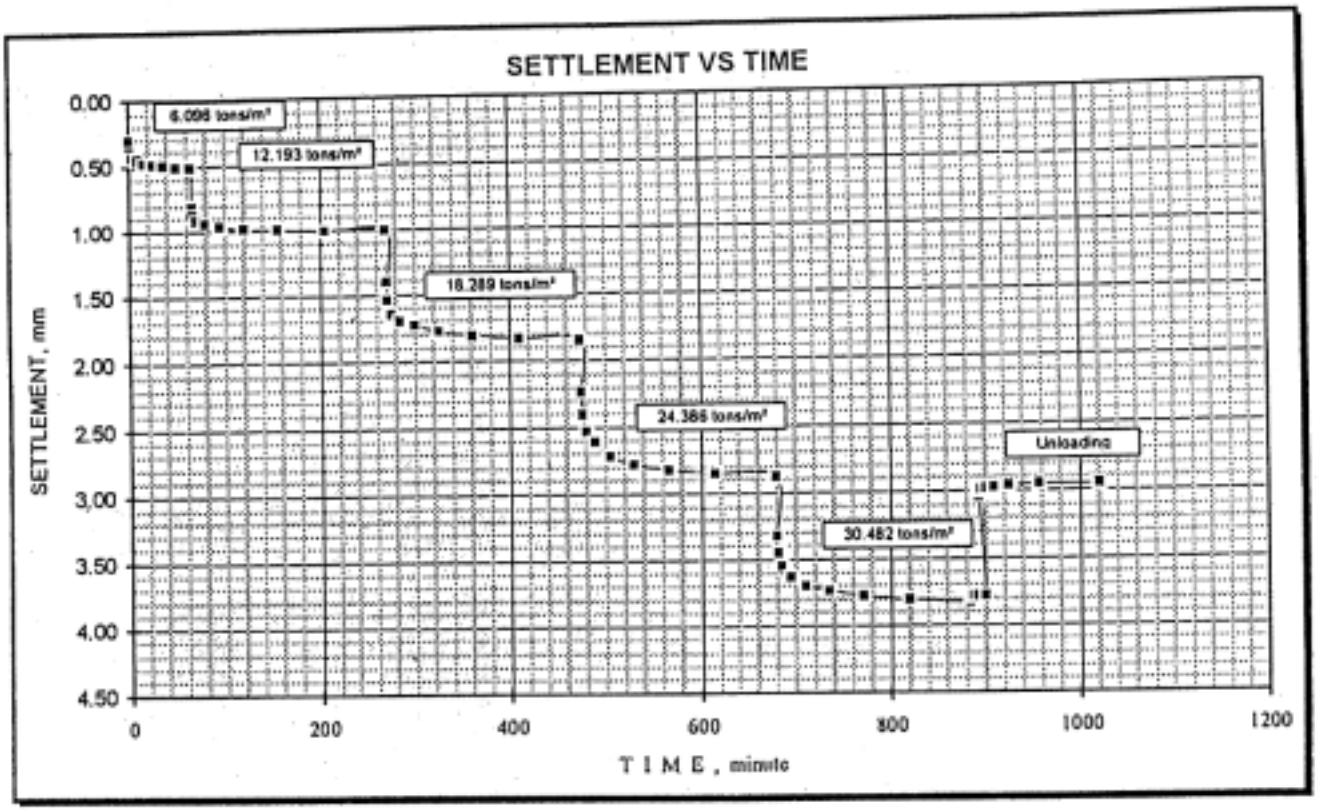

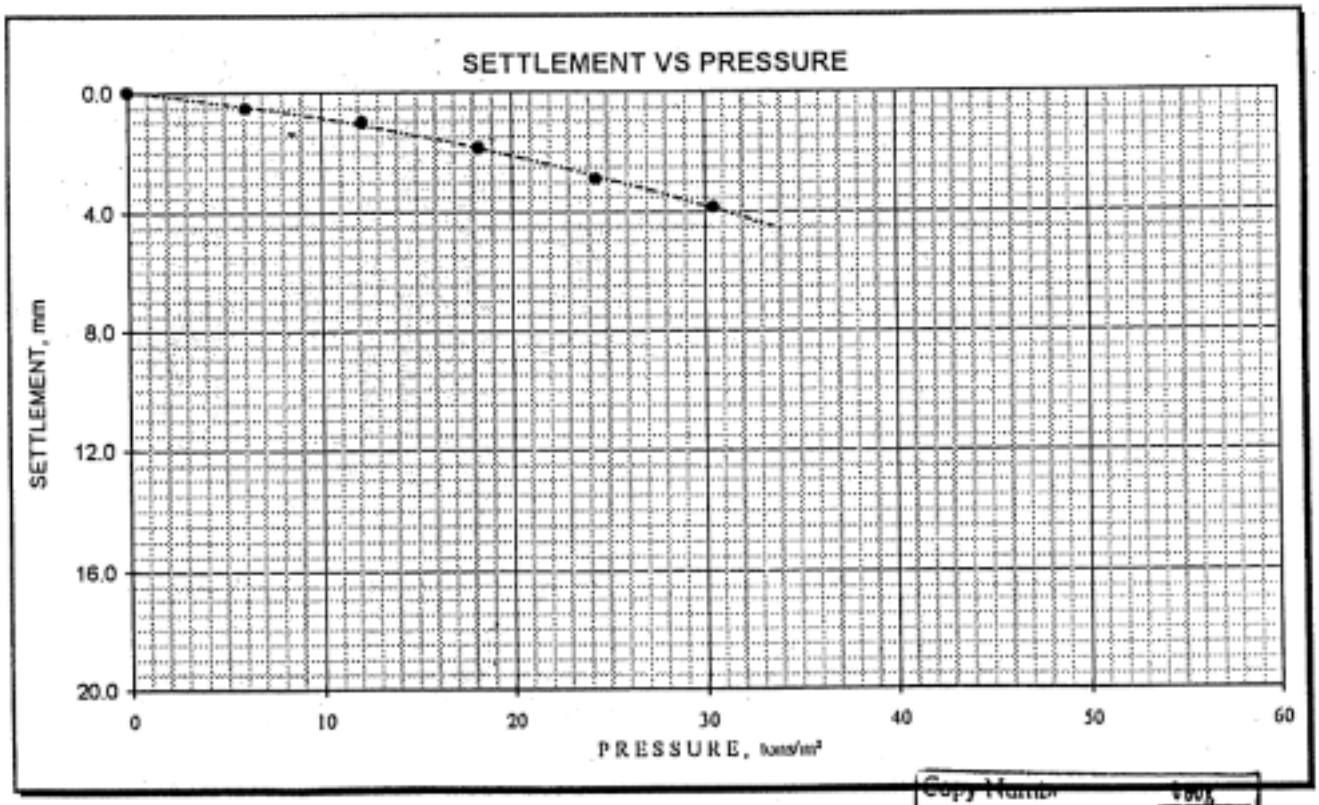

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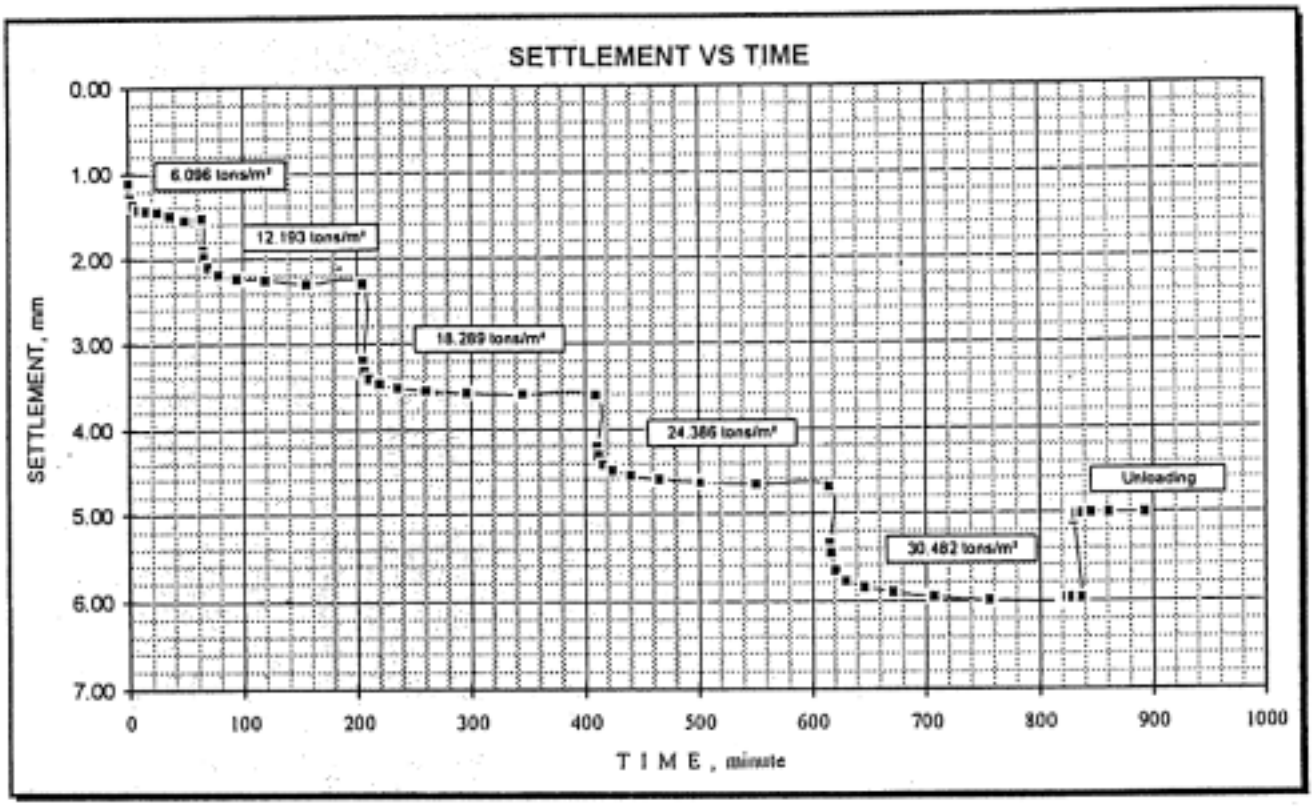

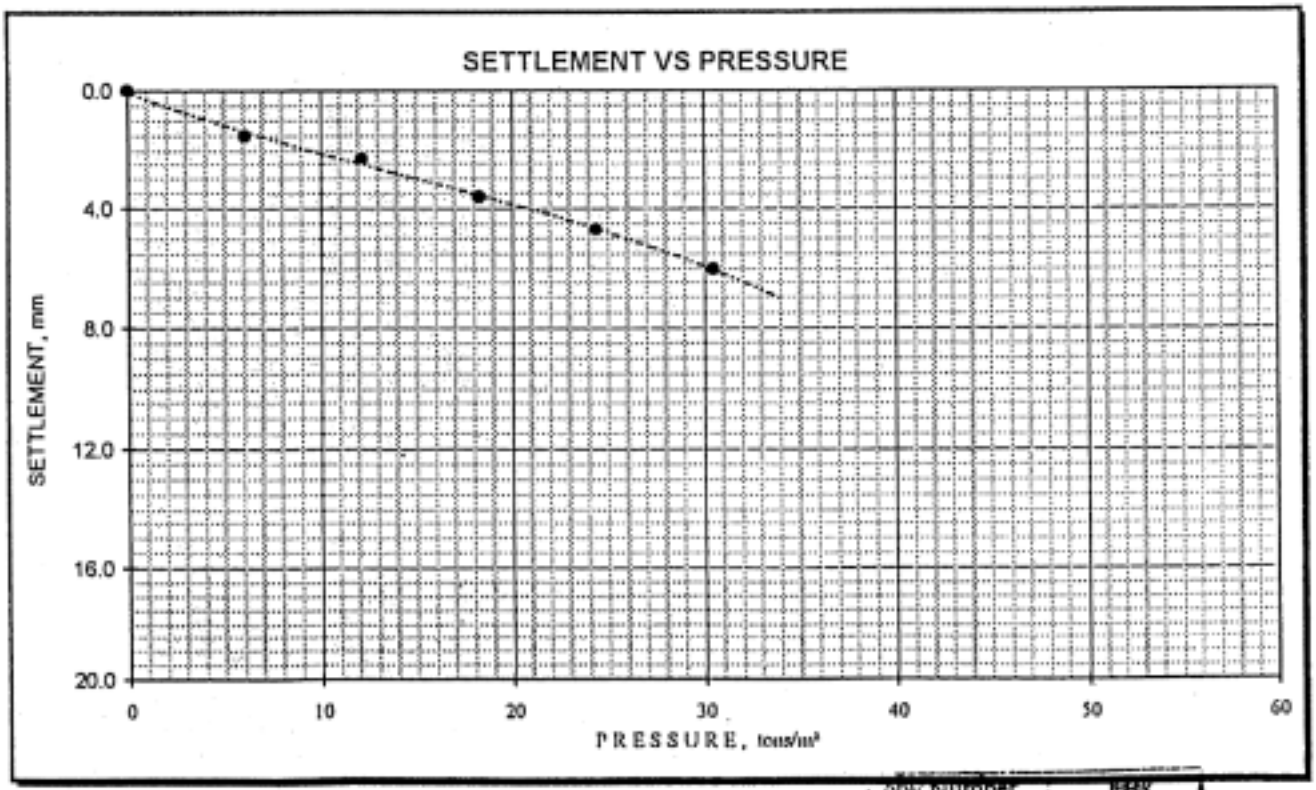

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Sheet 1 of 1

Appendices 7　References

1	Medium-term Philippine Development Plan　1999-2004	National Economic and Development Authority	1999
2	MakasMASA Fisheries （Fisheries Development Plan） 1999-2004	Bureau of Fisheries and Aquatic Resources	1999
3	National Accounts 2000-2001	National statistical coordination board	Jan. 2001
4	The President's 1999 Socioeconomic Report	National Economic and Development Authority	1999
5	The countryside in figures 1999	National statistical coordination board	1999
6	2000 Philippine Statistical Yearbook	Bureau of Agriculture Statistics	Aug. 2000
7	Food consumption of selected Commodities	Bureau of Agriculture Statistics	1995
8	Fisheries Statistics 1985-1994, 1993-1997	Bureau of Agriculture Statistics	1995 1998
9	Fisheries Profile 1999	Bureau of Fisheries and Aquatic Resources	2000
10	Seafdec Asian Aquaculture 2000	SEAFDEC/AQD	2000