

Ministry of Agriculture and Rural Development  
National Agro-Forestry-Fisheries Quality Assurance Dept.  
The Socialist Republic of Viet Nam

**PREPARATORY SURVEY REPORT (2)  
ON  
THE PROJECT FOR ENHANCING  
LABORATORY  
CAPACITIES OF THE RETAQ CENTER  
FOR ENSURING  
SAFETY OF AGRO-FISHERY FOODS  
IN  
THE SOCIALIST REPUBLIC OF VIET NAM**

**JANUARY 2018**

**JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)  
OAFIC CO., LTD.**

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JR
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## PREFACE

Japan International Cooperation Agency (JICA) decided to conduct the preparatory survey and entrust the survey to OAFIC Co., LTD.

The survey team held a series of discussions with the officials concerned of the Government of the Socialist Republic of Viet Nam, and conducted field investigations. As a result of further studies in Japan, the present report was finalized.

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

Finally, I wish to express my sincere appreciation to the officials concerned of the Government of the Socialist Republic of Viet Nam for their close cooperation extended to the survey team.

January 31, 2018

Ms. Mitsuko KUMAGAYA  
Director General,  
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Japan International Cooperation Agency

## SUMMARY

The Government of the Socialist Republic of Viet Nam (hereinafter referred to as “Viet Nam”) approved “The Ninth Five-year Socio-Economic Development Plan (2011-2015)” via Decree No. 10/2011/QH13 dated 8/11/2011 by the National Assembly, in which, regarding import and export policy, it is specified that “export will be given priority and the WTO method will be applied in order to achieve suppression of imports and reduction of import deficit in 2012~2013”. The export value of food is increasing in Viet Nam year by year, occupies approximately 35 percent of the total of export amount (in 2010) and it has become a valuable source to acquire foreign currency for the country. Viet Nam has also joined the Trans-Pacific Strategic Economic Partnership Agreement (TPP) and the export amount is expected to increase in the future. Especially in food, enhancement of the safety system for exported foods based on WTO/SPS Agreement and maintenance of international reliability are considered as national policy. Further, the monitoring of domestically distributed food including imported products is enhanced in order to ensure food safety for the nation in the increasing tendency of imported foods.

Viet Nam officially joined WTO in 2007. To that end, “National Action Plan” regarding the promotion of commitment implementation under SPS Agreement (the Application of Sanitary and Phytosanitary Measures) was approved via Decision No. 14/2008/QD-TTg dated 17/11/2008 by the Prime Minister in order to fulfill the obligations as a WTO member country.

On the other hand, in “Viet Nam-Japan Economic Partnership Agreement (EPA Agreement)” came into effect in December 2008, it was specified that Japan will provide assistance for establishment of SPS center as well as improvement of food hygiene management capability of Viet Nam. Based on this, JICA dispatched the advisor experts of SPS policy (October 2009 ~ October 2011) in order to provide advices about policies and institutions regarding food hygiene and safety required for operation of SPS center. Then, the current situation and problems surrounding SPS in Viet Nam as well as policy of Viet Nam towards the establishment of center was embodied, and the Japan’s Grant Aid regarding procurement and installation of the testing equipment of the center was requested by Viet Nam in August 2010 in the way of “The Project for Enhancing Laboratory Capacities of the RETAQ Center for Ensuring Safety of Agro-Fishery Foods” (hereinafter referred to as “the project”).

The summary of the ‘The project for enhancing laboratory capacities of the RETAQ center for ensuring safety of agro-fishery foods’ is as follows:

Agency:	Ministry of Agriculture and Rural Development, the Government of Viet Nam
Implementing Agency:	National Agro-Forestry-Fisheries Quality Assurance Dept. (NAFIQAD)
Entire project period:	Approximately 24 months, including the detailed design and Procurement (plan)
Planned construction site:	Gia lam district, Hanoi City
Building structure:	RETAQ center, Reference Test Building The Reference test building is constructed with reinforced concrete and four floors above the ground (the building is planned to be constructed by the Vietnamese side)
Total floor area:	Reference Test Building 3,399.0 m <sup>2</sup>

Project details:

Classification	Contents	Outline
Equipment	Bacteria laboratory	Clean bench, a bacterial laminar cabinet, draft chamber, pass box, homogenizer, automatic Petri dish filling equipment, automatic liquid medium filling equipment, safety cabinet, shaking incubator, incubator, colony counter, stereoscopic microscope, biological microscope etc.
	Pesticide residue/ animal drug test	GC / NPD (FTD), GC / MS / MS, GC / FPD, GC / ECD, LC / TOF/ MS, LC/MS/MS, HPLC / DAD, HPLC / FLD, ELISA system, rotary evaporator, GPC cleanup, solid-phase extraction equipment, freezer, refrigerator, organic solvent extraction, draft chamber, ultrapure water system, pure water production equipment, high-pressure microwave pretreatment equipment, dryer with degas pump, centrifuge.
	Molecular biology	Pass box, clean bench, incubator, refrigerator, RT-PCR, thermal cycler, Electrophoresis apparatus, CCD camera/ computer, Autoclave
	GMO	Safety cabinet, Freeze dryer, RT-PCR, thermal cycler, clean bench, Electrophoresis apparatus, CCD camera
	Inorganic chemical testing	AAS, IC - Ion Chromatography, ICP-MS, ion chromatograph, rotary evaporator, solid-phase extraction equipment, draft chamber, muffle furnace, electric oven, Soxhlet apparatus, automated titrator, Kjeldahl analysis equipment, waste water treatment system
	Radiation testing	Gamma Analyst Integrated Spectrometer
	Bio Assay	Environment control cabinet for animal experiment, Feeding equipment and growing equipment for small animal
	Sampling, risk assessment	Handsaw (moving type), sampling equipment
Facility equipment	Centralized air conditioning equipment	Target area: 689.68m <sup>2</sup> (1F: 333.28m <sup>2</sup> 、 2F:269.0m <sup>2</sup> 、 3F:402.4m <sup>2</sup> )
	Thermal cycler room	1F 68.0m <sup>2</sup> , air-cooled chiller, boiler, hot and cold-water pump etc.
	Storage area of exterior air conditioner	Outside of 4F: 400 m <sup>2</sup> , exterior air conditioner (7 pieces), hot and cold-water pump
	Individual air conditioning equipment	Target area: 653.8m <sup>2</sup> (1F: 384.8m <sup>2</sup> 、 2F:269.0m <sup>2</sup> )
	Individual evacuation equipment	Target area: 133m <sup>2</sup> (3F: 133m <sup>2</sup> ), evacuation pipe behind ceiling: 3 types of ventilation
	Evacuation gas treatment equipment	Outside of 4F, dry-type scrubber: 2 pieces (2,160m <sup>3</sup> /h、 10,152m <sup>3</sup> /h) Outside of 4F, wet-type scrubber: 2 pieces(2,160m <sup>3</sup> /h、 10,152m <sup>3</sup> /h)
Types of gas	Gas pipe for analysis	Central gas piping equipment (acetylene, argon, helium, nitrogen etc.) Oxygen piping equipment (to pipe from oxygen pump storage space at 3F up to inorganic analysis room)
	Storage space of the above gas	Gas cylinder fixing bracket, gas distribution pipe, etc.
	Compressed air pipe	Compressed air pipe equipment
Architecture	Interior and electricity	Area: 653.8m <sup>2</sup> (1F: 384.8m <sup>2</sup> 、 2F:269.0m <sup>2</sup> )
	Ceiling and lighting	Area: 535.4m <sup>2</sup> (3F: 535.4m <sup>2</sup> )
	Central corridor ceiling	Hot and cold water pipe, aeration and evacuation duct, space to install raceway (337m <sup>2</sup> : 1F 94m <sup>2</sup> 、 2F 119m <sup>2</sup> 、 3F 124m <sup>2</sup> )
	Duct space	Hot and cold-water pipe, vent cover of ventilation duct and inspection door (10 locations in total)
	Others	Sample storage (+4°C 12m <sup>2</sup> 、 -18°C 12m <sup>2</sup> : with storage shelf)

The project cost beard by Government of Viet Nam is estimated to 384 million Yen.  
The budgets required for the maintenance/management of the Reference test building of the

RETAQ center for the first fiscal year after the completion of the works under this project, the fiscal 2020, and the following fiscal year, in the 2021 are estimated to be VDN 47.74 billion and 65.01 billion (approximately 20 million and 29 million Yen) in following year, respectively.

With regard to the balance between the revenue and the expenditure of the entire NAFIQAD, the budgetary allocation from the Ministry of Agriculture and Rural Development is expected to increase. The revenue from the test activities is also expected to increase as food export sectors are growing. With these increases, the surpluses of VDN 9.1 billion (or approximately 45 million Yen) are expected for the fiscal 2021, even after deducting the costs borne by the Vietnamese side for the Project. Therefore, it is considered unlikely that a financial problem will hinder the maintenance/management of the facilities and equipment.

The implementation of this project (including the works under Japan’s cooperation and those under the responsibility of the Vietnamese side) is expected to generate the following direct impacts:

- Handling of chemical and biological test process of foods will be secured.

Most of the test activities using chemical and microbiological organism is handled in the laboratory without proper air conditioning system. Currently, most laboratories are insufficient from the view of safety to laboratory staffs in NAFIQAD branches. The construction of the RETAQ center, the Reference Test Building will enable experiments on testing of the organic and inorganic chemicals under the appropriate environment in safer condition.

- A number of tests and testing methods will increase.

At present, as high-risk pathogens are handled in the existing laboratories in the branch, the number of specimens acceptable to NAFIQAD branch is limited. The construction of the RETAQ center testing facility equipped with the necessary functions will increase the number of examination items, including the examination of trace elements including pesticide, hormones, heavy metals in food, and the acceptable number of specimens.

The following effects are expected through the implementation of this Project:

#### Quantitative effects

Quantitative index	Basal index 2020 (Before operation)	Target index 2013 3 years after operation
Foods safety		
Proficiency test	0	600
Reference test	0	200
Risk Analysis	0	150
Number of the sampled from National monitoring program		1,750
Residue analysis	0	500
Bivalve shells	0	750
Post harvesting program	0	500
Number of the samples for residual test and		

examination from import/export food product Physiochemical and Microbiological division	0	5,000
Examination of sample from private company	0	300
	Total	9,750

The implementation of this project is expected to realize the following qualitative effects:

- 1) Improvement of inspection capacity in SPS center will improve the reliability of food safety control for imported and exported foods.
- 2) Expansion of sampling and monitoring capacity in the northern region by SPS center can improve hazard analysis with quick and fast response.
- 3) Improvement of the reference testing activity in SPS center can enhance accuracy and sensitivity of result obtained in official food testing laboratories.
- 4) Implementing of soft components can secure proper techniques for laboratory waste control and systematic operation, which can improve labour safety and supervision techniques.
- 5) Including of facility operators to the soft component can enhance sustainable operation of facilities (central air conditioning, exhaust system, neutralization apparatus) to be maintained.
- 6) Securement of proper facility can assure health safety of staffs in SPS center.
- 7) Proper and accurate information relating to food safety can be provide from SPS center to universities institutes and related food stakeholders.

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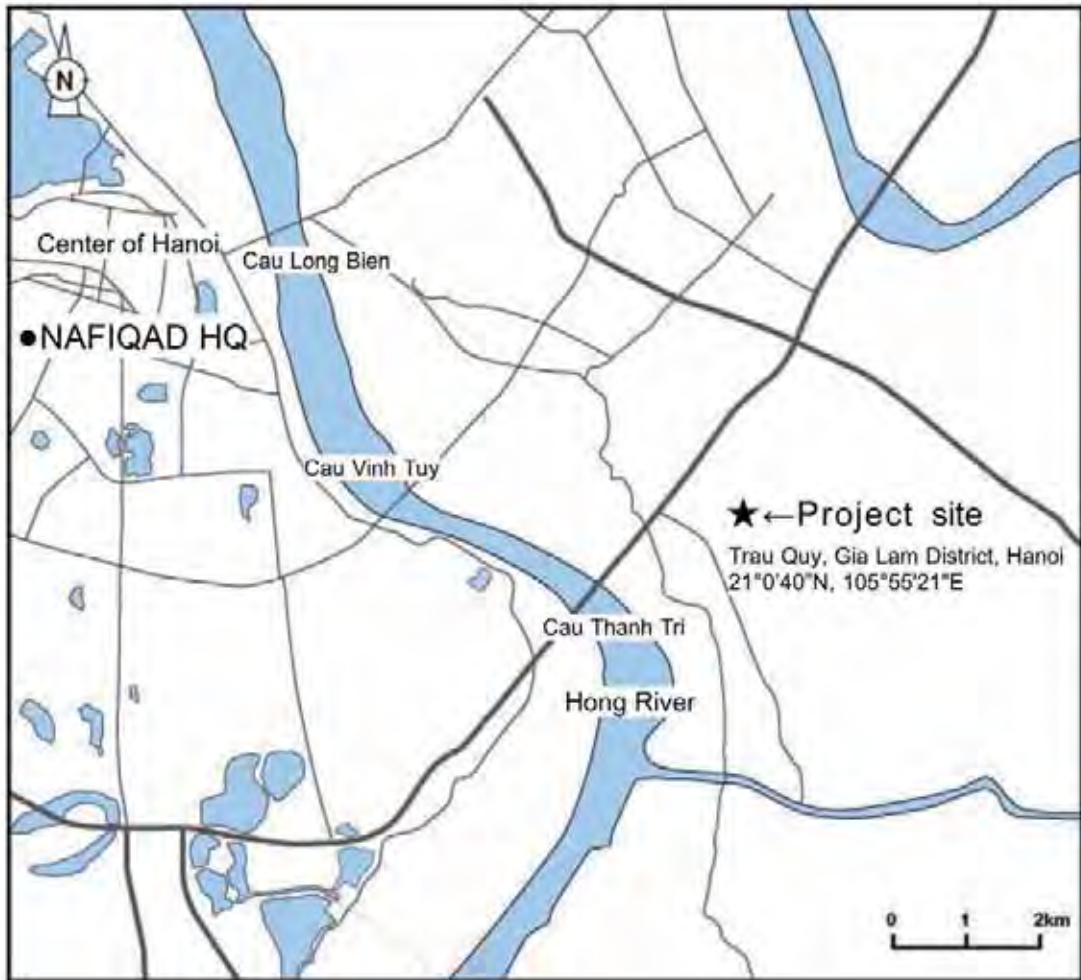
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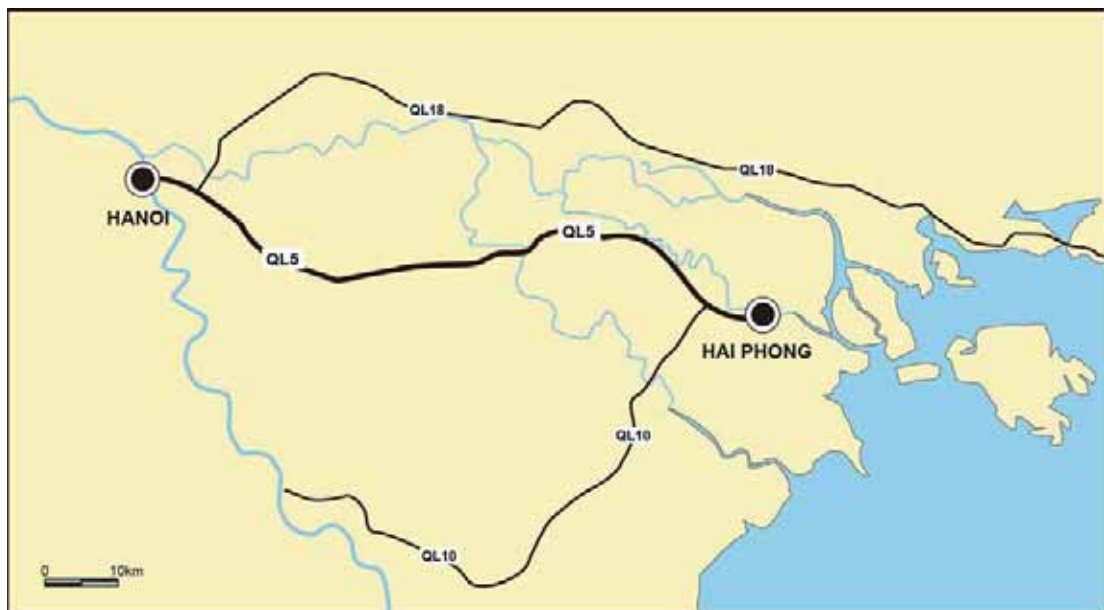
# Location map



The Socialist Republic of Viet nam

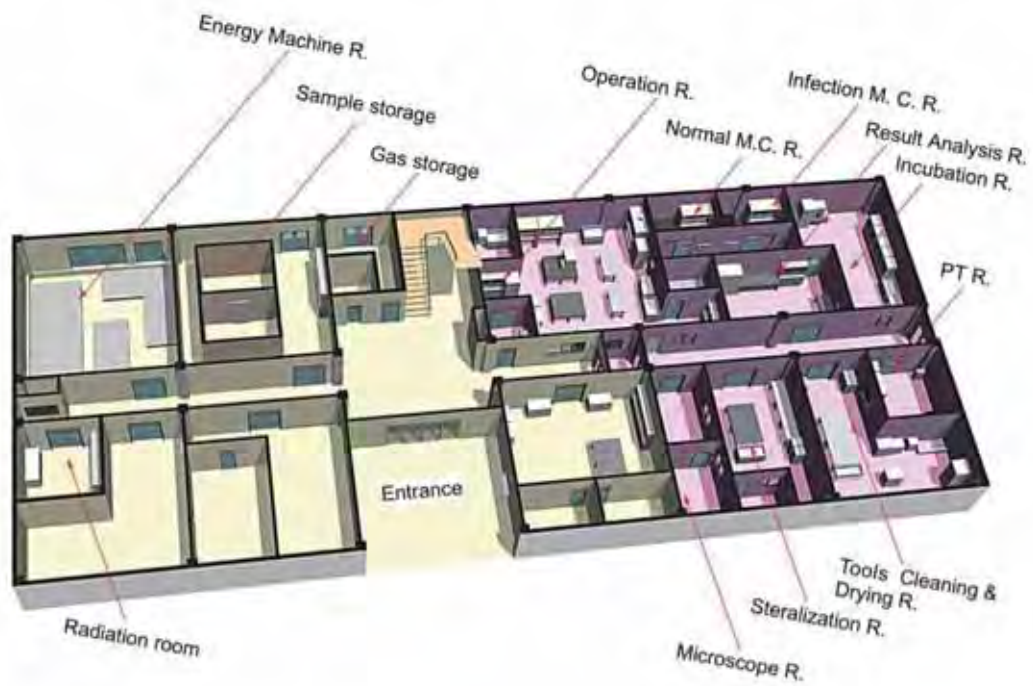


Site Map

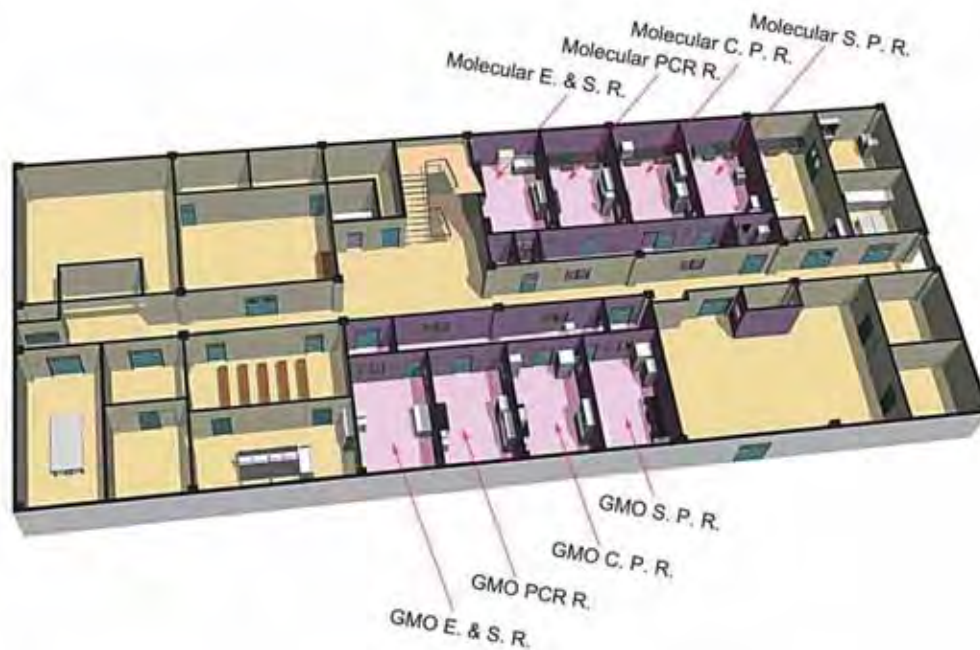


Hai phong to Hanoi

# Perspective of Reference Test Building of RETAQ center



RETAQ center 1<sup>st</sup> floor Perspective diagram



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## Abbreviations List

Abbreviations	Long form
A/P	Authorization to Pay
AAS	Atomic Absorption Spectrometer
ADB	Asian Development Bank
AHU	Air Handling Unit
ASEAN	Association of Southeast Asian Nations
B/A	Banking Arrangement
BSC	Biological Safety Cabinet
CAV	Constant Air Volume
CIDA	Canadian International Development Agency
DAH	Department of Animal Health
DARD	District Office for Agriculture and Rural Development
DCM	Department of Construction Management
DNA	Deoxyribonucleic Acid
DPP	Department of Plant Protection (under MARD)
DSEE	Department of Science, Education and Environment
E/N	Exchange of Notes
ECD	Electron Capture Detector
EIA	Environmental Impact Assessment
ELISA	Enzyme-Linked Immuno Sorbent Assay
EU	European Union
FAO	Food and Agriculture Organization
FPD	Flame Photometric Detector
G/A	Grant Agreement
GC	Gas Chromatography
GC-HR	High Resolution Gas Chromatograph
GDP	Gross domestic product
GLP	Good laboratory Practice
GMO	Genetically Modified Organism
GPC	Gel Permeation Chromatography
HCB	Hexachlorobenzene
HEPA	High Efficiency Particulate Air
HPGe	High-Purity Germanium Detectors
HPLC	High performance chromatography
IAEA	International Atomic Energy Agency
ICD	International Cooperation Department
ICP	Inductively-Coupled Plasma
ICP-MS	Inductively-Coupled Plasma Mass Spectrometer
IPPC	International Plant Protection Convention
IR-MS	Isotope-Ratio Mass Spectrometry
JICA	Japan International Cooperative Agency
LC	Liquid Chromatography
LC/MS/MS	Liquid Chromatograph Mass Spectrometer System
LGS	Light Gauge Steel
M/D	Minuets of Discussion
MARD	Ministry of Agriculture and Rural Development
MOH	Ministry of Health



MOST	Ministry of Science and Technology
MS/MS	Tandem Mass Spectrometer
NAFIQAD	National Agro-Forestry-Fisheries Quality Assurance Dept.
NIHE	National Institute of Hygiene and Epidemiology
NPCC	Northern Pesticide Control Center
NPD	Nitrogen Phosphorus Detector
OIE	World organization of Animal Health
OJT	On-The-Job Training
PAC	Package Air Conditioner
PCR	Polymerase Chain Reaction
PPD	Plant Protection Department
PSP	Paralytic Shellfish Poisoning
PT	Proficiency Test
QC	Quality Control
QUATEST	Quality Assurance and Testing
RC	Reinforce Concrete
RETAQ center	Reference Testing and Agri-Food Quality Assurance Centre
RNA	Ribonucleic Acid
RT-PCR	Real-Time Polymerase Chain Reaction
SCIESAF	Project for Strengthening Capacity of Inspection System for Ensuring Safety of Agro-Fishery Foods
SPCC	Southern Pesticide Control Center
SPE	Solid Phase Extraction
SPS	Sanitary and Phytosanitary
SUS	Steel special use stainless
TB	Terminal Board
TL reader	Thermoluminescence Reader
TPP	Trans-Pacific Strategic Economic Partnership Agreement
UV	Ultra Violet
UV-VIS	Ultraviolet • Visible Absorption Spectroscopy
VAV	Valuable Air Volume
VFA	Vietnam food Administration
WTO	World Trade Organization

## 1. Background of the Project

The study team had conducted second preparatory survey from July to December 2017, to confirm the current status of agriculture and fisheries sectors relating to the ensuring safety of Agro-Fisheries Foods in Viet Nam. As a result of study, there were not significant changes compared to the result of previous preparatory study conducted from June 2013 to December 2014, economic indicators and statistical data listed in the previous report (November 2014) have been revised to the latest information.

In this report, the project title “The Project for Enhancing Laboratory Capacities of the RETAQ Center for Ensuring Safety of Agro-Fishery Foods” is used, since the request letter to change the project title has been submitted from MARD to Ministry Planning and Investment for its approval (as of December 2017).

### 1-1 Project Objectives

In recent years, unsecured food safety has led to thousands of cases of acute food poisoning. According to statistics by the Ministry of Health, during 2006-2010, there were 944 cases of food poisoning with 33,168 victims and 259 deaths. On average, each person became gastrointestinal infection 1.5 times per year. The lack of food safety is caused by several factors such as abuse of plant protection drugs, veterinary drugs, and toxic chemicals, or caused by biological agents (viruses, bacteria, fungi, parasites), by impacts from environmental pollution or materials due to direct contact with the products concerned. Recently, unsecured food safety incidents have been more and more discovered and have raised great concerns among the people as well as management agencies.

Production and use of unsafe food have had negative impacts on health, working capacity and quality of people's lives in daily and long-term perspectives. On the other hand, Vietnam is an agricultural country with many key products exported to international markets, such as agriculture product and fisheries product. The incidents involved with discovered food safety issues will reduce market access opportunities for agricultural products of high values that Viet Nam has high potentials. Several major export markets were missed and the difficulties in dominating domestic markets are more visible, considering the increasingly fierce competition. Under the circumstances, the government of Viet Nam is taking urgent and intensive food safety control measures.

For control of food quality and safety as well as agricultural goods to meet requirements for food hygiene and safety, to protect health of local consumers and to promote exports, the Ministry of Agriculture and Rural Development (MARD) has assigned the National Agro-Forestry-Fisheries Quality Assurance Department (NAFIQAD) as the lead agency to coordinate with relevant departments, agencies, regional centers and local authorities in formulating an authority network for control of food safety and agricultural, forestry and fisheries product quality, covering central to local levels.

Currently, the legal documents related to agricultural, forestry and fisheries of food safety are basically included laws and guidance documents, which are rather complete, providing legal framework for implementation of food sanitation and safety control. Among the current legal documents, several have shown consistency and compliance with international regulations, which clearly stipulate that imported/exported products and those for domestic consumption must be equal, subjects to control food sanitation and safety through tests based on a number of specific parameters relevant for each specific object in accordance with provisions of laws of Viet Nam.

MARD as the lead body to manage agriculture and fisheries sectors has established competent agencies to control food hygiene and safety, including Agro-Forestry-Fisheries Quality Assurance Department (NAFIQAD), and agencies under central agencies responsible for agriculture, forestry and fisheries food sanitation and safety control. And the Department has assigned as the coordinating body for Vietnamese side or focal partner to food safety control agency of importing countries. The Department has responsibility to establish a qualified agency to provide technical guidance for local authorities, and to provide reference materials for other laboratories which involved in testing activities for agriculture, forestry and fishery food safety management. To achieve the above objectives, the project aimed to establish and install test equipment to test chemical and biological parameters in RETAQ center. RETAQ center will be constructed in suburb of Hanoi city, and to expand testing activities as part of food safety of Viet Nam.

The Government of the Socialist Republic of Viet Nam (hereinafter referred to as “Viet Nam”) approved “The Ninth Five-year Socio-Economic Development Plan (2011-2015)” via Decree No. 10/2011/QH13 dated 8/11/2011 by the National Assembly, in which, regarding import and export policy, it is specified that “export will be given priority and the WTO method will be applied in order to achieve suppression of imports and reduction of import deficit in 2012~2013”. The export value of food is increasing in Viet Nam year by year, occupies approximately 35 percent of the total of export amount (in 2010) and it has become a valuable source to acquire foreign currency for the country. Viet Nam has also joined the Trans-Pacific Strategic Economic Partnership Agreement (TPP) and the export amount is expected to increase in the future. Especially in food, enhancement of the safety system for exported foods based on WTO/SPS Agreement and maintenance of international reliability are considered as national policy. Further, the monitoring of domestically distributed food including imported products is enhanced in order to ensure food safety for the nation in the increasing tendency of imported foods.

Viet Nam officially joined WTO in 2007. It is entitled to utilization of provisions and principles of the SPS Agreement to protect health of humans and animals in the country as well as to address technical barriers against export-oriented agriculture, forestry and fishery products. Along with advancement of science and technology around the world, new indicators

and limits of food safety require new and modern equipment and instruments to detect and obtain accurate results as evidence in arbitration for international and local disputes.

To that end, “National Action Plan” regarding the promotion of commitment implementation under SPS Agreement (the Application of Sanitary and Phytosanitary Measures) was approved via Decision No. 14/2008/QĐ-TTg dated 17/11/2008 by the Prime Minister in order to fulfill the obligations as a WTO member country. This “National Action Plan” is aimed to improve the ability of relevant authorities by implementing following five criteria:

- 1) To comprehensively implementation of the Application of Sanitary and Phytosanitary Measures (SPS Agreement) based on the commitments taken by Viet Nam;
- 2) To enhance reputation and to promote exports of Agro-Forestry-Fisheries and food processing products of Viet Nam;
- 3) To enhance the control of food quality and safety as well as agricultural goods to meet requirements for food hygiene and safety for protection of health of consumers;
- 4) To improve competitiveness of agro-forestry-fisheries products in the international market;
- 5) To protect the diversity of natural resources and ecological environment of the Viet Nam from imported product.

The commitment of WTO/SPS Agreement request the enhancement of relevant organizations, training of relevant human resource for SPS measure and intensification of public relations activities, and expansion of agro-forestry-fisheries market. to accelerate implementation of policies and laws on the management of food quality and safety, Product Quality Law, Law on Food Safety; the Government and the Prime Minister has issued several legal documents, policies, schemes, projects, and the national target program on food safety. The Viet Nam adapted the improvement measures including, i) Securement of the scientific basis, ii) to be in harmony with international standards of CODEX, OIE and IPPC for establishment of SPS standards as well as domestic food hygiene and safety, iii) securement of the equality of various management systems, iv) analysis of the infection risk of infectious diseases and illness, v) to be compatible with the local conditions, vi) securement of transparency, and vii) improvement of process of management, testing and approval.

In December 2008, “Viet Nam-Japan Economic Partnership Agreement (EPA Agreement)” came into effect. In this agreement, it is specified that Japan will facilitate the provision of technical assistance for establishment of SPS center. Based on this agreement, JICA dispatched the technical advisor for SPS policy (October 2009 ~ October 2011) to accelerate implementation of policies and laws on the management of food quality and safety.

Decision No.198/DQ-BNN-TCCB (dated 6/2/2012) officially approved by the Ministry of Agriculture and Rural Development (MARD) to increase export of agricultural product as

for a national policy, it is requested to prepare and establish the SPS center. In this decision “Reference Testing and Agri-Food Quality Assurance Centre” (hereinafter referred to as “RETAQ center”) is used for the name of the SPS center. The Government of Viet Nam decided to secure one hectare of land located at east side of center of Hanoi City (about 15km from NAFIQAD headquarters) for construction and establishment of the RETAQ center, by the national budget. This project is to equip RETAQ center with the appropriate instruments to determine chemical and biological hazard parameter to ensure safety of distributed foods which including imported and export products. From this context, it is also included to ensure the international reliability for food safety of Viet Nam products, and to restraint the occurrence of food poisoning in the country.

By implementing this project, RETAQ center will be establish and chemical and biological testing system for the food safety in Viet Nam will be enhanced; and through the effective and sustainable operation of this center, following activities are expected to perform properly by the RETAQ center.

- Routine test for imported/exported food based on SPS Agreement,
- Sampling from domestic food chain by national monitoring plan
- Metrological precision management of the existing food testing equipment
- Risk analysis: in case of violation which occurs in food distribution chain and agriculture supplies
- Research and Development: screening of unknown substance,
- Education and Training: Human resource development for relevant organizations and to provide technical advice to relevant government agencies

## 2. Contents of the Project

### 2-1 Basic Concept of the Project

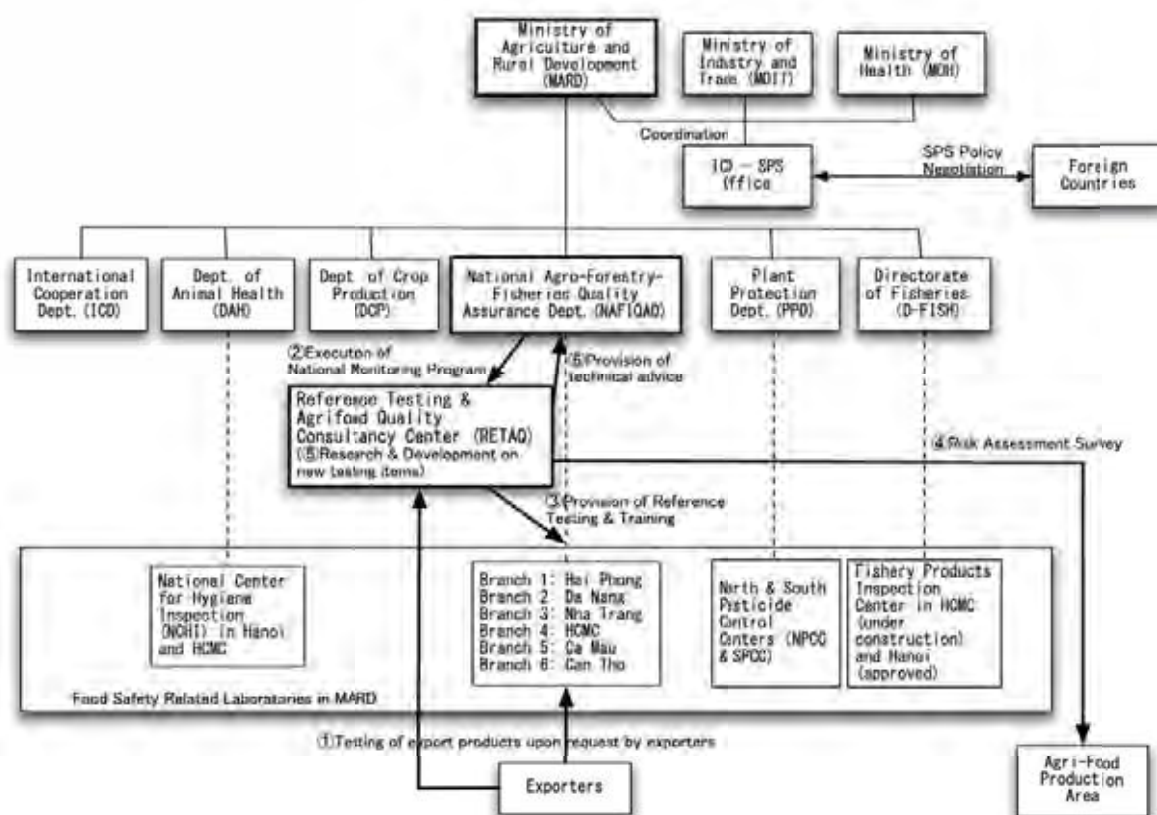


Figure 2-1 RETAQ center and other related organization

The Ministry of Agriculture and Rural Development (MARD) has assigned the National Agro-Forestry-Fisheries Quality Assurance Department (NAFIQAD) as the lead agency to coordinate with relevant departments, agencies, regional centers and local authorities in formulating an authority network for control of food safety and agricultural, forestry and fisheries product quality, covering central to local levels for control of food quality and safety as well as agricultural goods to meet requirements for food hygiene and safety.

Taking such current conditions into consideration, the Ministry of Agriculture and Rural Development of Viet Nam requested the government of Japan to provide Grant Aid Cooperation to the installation of the testing equipment to the SPS center for safety Foods, “The Project for providing Test and Examination Equipment for the SPS Center for Ensuring Safety of Agro-Fishery Foods” (hereinafter referred to as “the project”). In this original request, are to install the testing and researching equipment (280 items in total) for Reference Test Building as well as isolation testing building of SPS center built by NAFIQAD and the equipment for testing laboratory. In accordance with this, “The Project for Enhancement of Reference Testing for Ensuring Safety of Agro-Fishery Foods (December 2011- November 2014)” has been being carried as a JICA technical cooperation project “Strengthening Capacity

of Inspection System for Ensuring Safety of Agro-Fishery Foods in Viet Nam”, relation with establishment of testing system and enhancement of technical capability. The purpose of this project is to enable SPS center to test and determine for the food safety and appropriately installation of testing equipment for chemical and microbiological laboratories, which support activities in the testing laboratory, under construction in the premises of RETAQ center, and procuring the relevant laboratory equipment.

RETAQ center will be organized under NAFIQAD as a high leveled quality testing reference center in comparison with the existing Branch 1 to 6 as well as the existing laboratories of DAH or PPD as shown in Figure 1-1.

In this project, followings activities are expected to be developed:

1) Increase of a number of test in NAFIQAD.

The existing laboratories of NAFIQAD (Branch 1~6) have reached maximum allowable testing volume. For instance, NAFIQAD Branch 1 (Hai phong) is responsible to take a control over 28 northern prefecture of Viet Nam with limited number of staffs and equipment. As result, excess amount of testing sample is taken to private company for inspection. The project will support to enhance testing capability of export and import food in northern twenty-eight prefectures. In addition, numbers of sample from the national monitoring program can also increase by excess capacity.

2) Request of the newly test required for food and the agriculture supplies

The research of new testing methods and determination indicator for chemical/ biological limits also require modem laboratories, with sufficient capacity and prestige. RETAQ center is requested to develop and study this indicator. Recently, dioxins related substance measurement and irradiated food (Thermoluminescence analysis) measurement are requested from the export destination countries as a part of SPS measures. However, it is difficult to perform testing at current Branches because of lack of analysis experience and the equipment. The research of newly testing methods and detection of those elements cannot be established without suitable analysis equipment. It is essential to undertake technical development for dioxin and low irradiated food study.

3) Food safety risk analysis

A process of risk analysis consisting of three components: risk assessment, risk management and risk communication. Each of these components plays an essential and complementary role in the risk analysis process. Although, risk management and risk communication tended to receive less attention than risk assessment in the past, it is important to stress that risk analysis will only be effective when all three components are successfully integrated.

In order to perform successful risk analysis, countries need to have a well-functioning food safety system, the support and participation of key stakeholders (government, industry,

academia, consumers), and basic knowledge about the three main components of risk analysis. RETAQ center will function as main coordinate organization for risk analysis for food safety including the agriculture supplies.

#### 4) Reference Testing and Training

Promote public participation in control of agriculture, forestry and fisheries product quality control through step-wisely having public service organizations involved. In this context, NAFIQAD should be improved of control and management capacity so as to become national reference testing unit capable of providing guidance, conducting verification as authorized for based on ISO / IEC 17025:2005 or equivalent. RETAQ center is to formulate a network of government agencies from central to local level (NAFIQAD-Branch 1 to 6, PPD-NPCC/SPCC, DAH-NCHI 1&2) under MARD to exercise food safety control duties. In such a network, the affiliated centers performing functions of the Department in respective regions must become the destination for technical support, to carry out monitoring and supervision over the elements related to agriculture, forestry and fisheries food safety.

### 2-1-1 Project Site

The planned construction site of RETAQ center is located on the left bank of Hong River located on East side of Hanoi city. It is approximately 15km from NAFIQAD office building, and it is about 30 minutes by car. A part of site (10,011.6 m<sup>2</sup>) of Agricultural Experiment Site (about 17ha in total) under MARD is planned to be divert to the project site. The connection road is under construction, which is linked to highway (AH-1 line) towards Haiphong from Hanoi , located on North of the site. Project site is situated on the area highly convenient suburb of Hanoi city.



Figure 2-2 Location of Project site



## **2-1-2 Requested Japanese Assistance (Study of request)**

### **2-1-2-1 Changes in the request contents**

#### (1) The contents of the original request

The Government of Viet Nam prepared the Grant Aid requests for the project “The Project for Providing and Examination Equipment for the SPS Center for Ensuring Safety of Agro-Fishery Foods” and submitted to Government of Japan in August 2010. In this request, 280 items for testing equipment used for food inspection activities, and BSL3 testing facilities are listed to be install in Reference Test Building and isolation testing building of SPS center (renamed to RETAQ center in February 2012). However, there remain many issues to be clear as follows.

- No organization for monitoring the agro-fishery food safety as a whole and the scientific data are not reflected in policies.
- Lack of a technical center that can perform speedy and accurate inspection creates unfavorable condition taking immediate actions for the urgent issues brought by the globalization of food market.

In 2012, NAFIQAD has prepared and submitted the construction plan, design work and budget securement of RETAQ center and had approved by MARD. Simultaneously, Viet Nam has made the Grant Aid request for technical cooperation associated with the project. Following equipment are requested for the Reference Test Building and Isolation testing building.

#### 1. Reference Test Building (about 944m<sup>2</sup> )

Rotary evaporator, clean bench, real-time PCR, bio-safety cabinet, etc.

(Use for microbiological test, organic chemical analysis, inorganic chemical analysis, and physical-chemical analysis)

#### 2. Isolation testing building (about 662m<sup>2</sup> )

Equipment for animal test, BSL3 testing facilities, Equipment for Genetically Modified foods (GMO) analysis

(Use for animal experiment room, gene sequence analysis equipment for GMO analysis, PCR amplification equipment and electrophoresis equipment) etc.

#### (2) The request discussed during the preparatory survey (2013-2014)

The following are results of discussion during the preparatory survey with the Vietnamese side.

Modernization of testing equipment is necessary and it is planned to procure for supporting the activity of RETAQ center. The equipment is expected to improve precision index of food analysis that could contribute to food safety program for the people. Social contribution and responsibility of RETAQ center is large, in order to accomplish practical index for the testing are important factors to food industry. RETAQ center are requested to retain reference laboratory in Viet Nam, at the same time effectiveness and efficiency are required to be developed in accordance with the hygiene standard of WTO/SPS Agreement.

On the other hand, the protection Biosafety level 3 (BSL 3) room which included in the original request, is not commonly used for food safety testing. After discussion with the Vietnamese side the team requested to exclude BSL3 from the list.

(3) The request made by the Vietnamese side during the preparatory survey 2 (2017)

In accordance with the MARD decision 1120/QĐ-BNN-TCCB (31/3/2017) and NAFIQAD 446/QĐ-QLCL (31/3/2017), a new role of activity for the RETAQ Center was included to make screening and monitoring to "agriculture materials" which could be contaminated to foods during the distribution process. The RETAQ center, as a competence organization for food safety, retaining responsibility to analyze and trace those hazardous substances in materials of agriculture products, to reduce hazardous risks of agriculture products.

As a result of this additional activity, following three equipment are requested to the study team during the preparatory survey (Part 2) in August 2017.

Table 2-1 shows the outline of the equipment that was requested to be newly added or changed.

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<sup>1</sup> "Agricultural materials" indicated by the Vietnamese side include chemicals, fertilizer, agricultural medicine, pesticide, packaging materials, unknown substances used in the production(distribution) process. and those substances related to agricultural production (biological, inorganic and organic chemicals).

Table 2-1 Newly equipment requested during the Preparatory survey 2 (August 2017)

<b>Request of change of the specification of equipment</b>			
No. of equipment/ Name of room	Equipment	Reason	Remark
No. B-45  Room No. B-304 HPLC room	LC/MS/MS (Toxin)	Request of change from LC/MS/MS to LC/TOF/MS 1) Enhancement of activity of RETAQ center, It is requested to analyze quantitatively and qualitatively of trace elements such as pesticide, PCBs, unknown medicine, toxins which contained in agriculture and fisheries products 2)Quick and rapid qualitative analytical methods were requested from exporting destination countries, regarding to the trace chemicals materials retain in a food products.	Detection and analyzing pesticide, unknown substance, chemical residue, bio toxin, hormones. The quick and rapid screening of fisheries and agriculture product.
No.: A—104, E-39 Room No.: B110-2,B307-2 (Proficiency test room)	Freeze dryer	Increasing capacity of dehumidification 1) Extending activity of monitoring and reference capacity of RETAQ center, production of drying samples to prepare the standard reference material has been increased. It is requested to increase dehumidification capacity to 4-5 liters from 500ml.	Preparation of reference standard materials made from agriculture and fisheries product. Preparation of reference strains from liquid medium.
Additional (New) request			
Room No. B307-2 (Proficiency test room)	Ball Mill	Use for sample preparation: grind sample materials, such as grain rice, corn, beans, and oats. (1) RETAQ center require additional capacity to monitor and prepare reference materials to enhance analyzing potential. As reference laboratory, RETAQ center is requested to prepare to distribute standard reference materials to the laboratory in MARD, and the Viet Nam.	Preparation of reference standard materials from agriculture products.
Change of specification of equipment.			

1. Construction schedule of RETAQ center by Viet Nam Government

Viet Nam Government is planning to construct RETAQ center, accordingly,

in 2017	Start of construction of Reference test building
after 2020	Construction of office building
after 2020	Constriction of Isolation test building

The study team reached agreement with the Vietnamese side, that the equipment procure by the Japanese side in the project is limited to support to the equipment to the activities which carried in the Reference Test Building of RETAQ center. The contents of requested equipment for this facility by the Viet Nam Government are shown in Table 2-1.

Table 2-2 Changes of the request contents

Original request (in 2010 )	Preparatory Survey 1 (in July 2013)	Preparatory Survey 2 (in August 2017)
Quantity of machine: 280 items	Quantity of machine: 480 items	Quantity of machine: 481 items
(Testing function) Bacteria testing Organic chemical analysis Inorganic chemical analysis Physical-chemical analysis Animal testing room/ farming room Gene sequence analysis equipment for Genetically modified food analysis (GMO) PCR amplification equipment Electrophoresis equipment P3 testing room	(Testing function) The left +  Sample pretreatment equipment Isotope analysis equipment Sampling machine Machine for proficiency testing Machine for education and training Solvent processing equipment Dioxin analysis Radiation measuring equipment	(Testing function) The left +  Analyzation of Agriculture material (Monitoring and Proficiency test equipment)
(Example of equipment) Rotary evaporator, clean bench, real-time PCR, biosafety cabinet, gene sequence analysis equipment, PCR amplification equipment, electrophoresis equipment	(Additional equipment) In addition to equipment from original  GC-HR TL reader GPC pretreatment equipment Sample collection equipment, mobile lab (sampling vehicle) Lyphophilizator, seamer (can and bottle) Waste liquid neutralization equipment	(Additional equipment) In addition to equipment from July 2013  Ball mill  (Change of specification) • LC/MS/MS to LC/TOF/MS • Increase of capacity of Freeze dryer

## **2-1-2-2 Evaluation of requested equipment by Vietnamese side**

### **1. Evaluation result in 2014**

During the preparatory survey held in 2014, all of the requested equipment is carefully considered and determine to evaluate the priorities based on needs, technical levels, operation as well as maintenance management as below.

(1) Equipment of priority A:

- Testing equipment which are used on a daily basis at the NAFIQAD branch (equipment for testing of pesticide residues, veterinary drugs, microorganisms, marine-derived poisons, mycotoxins, radiation pollution and machine for sampling)
- Analysis equipment for testing used for SPS measures, which are practice of use in NAFIQAD laboratories (such as GMO testing equipment).
- Most of sampling equipment are evaluated as priority A.

(2) Equipment of priority B: It is essential to develop the operation plan by Vietnamese side.

- Equipment for test used for SPS measures, however having lack of experience with equipment (Dioxin test equipment)
- Mainly use for Research and Development: IR-MS, DNA sequencer

(3) Equipment of priority C

- A) General office equipment
- B) Commonly purchasable equipment in Viet Nam

As result of discussion and consideration based on the above conditions, the cooperation objectives in this project will be only focus to the equipment of priority A.

### **2. Evaluation of equipment in 2017**

Each equipment was re-confirmed and prioritized based in importance of need. The requested equipment is carefully evaluated, and re-prioritized during the second preparatory survey in 2017. Two additional criteria were added, to previous study. The prioritized results are shown Chapter 2 (Table 2-8).

### **2-1-3 Requirement of the facilities related to testing activity**

Food testing (inspection) laboratory in RETAQ center will be utilize different type of chemicals, special reagents, special gases, bacteria's, toxic materials, radiation etc. for determination. There are many different types of risk in the process of those biological and chemical testing. Safety is one of concern for worker, and some facilities can reduce risk of worker and increase safety.

Following facilities are requested and agree to install in the project.

- (1) Centralized piping system of special gas for analysis
- (2) Air conditioning facility
- (3) Isolated testing zone for pathogenic bacteria test and genetically modified food (GMO) test

## 2-1-4 Outline of architectural plan and Equipment for project

### 2-1-4-1 Outline of architectural work implemented by the Vietnamese side

The outline of building and facility constructed by the Vietnamese side are described in the following Table 2-3 and 2-4.

Table 2-3 Outline of architectural plan of RETAQ center

<b>Name of project</b>	Project of construction of RETAQ center	<b>Implementation agency Responsible agency</b>	National Agro- Forestry- Fisheries Quality Assurance Dept. (NAFIQAD) Ministry of Agriculture and Rural Development (MARD)
<b>Planned site</b>	Suburb of Hanoi city (the left bank of Hong River)	<b>Construction classification</b>	Newly constructed
<b>Objective of Facility</b>	Quality testing of Agro-forestry-fisheries products	<b>Number of story of Reference Test Building</b>	3-story building, one part is 4-story
<b>Land area</b>	10,011.6m <sup>2</sup>	<b>Total floor area</b>	3,399.0 m <sup>2</sup> (Reference Test Building) 2,496m <sup>2</sup> (Object area)
<b>Construction area</b>	995.22.0m <sup>2</sup> (Reference Test Building)	<b>Height of building</b>	16.4m (Reference Test Building: 4F is machine room)
<b>Supplemental facility (By Vietnamese side)</b>	The followings are planned to be constructed: Phase 1: substation room (40.32m <sup>2</sup> ), emergency generator room (25.74m <sup>2</sup> ), waste water treatment equipment used for experiment (50m <sup>2</sup> ), waste water treatment equipment (50m <sup>2</sup> ), connecting corridor (33.24m <sup>2</sup> ), parking area (114.52m <sup>2</sup> ), janitorial room (18.15m <sup>2</sup> ), incinerator (29.70m <sup>2</sup> ), regulating pond (450 m <sup>2</sup> );		
<b>Supplemental equipment (By Vietnamese side)</b>	Small-size elevators, fire extinguishing equipment (fire hydrant, extinguisher), substation equipment (substation transform 1250KVA), emergency generator (300KVA), water receiving tank (50 ton), Anaerobic-type sewage treatment tank, lightning protection equipment		

(NAFIQAD, 2017)

Table 2-4 Specification of outside building (The Reference Test Building)

Site	Specification
<b>Roof</b>	Flat-roofed: water-roof coating, gable roof: galvanized steel sheet
<b>Exterior wall</b>	Finish coating with EP paint on brick based mortar
<b>Construction frame</b>	Reinforced concrete structure with RC pile (Pile bearing capability: 30 T)
<b>Exterior fitting</b>	Aluminum sash, aluminum doors, iron door (painting)

## 2-1-4-2 Outline of Grant Aid Project

The finally requested equipment and material as a result of consultations with the Vietnamese side are shown in Table 2-5.

Table 2-5 Outline of Grant Aid Project

Classification	Contents	Outline
Equipment	Bacteria laboratory	Clean bench, a bacterial laminar cabinet, draft chamber, pass box, homogenizer, automatic Petri dish filling equipment, automatic liquid medium filling equipment, safety cabinet, shaking incubator, incubator, colony counter, stereoscopic microscope, biological microscope etc.
	Pesticide residue/ animal drug test	GC / NPD (FTD), GC / MS / MS, GC / FPD, GC / ECD, LC / MS / MS, LC/TOF/MS, HPLC / DAD, HPLC / FLD, ELISA system, rotary evaporator, GPC cleanup, solid-phase extraction equipment, freezer, refrigerator, organic solvent extraction, draft chamber, ultrapure water system, pure water production equipment, high-pressure microwave pretreatment equipment, dryer with degas pump, centrifuge.
	Molecular biology	Pass box, clean bench, incubator, refrigerator, RT-PCR, thermal cycler, Electrophoresis apparatus, CCD camera/ computer, Autoclave
	GMO	Safety cabinet, Freeze dryer, RT-PCR, thermal cycler, clean bench, Electrophoresis apparatus, CCD camera
	Inorganic chemical testing	AAS, IC - Ion Chromatography, ICP-MS, ion chromatograph, rotary evaporator, solid-phase extraction equipment, draft chamber, muffle furnace, electric oven, Soxhlet apparatus, automated titrator, Kjeldahl analysis equipment, waste water treatment system
	Radiation testing	Gamma Analyst Integrated Spectrometer
	Bio Assay	Environment control cabinet for animal experiment, Feeding equipment and growing equipment for small animal
Sampling, risk assessment	Handsaw (moving type), sampling equipment	
Facility equipment	Centralized air conditioning equipment	Object area: 989.68m <sup>2</sup> (1F: 333.28m <sup>2</sup> 、 2F:254.0m <sup>2</sup> 、 3F:402.4m <sup>2</sup> )
	Thermal cycler room	1F 68.0m <sup>2</sup> , air-cooled chiller, boiler, hot and cold-water pumps etc.
	Storage area of exterior air conditioner	Outside of 4F: 400 m <sup>2</sup> , exterior air conditioner (7 pieces), hot and cold-water pumps
	Individual air conditioning equipment	Object area: 624.68m <sup>2</sup> (1F: 373.28m <sup>2</sup> 、 2F:269.0m <sup>2</sup> )
	Individual exhaust gas equipment	Object area: 133m <sup>2</sup> (3F: 133m <sup>2</sup> ), Exhaust gas pipe behind ceiling: 3 types of ventilation
	Exhaust gas treatment equipment	Outside of 4F, dry-type scrubber: 2 pieces (2,160m <sup>3</sup> /h、 10,152m <sup>3</sup> /h) Outside of 4F, wet-type scrubber: 2 pieces(2,160m <sup>3</sup> /h、 10,152m <sup>3</sup> /h)
Types of gas	Gas pipe for analysis	Central gas piping equipment (acetylene, argon, helium, nitrogen etc.) Oxygen piping equipment (to pipe from oxygen pump storage space at 3F up to inorganic analysis room)
	Storage space of the above gas	Gas cylinder fixing bracket, gas distribution pipe, etc.
	Compressed air pipe	Compressed air pipe equipment
Architecture	Interior and electricity	Object area: 653.8m <sup>2</sup> (1F: 384.8m <sup>2</sup> 、 2F:269.0m <sup>2</sup> )
	Ceiling and lighting	Object area: 535.4m <sup>2</sup> (3F:535.4m <sup>2</sup> )
	Central corridor ceiling	Hot and cold water pipe, aeration and evacuation duct, space to install raceway (337m <sup>2</sup> : 1F94m <sup>2</sup> 、 2F119m <sup>2</sup> 、 3F124m <sup>2</sup> )
	Duct space	Hot and cold-water pipe, vent cover of ventilation duct and inspection door (10 places in total)
	Others	Sample storage (+4°C 12m <sup>2</sup> 、 -18°C 12m <sup>2</sup> : with storage shelf)

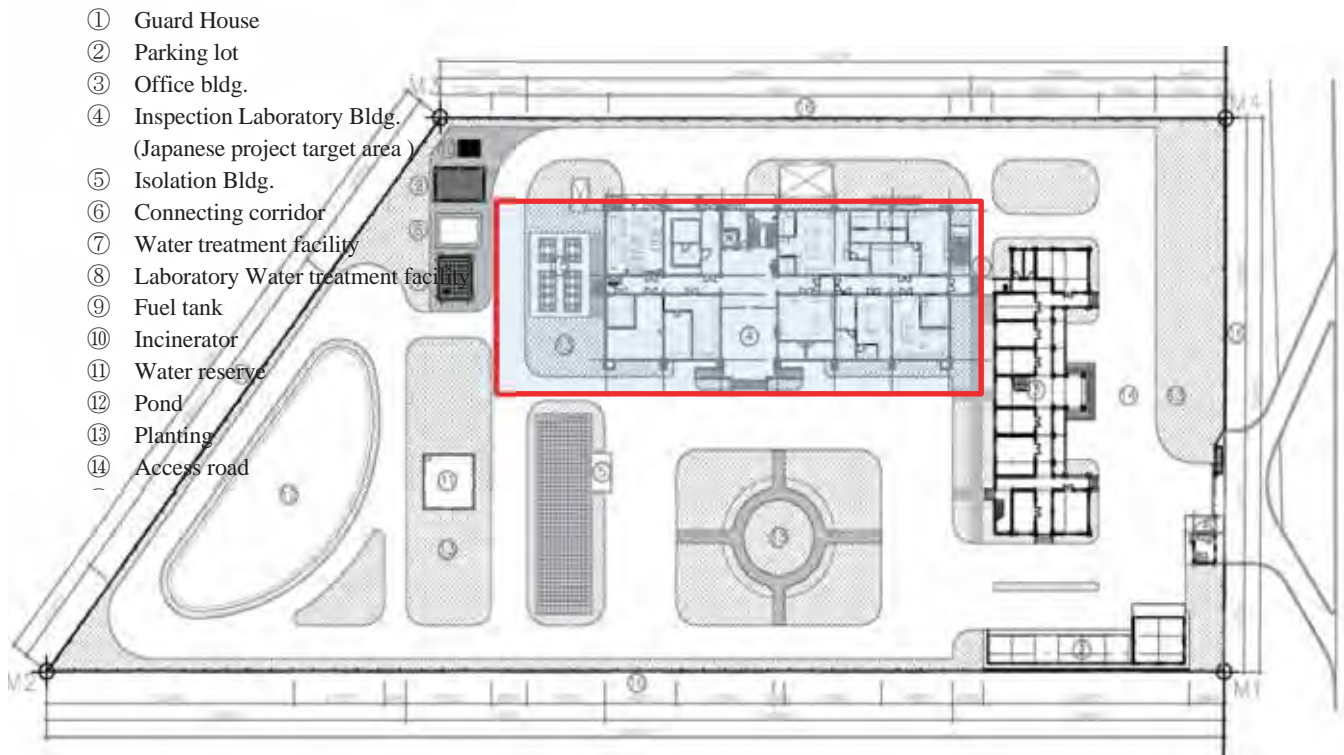


Figure 2-3 Location map of RETAQ center

## 2-2 Outline Design of the Japanese Assistance

### 2-2-1 Design Policy

The Project is planned to establish testing laboratories with associated facilities in the Reference Test Building of the RETAQ center, which is under construction with the budget of the government of Viet Nam. (while the structure and exterior works are planned to be completed in 2020)

#### (1) A necessity and relevancy of testing components (activities) for RETAQ center

- 1) The site survey by the survey team made clear that the Vietnamese side will construct Reference Test Building, and the Japanese side supplies equipment necessary for the activities planned to hold in the Reference Test Building of RETAQ center. The survey team further verified their drawing for Reference Test Building and is not sufficient to install machinery and facilities related to equipment. As result, it has been re-planned that the associated facility and air ventilation equipment will be accommodating on the first floor and fourth floor. The survey team further verified strength structure of the Reference Test Building to clarify the requirement for it equipment and related facilities. As a result, it has been modified and re-drawn the plan. The Japanese side will conduct procurement, initial installation of the equipment for Reference Test Building. In addition, equipment's relating facilities for Reference test laboratory such as air ventilation system, and central gas piping system are also included in the project.



- 2) The Japanese side will allocate construction a supervisor for verification of the construction work of Reference Test Building by the Vietnamese side. The supervisor will verify the construction process and work for the installation of equipment in RETAQ center.
- 3) Major test equipment and materials to be accommodate in the Reference Test Building are design based on similar equipment utilized in NAFIQAD branches from maintenance and management reason.
- 4) Carefully considerate the natural environment of the project site for project designing.

Following seven components are main function for RETAQ center planned by NAFIQAD as food testing center.

Component 1: Examination of quality control for import and export foods

Total amount of the food export and import of Viet Nam is gradually increasing as year by year, and it is predicted that the export and import of the food will enlarged more in near future by acceleration of the Trans-Pacific Strategic Economic Partnership Agreement (TPP). In

Testing responsibility for inspection of export food in the northern 28 province of Viet Nam will be sharing with Branch 1 and RETAQ center. Currently, inspection from 28 provinces is relying to testing capacity of Branch 1. Nevertheless, testing demand is already exceeding capacity limit of Branch 1 and causing loss of business chance of clients.

Number of the test performed in NAFIQAD Branches is shown in Table 2-6. The test number for import and export of foodstuffs are steadily increased from 2011 to 2013 in all of the Brach.

Following test equipment is require for import and export foodstuff test:

- Microbiological test equipment
- Inorganic organic test equipment
- Molecular biological test equipment
- Radioactivity measurement machine

Table 2-6 Number of inspection carried in NAFIQAD Branch in 2014-2016

		Branch 1	Branch 2	Branch 3	Branch 4	Branch 5	Branch 6	Total
Number of Staff (2016)	Chemistry section	6	8	8	16	10	19	67
	Microbiology section	4	5	5	21	19	22	76
	Administration	11	12	10	14	15	14	76
	Others	23	13	17	42	34	45	174
	Total	44	38	40	93	78	100	393
Number of Inspection in 2016	Chemical inspection	55,837	32,376	26,428	82,809	140,105	183,140	520,695
	Microbiological Inspection	30,566	53,340	23,353	292,100	202,365	237,968	839,692
	Total	86,403	85,716	49,781	374,909	342,470	421,108	1,360,387
	Percentage	6.4%	6.3%	3.7%	27.6%	25.2%	31.0%	100.0%
Number of	Chemical inspection	29,281	24,239	24,021	72,182	134,488	141,828	426,039

Inspection in 2015	Microbiological Inspection	25,650	52,196	19,633	292,300	200,546	209,900	800,225
	Total	54,931	76,435	43,654	364,482	335,034	351,728	1,226,264
	Percentage	4.5%	6.2%	3.6%	29.7%	27.3%	28.7%	100.0%
Number of Inspection in 2014	Chemical inspection	13,989	23,416	16,153	78,297	128,945	129,909	390,709
	Microbiological Inspection	22,784	44,348	18,162	286,600	198,847	212,397	783,138
	Total	36,773	67,764	34,315	364,897	327,792	342,306	1,173,847
	Percentage	3.1%	5.8%	2.9%	31.1%	27.9%	29.2%	100.0%

出典：NAFIQAD

### Component 2: National monitoring program

NAFIQAD participate “Sanitation Monitoring Program for Bivalve Mollusc Production Areas” (24 testing per year) and “Certain harmful substances residues in aquaculture fish” (once a year) as a part of the National monitoring program since 2004. The monitoring test includes the post-harvest process inspection (fish breeding feed, mud, dried fish, soy sauce, deep frying fish) and export food-processing factory, which demands are increasing every year .

Table 2-7 shows monitoring performed by Branch 1 (Haiphong) in the coast 6 province (13 site of sampling target) for two species (short necked clam and clamshell), and the aquaculture farm in coastal 8 provinces (31 places of sampling spots) from northern 28 provinces in 2012.

Improvement of food safety from mollusk poisoning is necessary in coastal are of the Viet Nam. From 2013, JICA technical cooperation project (SCIESAF) is implementing trial monitoring project to inspect residual substance from agro-fisheries product sold in wholesale market in Ho Chi Min city and Can Tho City as shown in Table 2-8.

It is essential to extend the area and continue monitoring program in Hanoi and surrounding area to ensure the food safety.

Following test equipment is require for National monitoring program:

- Microbiological test equipment
- Organic and Inorganic organic chemistry equipment
- Molecular biology test equipment
- Sampling equipment

Table 2-7 Number of National Monitoring Program studied by NAFIQAD

A. Monitoring program for Bivalve Mollusc

Year	2013	2014	2015	2016	Remarks
Target province	Quang Ninh, Thai Binh, Nam Dinh, Ninh Binh, Thanh Hoa, Ha Tinh	Quang Ninh, Thai Binh, Nam Dinh, Ninh Binh, Thanh Hoa, Ha Tinh	Quang Ninh, Thai Binh, Nam Dinh, Ninh Binh, Thanh Hoa, Ha Tinh	Thai Binh, Nam Dinh	
No. of sampling points	12	9	8	3	
No. of samplings (times/year)	-	23	26	26	
No. of samples (bivalves)	-	201	185	78	
No. of samples (water)	-	402	370	156	
Testing items	Marine toxin (Algal toxin and PSP, Algal toxins and lipophilic toxin, Algal toxins and ASP) Microbiology (E.coli, salmonella) Chemical (Organic chlorinated pesticides, heavy metals (Hg, Pd, Cd))				

B. Monitoring program for aquaculture fish

Year	2013	2014	2015	2016	Remarks
Target Province	8 Province (Coastal area)	8 Province (Coastal area)	8 Province (Coastal area)	8 Province (Coastal area)	1 sample per 100 tons of production in principle
Number of sampling site	34	36	36	36	
Total Number of samples	366	372	377	328	
Type of sample	Black tiger, White shrimp, Tilapia	Black tiger, White shrimp, Tilapia, Crab	Black tiger, White shrimp, Tilapia, Crab	Black tiger, White shrimp, Tilapia, Crab	
Testing item	A1 group (Stilbenes), A2 group (Steroids), A6 group (Prohibited antibiotics: CAP, NTRs) B1 group (Anti-bacteria substances: Tetracycline, Sulfonamides, Quinolones, Florfenicol, Trimethoprim) B2a group (: Trichlofon, Praziquantel, Trifluralin) B3a group (Organo chlorinated pesticides group: HCB, Lindane, Heptachlor, Aldrin, Dieldrin, Eldrin, Chlordan, DDT) B3c group (Heavy metals: Hg, Pb, Cd) B3d group (Fungal toxin: Aflatoxin) B3e group (Dyes: Malachite green, L.M.Green, Crystal violet, L.C.Violet)				

Reference : NAFIQAD

Table 2-8 Trial monitoring implemented by SCIESAF(May 2013~April 2014)

Area	Sampling site	Target	Number of sample	Inspection items
Ho chi min city	Whole sale market 1) Binh Dien, 2) Hoc Mon 3) Thu Duc 4) HCM City area	Pork	231	Salmonella sp.
		Chicken	231	Salmonella sp.
		Vegetable (Water vegetables, leaf mustard)	231	Residue indicator
		Fruit and legume (Tomato, legumes)	231	Residue indicator
		Marine fish	231	Salmonella sp., Histamine
		Cashew	231	Aflatoxin
		Rice	231	Residue indicator
Can Tho	Public market 1) Cai Khe, 2) Xuan Khanh 3) Thot Not 4) Tan An 5) O Mon	Pork	231	Clenbuterol, Ractopamine, Nitrofran
		Chicken	231	Tetracycline, Nitrofran
		Fresh water fish	231	Enfurokisachin, Ciprofloxacin, Nitrofran, Tetracycline
		TOTAL	2,310	

Reference: SCIESAF

### Component 3: Reference test

Reference laboratory for Food Safety, will require following activities.

- Expert analyses and confirmatory diagnostic tests (bacteriological, chemical, biochemical, physical, pathological and radiological) in diagnosis of, laboratory tests of food, water and food safety.
- Verification of test results, tests and methods applied in diagnosis of laboratory tests of food, food safety and monitoring, keeping the reference bacteria and standard reagents, strains of microorganisms.
- Organize inter-laboratory comparative tests for the laboratories at the national level
- Processes the results of inter-laboratory comparative tests,
- Take care and organize the establishment of unified criteria and methods for testing in designated laboratory, provide information obtained from national laboratories of other countries

RETAQ center are require playing main role of reference testing institute for food inspection, and it is necessary to take above measures with the cause investigation.

Following test equipment is require functioning as Reference test center:

- Microbiological test equipment
- Organic and Inorganic organic chemistry test equipment,
- Molecular biology test equipment

- Proficiency test equipment

#### Component 4: Risk assessment

Risk assessment is a scientifically based process consisting of hazard identification, hazard characterization, exposure assessment and risk characterization. When violation in the food safety is detected, trace back survey will be conducted and identifies a source of the violation.

Reentry, decree “On the Penalties for administrative violations of food safety (No. 91/2012/ND-CP)” dated 8/11/2012 was officially approved as legal framework system to prevent violation. However, the existing test laboratory does not consist institutional function and suitable equipment to collect the information of risk assessment. RETAQ center is expected to work on a risk assessment, where consultation with scientists, where required. Risk assessments can take a variety of forms, depending on the specific hazard and the risk management questions being posed. They may be formal and comprehensively cover hazard identification, hazard characterization, and exposure assessment and risk characterization. Sanitary measures (accordance of FAO) are to be based on an assessment of the risks to human using internationally, accepted risk assessment techniques.

Following risk Assessment should take into accounts:

- Available scientific evidence;
- Relevant processes and production methods;
- Inspection/sampling/testing methods;

Following test equipment is require for risk assessment:

- Sampling test equipment
- Equipment for component 1 and 2

#### Component 5: Research and development (R&D) on the food safety

One of role of RETAQ center is to engage in research and development based on scientific aspect, with the goal of increasing the value of food production as well as ensuring the safety, quality and sustainability of Viet Nam products.

Below list are require function of R&D in RETAQ center:

- to promote sustainable utilization of resources through research, innovation and consultancy
- to maintain the competitiveness of the food industry and products
- to enhance public health through research and dissemination of knowledge
- to provide risk assessment regarding safety of food and feed

Currently, RETAQ center is required to establish following four-test skill for following four inspections which is requested from SPS measures, from the bilateral or multilateral treaty with foreign countries,

### **A. Residue test of the dioxin related substance**

Dioxins and PCBs are toxic chemicals that can provoke serious health effects such as cancer, hormone disruption, reduced ability to reproduce, skin toxicity and immune system disorders, when exposure to them continues over an extended period. Maximum levels (MLs) for dioxins and PCBs in meat, fish, eggs, milk and other foods have been set by national authority. Regulation via Commission Regulation No 1881/2006, the framework EU legislation, which sets maximum, levels (MLs) for chemical contaminants in foodstuffs. These MLs are set at a very low level (as low as reasonably achievable for the particular foodstuff in question), in order to ensure that consumers' health is not affected by consuming these products.

Separate legislation applies to levels of dioxins and PCBs in animal feeds, since this is another important source of contamination of the human food chain. In order to ensure that these MLs are not exceeded, routine surveillance of food and feed must be carried out, involving the taking of samples of potentially contaminated product followed by laboratory analysis to determine the levels of dioxins and PCBs in the sample. EU is periodically requesting testing of dioxins and dioxin-like substance for aquaculture product to export. However, determination of the dioxin in a food requires considerable experience to achieve analysis technique using GC-HR. Testing of the dioxin and dioxin-like substance is a necessary technique to be developing for NAFIQAD.

### **B. Genetically modified food test (GMO)**

The GMO food is still unauthorized in Viet Nam, but, according to the MOST, application is under the consideration for corn, soybean, and cotton wools. On June 21, 2010, Viet Nam Prime Minister approved the Bio-Safety Decree 69/2010/ND-CP. This Bio-Safety Decree provides the legal framework for bio-safety management of genetically modified organisms (GMO), genetic specimens, and products derived from GMOs. NAFIQAD is under preparation of GMO laboratory in branch 6, as necessity of test and research of GMO product.

### **C. Stable isotopic ratio analysis for geographic origins**

In the food industry, this stable isotopic ratio is used as indicator to distinguish environment (area) where organisms inhabited and applies it to product district information distinction or material discriminant.

Recent years, many of vegetables produced in China, which is low-priced, are carried into the country and sold as Viet Nam brand product. MARD are planning to work on R&D for study the traceability of those foods to protect their own brand with coordination with ASEAN countries. Within the last few decades, stable isotope analysis has gained increasing importance in authenticity control of food and food ingredients.

The isotope ratio mass spectrum (IRMS) measures the stable isotopic ratio consist in the organic body and measures the small difference of environmental habitats that the creature (life) was brought up and alimentary stability isotopic ratios has taken in. The RETAQ

center is seeking to take central role for promoting research and development (including data base) for geographic origins of food sold in the country.

#### D. Irradiated foods analysis

Food irradiation is used in food processing to extend a shelf life and reduces spoilage of products. And food may be irradiated with a radiation for the purpose of sterilization, freshness preservation. In the Viet Nam, food such as fruits, vegetables, spices and meats can be exposed to radiation to kill insects, molds and microorganisms. It is requested to specify when it is irradiated in Viet Nam. Irradiated foods are commonly used in export market, however, many are required to examine before export. The irradiated food test use Thermoluminescence (TL) method, which Minerals (sand) attaching to food are collected and measure using TL reader (TL reader). The RETAQ center is planning to inspect irradiation as request based on accordance with SPS measure. However, TL method must be study and develop by RETAQ center, progressively.

#### Component 6: Education and Training

RETAQ center are expected to become and take central role on co-ordinate a network on education and training of food inspection in Viet Nam. RETAQ center is requisite to obtain high quality inspection results on scientific basis, the provision of reference methods, reference materials, proficiency testing schemes and training to laboratory staff. RETAQ center support the creation of a well performing network of laboratories throughout relating departments. The work of the RETAQ center leads to implementation of test methods, by applying original standard, limits of detection, and reducing repeatability of test.

The improvement of the capacity with relation to the food safety testing of staffs of NAFIQAD has been conducted by SCIESAF by JICA. Training programs by SCIESAF are shown in Table 2-9.

Table 2-9 Technical training by SCIESAF

Year	Training course	Training in Japan			OJT training by Japanese			Echo training				
		Duration (days)	Participant number		Duration (days)	Place	Participant	Duration (days)	Place	Participant		
			NAFIQAD	DAH/PPD						NAFIQAD	DAH/PPD	
May 2012- May 2013	Residual indicator for Pesticide 1	60	2	-	38	Branch 4		5				
	Pathogen bacteria	55	1	1	24	Branch 4	Trained participant In Japan	5	Branch 4	8	2	
	Animal drug 2	60	2	-	26	Branch 6		5	Branch 4	6	1	
	Sampling Aflatoxin	20	4	-	-	-		5	-	8	2	
			27	1	1	26	Branch 4		5	Branch 4	8	2
	Food safety · Monitoring plan	18	6	2	-	-	-	-	-	-	-	-
	Work shop for Monitoring program	-	-	-	3 days 3 days 2 days	HCMC HCMC Can Tho	26 19 22	-	-	-	-	-
June 2013 ~May 2014 (Plan)	Residual indicator for Pesticide 2	60	1	1	Nov. 2013	Branch 4		5	Branch 4	8 to 10		
	Animal Drug 2	60	1	1	Nov.2013	Branch 6		5	Branch 6	8 to 10		

Reference : SCIESAF

Proficiency testing are planned to conduct in RETAQ center. The basic purpose of proficiency testing is to assess performance of laboratories for their conduct of specific test, measurements or calibrations. Proficiency testing provides an opportunity to undertake such comparisons and to have an independent laboratory data are compared to reference values (or other performance criteria) or to the performance of similar laboratories. The results from such participation provide laboratory managers with either a confirmation that the laboratory's performance is satisfactory or an alert that investigation of potential problems within the laboratory is required.

Proficiency testing in RETAQ center can endorse following competent performance.

- Identifying testing or measurement problems
- Comparing methods and procedures
- Improving test performance
- Educating of staffs
- Comparing operator capabilities
- Generating reference materials
- Determining method precision and accuracy
- Satisfying regulators and accreditation bodies

Equipment for Education and Training (component 6) require following:

A laboratory table for training, Proficiency test equipment, Projector, Writing boards

#### Component 7: Quality assurance system for the measuring of food equipment

Currently, the quality assurance (calibration, correction) system for scientific equipment to meet international accreditation is performed in QUATEST center in the MOST. In original plan for RETAQ center, the Vietnamese side is planned to establish the quality assurance system in RETAQ center. Though, the survey team has decided not include those equipment to the Project after discussion with NAFIQAD, from reason of limitation of spaces in the Reference Test Building.

#### **(2) Policy toward the natural conditions**

Hanoi is located in the Monsoon Climate Zone, a mountainous area near the border to China where the temperature varies greatly with the time and the season,

- 1) Hanoi is in the subtropical monsoon climate zone. The average temperature in the summer (in July) is 32.9 °C. Humidity exceeds 70 % around the year. These weather conditions could affect to the air conditioning system.
- 2) Ventilation control system are highly required to equip by the central control monitoring system with quick response ventilation system to keep continuous ventilation with clean air. The plan is to keep running cost of the air-conditioning system low by constructing ecofriendly system.

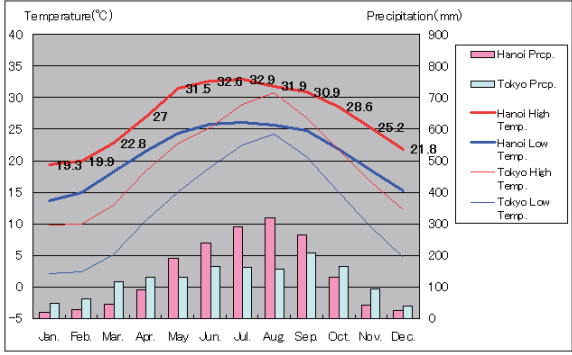
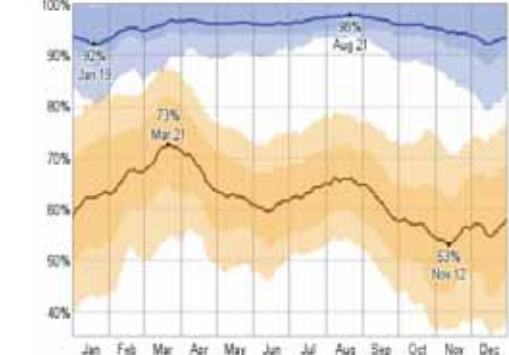


- 3) The easterly wind is prevalent in Hanoi throughout the year. The Reference Test Building has a central corridor from the northeast end to the southwest, that is, the wind blows stronger against the south side (from northeast to southeast) of this building. Air inlets are placed in the southeast wall and outlets and exhaust treatment devices in the both ends (northeast and southwest) of the building. The positions of louvers will be decided accordingly.
- 4) Material for air ducts are carefully selected among physiological characteristic and properties of air passing through since different chemicals are used for food analysis.

The project site is situated in suburbs of Hanoi, where moderate power failures and voltage falls sometimes occurs. Some of equipment and machines are very sensitive to electrical failure and required to protect by equipping AVR and UPS.

Table 2-10 shows conditions for the ventilation design based on the natural conditions.

Table 2-10 Natural conditions for the ventilation design

	Natural Conditions for the ventilation design	Notes
Wind Speed	Annual average is 3 m/s, average maximum speed is 12 m/s. Wind often blows from northeast to southeast (50 %), north wind sometimes blows (10%) around the site. It is usually cloudy except summer (rainy season)	Cover the air outlets (weather covers) and place the scrubber outlets at the height.
Rainfall	Annual rainfall is about 1800 mm, it rains every month around the year. The rain pours every other day in summer (from May to September) and lasts long except summer	Flash the outdoor piping
Temperature	Monthly maximum average highest temperature 32.9°C(July) Monthly maximum average lowest temperature 19.3°C(January) Monthly minimum average highest temperature 26.1°C(July) Monthly minimum average lowest temperature 13.7°C(January)	Outside often exceeds 40°C in summer
Humidity	Monthly maximum average highest humidity 98%(August) Monthly maximum average lowest humidity 92%(January) Monthly minimum average highest humidity 73%(March) Monthly minimum average lowest humidity 53%(November)	High humidity makes cooling load heavier
Temperature		Humidity
		

As the Vietnamese side is responsible for the construction work of the Reference Test Building, the main work of the Project implemented by the Japanese side will be the interior work. However, a certain level of vibration prevention measures will be required. In practice,

bracing will be applied to the partition and ceiling works, installation of facilities and equipment's, and the duct and plumbing works.

**(3) Policy toward the social-economic conditions**

Viet Nam has driven economic development with active introduction of foreign capital since adoption of the Doi Moi policy in 1986. Around project site, farmer's land stretched, and road conditions improved recently. The Project site is developed as a Hi-tech district in the suburbs of Hanoi, and the population is gradually increasing. Therefore, it is necessary for provisions of infrastructure such as the electricity to consider existing circumstances performed progressively. Under the circumstance, RETAQ center design with many a gabled roof format and brick blocks. The style of the construction, and traditional style is well respected. Therefore, it is requiring for the piping/ducting arrangement for the facility are not to be exposed to building.

**(4) Policy toward the construction / procurement condition**

The construction technology and mechanization in Viet Nam has improved remarkably with the entry of foreign companies driven by the economic liberalization. The Vietnamese construction companies have executed many projects financed by foreign investment in joint venture with the construction companies of various foreign countries. As a consequence, the number of local engineers who are experienced with Japanese execution and management methods has been increasing. Their capabilities have also improved with the progress of technology transfer from various foreign countries to the construction companies and mechanization of construction works.

The Japanese side will install a part of interior works and ventilation facilities after the Vietnamese side has finished the construction of the Reference Test Building. The interior works require a high degree of finishing skill and materials based on the Japanese standard of interior works for research institutes. From this reason, ventilation works will follow on legislation of the Japanese standard since Viet Nam does not have an equivalent to registration for the ventilation works.

Table 2-11 Standards or Specifications

	<b>Standards or Specifications</b>
Construction	Follow the Japanese Building Standards Act or the Japanese Architectural Standard Specification. Adopt a Vietnamese equivalent if any.
Facilities	Follow the Japanese Building Standards Act or the Japanese Architectural Standard Specification. Adopt a Vietnamese equivalent if any. Follow the Japanese Air Conditioning and Plumbing Standard Specification(SHASE-S010). Adopt a Vietnamese equivalent if any.

## Construction Materials

The Vietnamese economy is growing at a high rate and the subsequent construction boom has kept the prices of construction materials high. Taking into consideration the trend of escalating costs, the project will be planned to avoid increase of unit construction costs by very careful selection of the materials to be used. With the exception of specialized materials, most of the major construction materials can be procured in and around Hanoi and their supply is relatively stable. In Viet Nam, there are a wide variety of construction materials available in the market, some of which are domestic product, which are manufactured in the ASEAN countries. Almost all the construction materials are available and not costly for this project. If not available or costly, there is an option to source Japanese made materials in Thailand, Malaysia and other neighborhood Asian countries where there are local plants of Japanese companies. Japanese made in a local plant is of good quality and cheaper than that literally made in Japan, which is the last resort if there is no product available in the ASEAN countries. Table 2-12 explains how to source construction materials.

Table 2-12 Procurement of construction materials

	<b>Contents</b>	<b>Basic policy of procurement</b>
Interior works of analysis rooms	Floor (Long vinyl chloride sheet) Wall (Decorative calcium silicate board)	Purchase in local markets (Available and Achievement history in the past)
Fittings for analysis rooms	Doors in steel, fittings in aluminum	Purchase in local markets (Available and Achievement history in the past) There is a Japanese company in the locals
Materials for air conditioning	Piping materials, zinc steel plates for ducts, SUS plates, etc.	Purchase in local markets (ASEAN made of good quality Available)
Components for air conditioning	Air cooled chillers, boilers, AHU, scrubbers	Sourcing from Japan or neighborhood countries where Japanese manufacturers reside.
Monitoring device and software for air conditioning	Operational software and electrical instruments for air conditioning	Sourcing from Japan or the USA regarding specialty and trust ability as the most important factors

### **(5) Policy on the use of local contractors**

The contractor of the construction work of the Project will be a Japanese general contractor company. Under normal circumstances, Vietnamese construction companies and various kinds of Vietnamese laborers will be involved in the construction work under the supervision of the Japanese contractor. Although Vietnamese laborers have learned the Japanese technology through their work with Japanese construction companies, the number of skilled workers for the construction of specialized facilities and the works, which require highly sophisticated technology, is still small. Therefore, dispatch of specialized engineers

from Japan will be required for technical guidance and execution management in works, which demand high technical level such as this Project. Appropriate management and guidance on these points by Japanese enterprises will be required when using local construction companies. In the project, the Japanese side will install interior and a part of ventilation work after the Vietnamese side has complete construction of Reference testing center. The Japanese side will provide appropriate technical advice to the components that are constructed by the Vietnamese side in order to maintain the consistency of facility and equipment performance with the portions done by the Japanese side.

## **(6) Policy toward the operation, maintenance, and management capabilities of the implementing agency**

### 1) Equipment

The existing equipment is operated, maintained, and managed by the laboratory staff of NAFIQAD Branch and external maintenance companies or agents. The equipment provided in the Project will be maintained and managed in the same way. As NAFIQAD does not have a maintenance department, there is a need to reorganize necessities of the maintenance and management system before the completion of the equipment procurement in the Project. At present, NAFIQAD concludes temporary contracts with external equipment agents for the maintenance and management of the existing equipment, when need arises. However, for the maintenance and management of the major equipment to be procured in the Project, NAFIQAD (RETAQ center) needs to conclude long-term (one to two years) maintenance and management contracts with the supplier/agents. It is essential that the performance of the planned equipment is consistent with the examination and research program. On the other hand, to reduce the maintenance and management expenses, it is important that reagents and consumables for the equipment are obtainable at reasonable prices.

### 2) Facilities

NAFIQAD is in charge of 6 inspection branches. All of the Branches are old, the facilities appear well maintained and clean. However, although the latest experimental equipment is used widely in most of the laboratories, the facilities remain at the proto-modern level with limited consideration for the safety of researchers. For example, there is no installation of mechanical ventilation systems. In addition, the maintenance and management of the entire building and facility complex at NAFIQAD Branch is operated by a maintenance/management staff, which consists of only one to two personnel in each Branch. All the repair works except for simple ones are commissioned to external companies. The maintenance and management system is to be strengthened in the RETAQ center after completion of the projects including the Project facilities. The maintenance and management of the Reference Test Building equipped with the particularly highly sophisticated air conditioning system requires highly sophisticated operation techniques. Thus, an increase in the number of the maintenance/management personnel and upgrading

of their technical abilities is essential. Therefore, in the Project, technical training of a machine/facility engineer to be hired by the Vietnamese side is required. The training will be implemented under the software component of the Grant Aid Cooperation.

Commonly, medical facilities and research institutes are equipped with liquid or gas chromatograph made in foreign countries and the suppliers have opened their local sales office in Hanoi or Ho Chi Minh City to give customers various technical supports (consumables, spare parts, etc.). Some gases for special purposes are available in Viet Nam or neighboring countries. Air conditioning system and scrubbers are to be selected among products whose suppliers have their own local branch offices in Viet Nam or neighboring countries for their customer support (regular maintenance, consumables and repair, etc.).

## **(7) Policy toward the setting of grades of facilities and equipment**

### **1) Equipment Plan**

The equipment incidental to the Reference Test Building include bacteria laboratory, pesticide residue/ animal drug test, molecular biology, GMO, Inorganic chemical testing, Radiation testing, Bio Assay, and Sampling risk assessment. The minimum necessary equipment for each testing inspection materials is to be provided. For grade specifications, the specifications equivalent to those of the equipment and materials used at present in the inspection at NAFIQAD branch and departments will basically apply to the testing equipment, which will be limited to the equipment that can be operated and maintained in the existing technical level of the staff members.

### **2) Facilities Plan**

In the Project, the facilities for proper use of equipment will be constructed in the Reference Test Building, which is already in the process of construction under Vietnamese responsibility. This project will be the first introduction of food testing center equipped with proper air ventilation system in Viet Nam. The Japanese side will provide appropriate technical advice to the components, which are constructed by the Vietnamese side in order to maintain the consistency of facility and equipment performance with the potions done by the Japanese side. Following facilities are to be installed by the Japanese side

Restricted areas (GMO) are to be equipped with both central air conditioning system and independent for the necessity for traceability of analysis procedures, and safety of technical staffs and moderate working environment of machines and devices for prevention of hazardous gas leak. On the other hand, regulation areas (Microbiological laboratory) with a safety cabinet for its ventilation are to be equipped with a central air conditioning system for the necessity of safety of staffs and moderate working environment of machines and devices and prevention of dangerous gas leaks.

These facilities machineries and devices are to be selected among those of easy maintenances and according to the working conditions and environment.

## **(8) Policy on the construction/procurement methods and construction period**

### 1) Policy on the construction methods

Masonry wall reinforced with RC pillars and girders is the common building structure in Hanoi. The Reference Test Building (constructed by the Vietnamese side) in which the facilities of the Project are to be constructed is also composed of pile foundations, RC frame structure, and brick masonry walls. As the Reference Test Building are scheduled to start construction in end of 2014. It will take three months to make a consultant contract after E/N has been signed, thus E/N is delayed, implementation of the project is also delayed.

### 2) Policy on the procurement methods

The majority of materials can be procured in and around Hanoi. Materials of various qualities and standards imported from Japan, Europe, Southeast Asia, and China are available in Viet Nam. For the ease of maintenance, management, and repair after the completion of facility construction, materials and equipment will be procured locally as much as possible. When procuring locally, the quality and availability of the materials/equipment will be thoroughly investigated to ensure that the quality and availability do not affect the progress of construction.

The materials and equipment required for the specialized facility function of a reference testing are to be procured through import from Japan or third countries and will be shipped to Haiphong Port in Viet Nam by sea and transported over land by vehicles from the port to the construction site in Hanoi. A packaging method securing full resistance to damage from shock, humidity, and high temperature will be adopted for certain equipment and materials.

### 3) Policy on the construction period

The site of the Project is located suburb of Hanoi City and highway junction is near to the RETAQ center. Thus, as the transport of materials and equipment is accessible at all time. The implementation plan should be carefully prepared with, so that the construction work and facility and equipment installation schedule are directly cause interfering with the activities in operation. It is assumed to take 14 months to construct the Reference Test Building, and additional three months for some other subsidiary works to finish works. The Japanese side are scheduled to start the Vietnamese side has accomplished the Reference Test Building and some other subsidiary works.

NAFIQAD will requested for the exemption of customs duties concerning this project from the Ministry of Finance via MARD before this project starts. Contractors declare import duties and value added tax of materials and services respectively via NAFIQAD and MARD. Order receivers pay their duties and have their money refunded every month after requesting. NAFIQAD and MARD must pay attention to this protocol to secure budget accordingly.

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

### 2-2-2-1 Equipment Plan

#### (1) Examination of the request contents

Requested equipment was prioritize into three levels by seven categories; 1) the perspective of necessity 2) technical level 3) operation system 4) maintenance cost 5) application performance in Viet Nam 6) consumable supplies, 7) local agency

An evaluation result of the main equipment is shown in table 2-13 to table 2-14

Most of requested equipment is prioritize to priority-A from the necessity from the activity (component) of the RETAQ center as shown in table 2-13.

Table 2-13 Criteria for evaluation

Evaluation criteria	Evaluation score				
	1 point	2 points	3 points	4 points	5 points
Necessity	Low (no need)	Relatively low	Near future	High	Very high
Technical level	Oversea training	National training	In MARD	Internal	Not necessary
Operation	No experience	Difficult	Increase of staffs	Used in MARD	Use in NAFIQAD
Maintenance cost	Very high	High	Capable	Low	Very Low
Application performance	None in the country	in National level	in MARD level	in NAFIQAD level	in branch level
Consumable	Imported	Locally Imported	Supplied	Purchased in NAFIQAD	Locally sold
Local agent /supplier	None	None	Supplier	Yes	Yes

On the other hand, four testing equipment (dioxin and related chemical equipment, TL reader, IRMS, DNA sequencer) was prioritize to B or C. The DNA sequencer is not commonly used in testing for GMO thus, this equipment is not to include from the Grant Aid. In addition, another three equipment's require technical-staffs having high skill experience and knowledge to treat hazardous chemical and standard material. The educational program presented by NAFIQAD could not satisfy the safety protocol to control of handling that equipment and the operation maintenance-training program to treat the traceable elements.

The survey team determined introducing in the RETAQ center opening from a necessary in the time frame of the long-term educational training and exclude following three equipment, the dioxin analyzer, the IR-MS, the TL-reader, from the equipment list.

Therefore, it is required for the RETAQ center to secure a laboratory room to hold a mainly function of food testing and analysis, the equipment necessary to conduct reference function, and R&D for the future. Grade of specifications were planned, based on the equivalent specifications to those of the equipment used at the NAFIQAD branches (at present), which will basically apply to the laboratory equipment. Planned specification will be limited to the equipment that can be operated and maintained in the existing technical level of the staff members. It is also designed to employ equivalent grade of specification that have been transferred by technical assistance by SCISAF project.

Table 2-14 Priority scores of the main equipment

Type of Test	Target products	Major equipment	Number of Item	Needs	Technical level	Operation	Maintenance	Cost of maintenance	Domestically experience	Consumable supplies	Local agent	Total score	Evaluation result
Bacteriological test	Foodstuffs	Automatic petri dish filling system	1	4	5	5	5	5	5	5	5	39	A+
		Automatic liquid medium filing system	1	4	5	5	5	5	5	5	5	39	A+
		Stereomicroscope	1	5	5	5	5	5	5	5	5	40	A+
		Microscope	1	5	5	5	5	5	5	5	5	40	A+
Residual pesticides, Antibiotic, Animal drugs	Pesticide Agricultural product Fishery product Livestock product Food in general Antibiotic	GC/NPD(FTD)	1	4	5	5	5	5	5	5	5	39	A+
		GC/MS/MS	2	5	5	5	5	5	5	5	5	40	A+
		GC/FPD (phosphorus, sulfur)	1	3	4	5	5	5	4	5	5	36	A-
		GC/ECD	1	4	5	5	5	5	5	5	5	39	A+
		LC/TOF/MS (pesticide)	1	5	5	5	5	5	5	5	5	40	A+
		LC/MS/MS (animal drugs)	1	5	5	5	5	5	5	5	5	40	A+
		LC/MS/MS (overall food contamination material)	1	5	5	5	5	5	5	5	5	40	A+
		HPLC/DAD/FLD (PAH system, others)	1	4	5	5	5	5	5	5	5	39	A+
		GPC clean up system ELISA system	1	4	5	5	4	4	4	5	4	35	A-
		ELISA system	1	5	5	5	5	5	5	5	5	40	A+
Molecular biology	Bacteriological test	RT-PCR (BAX system)	1	5	5	5	5	5	5	5	40	A+	
GMO	Plant, agricultural product	Thermal cycler	1	5	5	5	5	5	5	5	5	40	A+
		RT-PCR	1	5	5	5	5	5	5	5	5	40	A+
Inorganic compound	Foodstuffs	Soxhlet apparatus	2	5	5	4	5	5	5	5	5	39	A+
		Automated titrator	2	5	5	5	5	5	5	5	5	40	A+
		Kjeldahl analyzer	2	5	5	5	5	5	5	5	5	40	A+
		UV-VIS	1	5	5	4	5	5	5	5	5	39	A+
		ICP-MS	1	5	5	5	5	5	5	5	5	40	A+
		Microwave Digestion System	1	5	5	5	5	5	5	5	5	40	A+
		Ion Chromatography	1	5	5	5	5	5	5	5	5	40	A+
AAS	2	5	5	4	5	5	5	5	5	39	A+		
Radiation measurement	Foodstuffs	Gamma rays test	1	5	5	5	5	5	5	5	40	A+	
Sampling	Sampling	Pick-up truck (Mobile Lab.)	1	5	5	5	5	5	5	5	40	A+	
Bio assay	Bioassay	Mouse breeding unit (Environment controller)	1	5	5	5	5	5	5	5	40	A+	
Gas generator	Supplemental equipment	N <sub>2</sub> Generator	3	5	5	4	5	5	5	5	5	39	A+
		H <sub>2</sub> Generator	2	4	5	5	5	5	5	5	5	39	A+

Most of the equipment that will be procured in this Project is similar to the existing equipment to NAFIQAD branches. For the maintenance of the main equipment, NAFIQAD prepared plans to enter into maintenance agreements with the distributor/agents of such equipment (TOF, MS, AAS, etc). Most of laboratory chemicals, reagents and consumables that are required after the equipment installation are presently utilized in the laboratories of NAFIQAD Branches. Therefore, only the consumables which would require for the trial



operation and training for maintenance and operation, which the Japanese equipment suppliers will conduct after installation of the equipment, will be included in the Project, but other reagents and consumables will be procured by the Vietnamese side. The maintenance costs for the equipment will be secured by NAFIQAD, and the minimum spare parts (1 cycle: items used in one year) for the project equipment will be included in the Grant Aid project.

## (2) Plan of the Testing equipment

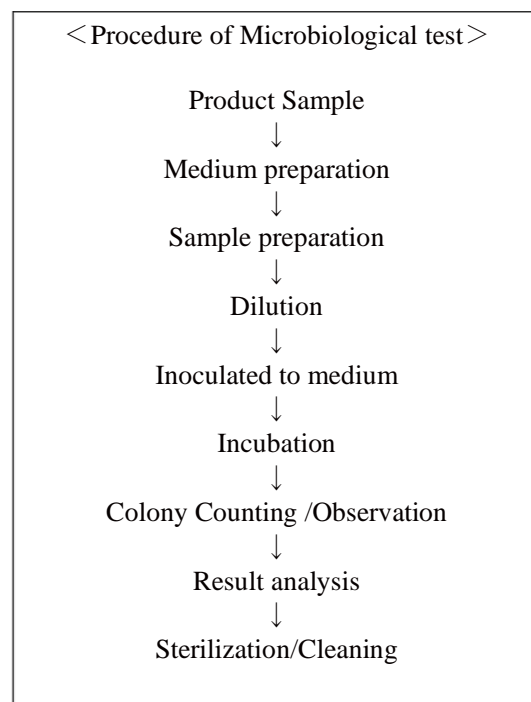
At the beginning of the study in Viet Nam, NAFIQAD requested the Japanese side to provide the equipment required for the entire RETAQ center, which will be constructed, by the Vietnamese side. However, it became clear after the study, that the construction of the isolation building will be delayed and only the Reference Test Building will be contact as schedule. Through the discussions with the Vietnamese side, it was agreed upon that the Project covered principally the equipment required for the test equipment for import/export foods (component 1), national monitoring plan (component 2), reference testing (component 3), risk assessment (component 4) GMO testing (part of component 5), education and training (component 6).

Based on the information on the contents, methods and processes of the equipment used in various processes of the testing procedure made by NAFIQAD branches at present, following process as shown below were prepared in order to examine the types and quantities of required equipment and materials in this Project. These flowcharts will be outlined as follows:

### 1. Process of Microbiological test

Product inspection for the export and import food is carried out to conducts pathogenic test mainly on the causative micro-organisms of food poisoning and the test of the antibiotic assay to secures the safety of the food and agriculture supplies.

Most of the currently known species of bacteria have been identified using traditional microbiological techniques such as the gram stain reaction, morphology, and metabolic reactions. Bacteria rarely live alone but in communities with other bacteria. This is true both in the environment and in and on our bodies. This class focuses on the role of bacteria in disease. Isolating a single bacterium species is the first step in identifying the bacteria possibly responsible for a disease process. In RETAQ center the testing of *Pseudomonas aeruginosa*, *enterococcus*, *Listeria*, *Salmonella*, *enteritis vibrio*, *cholera*, O-157 will be conducted. The first requirement for physically isolating a bacterium



is that it can be cultured in the laboratory. This requires knowledge of optimal temperature for growth, optimal oxygen requirements, and optimal nutritional needs.

All of the inoculating will be proceeding in clean bench or the BS cabinet that aseptic condition is kept a series of bacteriological examinations. The equipment, which is required for a general bacteriological examination of the food, is shown below to table 2-15.

Table 2-15 Main equipment for Microbiological test

Equipment	Qty.	Description
Oven sterilizer	2	Dried heat sterilizer
Autoclave	5	High pressurize Sterilizer
Medium controller	2	Separator for medium (liquid and plate)
Incubator	8	Incubation for bacteria
Water bath	4	Insulation unit for medium, sample
Blender, stomacher	7	Mixing and homogenation of sample
Balance,	4	Weighting of sample, medium, chemicals
Microscope	2	Classification of bacteria
Colony counter	1	Automated bacterial colony counter
Filtration sterilizer	2	Filtrate sterilization for the liquid medium
Microwave oven, stirrer platinum wire sterilizer	2	Dissolve of culture medium
Loop sterilizer (Cinerator)	2	Sterilized wire loop with high temperature

## 2. Test process for examination of residual pesticides / animal drug medicine

Test of residual indicator and the residual animal medicine is conducted to secure safety of the food and agriculture supplies. The test method of these organic substances mainly identified with chromatography. Most of the testing for pesticides and animal drug is possible by a test method using the mass spectrograph in simultaneous analysis.

### (Pesticide and residual animal drug medicine)

Pesticides may occur in foods in concentrations called trace levels. Trace levels are generally concentrations of parts per million, that is, one microgram of pesticide per gram of food or less. Measuring such small amounts of pesticides in the presence of enormous amounts of other chemicals that occur naturally in food is a challenge because those chemicals may interfere with measurement, a variety of analytical methods are currently used to detect pesticide residues, and all contain certain basic steps in application. The basic steps of an analytical method include the following:

- Sample preparation: preparation of the sample to be analyzed by chopping, grinding, or separating plant parts;

- Extraction: removal of a pesticide residue from the sample's other components;
- Cleanup (isolation): removal of constituents that interfere with the analysis of the pesticide residue of interest, this step includes partitioning and purification;
- Determination–separation: separation of components, individual pesticides, and sample co-extractives according to differential partitioning between a solid or nonvolatile solvent and a liquid or gas carrier that moves through a column (liquid and gas chromatography) or along a coated plate (thin layer chromatography); and
- Determination—detection: production of a response that measures the amount of the components moving through the column, allowing detection and quantification of each pesticide.

The test of residual pesticides and the animal drug medicine analyzes many items by the screening by the simultaneous analysis method effectively and examines the item, which a test cannot analyze in simultaneous analysis with a highly precise test machine afterwards.

#### (Mycotoxin)

Food contamination with the toxin derived from microbes such as the Aflatoxin is examined. Aflatoxin is the toxic secondary metabolite which mold produces and has strong carcinogenicity. The safety precautions that the Aflatoxin is instability for ultraviolet rays and care to prevent decomposition are necessary by test operation.

The equipment required for testing of the pesticide / animal drug medicine / mycotoxin in the food is shown to table 2-16.

Table 2-16 Main equipment for Test of Residual pesticide and animal drugs

Step	Equipment	Qty.	Object
Extraction			
	Balance	6	Weighting of sample, chemical, reagent
	Homogenizer, agitator centrifuge	10	Homogenization, emulsification of the sample
↓	Vacuum dryer	4	Concentration of the sample
	pH meter	1	Determination of pH
	Balance	2	Weighting of test sample
Purification			
	Rotary evaporator	6	Vacume concentration
↓	Liquid Solvent strong shaker	3	Liquid-liquid extraction
	Solid Phase Extraction	6	Solid phase extraction
	Gel permeation chromatograph (GPC)	1	Separation of pesticide components from matrix
Measurement(Equipment analysis)			
	Liquid chromatograph (LC/MS/MS) (LC/TOF/MS)	2	Measurement of the unstable pesticide, animal drug medicine
↓	Gas chromatograph/MS/MS (GC/MS/MS):	2	Measurement by high sensitivity detector (EI and NCI method) to support detection of pesticide of organochlorine and the organophosphate.
	High performance Liquid chromatograph (HPLC)	2	Measurement of animal drug medicine, the mycotoxin by the fluorescence detector
	Gas chromatograph (GC)	5	Measurement of the volatile substance of pesticide

### 3. Identification of bacteria with PCR

Bacteria contained in the food are identified using a molecular biologic approach. Quality and risk assessment of food are the most important tasks for microbial diagnostic laboratories worldwide. The development of a global market for food industries. The discovery of new routes of transmission and the emerging of several foodborne and waterborne pathogenic bacteria revealed a serious health hazard for both developed and developing countries. The use of molecular based technologies in microbial diagnostic has greatly enhanced the ability to detect and quantify pathogenic bacteria in food. Many of these molecular tools have been accepted and implemented in standard protocols for detection and quantification of the most important pathogenic bacteria, such as *Salmonella*, *O-157: H7*, *Listeria*, *Vibrio*, *enterococcus*.

The molecular biology testing is conducted in the clean bench to reduce contamination. Glassware, centrifuge tube, chips used for molecular biology must be autoclaved and sterilize rDNA attaching to those instruments and to deactivate ribonuclease.

Table 2-17 Main equipment for Molecular biological test

Step	Equipment	Qty.	Object
Preparation			
	Homogenizer, Mixer	2	Homogenization, suspension, emulsification of the sample
↓	Balance	2	Weight Measurement of test sample
	Centrifuge	2	Sample separation, collection
Extraction/ Purification			
	Centrifuge	1	Separation and collection of sample
↓	Micro mixer	2	Sample mixing
Polymerase chain reaction			
	RT-PCR	1	Enzyme reaction for amplification (DNA, RNA)
↓	Centrifuge	1	Collection of sample
Determination			
	Electrophoresis	2	Separation of DNA fragment which prepared by PCR
↓	Gel Image capture, processor	1	Image processing and analyzing system
Discard			
	Autoclave	1	Deactivation of DNA, RNA and enzyme

### 4. Genetically modified food test (GMO)

GMO testing methods vary for the different companies and countries, but there are two basic means for detecting genetic modification. One method tests food for the product of the transgene, usually a protein. The other method tests for the presence of DNA from the transgene or another portion of the gene cassette.

Proteins are assayed using an ELISA (Enzyme Linked Immuno Sorbent Assay). In the test, an enzyme is linked to an antibody bound to the protein, which then reacts with a colored substrate enabling detection of a specific protein. ELISAs usually cost less than DNA tests, offer quicker results, and can sometimes be done on site. The big drawback is that ELISAs do not work well on processed foods because heat during processing can destroy the protein. In contrast, DNA tests are more expensive, cannot be done on site, and take several hours to complete. Importantly, however, DNA tests are very accurate, work on processed foods, and can be quantified.

As for the facilities of the Genetically modified food test, Laboratory containment is usually measured on the basis of the pressure differentials between the laboratory and the external air (either the outside or other parts of the laboratory suite or building). The directional airflow moves from areas of lesser hazard to areas of higher hazard area.

Table 2-18 Main equipment for genetically modified food test

Stage	Equipment	Qty.	Description
Preparation			
	Homogenizer, Mixer, food processor	2	Homogenization, suspension, emulsification of the sample
↓	Balance	2	Weight Measurement
	Centrifuge	2	Sample separation and collection
Extraction/ isolation			
↓	Centrifuge	1	Separation/isolation of the sample
	Agitator	2	Agitation of sample
Amplification			
	RT-PCR	1	Enzymatic reaction using Molecular biological techniques
↓	Incubator(Block)	1	Incubation of sample for enzyme reaction
	Centrifuge	1	Collection of sample
Measurement			
↓	Electrophoresis	2	Separation of DNA fragment which prepared by PCR
	Gel imaging capture, Processor	1	Image processing and analyzing system
Discard (Deactivation process)			
	Autoclave	1	Deactivation of DNA, RNA and enzyme.

## 5. Flow chart for the testing of inorganic substance

Arsenic (As), cadmium (Cd), mercury (Hg), lead (Pb), and inorganic tin (Sn) is the most toxic heavy metal that account for most heavy metal poisoning cases. Poisoning is usually a result of environmental pollution or chronic intake of foods high in these metals. Levels of arsenic are usually high in fish and seafood because these organisms absorb and accumulate arsenic from the environment. Cadmium, found in soil because of insecticides, fungicides, sludge, and commercial fertilizers, can contaminate agricultural food products. Some foodstuffs are naturally rich in cadmium, such as liver, mushrooms, shellfish, mussels, cocoa powder, and dried seaweed. Mercury is generated naturally in the environment from volcanic emissions. It is then dispersed across the globe by winds, returning to the earth in rainfall and accumulating in aquatic food chains. Mercury can also contaminate crops sprayed with mercury-containing pesticides.

The assay of the inorganic contaminant uses atomic absorption spectrometer (AAS), ICP emission spectrometry (ICP, ICP-MS) mainly.

Using ion chromatography of nitrate nitrogen, fluorine, and the chlorine ion to measure.

The extract operation of the inorganic analysis coordinates a sample with volatile solution (acid, alkali) and organic solvent.

Therefore, the examination for inorganic chemistry is operated mainly in the draft chamber, and the exhaust to outdoors after reducing hazardous chemical in the gases through the scrubber.

Table 2-19 Main equipment for test for Inorganic Substance in food

Step	Equipment	Qty.	Description
Preparation			
	Balance	3	Weighting sample, chemical, reagent
	Low pressure concentrator	4	Concentration of the sample
	Liquid Solvent strong shaker	2	Liquid-liquid extraction
↓	Homogenizer, Mixer, food processor	9	Homogenization, emulsification of the sample
	Centrifuge	4	Separation and isolation of sample
	Solid phase extractor	2	Solid phase extraction using Polymer (reverse, amide, C18)
	Rotary evaporator	1	Concentration using vacuum system
Digestion (Ash)			
↓	Microwave digestion system	1	High pressure, high temperature digestion system
Measurement			
	Atomic absorption (AAS)	1	Measurement of Heavy metal
	Ultraviolet detector(UV-VIS)	1	Concentration measurement using UV.
	ICP-MS	1	Measurement of inorganic substance to ppt level, with multi-element analysis
	Ion chromatograph	1	Detection of trace amount of inorganic anion

## 6. Flow chart for the detection by radiographic inspection

Governments are concerned about limiting radiation doses to populations and have introduced regulations to prevent the distribution of food which exceeds levels of

contamination regarded by the Government concerned as significantly detrimental. Different countries can propose their own activity levels on imports notwithstanding the advice of the recommendations of a published FAO/WHO CODEX. Variations on the limits among countries arise partly from differing eating habits, but chiefly from differing perceptions of risk.

Most countries monitor imported food and reject shipments exceeding regulation limits. Some countries will require a certificate of actual activity level to accompany the shipment.

RETAQ center will contribute to verification of prevention of the safety hazard incidence in the food hygiene of a radiological exposure derived from food. For the accurate analysis of radiation, to measure a large food sample as efficiently as possible, the material is contained in a re-entrant vessel called a Marinelli beaker, which surrounds the detector as much as possible. Lead radiation shielding is a vital piece of equipment for High Purity Germanium (HPGE) detector. In addition, this shielding is produce with high loaded material, making this equipment become very heavy. It is requested to locate this detector on 1st floor of Reference Test Building.

Table 2-20 Equipment for inspection of Radiographic in food

Equipment	Qty.	Description
Preparation process		
Homogenizer, Mixer	2	Emulsification of the sample
Balance	1	Weight measurement
Amplification/Detection/analysis Procedure		
Germanium (Ge) Semiconductor detector	1	Measurement of nuclides such as the radioactive cesium is to measure and analyzes using germanium semiconductor detector

## 7. Detection of Marine toxin by Bioassay

Marine toxins are naturally occurring chemicals. These toxins can spoil (contaminate) certain seafood. The infected seafood often looks, smells, and tastes normal. When humans eat such seafood, disease can result. The food poisoning of main naturally occurring toxicant of animal origin is divided into shellfish poison and globefish toxin.

Diarrheic shellfish poisoning (DSP) is caused by the consumption of shellfish with high levels of marine algal toxins, like okadaic acid (OA) and dinophysis toxins (DTXs), accumulated in their tissue. These molecules are potent inhibitors of the dephosphorylation activity of protein phosphatase 1 and PP2A, by their binding to the catalytic subunit of the enzyme. Reentry, the testing method mainly divided into two methods, the physio chemistry and biological (bioassay) method,

In RETAQ center, bioassay is applied for determination of marine toxin test. In this case an animal breeding unit is used for conservation in stable breeding environment for bioassay test.

Table 2-21 Main equipment for test for Bio assay

Equipment	Qty.	Description
Environment controlled mouse cage	1	Mouse cage for bioassay, temperature controlled.
Dissector	2	Dissector kit for mouse

## 8. Sampling and Risk assessment

In National monitoring program, Residual test of the aquaculture fish, Water and soil survey (in situ measurement), and Residual indicator test for agro-fisheries product and agriculture supplies in the public market will be performed. Basically, there are two sampling process. One is DARD (Department of agriculture in each province) collect sample and sends to REAQ center, another is direct monitoring by center.

The sampling will be collected from northern 28 provinces. After collecting a sample; following test will be held at RETAQ center.

- Residual pesticides and animal drugs
- Heavy metals(Hg, Cd, Pb)
- Marine toxin (DSP, OA, DTx)
- Bacteria (*Escherichia coli*, *Salmonella*, etc.).
- Unknown hazardous chemicals in agriculture supplies

In NAFIQAD Branch 1, monitoring vehicle (4x4) is under the operation to site survey and to collect sample from northern area, reaching travel distance of 6,000 km/month.

For the equipment for Sampling and Risk assessment, Sampling equipment and monitoring vehicle are necessary in the RETAQ center.

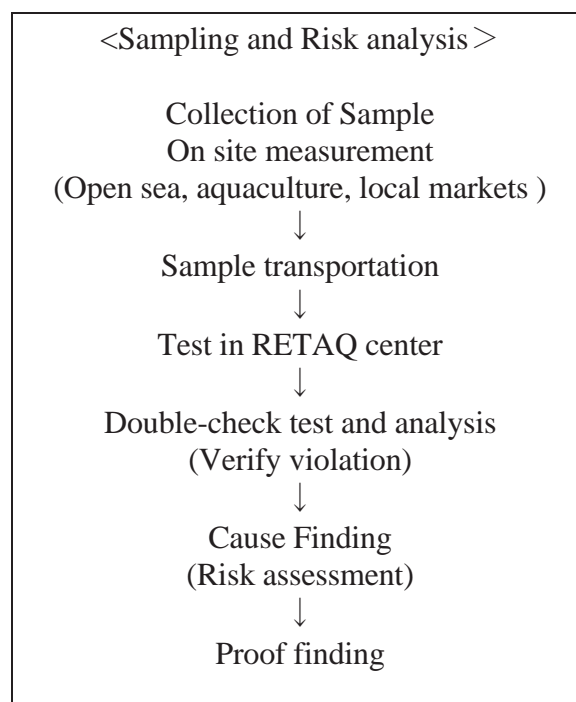


Table 2-22 Main Equipment for sampling and risk assessment

Equipment	Qty.	Description
Sediment sampler, Water sampler	4	Sediment dredger, Ekman-Berge bottom sampler
Micro sampler, Drill, Analytical Sieve	2	Micro-sampler for grain, automatic drill, Analytical sieve
TSD detector	1	Water turbidity analyzer
Pickup vehicle	1	Pickup vehicle (Sampling car)



### (3) Equipment Plan

The items and quantities of the finally requested equipment and materials are shown in Table 2-23 to 2-37.

#### 1) Inspection of Microbiology section

Table 2-23 Equipment list for inspection of Microbiology

Category number	Equipment number	Equipment (description)	QTY
Ante Room			
B105-2			
A-001	77	UV shoes box	1
A-002	78	Ultra Violet radiation locker	1
Operation Room			
B105-1			
A-003	114	Liquid filtration system	2
A-004	53	Freezer (low temperature freezer)	1
A-005	57	Refrigerator (+4°C) (approx. 500L )	1
A-006	57	Refrigerator (+4°C) (approx. 500L )	1
A-007	57	Refrigerator (+4°C) (approx. 500L )	1
A-008	144	Hazard gas sucker	1
A-009	25	Vortex genie mixer	2
A-010	26	Homogenizer	1
A-011	115	Loop Cinerator	1
A-012	145	Pass box	1
A-013	104	Draft chamber (it is used for medicines)	1
A-014	79	Reagent storage	2
A-015	80	System cabinet	1
A-016	121	Microwave oven	2
A-017	137	Hand washing sink	1
A-018	129	Dispenser , handy step (micropipette) (1)	3
A-019	27	Stomacher	2
A-020	63	Water distillation apparatus	1
A-021	64	Water purifying apparatus	1
A-022	123	Automatic Petri Dish Filing system	1
A-023	124	Automatic liquid Filing system	1
A-024	146	Jars for anaerobic bacteria	4
A-025	100	Clean bench (Desktop)	1
A-026	101	Clean bench	4
A-027	21	Centrifuge and rotor (Medium-centrifuge)	1
A-028	20	Centrifuge and rotor (small, Refrigerated)	1
A-029	144	Hazard gas sucker	1
A-030	40	Circulating water bath	3
A-031	83	pH meter	2
A-032	206	Stainless sink (stainless steel 1200)	2
A-033	197	Work table (stainless steel, 1200)	2
A-034	171	Central experiment table	2
A-035	200	Work table (stainless steel, 1500 with the cutting board)	2
A-036	202	Stainless sink (stainless steel, 900)	1
A-110	125	Hotplate stirrer (2)	2
A-111	67	Electrical balance	1

Autoclave Room			
B105-3			
A-037	116	Autoclave (large)	2
A-038	117	Autoclave (the small)	1
A-039	197	Work table (stainless steel, 1200)	2
A-040	201	Stainless sink (stainless steel, 1200)	1
Balance Room			
B107-1			
A-041	72	Balance Enclosures	1
A-042	70	Standard scale table (semi-micro)	1
A-043	71	Standard scale table (micro)	1
A-044	67	Electrical balance	1
A-045	68	Analytical balance (semi micro)	1
Normal Microbiology room			
B107-3			
A-046	41	Heat block	1
A-047	115	Loop Cinerator	1
A-048	79	Reagent storage	1
A-049	129	Dispenser, handy step (micropipette) (1)	4
A-050	102	Bio safety cabinet	1
A-051	42	Water bath(small)	1
A-052	186	Side experiment table(900)	1
A-053	190	Side experiment table, single face (1200)	1
Infection Microbiology room			
B107-4			
A-054	147	Glove box	1
A-055	115	Loop Cinerator (burner)	1
A-056	102	Bio safety cabinet	1
A-057	188	Side experiment table (left single face, 1500)	1
A-058	193	Side experiment table (corner)	1
Incubation room			
B109-2			
A-059	28	Small shaker (incubation)	2
A-060	43	Incubator (a liquid shaker)	1
A-061	44	Incubator (anaerobic)	1
A-062	45	Incubator	6
A-063	192	Side experiment table (lower part sliding door, 2400)	1
A-064	201	Stainless sink (stainless steel, 1200)	2
A-065	196	Work table (stainless steel, 1800 with the shelf board)	2
Result Analysis room			
B109-1			
A-066	145	Pass box	1
A-067	79	Reagent storage	1
A-068	129	Dispenser, handy step (micropipette) (1)	3
A-069	148	Colony Counter	1
A-070	102	Bio safety cabinet	1
A-071	118	UV Transilluminator	1
A-072	181	Side experiment table(reagent shelf, 2400)	2
A-112	192	Side experiment table (lower part sliding door, 2400)	1
Microscope Preparation Room			
B108-2			
A-073	129	Dispenser , handystep (micropipette) (1)	2
A-074	100	Clean bench (Desktop)	1
A-075	118	UV Transilluminator	1

A-076	188	Side experiment table (left single face, 1500)	2
Microscope Room B108-3			
A-077	37	Laboratory Desk (for microscope)	2
A-078	38	Stereomicroscope	1
A-079	39	Microscope	1
Sterilization room B108-1			
A-080	119	Hot air sterilizer (small size)	1
A-081	120	Hot air oven sterilizer (large size)	1
A-082	116	Autoclave (large)	2
A-083	172	Central experiment table (sink)	1
A-084	194	Work table (stainless steel, 1200 with the shelf board)	4
Tools Cleaning & Drying Room B110-1			
A-085	73	Laboratory washer for glass ware	1
A-086	149	Dry wagon	4
A-087	150	Dry shelf	2
A-088	74	Ultrasonic cleaning unit (for pipette)	1
A-089	75	Ultrasonic cleaning unit (large-scale cleaning sink)	2
A-090	65	Water purifying apparatus (ion)	1
A-091	205	Stainless sink (stainless steel, 2 tanks, drain board, 1800)	2
A-092	198	Work table (stainless steel, 1500)	4
A-093	194	Work table (stainless steel, 1200 with the shelf board)	1
A-109	204	Stainless sink (stainless steel, L angle, 1500)	1
Proficiency Test Room B110-2			
A-094	54	Freezer (ultra-low temperature)	1
A-095	55	Cold storage (Freezer side)	1
A-096	58	Refrigerator (low temperature Incubator)	1
A-097	29	Laboratory blender (meat)	1
A-098	29	Laboratory blender (meat)	1
A-099	30	Laboratory blender (cereal)	1
A-100	31	Laboratory blender	1
A-101	130	Dispenser , handstep (micropipette) (2)	1
A-102	100	Clean bench (Desktop)	1
A-103	177	Side experiment table, 1200)	2
A-104	110	Lyphophilizator (ampoule)	1
A-105	56	Rapid freezing system (bath type)	1
Corridor 1 B107-2			
A-106	145	Pass box	2
Ante Room 3 B191			
A-107	77	UV shoes box	1
A-108	78	Ultra Violet radiation locker	1

## 2) Inspection of Residual indicators room

Table 2-24 Equipment list for inspection of Residual indicators

Category	Equipment	Equipment (description)	QTY
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number	number		
Sample Scaling Room3			
B312-1			
B-01	80	System cabinet	1
B-02	72	Balance Enclosures	1
B-03	71	Standard scale table (micro)	2
B-04	67	Electrical balance	2
B-05	68	Analytical balance (semi micro)	2
B-06	83	pH meter	2
B-07	179	Side experiment table (reagent shelf, 1800)	2
Residue Indicator Analysis Sample Preparation Room			
B310-1			
B-10	127	Rotary evaporator	6
B-11	53	Freezer (low temperature freezer)	2
B-12	57	Refrigerator (+4°C) (approx. 500L)	1
B-13	32	Liquid Solvent strong shaker	3
B-14	125	Hotplate stirrer (2)	2
B-15	46	Digital hot plate(S)	2
B-16	29	Laboratory blender, (meat)	2
B-17	29	Laboratory blender, (meat)	2
B-18	151	Sample grinder	4
B-19	30	Laboratory blender (cereal)	2
B-20	30	Laboratory blender (cereal)	2
B-21	33	Food processor	2
B-22	105	Draft chamber (central laboratory table, organic solvent)	2
B-23	106	Draft chamber (sample preparation)	3
B-24	80	System cabinet	1
B-25	69	Scale	2
B-26	66	Ultra-pure water system	2
B-27	130	Dispenser, handystep (micropipette) (2)	4
B-28	63	Water distillation apparatus	1
B-29	152	Solid-phase extraction manifold	6
B-30	111	Dryer with degas pump	1
B-31	21	Centrifuge and rotor (Medium-centrifuge)	3
B-32	22	Centrifuge (large, refrigerated)	1
B-33	1	GPC clean up system	1
B-35	201	Stainless sink (stainless steel, 1200)	2
B-36	185	Side experiment table (gallery)	2
B-37	173	Central experiment table, (with sink and chair)	2
B-68	180	Side experiment table (reagent shelf, 1800)	2
ELISA Assay room			
B310-2			
B-38	59	Refrigerator (approx. 300L)	1
B-39	2	ELISA system	1
B-40	182	Side experiment table(2400)	1
B-41	208	Laboratory chair	2
Liquid Chromatogram Room			
B304			
B-42	80	System cabinet	2
B-43	129	Dispenser, handystep (micropipette) (1)	4
B-45	3	LC/TOF/MS (toxin)	1
B-46	6	HPLC/FLD	1
B-47	178	Side experiment table, (reagent shelf,1800)	4
B-48	173	Central experiment table, (with sink and chair)	1

B-66	4	LC/MS/MS (animal medicine)	1
B-67	5	HPLC/DAD	1
Gas chromatogram Room B302			
B-49	80	System cabinet	2
B-50	129	Dispenser, handystep (micropipette) (1)	3
B-52	7	Gas Chromatography(GC/NPD(FTD))	1
B-53	10	Gas Chromatography mass spec.(GC/MS/MS)	2
B-54	8	Gas Chromatography (GC/FPD)	1
B-55	9	Gas Chromatography (GC/ECD)	1
B-56	141	H <sup>+</sup> generators	2
B-57	178	Side experiment table, (reagent shelf, 1800)	4
B-58	173	Central experiment table, (with sink and chair)	1
Tools Cleaning Room3 B312-3			
B-59	73	Laboratory washer for glass ware	1
B-60	150	Dry shelf	1
B-61	64	Water purifying apparatus (Barnstead type)	1
B-62	74	Ultrasonic Pipet cleaner	1
B-63	75	Ultrasonic cleaning unit (large-size cleaning)	2
B-64	205	Stainless sink (stainless steel, 1800)	2
B-65	199	Work table (stainless steel, 1800)	2

### 3) Molecular biology room

Table 2-25 Equipment list for inspection of molecular biology

Category number	Equipment number	Equipment (description)	QTY
Molecular biology Preparation Room B201-3			
C-01	57	Refrigerator (+4°C) (approx. 500L )	2
C-02	145	Pass box	1
C-03	80	System cabinet	1
C-04	131	Dispenser, handystep (micropipette) (3)	3
C-05	103	Clean bench (Desktop)	2
C-07	191	Side experiment table, (1800)	3
C-14	20	Centrifuge and rotor (small, Refrigerated)	1
C-46	25	Vortex genie mixer	1
C-47	53	Freezer (low temperature freezer)	1
Molecular PCR Room B201-2			
C-08	60	Refrigerator (150L)	1
C-09	145	Pass box	1
C-10	79	Reagent storage	1
C-11	132	Dispenser, handystep (micropipette) (4)	3
C-12	154	Thermal cycler	1
C-15	20	Centrifuge and rotor (small, Refrigerated)	1
C-16	11	RT-PCR (BAX system)	1
C-17	78	Ultra Violet radiation locker	1
C-18	189	Side experiment table (1500)	3
Molecular Electrophoresis & Sterilization Room B201-1			

C-19	145	Pass box	1
C-20	150	Dry shelf	1
C-21	79	Reagent storage	1
C-22	76	Ultrasonic cleaning unit	1
C-23	155	Electrophoresis apparatus	2
C-24	156	CCD camera, computer	1
C-25	117	Autoclave (small)	1
C-26	20	Centrifuge and rotor (small, Refrigerated)	1
C-27	187	Side experiment table, (1200)	4
C-28	206	Stainless sink (1200)	1
Molecular Sample Preparation Room B201-4			
C-29	53	Freezer (low temperature freezer)	1
C-30	59	Refrigerator (approx. 300L)	1
C-31	34	Ultrasonic homogenizer	1
C-32	33	Food processor	1
C-33	79	Reagent storage	1
C-34	112	Lyophilization: Freeze-Dry (with flask holder)	1
C-35	67	Electrical balance	1
C-36	68	Analytical balance (semi micro)	1
C-37	63	Water distillation apparatus	1
C-38	21	Centrifuge and rotor (Medium)	1
C-39	20	Centrifuge and rotor (small, Refrigerated)	1
C-40	48	Water bath(shaker)	2
C-41	207	Stainless sink (900)	1
C-42	187	Side experiment table (1200)	2
C-06	47	Incubator (block)	1
Corridor2 B201-6			
C-43	138	Hand washing sink	1
Ante Room 5 B201-7			
C-44	77	UV shoes box	1
C-45	78	Ultra Violet radiation locker	1

#### 4) Inspection of Genetic Modified Food

Table 2-26 Equipment list for inspection of Genetic Modified food

Category number	Equipment number	Equipment (description)	QTY
Ante Room B206-7			
D-01	77	UV shoes box	1
D-02	78	Ultra Violet radiation locker	1
GMO Sample Preparation Room B206-4			
D-03	53	Freezer	1
D-04	59	Refrigerator (approx. 300L)	1
D-05	34	Ultrasonic homogenizer	1
D-06	112	Lyophilization: Freeze-Drying (flask specification)	1
D-07	33	Food processor	1
D-08	145	Pass box	1

D-09	80	System cabinet	1
D-10	67	Electrical balance	1
D-11	129	Dispenser , handystep (micropipette) (1)	3
D-12	68	Analytical balance (semi micro)	1
D-13	63	Water distillation apparatus	1
D-14	21	Centrifuge and rotor (Medium-centrifuge)	1
D-15	20	Centrifuge and rotor (small, Refrigerated)	1
D-16	48	Water bath(shake)	2
D-17	102	Bio safety cabinet	1
D-18	207	Stainless sink (900)	1
D-19	187	Side experiment table, (1200)	2
GMO Chemical Preparation Room B206-3			
D-20	145	Pass box	1
D-21	80	System cabinet	1
D-22	103	Clean bench (Desktop)	1
D-23	20	Centrifuge and rotor (small, Refrigerated)	1
D-25	191	Side experiment table, (1800)	2
D-26	53	Freezer (low temperature freezer)	1
D-27	59	Refrigerator (approx. 300L)	2
D-32	103	Clean bench (Desktop)	1
D-44	25	Vortex genie mixer	1
GMO PCR Room B206-2			
D-28	145	Pass box	1
D-29	79	Reagent storage	1
D-30	132	Dispenser, handystep (micropipette) (4)	3
D-31	12	RT-PCR	1
D-33	20	Centrifuge and rotor (small, Refrigerated)	2
D-34	189	Side experiment table (1500)	3
GMO Electrophoresis & Sterilization Room B206-1			
D-35	150	Dry shelf	1
D-36	76	Ultrasonic cleaning unit	1
D-37	155	Electrophoresis apparatus	2
D-38	156	CCD camera, computer	1
D-39	117	Autoclave (small)	1
D-40	20	Centrifuge and rotor (small, Refrigerated)	1
D-41	189	Side experiment table (1500)	2
D-42	207	Stainless sink (900)	1
D-24	47	Incubator (block)	1
Corridor B206-6			
D-43	138	Hand Washing sink	1

## 5) Inspection of Inorganic substance

Table 2-27 Equipment list for inspection Heavy metals

Category number	Equipment number	Equipment (description)	QTY
Sample Analysis Room 2 B307-1			

E-01	128	Rotary evaporator (with the vacuum system)	1
E-02	122	Close Vessel Microwave Digestion System	1
E-03	61	Refrigerator (reagent)	2
E-04	32	Liquid Solvent strong shaker	2
E-05	35	Vortex	4
E-06	26	Homogenizer	2
E-07	126	Hotplate stirrer	2
E-08	49	Digital hot plate (L)	2
E-10	29	Laboratory blender, edible meat	6
E-11	41	Heat block	4
E-12	157	Concentrator (Rapid)	2
E-13	107	Draft chamber (central laboratory table, inorganic solvent)	2
E-14	106	Draft chamber (sample preparation)	3
E-15	80	System cabinet	5
E-16	67	Electrical balance	3
E-17	158	Electric cooker	2
E-18	66	Ultra-pure water system	2
E-19	76	Ultrasonic cleaning unit	2
E-20	129	Dispenser, handy step (micropipette) (1)	3
E-21	63	Water distillation apparatus	1
E-22	152	Solid-phase extraction manifold	2
E-23	111	Dryer with degas pump	1
E-24	120	Hot air oven sterilizer (large size)	1
E-25	21	Centrifuge and rotor (Medium)	3
E-26	23	Centrifuge (large size 2, Refrigerate)	1
E-27	24	Centrifuge and rotor (Degas-Medium centrifuge)	1
E-28	83	pH meter	2
E-29	201	Stainless sink (1200)	3
E-30	153	Exhaust air gallery box	1
E-31	193	Side experiment table (corner)	1
E-32	187	Side experiment table, (1200)	4
E-33	173	Central experiment table, (with sink and chair)	1
E-34	172	Central experiment table, (with sink)	1
E-35	197	Work table (stainless steel, 1200)	4
Proficiency Test Room B307-2			
E-36	53	Freezer (low temperature)	1
E-37	59	Refrigerator (approx. 300L)	1
E-38	36	Mixer	3
E-39	110	Lyophilization: Freeze-Drying (with ampoule holder)	1
E-40	130	Dispenser , handystep (micropipette) (2)	1
E-41	139	Bottle seamer	1
E-42	140	Can seamer	1
E-43	208	Chair for examinations of laboratory work	2
E-44	180	Side experiment table, reagent shelf, 1800)	1
E-70	116	Autoclave	1
E-71	209	Ball Mill	1
Sample Analysis Room B305			
E-45	129	Dispenser, handystep (micropipette) (1)	3
E-46	13	Atomic Absorption Spectrometer(AAS)	1
E-47	14	UV-VIS	1
E-49	15	Inductively-Coupled Plasma Mass (ICP-MS)	1



E-50	16	Ion Chromatography (IC)	1
E-51	201	Stainless sink (stainless steel, 1200)	2
E-52	193	Side experiment table(corner)	2
E-53	187	Side experiment table, (1200)	5
E-54	173	Central experiment table, (with sink and chair)	1
Wet & Ash Analysis Room B301			
E-55	50	Muffle furnace	2
E-56	159	Waste water treatment system	1
E-57	108	Draft chamber (for organic solvent)	2
E-58	109	Draft chamber (acid, alkali)	2
E-59	80	System cabinet	1
E-60	113	Electric oven	2
E-61	129	Dispenser , handystep (micropipette) (1)	5
E-62	160	Soxhlet oil apparatus	2
E-63	161	Automated titrator	2
E-64	17	Kjeldahl apparatus (nitrogen analyzer)	2
E-65	18	Duma nitrogen analyzer	1
E-66	162	Extraction Arm Ventilator (movable)	1
E-67	193	Side experiment table (corner)	2
E-68	186	Side experiment table,(900)	3
E-69	173	Central experiment table, (with sink and chair)	1
Corridor (2) B210			
F-1	163	Automatic icemaker	1

## 6) Inspection of Radiation

Table 2-28 Equipment list for Inspection of Radiation

Category number	Equipment number	Equipment (description)	QTY
Radiation Room B202-3			
G-1	26	Homogenizer	2
G-2	150	Dry shelf	2
G-3	79	Reagent storage	2
G-4	67	Electrical balance	1
G-5	19	Integrated Gamma Spectrometer	1
G-6	180	Side experiment table, (1800)	1

## 7) Training and Education

Table 2-29 Equipment list for Training

Category number	Equipment number	Equipment (description)	QTY
Training (Dry) Room B204-1			
H-1	166	Writing board	1
H-2	167	Screen	1
H-3	168	Projector	1
H-4	169	Lab Desks (4 person)	10

H-5	170	Lecture chairs	30
Training (Wet) Room B204-2			
H-6	79	Reagent storage	1
H-7	129	Dispenser, handystep (micropipette) (1)	5
H-8	174	Central experiment table,(with sink)	1

## 8) Sampling and Risk assessment

Table 2-30 Equipment list for Sampling and Risk assessment

Category number	Equipment number	Equipment (description)	QTY
Sampling and monitoring Room B106-1			
I-01	52	Freezer (stocker type)	2
I-02	62	Refrigerator (approx. 500L)	2
I-03	84	Scalar (length)	1
I-04	93	Sieve (Analytical)	1
I-06	164	Mobile Lab. Vehicle	1
I-07	94	Handsaw	1
I-08	95	Automatic Drill (hole opener)	1
I-09	79	Reagent storage	2
I-10	138	Hand washing sink	1
I-11	133	Sampling box(L)	5
I-12	134	Sampling box(M)	5
I-13	135	Sampling box(S)	5
I-14	85	Hygrometer	1
I-15	136	Sampling bottle	1
I-16	96	Sampling equipment (soil)	2
I-17	97	Sampling equipment (air)	2
I-18	98	Sampling equipment (grains)	2
I-19	86	Illuminometer	1
I-20	87	Thermometer (Portable)	1
I-21	88	Thermometer	1
I-22	89	Chlorine meter	1
I-23	90	TSD meter	1
I-24	91	Portable pH meter	1
I-25	92	Electric currency meter	1
I-26	176	Side experiment table, (1800)	4

## 9) Inspection of Marine toxin (Bioassay)

Table 2-31 Equipment list of inspection of Marine toxin

Category number	Equipment number	Equipment (description)	QTY
Bio Assay room B209-2			
J-1	57	Refrigerator (+4°C) (approx. 500L )	1
J-2	80	System cabinet	1
J-3	165	Environment control cabinet for animal experiment	1

J-4	99	Feeding equipment and operating equipment for small animal	2
J-5	129	Dispenser , handystep (micropipette) (1)	2
J-6	195	Work table (stainless steel, 1500)	2

10) Quality control room

Table 2-32 Equipment list for Quality control

Category number	Equipment number	Equipment (description)	QTY
Organic chemistry Quality control room B207			
K-1	53	Freezer	2
K-2	62	Refrigerator (approx. 500L)	2
K-3	80	System cabinet	1
K-4	51	Ultra-Freezer	1
K-5	175	Side experiment table,(1500)	2
Molecular biology-Quality Control Room B205-1			
K-6	184	Side experiment table (3000)	1
Inorganic chemistry-Quality Control Room B306-1			
K-7	176	Side experiment table(1800)	4
K-8	190	Side experiment table(1200)	4

11) Chemical Storage room

Table 2-33 Equipment list for Chemical Storage

Category number	Equipment number	Equipment (description)	QTY
Stand by Mechanicals & Tools Archive room B209-1			
L-1	81	Chemical closet (S)	1
L-2	82	Chemical closet (L)	1
L-3	80	System cabinet	1
L-4	183	Side experiment table(3000)	1

12) Gas generator room

Table 2-34 Equipment for Gas generator room

Category number	Equipment number	Equipment (description)	QTY
Gas Generator Room B306-4			
M-2	142	N(Nitrogen)generators	3

13) Mechanic room

Table 2-35 Equipment for Mechanic room

Category number	Equipment number	Equipment (description)	QTY
Mechanic Room B202-1			
N-1	203	Stainless sink (stainless steel, L angle, 1200)	1
N-2	177	Side experiment table, 1200)	1
N-3	198	Work table (stainless steel, 1500)	4

14) Gas storage room

Table 2-36 Equipment for Gas storage

Category number	Equipment number	Equipment (description)	QTY
Gas Storage B103			
O-2	143	Air compressor	1

15) Sample Storage room

Table 2-37 Equipment list for Sample storage

Category number	Equipment number	Equipment (description)	QTY
Ante room B101-3			
P-3	80	System cabinet	2

## 2-2-2-2 Facilities Plan

### (1) Site plan and layout Plan

This project is comprised the construction of the building by the Vietnamese side and the supply of equipment for the RETAQ center by the Japanese side. Examined the equipment based on the activities of RETAQ center, the demarcation of facilities works to be done between the Vietnamese and The Japanese sides are as shown in Table 2-38, in order to fulfill the functions of equipment on sustainable and safe manners.

Table 2-38 Demarcation of scope of work of RETAQ center

Section	Content of inspection	Room	Equipment	Ceiling	Interior	Individual air condition	Central air condition in	Exhaust
Inspection rooms	Microbiology section	105, 107, 108, 109, 110	○	○	○	○	○	○
	Residue indicator	302, 304, 310, 312	○	○			304,310	○
	Molecular biology	201	○	○	○	○	○	○
	GMO	206	○	○	○	○	○	○
	Inorganic chemistry	301, 305, 307	○	○			○	○
	Radiation analysis	202-3	○					
	Marine toxin	209-2	○					
	Sampling, Risk assessment	106-1	○					
	Dioxin analysis	102, 104						
	Isotope ratio analysis	202-2						
Thermoluminescence	312-2							
Utilities rooms	Mechanic room	202	○					
	Training room (Dry/Wet)	204-1, 204-2	○					
	Sample standby room	209-1	○					
	Sample storage	103	○					
	Gas room	101	○					
	Air conditioning Heat source room	1- floor						
	Air conditioning machinery room	4- floor						
Exhaust control room	4- floor							

Outdoor units for ventilation, air-cooled chillers and fuel tanks for boilers are to be arranged properly considering the layout plan of Reference Test Building and other related facilities, which are to be constructed by the Vietnamese side. Scrubbers for treatment of exhaust gas are to be placed on both ends of the fourth floor to reduce the volume of air aspiration into the outdoor units.

### (2) Contents of the Layout Planning

Reference Test Building is planning to use hazard materials such as organic solvent, a genetically modified material, and pathogenic bacteria. Laboratory safety of GMO and genetically engineering laboratory should base on agreement of Cartagena Protocol on Biosafety, (genetically-modified related rule) for ensuring safety of staffs and the outside environment.

Specifications for a Restricted area, Regulation area, General area for installation of ventilation system and the interior work by the Japanese side are shown in Table 2-39.

Table 2-39 Testing Area and Facility Equipment Install by the Japanese side

Area	Component Rooms	Installations by the Japanese side
Restricted area	105, 107 - 110 (Operation Room, M.O.R., Sterilization Room, Tools Cleaning & Drying Room, etc.) 201, 206 (Rooms related to GMO)	Central and independent Air-Conditioning System (Air Supply & Exhaust) Gas piping for Analysis (Kinds of gas and compressed air) Interior Decorating (Partitions, Floor finishing, Suspended ceilings) Electrical Works (Lighting, Outlets, etc.)
Regulation area	102-1 (Radiation Room) 301 (Wet & Ash Items Analysis Room) 302 (GC Machine Room) 304 (LC Machine Room) 305 (Sample Preparation Room-1) 307 (Sample Analysis Room) 310 (Residue Indicator Analysis Sample Preparation Room)	Central Air-Conditioning System (Air Supply & Exhaust) Exhausted Gas Treatment Unit (Wet & Dry) Gas piping for Analysis (Kinds of gas and compressed air) Interior Decorating (Suspended ceilings) Electrical Works (Lighting)
General area	Other Rooms (Machine Rooms, Training Rooms, Animal Breeding Rooms, Corridors, etc.)	No installation. Some attachments of the equipment to the rooms are available. Some electrical works and ventilation are installed under the roof.

### (3) Air Conditioning and Ventilation

#### 1) Design concept

##### 1. Restricted area

This area utilizes hazardous genetically engineered material (GMO). Leaks of genetically engineered material must be prevented and strictly controlled. For this reason, the rooms are kept depressurized and the exhausted are to filter out with HEPA (High Efficiency Air Filter). Inoculations of bacteria are controlled in BSC (Biological Safety Cabinet) for the safety of inspectors, and air inside the rooms has to filtrate through the HEPA. Anterooms before the main door are placed to maintain the differential pressure between inside and outside. Partitions and some fittings or fixtures are made of materials with highly airtight and washable.

##### 2. Regulation area

Regulation areas utilize organic solvents that should be kept away from the staff to conduct safely during chemical analysis. Chemical analysis commonly uses organic solvents for extraction and chemical reaction, repeatedly, to have chemical reaction with target component are in a fume hood or a ventilation hood to avoid inhaling gas from organic solvents. This ventilation hood system requires 1,000 to 3,500 cubic meters fresh air per hour when working. Exhaust from liquid chromatogram Machine Room and Gas chromatogram machine room respectively use organic solvent and high temperature gas when their precision analysis machines start. These rooms need to be equipped with a ventilation system installed under the roof to secure staff and machine.

### 3. General area

This area consists rooms for sample storage or a radiation room. It does not require any specific air conditioning or ventilation system. The Vietnamese side will bear the construction.

### 2) Ventilation Plan

A man requires 20 to 25 cubic meters fresh air per hour for breath (that is called “basal quantity of fresh air”). Those rooms need constant ventilation (intake) using air control system from outside. The Japanese side will bear the installation of Restricted and Regulation area where whole ventilation systems are under operation when a Bio Safety Cabinet and a fume hood are working. Ventilation Plan offers whole ventilation twice an hour taking dust penetration and diffusion into consideration of the basal quantity of fresh air. Calculated volume of fresh air is equal to the requirements above assuming that a man occupies 10 square meters. All room will be controlled by CAV (Constant Air Volume) in every zone and well ventilated through a duct from the outdoor air processing units on the fourth floor. Every room has its own exhaust duct in its ceiling space to let fresh air into a room and polluted air out of a room.

A room with an independent ventilation system will be controlled by VAV (Valuable Air Volume) and ventilated through its own intake duct. Independent ventilation system can control intake and exhaust via electric signal converted instantly from exhaust. This system works independently if a few systems are working in a room at the same time.

Infection Microbiology (105-1) and several rooms related to GMO exhaust polluted air through HEPA. Rooms related to chemical analysis on the third floor for acidify exhaust or alkaline polluted air through wet type (acid and alkali) or dry type (organic solvent) scrubber for the neutralization.

Table 2-40 shows the basal quantity of fresh air and that of the independent ventilation system calculated in terms of the volume of each room. LC Machine Room doubles the basal quantity of ventilation (4 cycles/hour) and needs small exhaust emission device near the LC machine to emit solvent and heat efficiently, because it is impossible to avoid solvent diffusion completely.

Rooms 302 (GC Machine Room) and 305 (Sample Analysis Room) need an efficient exhaust emission system to emit waste exhaust heat from analysis machines. The Japanese side will offer one for the stable working of the machines and for the safety of working staffs. The Vietnamese side will bear installation of independent air conditioning units that play same function as ventilation system used in current buildings of NAFIQAD Branch offices.

### 3) Ventilation Capacity of Central Air Conditioning

Table 2-40 shows the calculation result of ventilation capacity of each room from the central air conditioning system.

Table 2-40 Calculation of ventilation capacity from the central air conditioning system

Area	R No.	Room Name	Volume	Specifications	
First floor North	105-1	Operation Room	207.9m <sup>3</sup>		
	105-3	Autoclave Room	23.6m <sup>3</sup>	1,296m <sup>3</sup> /h (Safety Cabinet Direct Exhaust)	
	107-1	Balance Room	16.7m <sup>3</sup>		
	107-3	Normal M.O.R	26.5m <sup>3</sup>		
	107-4	Infection M.O.R	26.5m <sup>3</sup>	1,296m <sup>3</sup> /h (BS Safety Cabinet HEPA Exhaust)	
	109-1	Result Analysis Room	80.5m <sup>3</sup>		
	109-2	Incubation Room	113.7m <sup>3</sup>		
	1F North Total Volume			495.4m <sup>3</sup>	
	Fresh air in need (Double the number of the above)			1,100m <sup>3</sup> /h	
First floor South	108-1	Sterilization Room	114.8m <sup>3</sup>		
	108-2	Microscope Prep Room	36.5m <sup>3</sup>		
	108-3	Microscope Room	32.4m <sup>3</sup>		
	110-1	Tools Cleaning & Drying Room	137.7m <sup>3</sup>		
	110-2	PT. Room	45.9m <sup>3</sup>		
	1F South Total Volume			367.3m <sup>3</sup>	
	Fresh air in need (Double the number of the above)			980m <sup>3</sup> /h	
Second floor North	201-1	Molecular Elect & Sterilization Room -1	70.2m <sup>3</sup>		
	201-2	Molecular PCR Room-1	70.2m <sup>3</sup>		
	201-3	Molecular Chemical Prep Room -1	70.2m <sup>3</sup>		
	201-4	Molecular Sample Prep Room -1	70.2m <sup>3</sup>		
	201-5	Anteroom -4	7.0m <sup>3</sup>		
	201-6	Pathway -2	57.8m <sup>3</sup>		
	201-7	Anteroom -5	13.5m <sup>3</sup>		
	2F North Total Volume			359.1m <sup>3</sup>	Differential Pressure Control Needed
	Fresh air in need (Double the number of the above)			720m <sup>3</sup> /h	
Second floor South	206-1	GMO Electro Sterilization Room -2	70.2m <sup>3</sup>		
	206-2	GMO PCR Room -2	70.2m <sup>3</sup>		
	206-3	GMO Chemical Prep Room -2	70.2m <sup>3</sup>		
	206-4	GMO Sample Prep Room -2	70.2m <sup>3</sup>	1,296m <sup>3</sup> /h (BS Safety Cabinet HEPA Exhaust)	
	206-5	Anteroom -6	13.5m <sup>3</sup>		
	206-6	Pathway -3	59.4m <sup>3</sup>		
	206-7	Anteroom -7	13.5m <sup>3</sup>		
	2F South Total Volume			367.2m <sup>3</sup>	Differential Pressure Control Needed
	Fresh air in need (Double the number of the above)			730m <sup>3</sup> /h	
Third floor (1)	301	Wet & Ash Items Analysis Room	183.6m <sup>3</sup>	2,160m <sup>3</sup> /h Scrubber (Wet×2) 2,160m <sup>3</sup> /h Scrubber (Dry×2)	
	304	LC Machine Room	183.6m <sup>3</sup>	4 times/h (Because of Solvent Diffusion)	
	3F Northwest Southwest Total Volume			367.2m <sup>3</sup>	
	Fresh air in need (Triple the number of the above)			1,100m <sup>3</sup>	
Third floor (2)	307-1	Sample Analysis Room -2	327.8m <sup>3</sup>	10,152m <sup>3</sup> /h Scrubber (Wet×5)	
	307-2	PT. Room -2	39.4m <sup>3</sup>		
	310-1	Residue Indicator Analysis Sample Preparation Room	340.2m <sup>3</sup>	10,152m <sup>3</sup> /h Scrubber (Dry×5)	
	310-2	ELISA Assay Room	27.0m <sup>3</sup>		
	3F Northeast Southeast Total Volume			734.4m <sup>3</sup>	
	Fresh air in need (Double the number of the above)			1,460m <sup>3</sup> /h	
Total			6,090m <sup>3</sup> /h	Total Independent Exhaust 28,540m <sup>3</sup> /h	

Note: Normal corridors and pathways excluded.



#### 4) Calculation of Heating Capacity of the Central Air Conditioning

##### 1. Temperature and Humidity

Table 2-41 shows the calculation of heating capacity of the Central Air Conditioning Device taking temperature and humidity in Hanoi into consideration.

Table 2-41 Calculation of heat source of the Central Air Conditioning Device (1)

Air	Summer			Winter			
	Temperature [°C]	Humidity [%]	Ratio ENT[kJ/kg]	Temperature [°C]	Humidity [%]	Ratio ENT[kJ/kg]	
Outdoor	32.9	80	98.63	14.0	60	28.09	
Indoor	25.0	50	50.29	22.0	50	43.61	
Air Outlet	15.0	90	39.26	22.0	50	43.61	
Difference between Outdoor and Outlet			59.37				-14.52

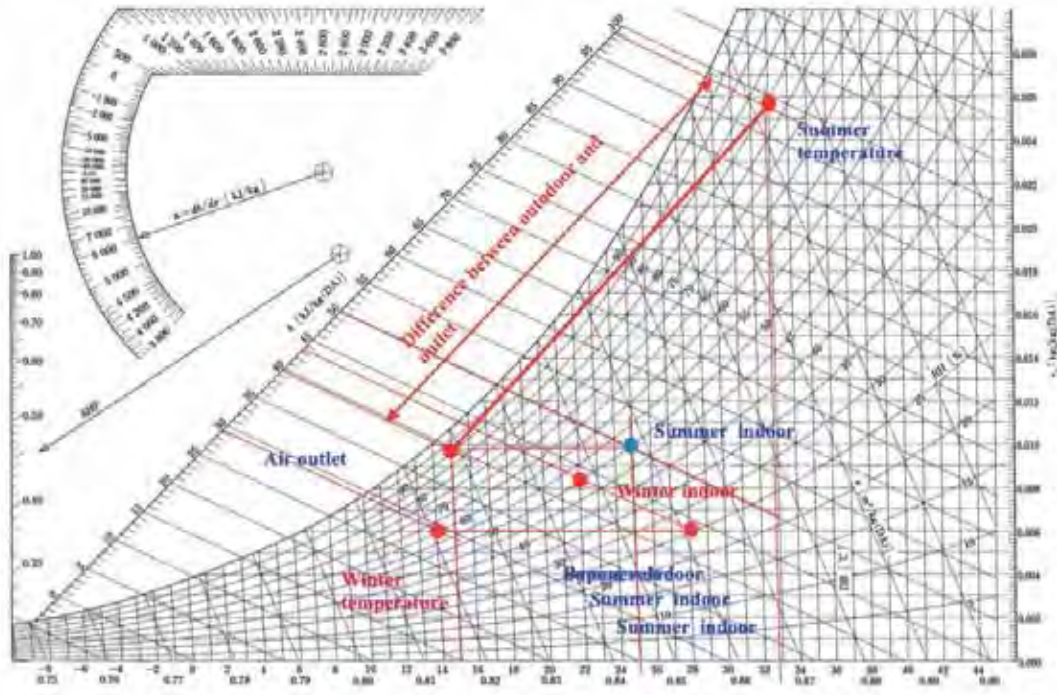


Figure 2-4 Psychrometric Charts

##### 2. Cooling and Heating Capacity of the Outdoor Air Processing Units

Table 2-42 Calculation of heat source of the Central Air Conditioning Device (2)

	Air Volume m/h	Cooling			Heating		
		Difference Ratio ENT [kJ/kg]	Kj/h	kW (*1)	Difference Ratio ENT [kJ/kg]	Kj/h	kW
Outdoor Air	6,090	59.37	361,563	120.5	-14.52	88,428	29.5
Draft System	28,540	59.37	1,694,420	564.8	-14.52	414,401	138.1
Total	34,630			685.3			167.6

\*1 Assuming 20 % loss in the thermal conversion

The basic capacity of air-cooled chiller and heat pumps (RR-1 to 4) are calculated from one third of 150 percent of original capacity. Which is the need for regular maintenance for one device and high temperature operation, and to energy conservation and low loading operation at the same time, it is better to use two devices with a half capacity (that is  $50\% \times 1/2 = 25\% \times 2$  devices). The capacities of boiler (B-1/2) are to be set to 100 percent back up ( $100\% \times 2$  devices) from the need for regular maintenance of one device.

Air condensing units will also need a substitute machine from the need for regular maintenance. Refrigerant R-407 will be selected from environmental reason (deplete the ozone layer).

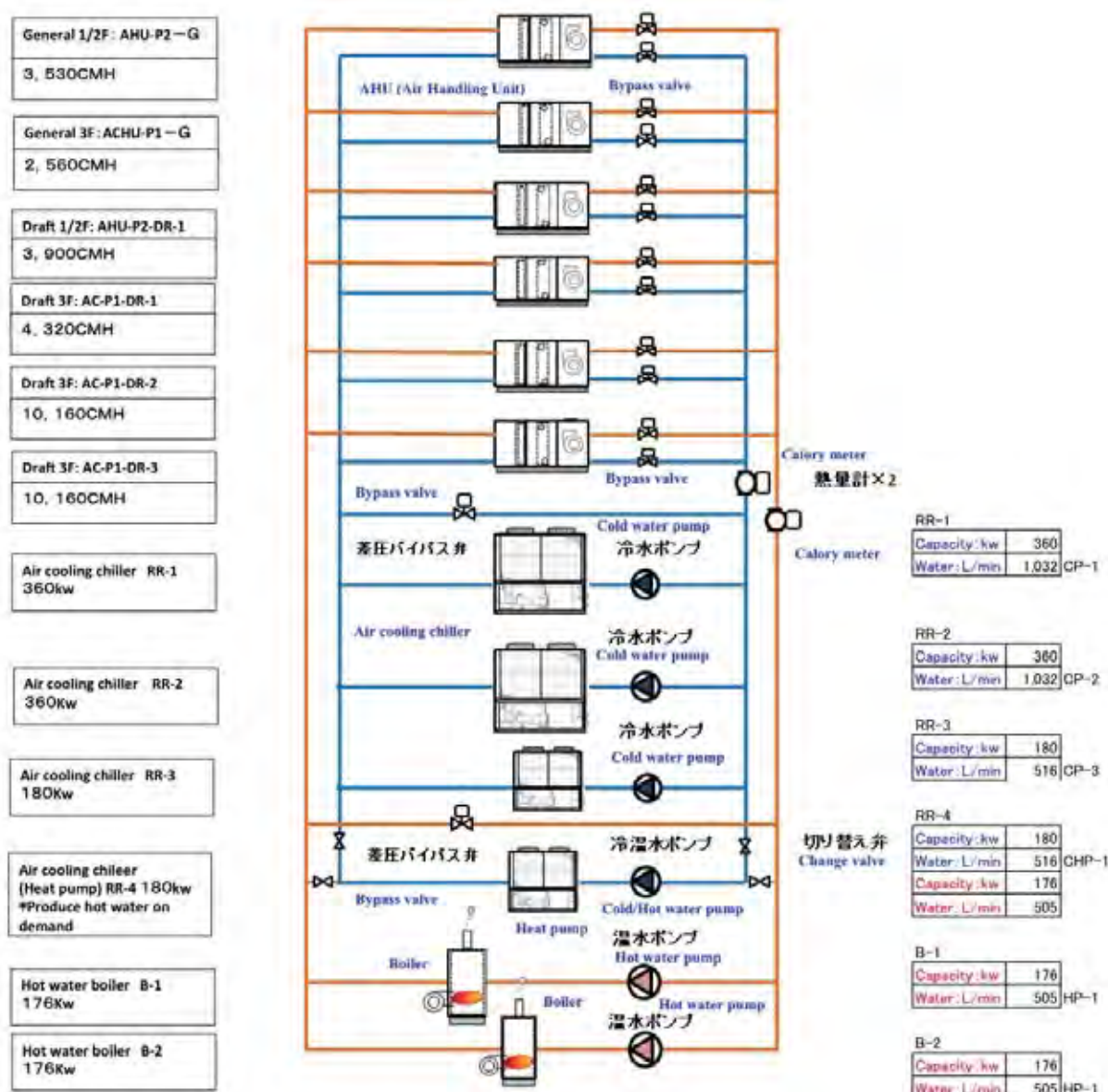


Figure 2-5 Composition of central air conditioning and air condensing units

### 3. Exhaust Plan

Interior work for inspection rooms on first and second floors will be done by the Japanese side, many of rooms are separated into small divisions, and the air inside the rooms are aspirated and exhausted to outside by ventilation fan through exhaust duct installed on ceiling of each room. Since both floors handle hazard substances, air is exhausted outside through HEPA filter. Although small amount of organic chemicals and heat are generated from equipment of Liquid chromatograph and Gas chromatograph analysis rooms on the third floor, direct exhaust system are applied to this rooms.

Inner height ceiling of each testing room are secured by 1.4 m, in which air intake and exhaust ducts, ventilation fans, piping for refrigerant for PAC and condensed water, ceiling lights, etc. are installed. Therefore, maintenance and inspection entrance with a rudder on ceiling are to be prepared to ensure easy maintenance. Furthermore, both intake and exhaust ducts to each floor from air condensing unit of the 4<sup>th</sup> floor are placed through duct space. As well as accessibility of maintenance, the maintenance entrance is to build on the side of office rooms.

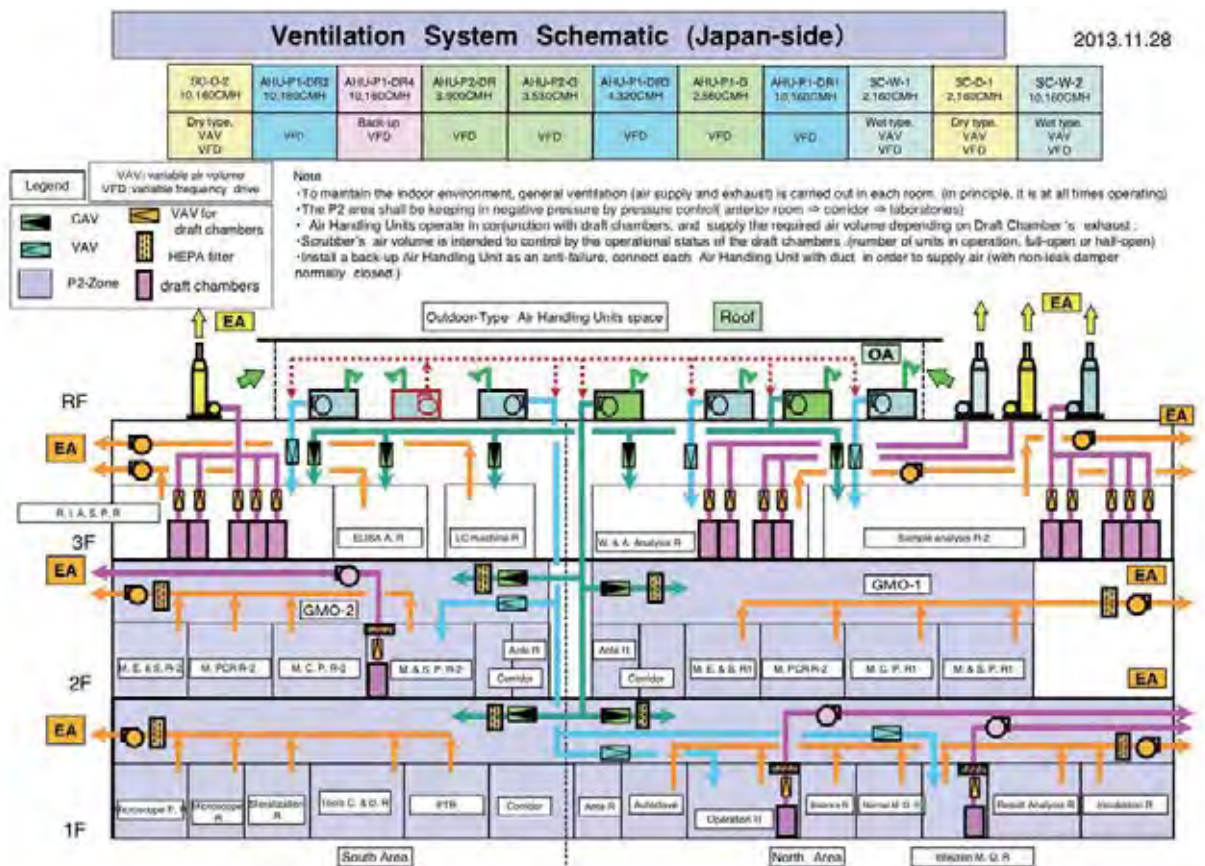


Figure 2-6 Schematic diagram of Ventilation system

## 5) Independent Air Conditioning

The main objective of a central air conditioning system is to fresh air enter the whole rooms constantly, however from large consumption energy, it is not to keeping air temperature constant and not to adjust air temperature in the whole building. Independent air conditioning compensates for the weaknesses of central air conditioning. The Japanese side are planned to install and construct including interior because the both systems work in close cooperation for each other and need wiring and piping work in common on the ceiling under the roof.

The building will be equipped with independent air conditioning system of energy-saving multiple type (multiple air conditioning units with one outdoor unit).

### 1. Assumed standard cooling load (unit: W)

Table 2-43 Standard cooling load

	Structure	Light	Human body	Machine generated Heat	Total
North • East Side	50	30	10	50	140
South • West Side	100	30	10	50	150

### 2. Cooling load of each room

Table 2-44 Cooling load of each room

Area	Room Number	R Name/Device	Floor space	Cooling Load per unit (w/m <sup>2</sup> )	Cooling load (kW)	Safety factor 1.15	PAC load indoor (kW)	Capacity indoor (kW)	N
First floor North	105-1	Operation Room	77.0m <sup>2</sup>	190	14.6	1.15	16.82	11.2	2
		Refrigerators×4					1.00		
		Water Purifier					3.00		
	105-3	Autoclave Room	8.8m <sup>2</sup>	190	1.7	1.15	1.91	2.8	1
	107-1	Balance Room	6.2m <sup>2</sup>	190	1.2	1.15	1.35	2.8	1
	107-2	Pathway-1	14.4m <sup>2</sup>	80	1.2	1.15	1.32	2.8	1
	107-3	Normal M.O.R	9.8m <sup>2</sup>	190	1.9	1.15	2.14	2.8	1
	107-4	Infection M.O.R	9.8m <sup>2</sup>	190	1.9	1.15	2.14	2.8	1
	109-1	Result Analysis Room	29.8m <sup>2</sup>	190	5.7	1.15	6.51	7.1	1
	109-2	Incubation Room	42.1m <sup>2</sup>	190	8.0	1.15	9.20	11.2	1
1F North Total Load							45.39	43.5	9
First floor South	108-1	Sterilization Room	42.5m <sup>2</sup>	140	6.0	1.15	6.84	7.1	1
	108-2	Microscope Prep Room	13.5m <sup>2</sup>		1.9	1.15	2.17	5.6	1
		Dry heating Sterilizer (Small)					1.36		
		Dry heating Sterilizer (Large)					1.20		
	108-3	Microscope Room	12.0m <sup>2</sup>	140	1.7	1.15	1.93	2.8	1
	110-1	Tools Cleaning & Drying Room	51.0m <sup>2</sup>	140	7.1	1.15	8.21	9.0	1
	110-2	PT. Room	17.0m <sup>2</sup>	140	2.4	1.15	2.74	4.5	1
		Freezer×3					1.40		
192	Corridor-2	40.0m <sup>2</sup>	80	3.2	1.15	3.68	4.5	1	
1F South Total Load							29.53	33.5	6
Second floor North	201-1	Molecular Elect & Sterilization Room -1	26.0m <sup>2</sup>	190	4.9	1.15	7.18	8.0	1
		Dry steam heating Sterilizer					1.50		
	201-2	Molecular PCR Room-1	26.0m <sup>2</sup>	190	4.9	1.15	7.18	7.1	1
	201-3	Molecular Chemical Prep Room -1	26.0m <sup>2</sup>	190	4.9	1.15	7.18	7.1	1
	201-4	Molecular Sample Prep Room -1	26.0m <sup>2</sup>	190	4.9	1.15	7.18	7.1	1
	201-6	Pathway-2	21.4m <sup>2</sup>	190	1.7	1.15	1.97	2.8	1
2F North Total Load							32.19	32.1	5
Second floor South	206-1	GMO Electro Sterilization Room -2	70.2m <sup>2</sup>	140	3.6	1.15	5.68	7.1	1
		Dry steam heating Sterilizer					1.50		
	206-2	GMO PCR Room -2	70.2m <sup>2</sup>	140	3.6	1.15	5.68	4.5	1
	206-3	GMO Chemical Prep Room -2	70.2m <sup>2</sup>	140	3.6	1.15	5.68	4.5	1
	206-4	GMO Sample Prep Room -2	70.2m <sup>2</sup>	140	3.6	1.15	5.68	4.5	1
	206-6	Pathway-3	59.4m <sup>2</sup>	140	1.8	1.15	1.97	2.8	1
2F South Total Load							26.70	22.4	5
Total of Independent Ventilation (Japan side)							133.81	133.9	25

#### (4) Gas Supply for Analysis

Gas supply system for analysis is set to supply to each room with the gas continuously from storage of gas cylinders and nitrogen gas producers. Gases supplied via piping works are shown as follows:

Type: Acetylene, Argon, Helium, Nitrogen, Compressed air, Oxygen (supplied through piping from oxygen cylinders next to a nitrogen producer on the third floor.)

Storage: Next to the stair room on the first floor, storing 4 cylinders of every kind of gas and changing cylinders automatically before gas is empty.

Piping: Exposed stainless piping for an easy maintenance

**(5) Construction Works**

Table 2-45 shows finishing works of each area that The Japanese side will offer.

Table 2-45 Indoor finishing

Area	Floor	Baseboard	Wall	Ceiling
Regulation Area	Long vinyl chloride sheet	Soft type	LGS Plaster board and color calcium silicate board	LGS Plaster board and color calcium silicate board
			Mortar finish with EP	
Restricted Area	N/A	N/A	N/A	Same of the above
General Area	N/A	N/A	N/A	Corridor ( Light Gauge Steel Material Rock wool board. Hot and cold-water pipe • Cable tray, etc.)

Note: LGS (Light Gauge Steel)

**(6) Electrical Instruments**

1. Electric Wiring Layout

There is a 22KV public high-tension wire near the site available to a substation in the site to transmit power to every building by a step-down transformer. The Japanese side will wire in the Reference Test Building to a terminal board from a main switchboard that the Vietnamese side will provide to the staircase of the first floor. Lightings and electrical outlets are connected to the terminal board. Energy Machine Room in the first floor requires stronger power capacity and connected to the main switchboard with cable trays behind the ceiling.

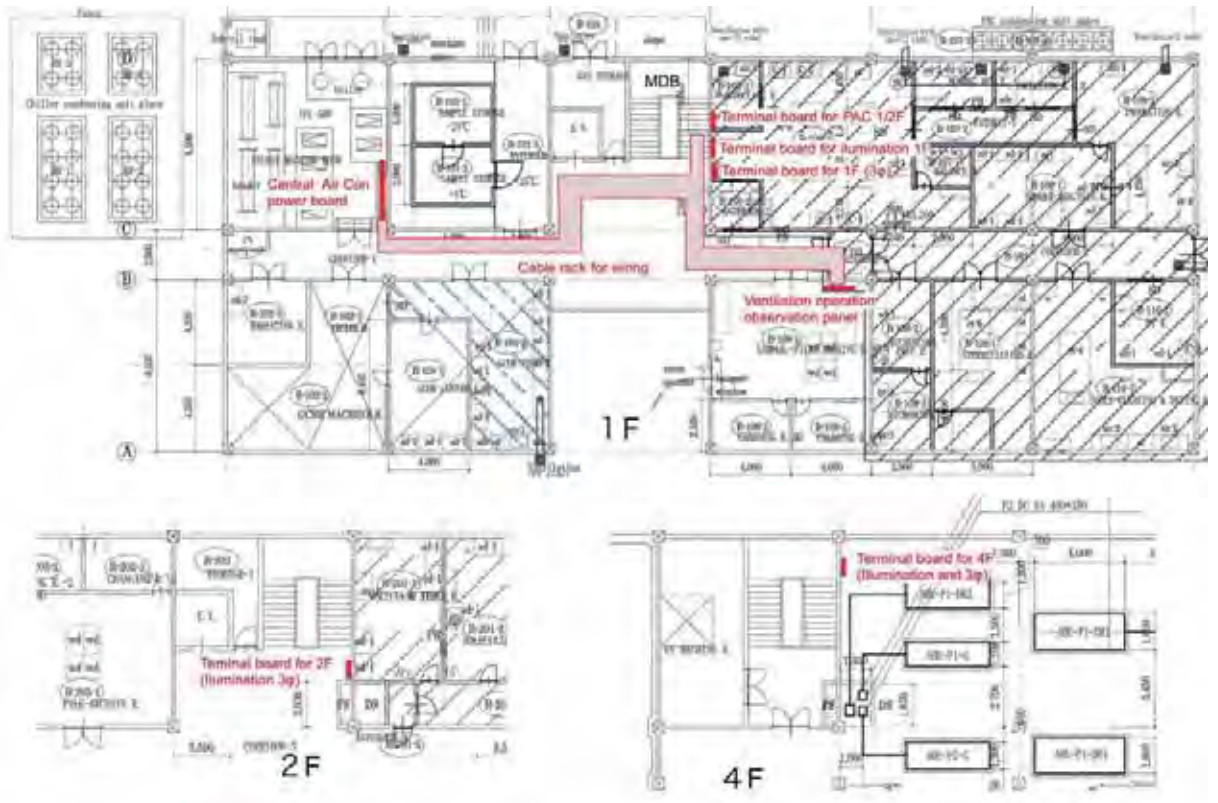


Figure 2-7 Electrical Board (Vietnamese work and Japanese work)

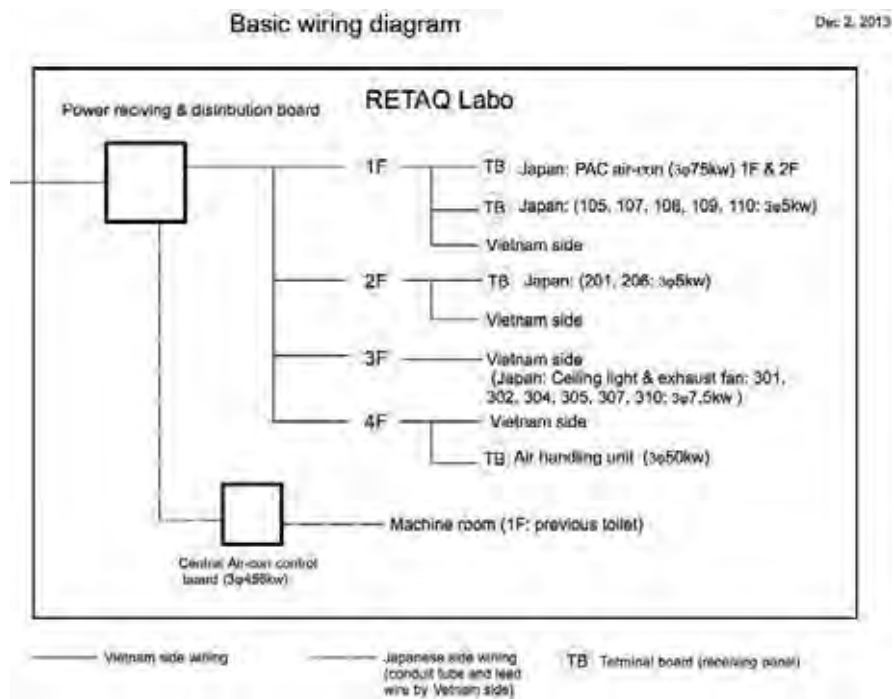


Figure 2-8 Basic wiring diagram (Vietnamese work and Japanese work)

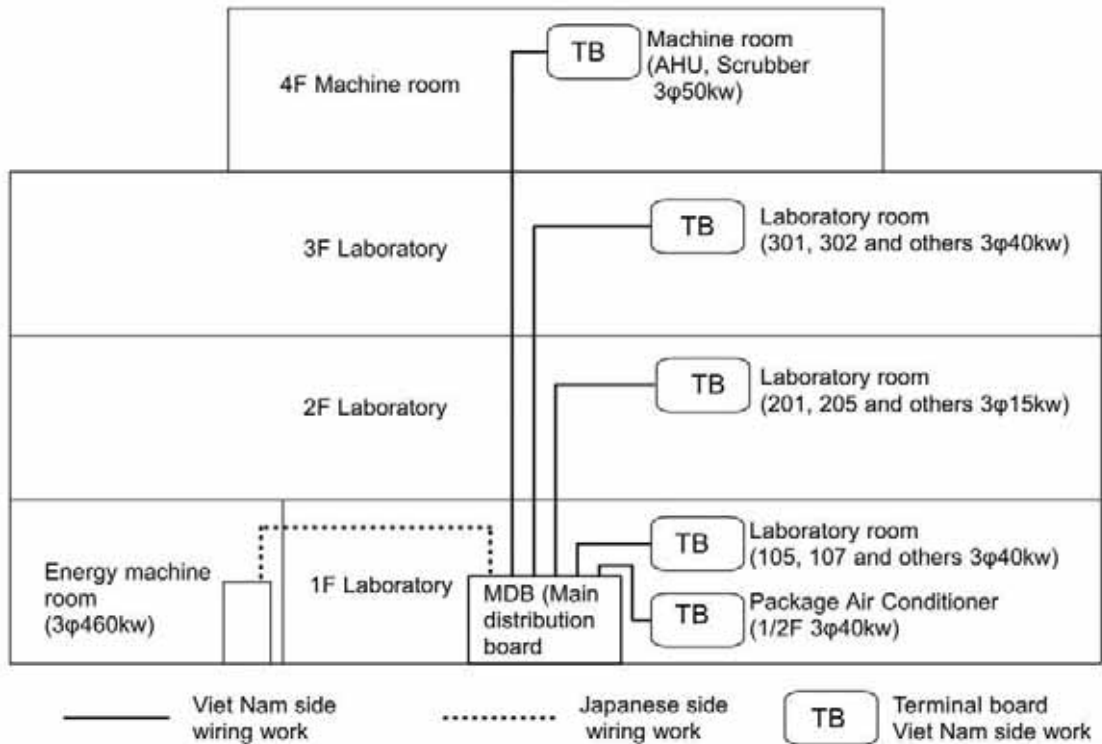


Figure 2-9 Distribution Plan (Vietnamese work and Japanese work)

## 2. Electric Lighting and Wall outlets

Fluorescence lights will be used for the majority of the lighting in the project facilities. Electric lightings and outlets are to be connected to the distribution board prepared by the Japanese side from the terminal board by the Vietnamese side in the restricted area. The Japanese side will install only ceiling works in the regulation area. Illuminance emittance is calculated based on plan prepared by the Vietnamese side, which will be carefully considerate to applied. The standard wall outlet will be two-round-pin/flat-parallel-pin type with ground terminals commonly used in Viet Nam.

## 3. Calculation of power supply

The 380V/220V electric power will be provided from power receiving and transformer facility to the project facilities by Viet Nam construction work (1,250KVA transformer). The Vietnamese side will be responsible for the primary electrical work, the wiring up to the terminals on the main switchboard to be installed in the project facilities. The Japanese side will be responsible for the secondary work, the wiring from the main switchboard. The Japanese side will supply automatic voltage regulators (AVRs) and uninterrupted power supplies (UPSs) to the required equipment.



Table 2-46 Estimation of the transformer capacity

	<b>Power (kw)</b>	<b>Demand Ratio</b>	<b>Power Consumption (kw)</b>	<b>Remark</b>
Central Air Condition (Outdoor air system)	110.6	100%	105.6	Continuous working of all the rooms
Central Air Condition (Draft system)	392.4	80%	313.9	
PAC Air Conditioning	75.4	100%	75.4	Continuous working of all the rooms
Subtotal	578.4		494.9	
Lightings	29.8	70%	20.8	
General (pumps, etc.)	10.0	80%	8.0	
Analytical Machines	178.5	50%	89.3	
Subtotal			118.1	
Total			613.0	Power Factor 0.5 with 1,250KVA

#### 4. Emergency Generator

The Vietnamese side is planning to install an additional emergency backup, 300 KVA standby generator. Generator supplies manually to the building with electricity in case of a power failure. Table 2-46 shows that the generator have capacity of supply to analytical machines, continuous working of the central air conditioning and a part of PAC at the same time.

### 2-2-3 Outline Design Drawings

#### List of drawings

- 1) Site plan (prepared by the Vietnamese side)
- 2) Floor plan of Reference Test Building (prepared by the Vietnamese side)
- 3) Elevation plan of Reference Test Test Building (prepared by the Vietnamese side)
- 4) Section plan of Reference Test Building
- 5) Section plan of ventilation facilities of Reference Test Building (prepared by the Japanese side)
- 6) Equipment layout plan (prepared by the Japanese side)

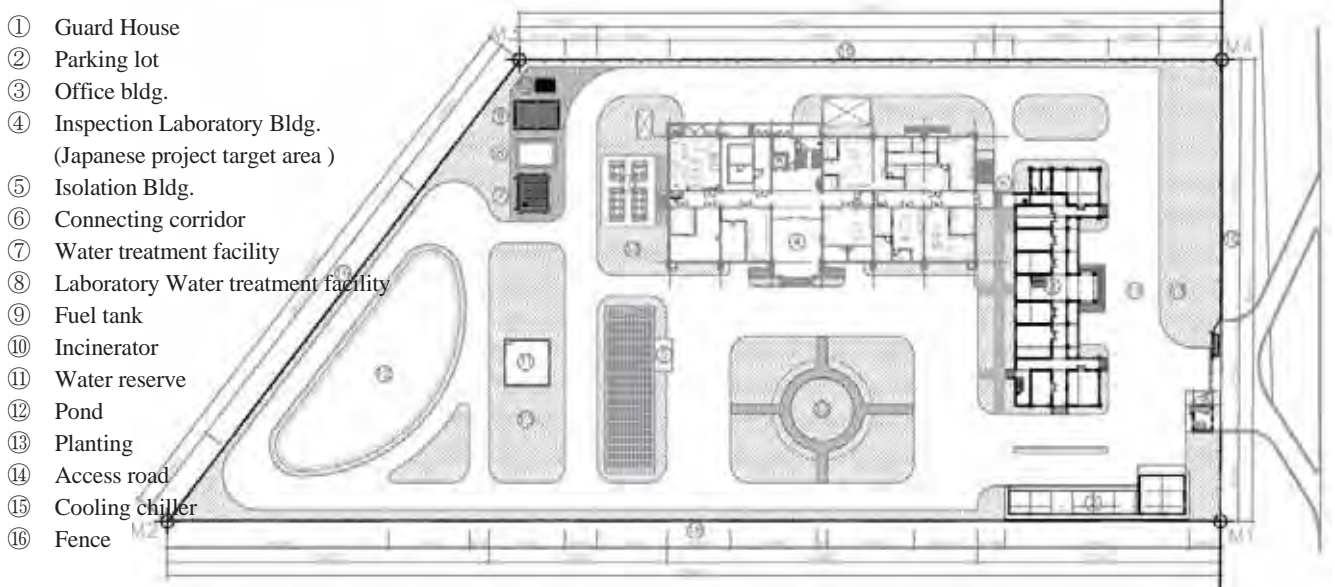


Figure 2-10 Site plan

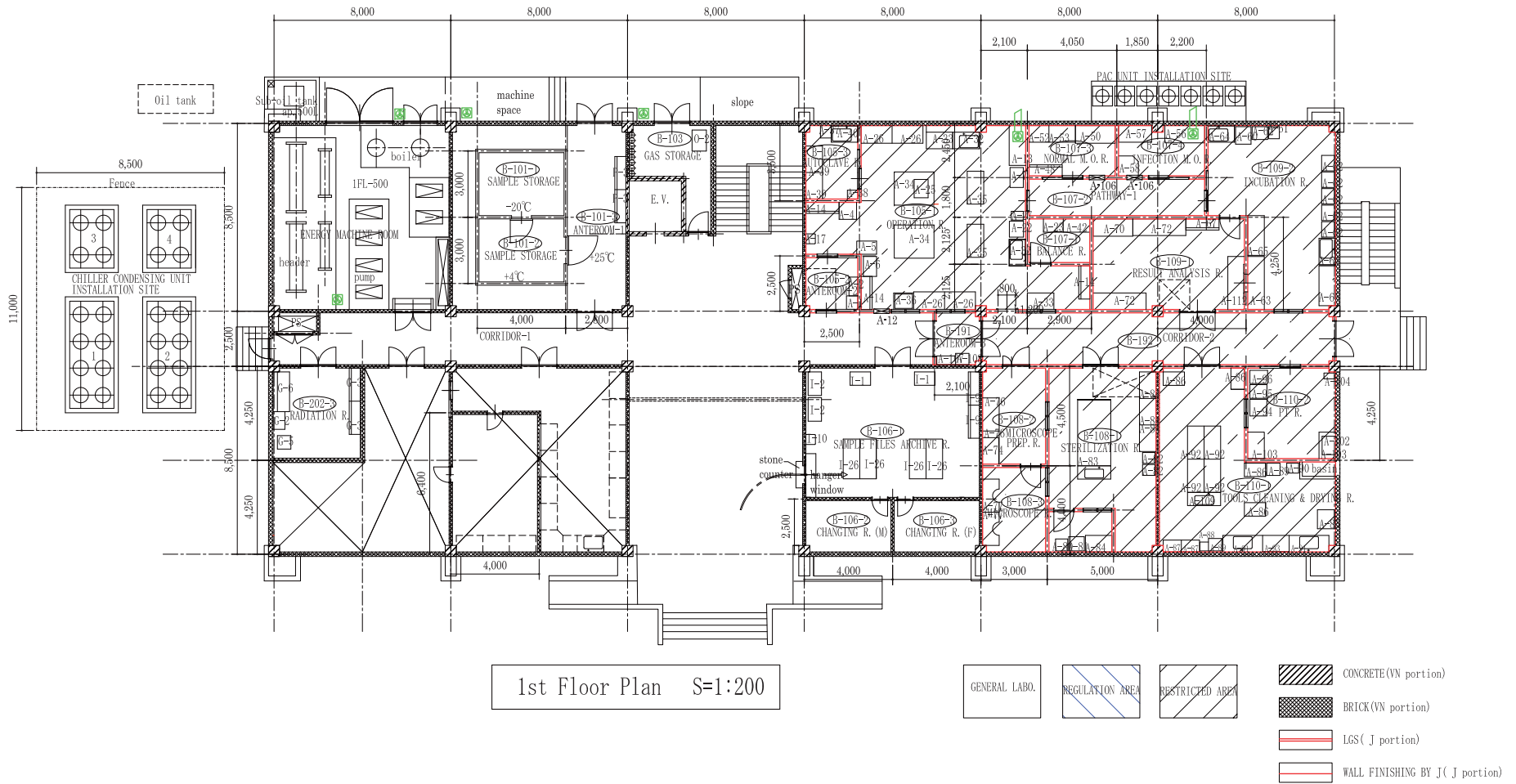


Figure 2-11 RETAQ center Reference Test Building: 1<sup>st</sup> Floor plan

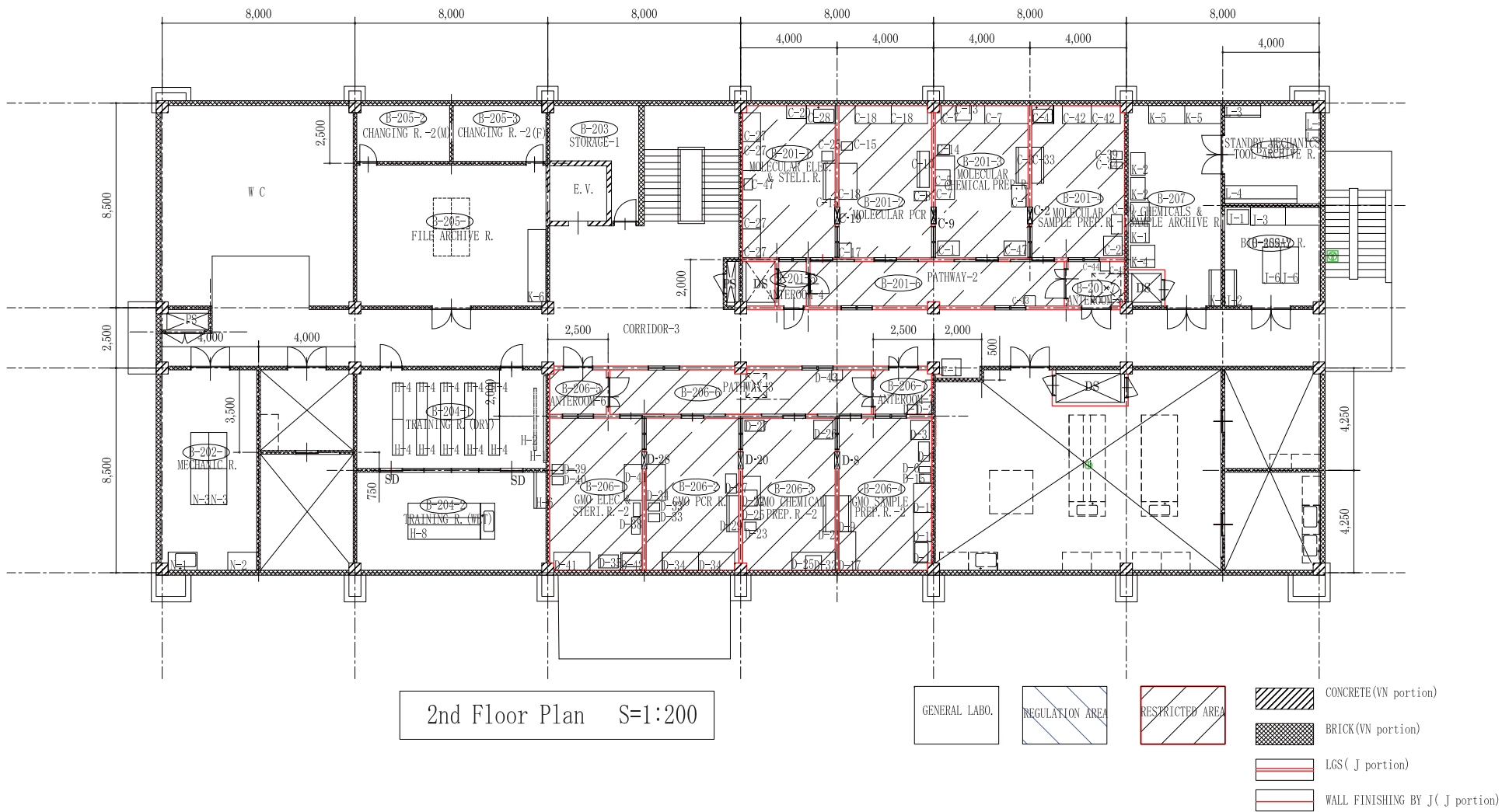
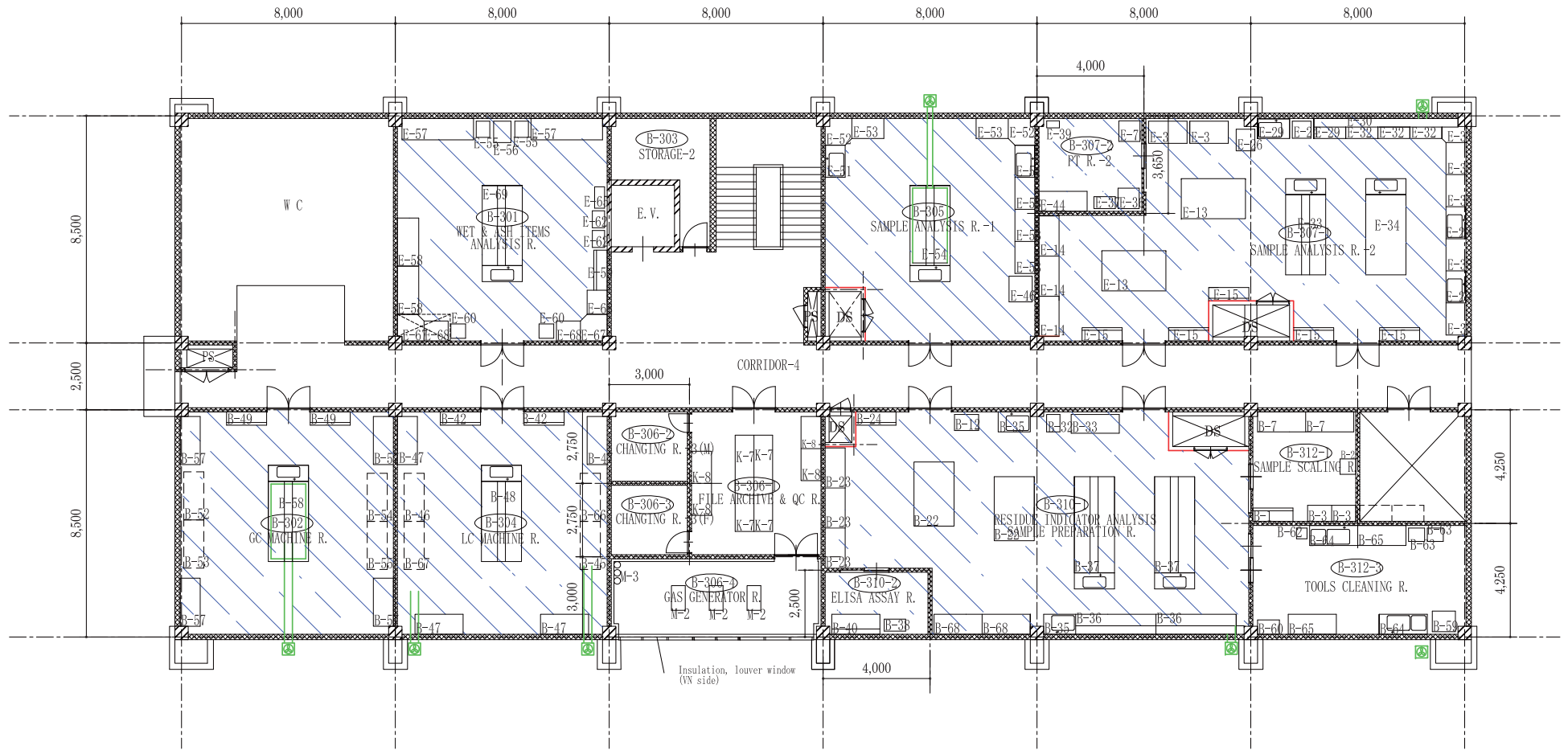


Figure 2-12 RETAQ center Reference Test Building: 2<sup>nd</sup> Floor plan



3rd Floor Plan S=1:200





-  CONCRETE (VN portion)
-  BRICK (VN portion)
-  LGS ( J portion)
-  WALL FINISHING BY J ( J portion)

Figure 2-13 RETAQ center Reference Test Building: 3rd Floor plan

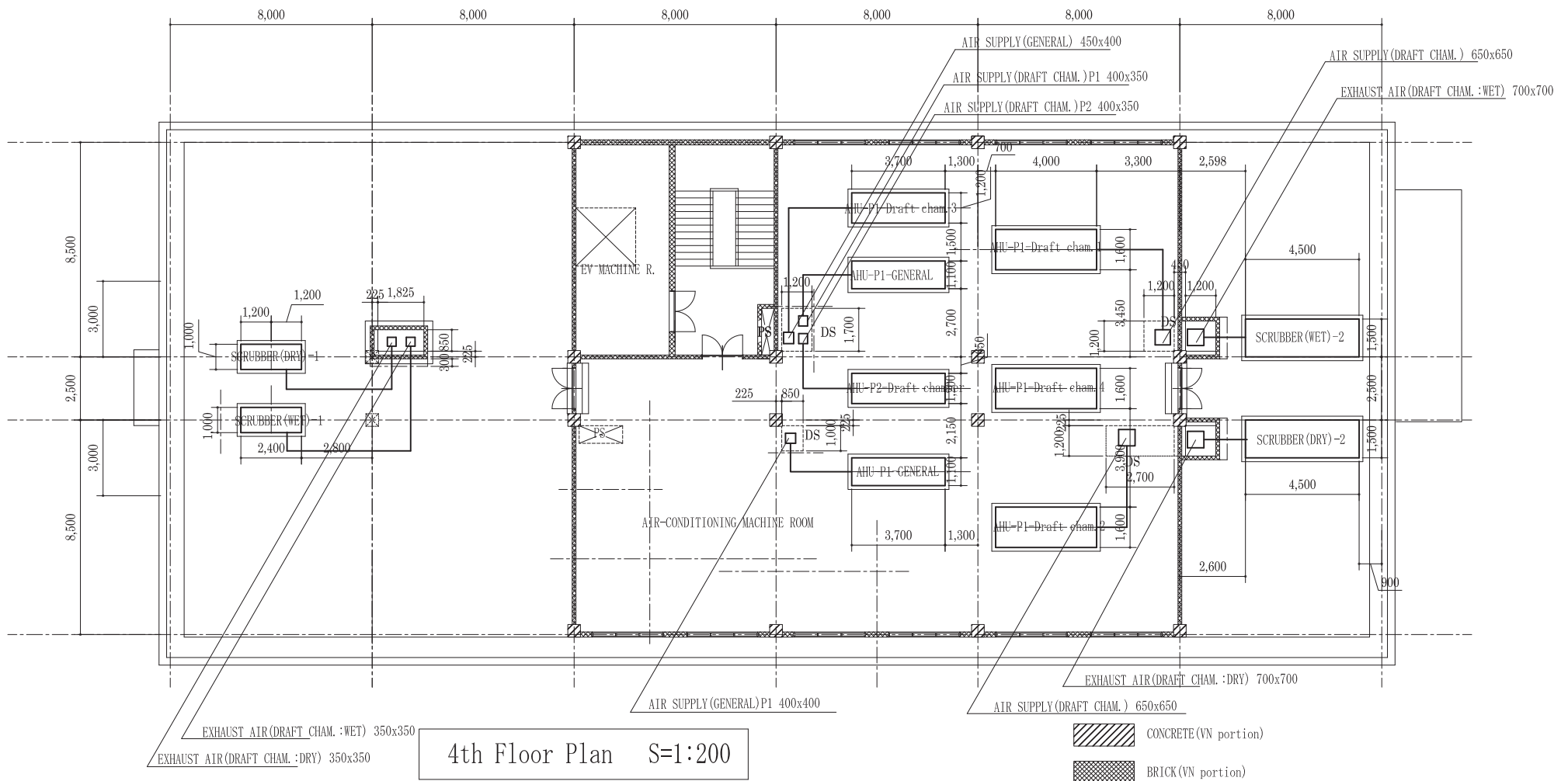


Figure 2-14 RETAQ center Reference Test Building: 4<sup>th</sup> Floor plan

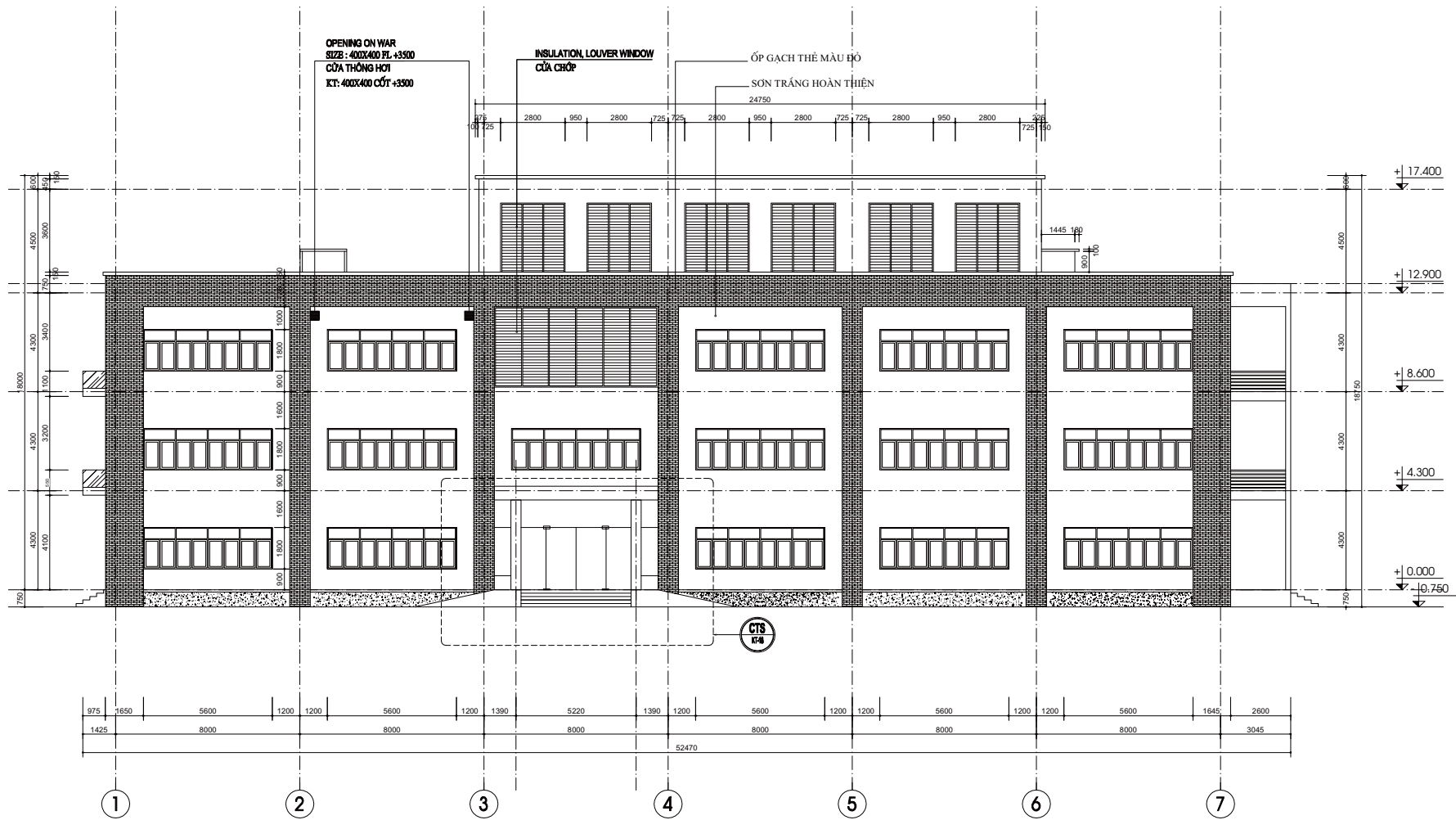


Figure 2-15 RETAQ center Reference Test Building: Elevation plan

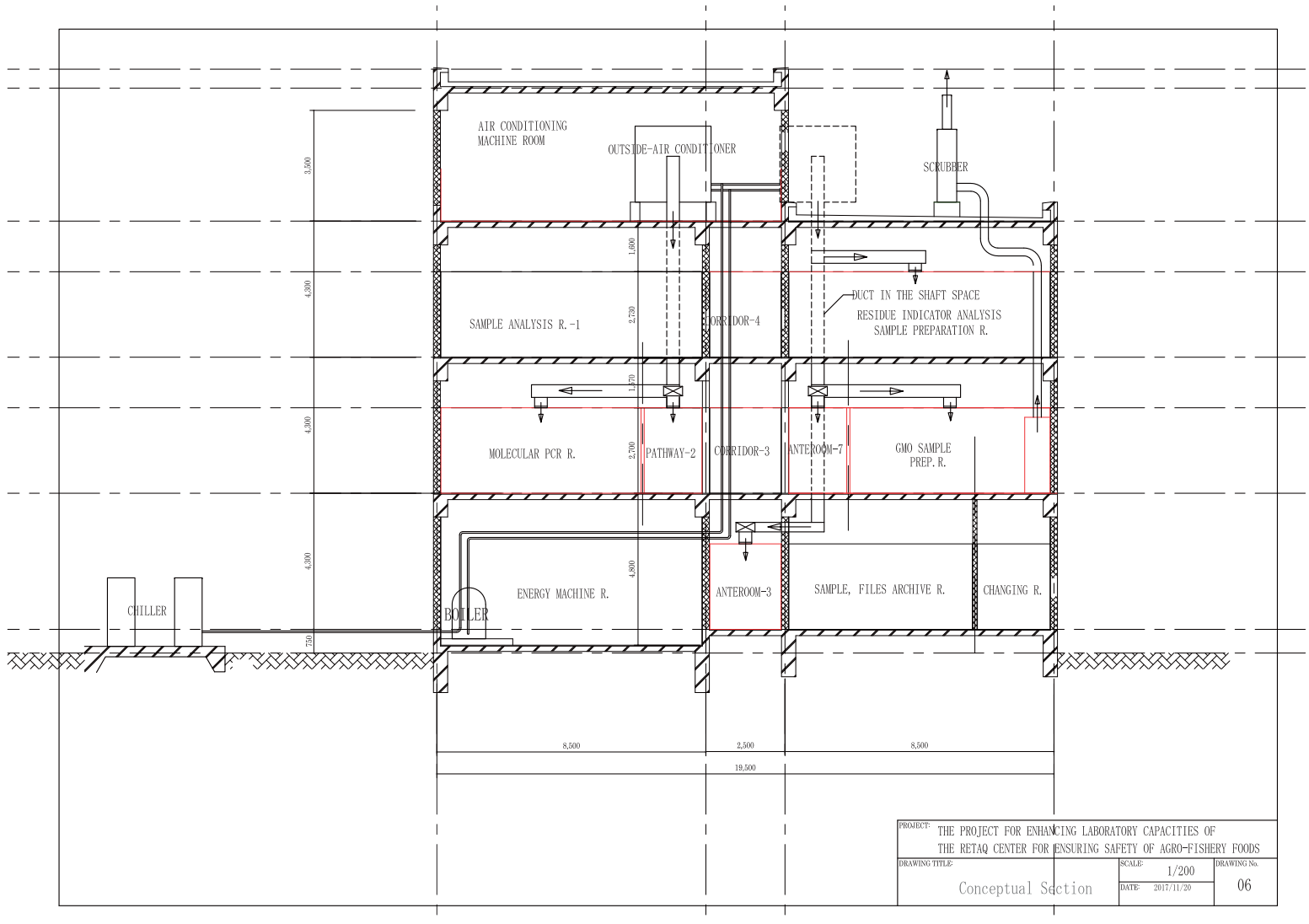


Figure 2-16 Duct elevation plan of Reference Test Building



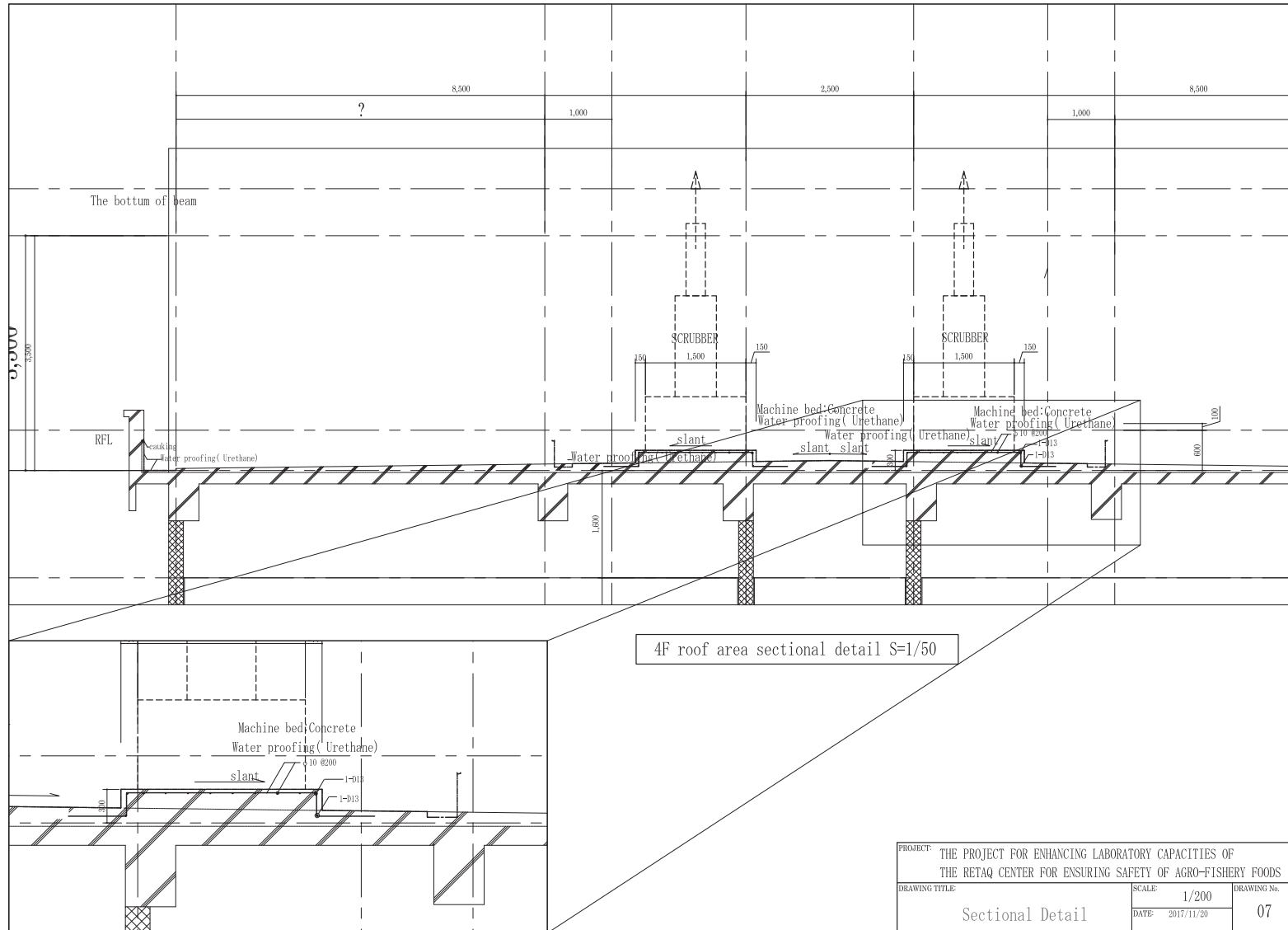
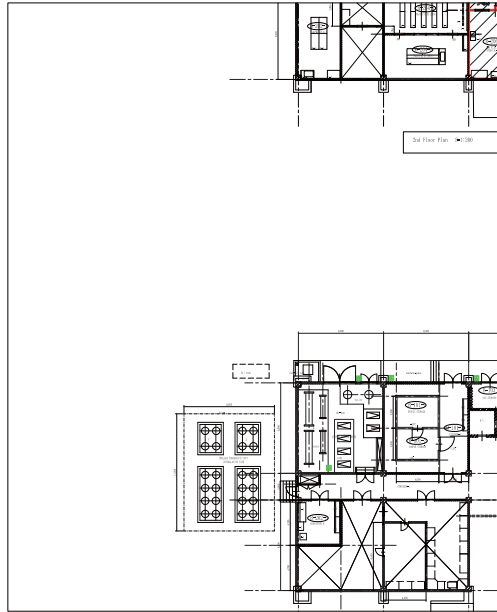


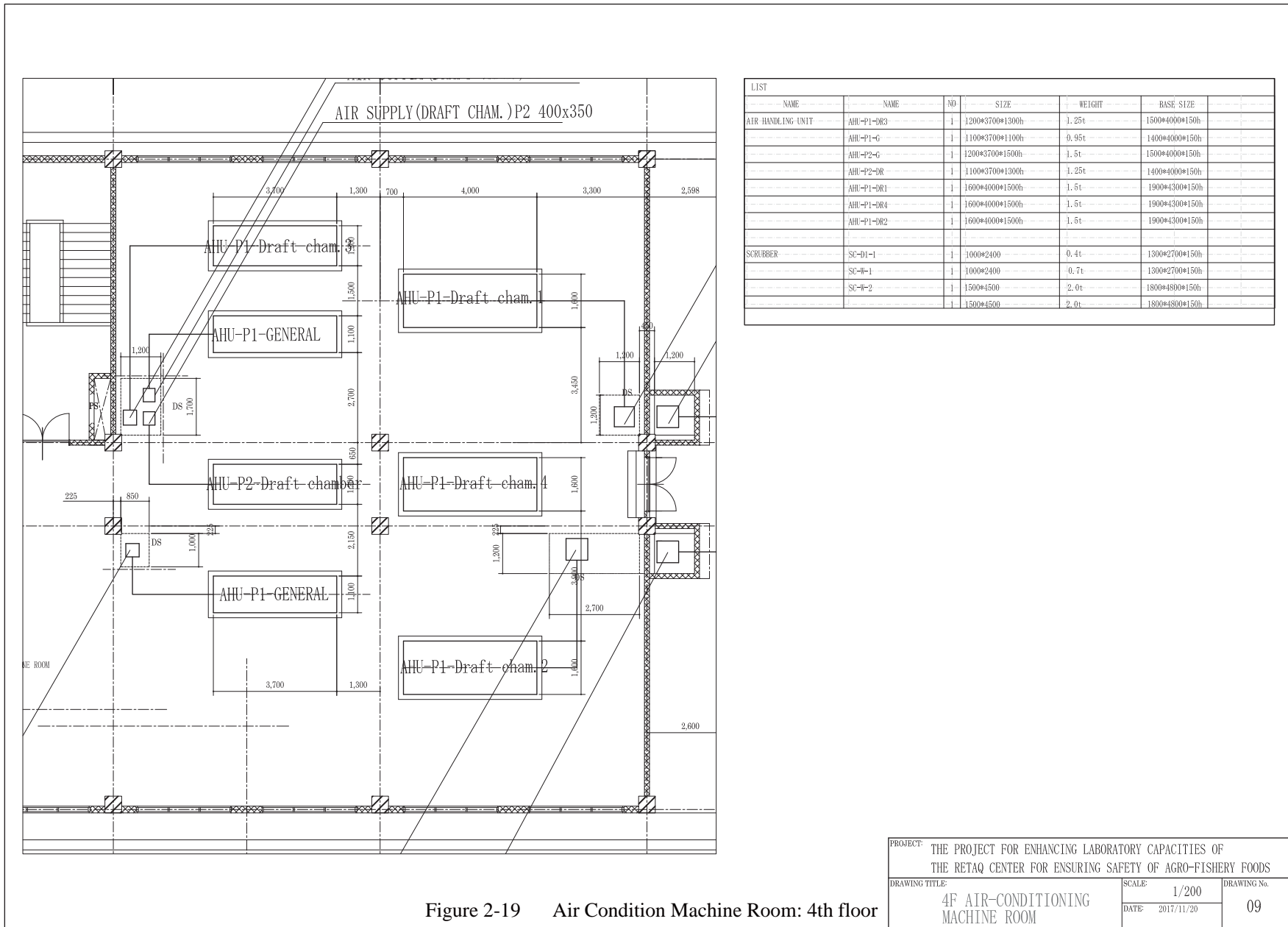
Figure 2-17 Duct elevation plan of Reference Test Building



ROOM No.	ROOM NAME	EQUIPMENT NAME	QTY	CONCRETE BASE	SIZE	WEIGHT	ELEC	SUP/WAT	DRAIN	GAS
	ENERGY MACHINE R	Boiler	2	concrete base #1200	ap. d1200#1500	1000kg				
		CP-1, 2	2	concrete base #1200		400kg				
		CP-3	2	concrete base #1200		300kg				
		CH-1	1	concrete base #1200		300kg				
		HP-1, 2	2	concrete base #1200		300kg				
		Sub-oil tank	1	outside	500L	ap. 1000kg				
		HEADER (CCH)	1	concrete base #1200		500kg				
		HEADER (CRH)	1	concrete base #1200		500kg				
		HEADER (HSH)	1	concrete base #1200		300kg				
		HEADER (HRH)	1	concrete base #1200						
		POWER CONTROL PANEL	1	concrete base #1200	w2500#d450#h2000					
		Supply air fan	1		2800m3 Lower800#800					
		Exhaust air fan	1		2800m3 Lower800#800					
	CHILLER CONDENSING UNIT	RR-1	1	concrete base #1200	w2000#d4850#h2600	4630kg				
		RR-2	1	concrete base #1200	w2000#d4850#h2600	4630kg				
		RR-3	1	concrete base #1200	w2000#d2650#h2600	2700kg				
		RR-4	1	concrete base #1200	w2000#d2650#h2600	2700kg				
	PAC compressor UNIT		7	concrete base #1200	ap. w800#d800#h2000					

PROJECT: THE PROJECT FOR ENHANCING LABORATORY CAPACITIES OF THE RETAQ CENTER FOR ENSURING SAFETY OF AGRO-FISHERY FOODS		
DRAWING TITLE:	SCALE: 1/200	DRAWING No. 08
1F ENERGY ROOM LAYOUT		DATE: 2017/11/20

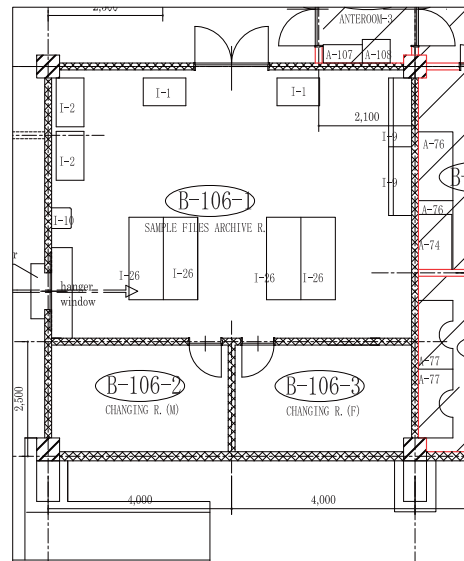
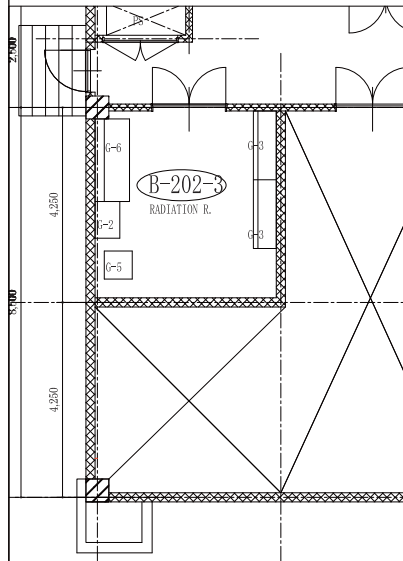
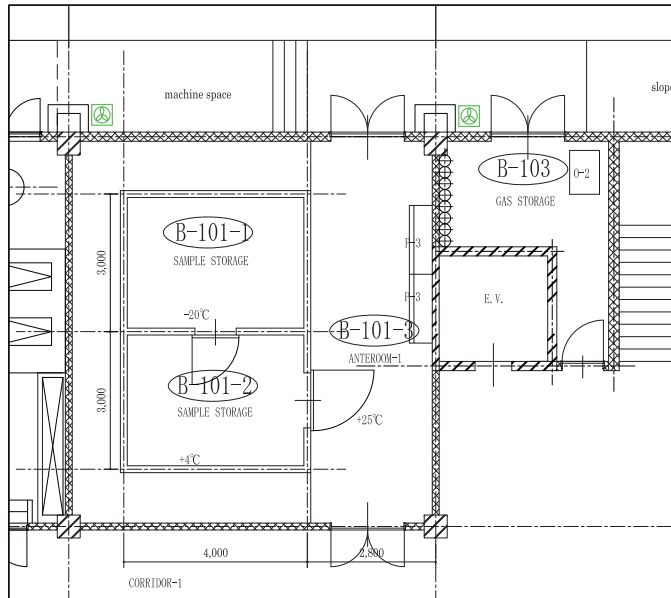
Figure 2-18 Energy Room Layout 1F



LIST						
NAME	NAME	NO	SIZE	WEIGHT	BASE SIZE	
AIR HANDLING UNIT	AHU-P1-DR3	-1	1200*3700*1300h	1.25t	1500*4000*150h	
	AHU-P1-G	-1	1100*3700*1100h	0.95t	1400*4000*150h	
	AHU-P2-G	-1	1200*3700*1500h	1.5t	1500*4000*150h	
	AHU-P2-DR	-1	1100*3700*1300h	1.25t	1400*4000*150h	
	AHU-P1-DR1	-1	1600*4000*1500h	1.5t	1900*4300*150h	
	AHU-P1-DR4	-1	1600*4000*1500h	1.5t	1900*4300*150h	
	AHU-P1-DR2	-1	1600*4000*1500h	1.5t	1900*4300*150h	
SCRUBBER	SC-D1-1	-1	1000*2400	0.4t	1300*2700*150h	
	SC-W-1	-1	1000*2400	0.7t	1300*2700*150h	
	SC-W-2	-1	1500*4500	2.0t	1800*4800*150h	
		-1	1500*4500	2.0t	1800*4800*150h	

Figure 2-19 Air Condition Machine Room: 4th floor

PROJECT: THE PROJECT FOR ENHANCING LABORATORY CAPACITIES OF THE RETAQ CENTER FOR ENSURING SAFETY OF AGRO-FISHERY FOODS		
DRAWING TITLE: 4F AIR-CONDITIONING MACHINE ROOM		
SCALE: 1/200	DRAWING No. 09	
DATE: 2017/11/20		



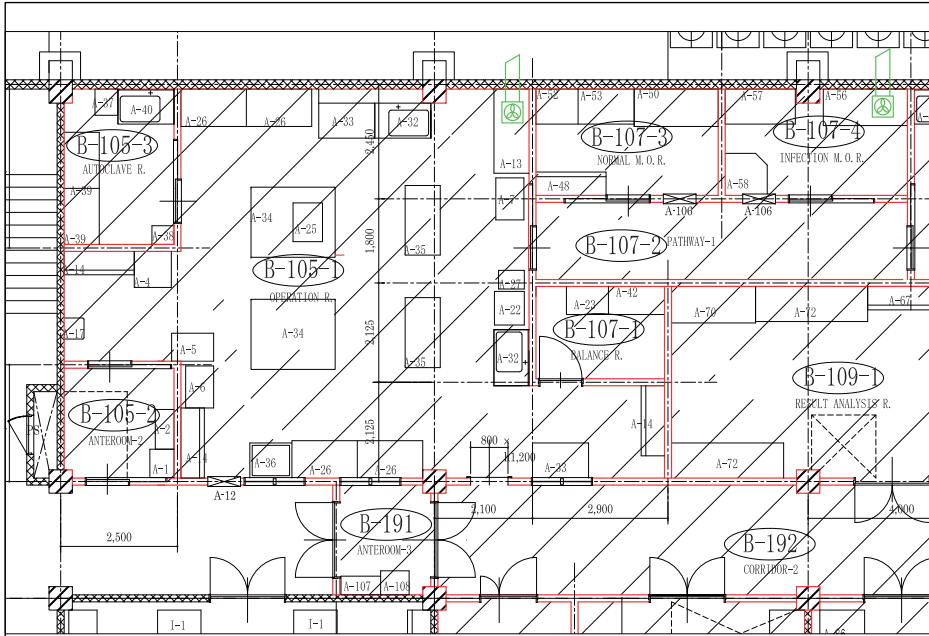
ROOM No.	ROOM NAME	Eq. No.	EQUIPMENT NAME	Nos	SIZE	WEIGHT	ELEC	SUP. WAT	DRAIN	GAS
B-101-1	SAMPLE STORAGE -20°C	P-1	Walk-in Freezer	1	3600*2700*1900ch	700kg	3 phase			
B-101-2	SAMPLE STORAGE +4°C	P-2	Walk-in Refrigerator	1	3600*2700*1900ch	550kg				
B-101-3	ANTEROOM-1	P-3	System cabinet	2	1500*500/500*2400h	287kg				
B-103	GAS STORAGE	0-2	Air compressor	1	concrete base 850*1200*1100	410kg	3 phase			

ROOM No.	ROOM NAME	Eq. No.	EQUIPMENT NAME	Nos	SIZE	WEIGHT	ELEC	SUP. WAT	DRAIN	GAS
B-202-3	RADIATION R.	G-1	Homogenizer	2	on the desk		○			
		G-2	Dry shelf	2	ø800*4540*1600h	28kg				
		G-3	Reagent storage	2	1500*540*1600h	166kg				
		G-4	Electrical balance	1	on the desk		○			
		G-5	Integrated flame spectrometer	1	610*610*762~838h	ap. 1500kg	○			
		G-6	Side experiment table	1	1800*750*800h	156kg	○			

ROOM No.	ROOM NAME	Eq. No.	EQUIPMENT NAME	Nos	SIZE	WEIGHT	ELEC	SUP. WAT	DRAIN	GAS
B-106-1	SAMPLE FILES ARCHIVE R.	I-1	Freezer (stocker-type)	2	1250*6055*840h	62kg	○			
		I-2	Refrigerator (app. 500L)	2	929*605*838h	145kg	○			
		I-9	Reagent storage	2	1500*400/500*1800h	166kg				
		I-10	hand wash sink	1		10kg		○	○	
		I-26	Side equipment table	4	1200*700*800h	117kg				

Figure 2-20 Equipment layout plan: 1st floor -1

PROJECT: THE PROJECT FOR ENHANCING LABORATORY CAPACITIES OF THE RETAQ CENTER FOR ENSURING SAFETY OF AGRO-FISHERY FOODS	
DRAWING TITLE: EQUIPMENT LAYOUT 1F-1	DRAWING No. K-01
SCALE: 1/100	DATE: 2017/11/20

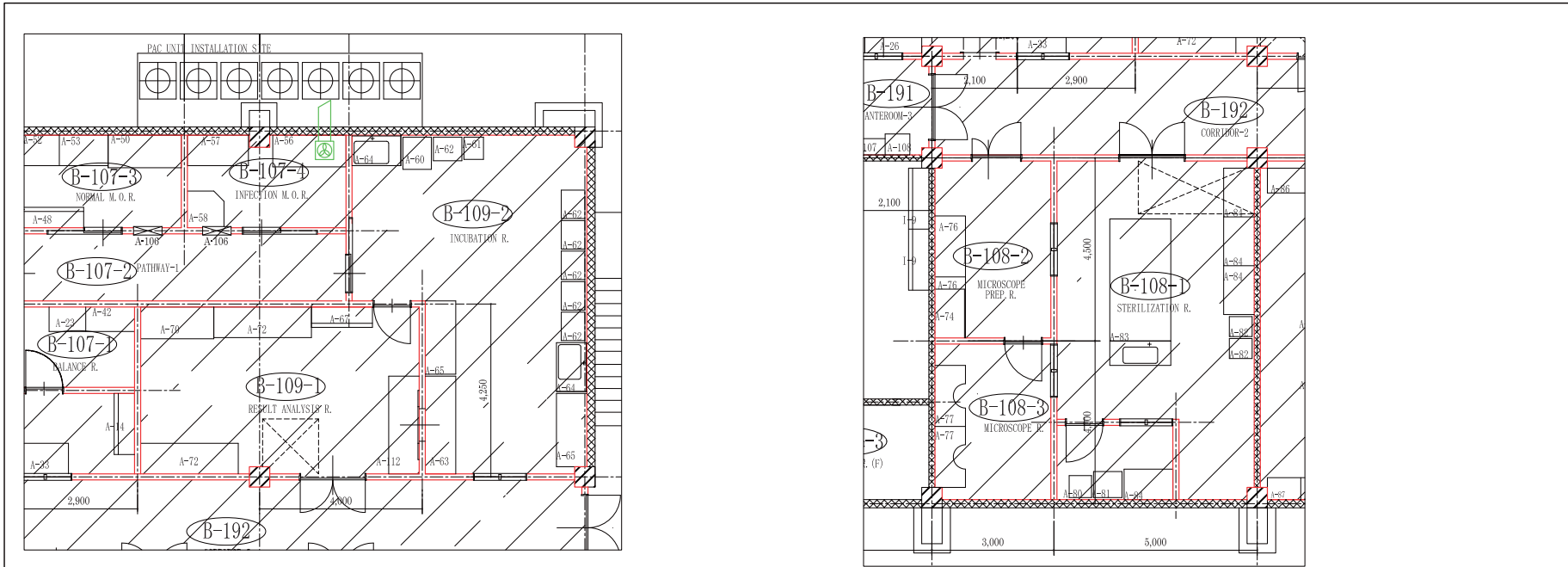


ROOM No.	ROOM NAME	Eq. No.	EQUIPMENT NAME	Nos	SIZE	WEIGHT	ELEC	SUP WAT	DRAIN	GAS
B-107-1	Balance Room	A-41	Balance enclosers	1	on the desk		○			
		A-42	Standard scale table(sem)	1	1200*600*750h	ap. 150kg				
		A-43	Standard scale table(micro)	1	900*600*750h	ap. 130kg				
		A-44	Electrical balance	1	on the desk			○		
		A-45	Analytical balance	1	on the desk			○		
B-107-2	Passway-1	A-106	Pass box	2			○			
B-107-3	Normal M.O.R.	A-46	Heat block	1	on the desk					
		A-47	Loop cinerator(burner)	1	on the desk					
B-107-4	Infection M.O.R.	A-48	Reagent storage	1	1500*500/400*1800h ?	166kg				
		A-49	Dispenser, handystep	4	on the desk					
		A-50	Bio safety cabinet	1	1800*780*2030h ?	340kg				
		A-51	Water bath(small)	1	on the desk			○		
		A-52	Side experiment table	1	900*750*800h	44kg				
		A-53	Side experiment table (single face)	1	1200*750*800h	68kg				
		A-54	Glove box	1	1486*889*666h	90kg				
		A-55	Loop cinerator(burner)	1	on the desk			○		
		A-56	Bio safety cabinet	1	1800*780*2030h	340kg				
		A-57	Side experiment table (left single face)	1	1500*750*800h	82kg				
A-58	Side experiment table (corner)	1	900*900*800h	44kg						

ROOM No.	ROOM NAME	Eq. No.	EQUIPMENT NAME	Nos	SIZE	WEIGHT	ELEC	SUP WAT	DRAIN	GAS
B-105-2	ANTEROOM-2	A-1	UV shoes box	1	850*400*1070h	40kg	○			
		A-2	UV locker	1	608*615*2000h	60kg	○			
B-105-1	OPERATION R.	A-3	Liquid filtration sys.	2	on the desk	152*451*152h*330*265*390	ap. 20kg	○		
		A-4	Freezer(low temp. freezer)	1	793*770*1806h	172kg	○			
		A-5	Refrigerator(+4C)app500L	1	900*600*1790h	147kg	○			
		A-6	Refrigerator(+4C)app500L	1	900*600*1790h	147kg	○			
		A-7	Refrigerator(+4C)app500L	1	900*600*1790h	147kg	○			
		A-8	Hazard gas sucker	1	on the desk			○		
		A-9	Vortex genie mixer	2	on the desk			○		
		A-10	Homogenizer	1	on the desk			○		
		A-11	Loop cinerator(burner)	1	on the desk			○		
		A-12	Passbox	1				○		
		A-13	Draft chamber (for medicine)	1	1800*750*2200h	370kg		○	○	○
		A-14	Reagent storage	2	1500*400/500*1800h	166kg				
		A-15	System cabinet	1	1500*400/500*2400h	287kg				
		A-16	Microwave oven	2	on the desk	ap. 20kg		○		
		A-17	Hand washing sink	1		10kg			○	○
		A-18	Dispenser, handystep	3	on the desk					
		A-19	Stomacher	2	on the desk				○	
		A-20	Water distillation apparatus	1	on the desk	**0**0**90h	**kg	3 phase	○	○
		A-21	Water purifying apparatus	1	on the desk				○	
		A-22	Automatic petri dish filling system	1		720*640*900h	60kg		○	
A-23	Automatic liquid filling system	1	on the desk	715*450*900h*280*150*220	25kg*8kg		○			
A-24	Jar for anaerobic bacteria	4	on the desk				○			
A-25	Clean bench (desktop)	1	on the desk	830*610*1070h	74kg		○	○		
A-26	Clean bench	4	on the desk	1390*811*1890h	263kg		○	○		
A-27	Centrifuge & roter(medium)	1	on the desk		106kg		○			
A-28	Centrifuge & roter(ref.)	1	on the desk		400*550*852h		○			
A-29	Hazard gas sucker	1	on the desk				○			
A-30	Circulating water bath	3	on the desk				○			
A-31	Ph meter	2	on the desk							
A-32	Stainless sink	2		1200*750*800h	54kg			○		
A-33	Side work table	2		1200*750*800h	42kg					
A-34	Central experiment table	2		1800*1500*800h	248kg		○			
A-35	Stainless steel table	2		1500*750*800h	50kg					
A-36	Stainless sink	1		900*750*800h	40kg			○		
A-110	Hotplate stirrer	2	on the desk							
A-111	Electrical balance	1	on the desk				○			
B-105-3	AUTOCLAVE R	A-37	Autoclave(large)	2	490*560*1090h	80kg				
		A-38	Autoclave(small)	1	400*460*920h	50kg		○		
		A-39	Stainless work table	2	1200*750*800h	49kg		○		
		A-40	Stainless sink	1	1200*750*800h	48kg			○	
B-191	ANTEROOM-3	A-107	UV shoes box	1	850*400*1070h	40kg	○			
		A-108	UV locker	1	608*615*2000h	60kg	○			

Figure 2-21 Equipment layout plan: 1st floor -2

PROJECT: THE PROJECT FOR ENHANCING LABORATORY CAPACITIES OF THE RETAQ CENTER FOR ENSURING SAFETY OF AGRO-FISHERY FOODS		
DRAWING TITLE: EQUIPMENT LAYOUT 1F-2	SCALE: 1/100	DRAWING No. K-02
	DATE: 2017/11/20	

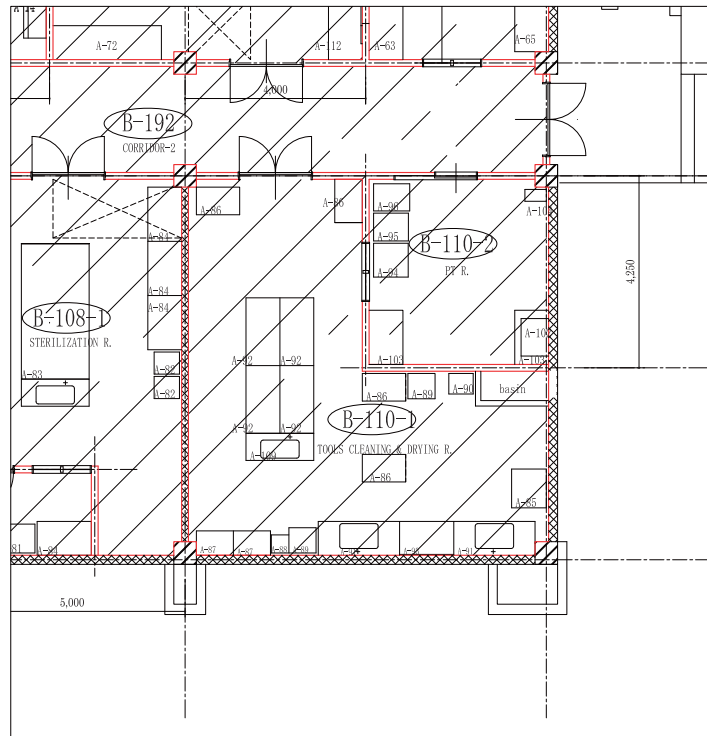


ROOM No.	ROOM NAME	Eq. No.	EQUIPMENT NAME	Nos	SIZE	WEIGHT	ELEC	SUP. WAT	DRAIN	GAS
B-109-1	Result analysis R.	A-66	Pass box	1						
		A-67	Reagent storage	1	1500*100/500*1800h	166kg				
		A-68	Dispenser, handstep(pipetman)	3	on the desk					
		A-69	Colony counter	1	on the desk					
		A-70	Bio safety cabinet	1	1800*780*2020h	340kg				
		A-71	UV transilluminator	1	on the desk					
		A-72	Side experiment table (reagent shelf)	2	with shelves 2400*750*800h	191kg				
		A-112	Side experiment table (lower part sliding door)	1	2400*750*800h	136kg				
B-109-2	Incubation R.	A-59	Small shaker(incubation)	2	on the desk					
		A-60	Incubator(liquid shaker)	1	700*790*1800h	132kg				
		A-61	incubator(anaerobic)	1	480*548*575h	49kg				
		A-62	Incubator	6	700*580*1618h	108kg				
		A-63	Side experiment table (lower part sliding door)	1	2400*750*800h	136kg				
		A-64	Stainless steel sink	2	1200*750*800h	48kg				
		A-65	Stainless table (with the shelf board)	2	1800*750*800h	71kg				

ROOM No.	ROOM NAME	Eq. No.	EQUIPMENT NAME	Nos	SIZE	WEIGHT	ELEC	SUP. WAT	DRAIN	GAS
B-108-1	STERILIZATION ROOM	A-80	Hot air sterilizer (small)	1	550*540*770h	42kg				
		A-81	Hot air oven sterilizer (large)	1	700*640*877h	59kg				
		A-82	<b>Autoclave</b>	2	490*560*1090h	80kg				
		A-83	Central experiment table with Sink	1	3600*1500*800h	368kg				
B-108-2	MICROSCOPE PREP. R.	A-84	Stainless steel table (with the shelf board)	4	1200*750*800h	48kg				
		A-73	Dispenser, handstep	2	on the desk					
		A-74	Clean bench	1	on the desk 830*610*1070h	74kg				
		A-75	UV Transilluminator	1						
B-108-3	MICROSCOPE R.	A-76	Side experiment table	2	1500*750*800h	82kg				
		A-77	Labo desk(for microscope)	2	1500 (Round cut)*750*800h	ap.100kg				
		A-78	Stereomicroscope	1	on the desk					
		A-79	Microscope	1	on the desk					

Figure 2-22 Equipment layout plan: 1st floor -3

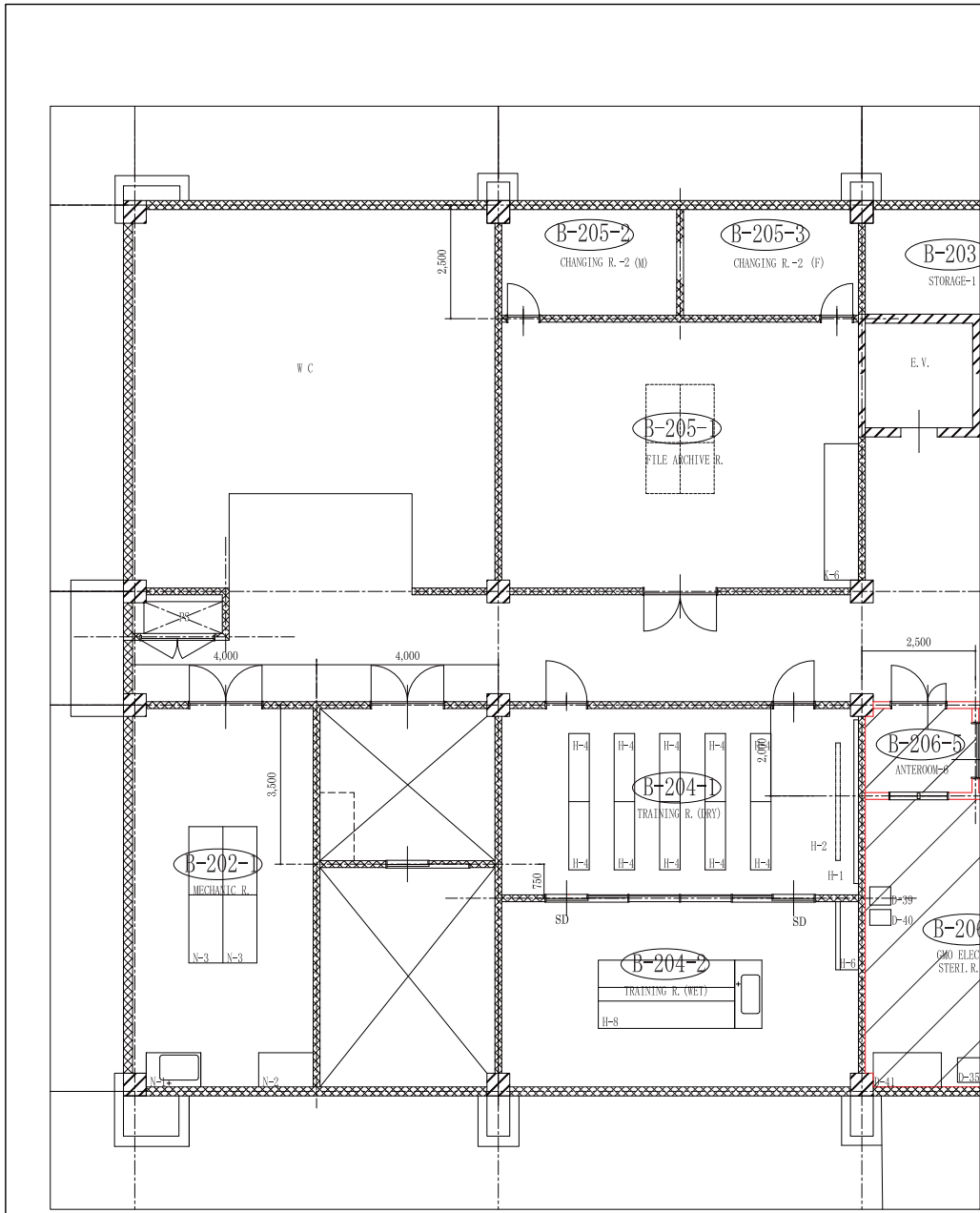
PROJECT: THE PROJECT FOR ENHANCING LABORATORY CAPACITIES OF THE RETAQ CENTER FOR ENSURING SAFETY OF AGRO-FISHERY FOODS		
DRAWING TITLE: EQUIPMENT LAYOUT 1F-3	SCALE: 1/100	DRAWING No. K-03
	DATE: 2017/11/20	



ROOM No.	ROOM NAME	Eq.No.	EQUIPMENT NAME	Nos	SIZE	WEIGHT	ELEC	SUP WAT	DRAIN	GAS
B-110-1	TOOLS CLEANING & DRYING R.	A-85	labo washer for glass ware	1	860*770*1795h	230kg		3 phase	○	○
		A-86	Dry wagon	4	610*910*960h	ap. 20kg				
		A-87	Dry shelf	2	830*540*1600h	ap. 30kg				
		A-88	Ultrasonic cleaning unit (for pipette)	1	390*400*944h	18.8kg	○			
		A-89	Ultrasonic cleaning unit (large-scale cleaning sink)	2	630*560*800h	48kg	○			
		A-90	Water purifying apparatus (ion)	1	540*455*730h	50kg	○	○		
		A-91	Stainless sink (2 tank, drain board)	2	1800*750*800h	66kg		○	○	
		A-92	Stainless center table	4	1500*750*800h	51kg				
		A-93	Stainless table	1	1200*750*800h	49kg				
		A-109	Stainless sink (L-angle)	1	1500*750*800h	46kg		○	○	
B-110-2	PT R.	A-94	Freezer (ultra low)	1	710*765*1976h	170kg	○			
		A-95	Cold storage (Freezer side)	1	616*770*1806h	128kg	○			
		A-96	Refrigerator van (low temp)	1	600*800*1905h	100kg	○			
		A-97	Lab. blender (meat)	1	on the desk		○			
		A-98	Lab. blender (meat)	1	on the desk		○			
		A-99	Blender for cereal	1	on the desk		○			
		A-100	Lab. blender	1	on the desk		○			
		A-101	Dispenser handystep (pipetman)	1	on the desk		○			
		A-102	Clean bench	1	on the desk	830*610*1070h	74kg	○		
		A-103	Side experiment table	2	1200*750*800h	66kg				
		A-104	Lymphophilizer	1	260*475*810h	36kg	○			
		A-105	Rapid freezing system (bath type)	1			○			

Figure 2-23 Equipment layout plan: 1st floor -4

PROJECT: THE PROJECT FOR ENHANCING LABORATORY CAPACITIES OF THE RETAQ CENTER FOR ENSURING SAFETY OF AGRO-FISHERY FOODS	
DRAWING TITLE: EQUIPMENT LAYOUT 1F-4	DRAWING No. K-04
SCALE: 1/100	DATE: 2017/11/20

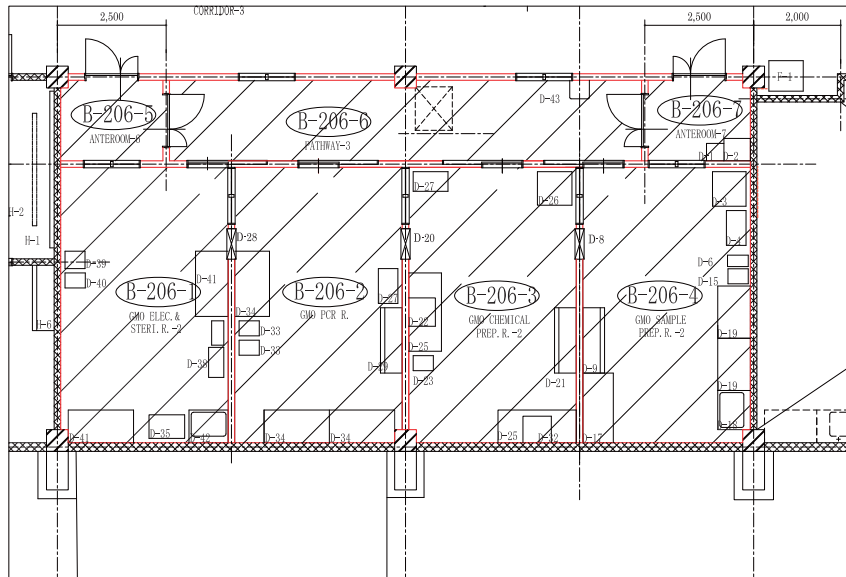


ROOM No.	ROOM NAME	Eq. No.	EQUIPMENT NAME	Nos	SIZE	WEIGHT	ELEC	SUP. WAT	DRAIN	GAS
B-202-1	MECHANIC R.	N-1	Stainless steel sink	-1	L angle	1200*750*800h	53kg		○	○
		N-2	Side experiment table	-1		1200*750*800h	66kg			
		N-3	Stainless steel table	-4		1500*750*800h	51kg			
B-204-1	TRAINING R. (DRY)	H-1	Writing board	-1		3600*1200	50kg			
		H-2	Screen	-1	hanging under ceiling	2584*1615	10kg	○		
		H-3	Projector	-1						
		H-4	Labo desk	-10		1500*450*700	ap. 20kg			
		H-5	Chair	-30						
B-204-2	TRAINING R. (WET)	H-6	Reagent storage	-1		1500*400/500*1800h	165kg			
		H-7	Dispenser, handstep (pipetman)	-5						
		H-8	Central experiment table	-1	with sink, shelves	3600*1500*800h	388kg	○	○	○
B-205-1	FILE ARCHIVE R.	K-6	Side experiment table	-1		3000*750*800h	227kg	○		

Figure 2-24 Equipment layout plan: 2nd floor -1

PROJECT: THE PROJECT FOR ENHANCING LABORATORY CAPACITIES OF THE RETAQ CENTER FOR ENSURING SAFETY OF AGRO-FISHERY FOODS		
DRAWING TITLE:	SCALE:	DRAWING No.
EQUIPMENT LAYOUT 2F-1	1/100	K-05
DATE:	2017/11/20	



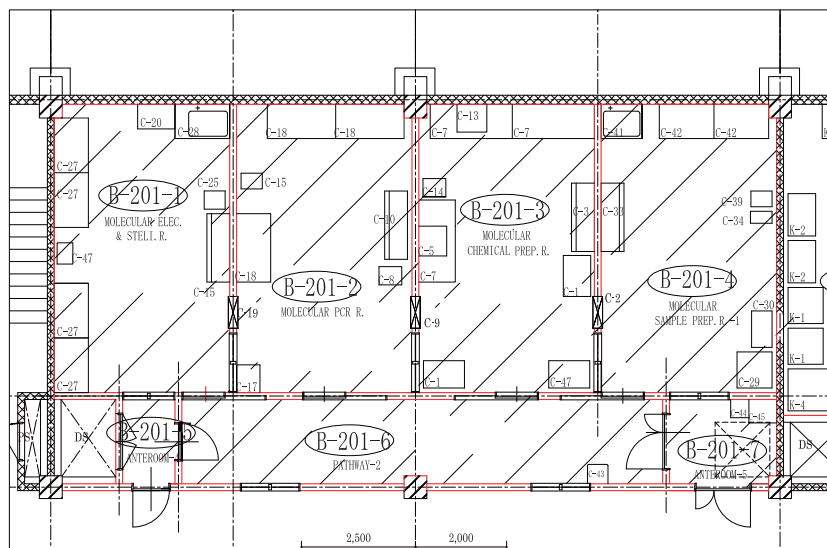


ROOM No.	ROOM NAME	Eq. No.	EQUIPMENT NAME	Nos	SIZE	WEIGHT	ELEC	SUP. WAT	DRAIN	GAS
B-206-2	GMO PCR R.	D-28	Pass box	1			○			
		D-29	Reagent storage	1	1500*400/500*1800h	166kg				
		D-30	Dispenser, handystep(pipetman)	3	on the desk					
		D-31	Real time PCR	1	on the desk	40kg	○			
		D-33	Centrifuge & rotor(refrigerated)	2	345*465*860h	63kg	○			
D-34	Side experiment table	3	1500*750*800h	82kg						
B-206-1	GMO ELECTRO. STERILIZATION ROOM	D-24	Incubator (block)	1	on the desk	212*370*200h	6kg	○		
		D-35	Dry shelf	1	820*540*1600h	28kg				
		D-36	Ultrasonic cleaning unit	1	on the desk	290*208*245h	44kg	○		
		D-37	Electrophoresis apparatus	2	on the desk	138*200*274h+198*431*436h	3.2*2kg	○		
		D-38	CCD camera, computer	1	on the desk	560*280*595h+690*350*743h	21*26,1kg	○		
		D-39	Autoclave (small)	1		440*460*920h	50kg	○		
		D-40	Centrifuge & rotor(refrigerated)	1		345*465*860h	63kg	○		
		D-41	Side experiment table	2		1500*750*800h	82kg			
B-206-6	PATHWAY-3	D-42	Stainless steel sink	1		46kg				
		D-43	Hand washing sink	1		10kg		○	○	

ROOM No.	ROOM NAME	Eq. No.	EQUIPMENT NAME	Nos	SIZE	WEIGHT	ELEC	SUP. WAT	DRAIN	GAS
B-206-7	ANTEROOM	D-1	UV shoes box	1	850*400*1070h	40kg	○			
		D-2	UV locker	1	608*615*2000h	60kg	○			
B-206-4	GMO SAMPLE PREP. R.	D-3	Freezer	1	793*770*1800h	172kg	○			
		D-4	Refrigerator (GMO)	1	800*450*1800h	98kg	○			
		D-5	Ultrasonic mixer	1	on the desk	190*375*270h+250*320*600h	9.5*11.3kg	○		
		D-6	Lyophilization/Freeze dry	1	on the desk with flask holder	203*475*810h	36kg	○		
		D-7	Food processor	1	on the desk	311*355*434h	10.9kg	○		
		D-8	Pass box	1				○		
		D-9	System cabinet	1		1500*400/500*1800h	60kg			
		D-10	Electrical balance	1	on the desk			○		
		D-11	Dispenser, handystep(pipetman)	3	on the desk					
		D-12	Analytical balance (semi micro)	1	on the desk			○		
D-13	Water distillation apparatus	1	on the desk				○			
D-14	Centrifuge & rotor (medium)	1	on the desk	440*595*330h	45kg	○				
D-15	Centrifuge & rotor (refrigerated)	1		345*465*860h	63kg	○				
D-16	Water bath (shaker)	2				○				
D-17	Bio safety cabinet	1		1800*780*2030h	340kg	○				
D-18	Stainless sink	1		900*750*800h	46kg		○	○		
D-19	Side experiment table	2		1200*750*800h	71kg					
B-206-3	GMO CHEMICAL PREP. R.	D-20	Pass box	1				○		
		D-21	System cabinet	1		1500*400/500*2400h	287kg			
		D-22	Clean bench	1	on the desk	653*610*785h	30kg	○		
		D-23	Centrifuge & rotor (refrigerated)	1		345*465*860h	63kg	○		
		D-25	Side experiment table	2		1800*750*800h	106kg			
		D-26	Freezer (low temperature freezer)	1		793*770*1800h	172kg	○		
		D-27	Refrigerator (semi for working)	2		800*450*1800h	98kg	○		
		D-32	Clean bench	1	on the desk			○		
D-44	Vortex genie mixer	1	on the desk			○				

PROJECT: THE PROJECT FOR ENHANCING LABORATORY CAPACITIES OF THE RETAQ CENTER FOR ENSURING SAFETY OF AGRO-FISHERY FOODS		
DRAWING TITLE:	SCALE:	DRAWING No.
EQUIPMENT LAYOUT 2F-2	1/100	K-06
	DATE: 2017/11/20	

Figure 2-25 Equipment layout plan: 2nd floor -2



ROOM No.	ROOM NAME	Eq. No.	EQUIPMENT NAME	Nos	SIZE	WEIGHT	ELEC	SUP. WAT	DRAIN	GAS
B-201-1	MOLECULAR ELEC. & STERIL. ROOM	C-19	Pass box	1						
B-201-1	MOLECULAR ELEC. & STERIL. ROOM	C-20	Dry shelf	1	820*540*1600h	28kg				
B-201-1	MOLECULAR ELEC. & STERIL. ROOM	C-21	Reagent storage	1	1500*100/500*1800h	166kg				
B-201-1	MOLECULAR ELEC. & STERIL. ROOM	C-22	Ultra cleaning unit	1	290*208*245h	44kg	○			
B-201-1	MOLECULAR ELEC. & STERIL. ROOM	C-23	Electrophoresis apparatus	2	138*200*274h+198*431*436h	3.2*22kg	○			
B-201-1	MOLECULAR ELEC. & STERIL. ROOM	C-24	CCD camera , computer	1	560*280*595h+690*350*742h	21*26.1kg	○			
B-201-1	MOLECULAR ELEC. & STERIL. ROOM	C-25	autoclave (small)	1	400*460*920h	50kg	○			
B-201-1	MOLECULAR ELEC. & STERIL. ROOM	C-26	Centrifuge & rotor (refrigerated)	1	440*595*330h	45kg	○			
B-201-1	MOLECULAR ELEC. & STERIL. ROOM	C-27	Side experiment table	4	1200*750*800h	71kg				
B-201-1	MOLECULAR ELEC. & STERIL. ROOM	C-28	Stainless steel sink	1	1200*750*800h	54kg		○	○	
B-201-4	MOLECULAR SAMPLE PREP. ROOM	C-29	Freezer (low temperature)	1	793*770*1800h	172kg	○			
B-201-4	MOLECULAR SAMPLE PREP. ROOM	C-30	Refrigerator (app. 300L)	1	800*450*1800h	98kg	○			
B-201-4	MOLECULAR SAMPLE PREP. ROOM	C-31	Ultrasonic homogenizer	1	190*375*270h+250*320*600h	9.5+11.3kg	○			
B-201-4	MOLECULAR SAMPLE PREP. ROOM	C-32	Food processor	1	263*475*810h	36kg	○			
B-201-4	MOLECULAR SAMPLE PREP. ROOM	C-33	Reagent storage	1	1500*400/500*1800h	166kg				
B-201-4	MOLECULAR SAMPLE PREP. ROOM	C-34	Lyophilization: Freeze dry	1	263*170*810h	36kg	○			
B-201-4	MOLECULAR SAMPLE PREP. ROOM	C-35	Electric balance	1			○			
B-201-4	MOLECULAR SAMPLE PREP. ROOM	C-36	Analytical balance	1			○			
B-201-4	MOLECULAR SAMPLE PREP. ROOM	C-37	Water distillation apparatus	1	270*170*270h	7.2kg	○			
B-201-4	MOLECULAR SAMPLE PREP. ROOM	C-38	Centrifuge (Medium)	1	440*595*330h	50kg	○			
B-201-4	MOLECULAR SAMPLE PREP. ROOM	C-39	Centrifuge & rotor (small)	1	345*465*860h	64kg	○			
B-201-4	MOLECULAR SAMPLE PREP. ROOM	C-40	Water bath (shaker)	2			○			
B-201-4	MOLECULAR SAMPLE PREP. ROOM	C-41	Stainless steel sink	1	900*750*800h	46kg		○	○	
B-201-4	MOLECULAR SAMPLE PREP. ROOM	C-42	Side experiment table	2	1200*750*800h	80kg				
B-201-4	MOLECULAR SAMPLE PREP. ROOM	C-6	Incubator (micro sample)	1	212*370*200h	6kg	○			
B-201-6	Pathway	C-43	Hand washing sink	1		10kg		○	○	
B-201-7	Anteroom	C-44	UV shoes box	1	850*400*1070h	40kg	○			
B-201-7	Anteroom	C-45	UV locker	1	608*515*2000h	60kg	○			

ROOM No.	ROOM NAME	Eq. No.	EQUIPMENT NAME	Nos	SIZE	WEIGHT	ELEC	SUP. WAT	DRAIN	GAS
B-201-3	MOLECULAR CHEMICAL PREP. ROOM	C-1	Refrigerator(+4C) (500L)	2	900*600*1790h	147kg	○			
B-201-3	MOLECULAR CHEMICAL PREP. ROOM	C-2	Pass box	1			○			
B-201-3	MOLECULAR CHEMICAL PREP. ROOM	C-3	System cabinet	1	1500*400/500*2400h	287kg				
B-201-3	MOLECULAR CHEMICAL PREP. ROOM	C-4	Dispenser, handystop (pipetman)	3	on the desk					
B-201-3	MOLECULAR CHEMICAL PREP. ROOM	C-5	Clean bench	1	on the desk	653*610*785h	30kg	○		
B-201-3	MOLECULAR CHEMICAL PREP. ROOM	C-7	Side experiment desk	3	1800*750*800h	166kg				
B-201-3	MOLECULAR CHEMICAL PREP. ROOM	C-13	消毒	1						
B-201-3	MOLECULAR CHEMICAL PREP. ROOM	C-14	Centrifuge & rotor (refrigerator)	1	345*465*860h	64kg	○			
B-201-3	MOLECULAR CHEMICAL PREP. ROOM	C-46	Vortex genie mixer	1	on the desk		○			
B-201-3	MOLECULAR CHEMICAL PREP. ROOM	C-47	Freezer (low temp.)	1	不明		○			
B-201-2	MOLECULAR PCR R.	C-8	Refrigerator(150L)	1	400*500*1885h	70kg	○			
B-201-2	MOLECULAR PCR R.	C-9	Pass box	1			○			
B-201-2	MOLECULAR PCR R.	C-10	Reagent storage	1	1500*400/500*1800h	166kg				
B-201-2	MOLECULAR PCR R.	C-11	Dispenser, handystop (pipetman)	3	on the desk					
B-201-2	MOLECULAR PCR R.	C-12	Thermal cycler	1	on the desk	220*210*300h	20kg	○		
B-201-2	MOLECULAR PCR R.	C-15	Centrifuge & rotor (refrigerated)	1	345*465*860h	63kg	○			
B-201-2	MOLECULAR PCR R.	C-16	RT PCR (BAX system)	1	220*210*360h	40kg	○			
B-201-2	MOLECULAR PCR R.	C-17	UV locker	1	608*515*2000h	60kg	○			
B-201-2	MOLECULAR PCR R.	C-18	Side experiment table	3	1500*750*800h	80kg				
B-201-1	MOLECULAR ELEC. & STERIL. ROOM	C-19	Pass box	1						
B-201-1	MOLECULAR ELEC. & STERIL. ROOM	C-20	Dry shelf	1	820*540*1600h	28kg				
B-201-1	MOLECULAR ELEC. & STERIL. ROOM	C-21	Reagent storage	1	1500*100/500*1800h	166kg				
B-201-1	MOLECULAR ELEC. & STERIL. ROOM	C-22	Ultra cleaning unit	1	on the desk	290*208*245h	44kg	○		
B-201-1	MOLECULAR ELEC. & STERIL. ROOM	C-23	Electrophoresis apparatus	2	on the desk	138*200*274h+198*431*436h	3.2*22kg	○		
B-201-1	MOLECULAR ELEC. & STERIL. ROOM	C-24	CCD camera , computer	1	on the desk	560*280*595h+690*350*742h	21*26.1kg	○		
B-201-1	MOLECULAR ELEC. & STERIL. ROOM	C-25	autoclave (small)	1	400*460*920h	50kg	○			
B-201-1	MOLECULAR ELEC. & STERIL. ROOM	C-26	Centrifuge & rotor (refrigerated)	1	on the desk	440*595*330h	45kg	○		
B-201-1	MOLECULAR ELEC. & STERIL. ROOM	C-27	Side experiment table	4	1200*750*800h	71kg				
B-201-1	MOLECULAR ELEC. & STERIL. ROOM	C-28	Stainless steel sink	1	1200*750*800h	54kg		○	○	

Figure 2-26 Equipment layout plan: 2nd floor -3

PROJECT: THE PROJECT FOR ENHANCING LABORATORY CAPACITIES OF THE RETAQ CENTER FOR ENSURING SAFETY OF AGRO-FISHERY FOODS		
DRAWING TITLE: EQUIPMENT LAYOUT 2F-3	SCALE: 1/100	DRAWING No. K-07
	DATE: 2017/11/20	

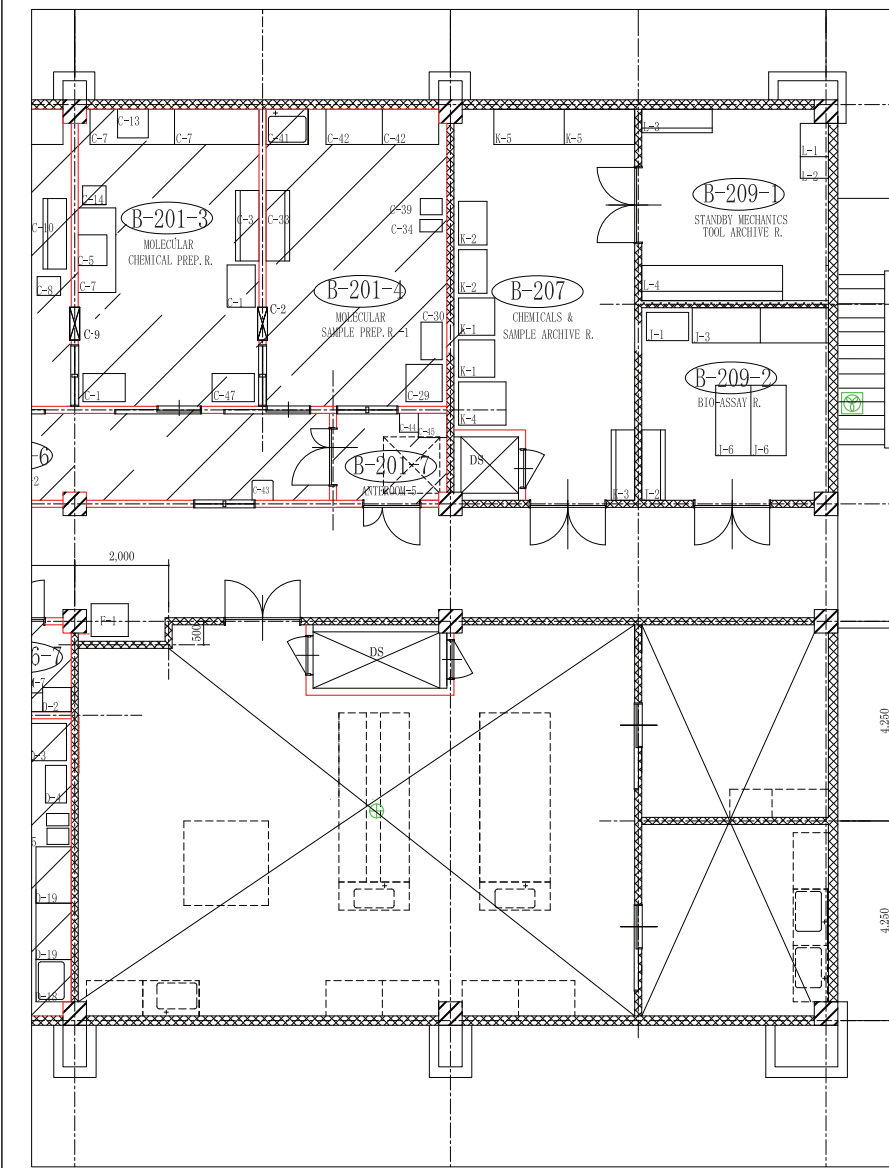


Figure 2-27 Equipment layout plan: 2nd floor -4

ROOM No.	ROOM NAME	Eq. No.	EQUIPMENT NAME	Nos	SIZE	WEIGHT	ELEC	SUP. WAT	DRAIN	GAS
B-207	CHEMICAL & SAMPLE ARCHIVE ROOM	K-1	Freezer	-2	793*770*1806h	172kg	○			
		K-2	Refrigerator (app. 500L)	-2	929*605*1838h	145kg	○			
		K-3	System cabinet	-1	1500*400/500*2400h	287kg				
		K-4	Ultra-freezer	-1	921*1008*1975h	220kg	○			
		K-5	Side experiment desk	-2	1500*750*800h	103kg				
B-209-1	STANDBY MECHANICALS TOOL ARCHIVE ROOM	L-1	Chemical closet	-1	710*600*800h	150kg				
		L-2	Chemical closet	-1	460*600*1300h	150kg				
		L-3	System cabinet	-1	1500*400/500*2400h	287kg				
		L-4	Side experiment table	-1	with shelves 3000*750*800h	237kg	○			
B-209-2	BIO-ASSAY R.	J-1	Refrigerator(+4°C 500L)	-1	900*600*790h	147kg	○			
		J-2	System cabinet	-1	1500*400/500*2400h	287kg				
		J-3	Environment control cabinet for animal experiment	-1	1450*750*1050h+1450*750*950h	200kg	○			
		J-4	Feeding equipment & operating equipment for small animal	-2	on the desk					
		J-5	Dispenser, handstep (pipetman)	-2	on the desk					
		J-6	Stainless steel table	-2	1500*750*800h	59kg				
B-210	CORRIDOR-3	F-1	Automatic ice maker	-1	770*790*1790h	241kg	3 phase	○	○	

PROJECT: THE PROJECT FOR ENHANCING LABORATORY CAPACITIES OF THE RETAQ CENTER FOR ENSURING SAFETY OF AGRO-FISHERY FOODS		
DRAWING TITLE: EQUIPMENT LAYOUT 2F-4	SCALE: 1/100 DATE: 2017/11/20	DRAWING No. K-08

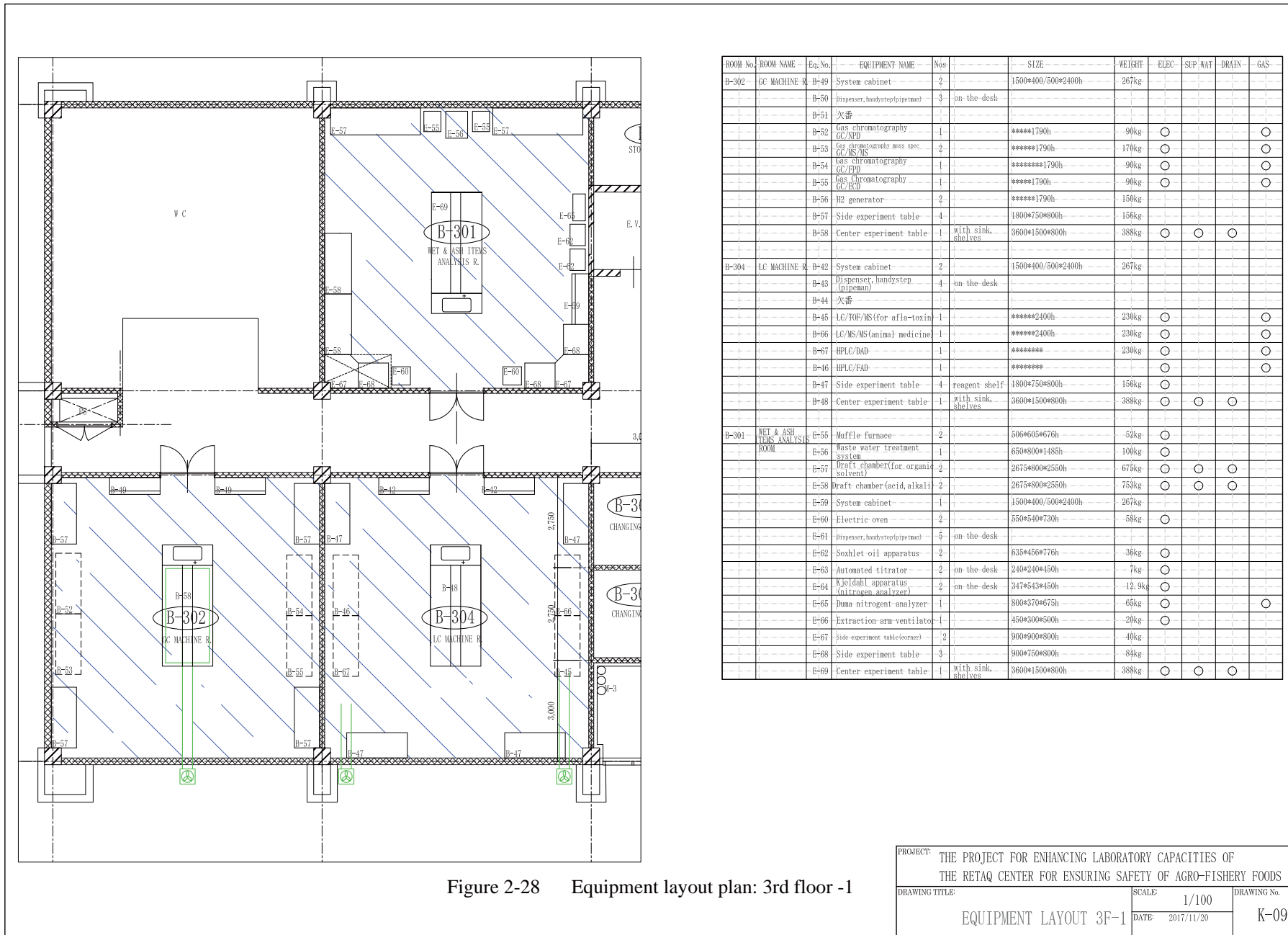
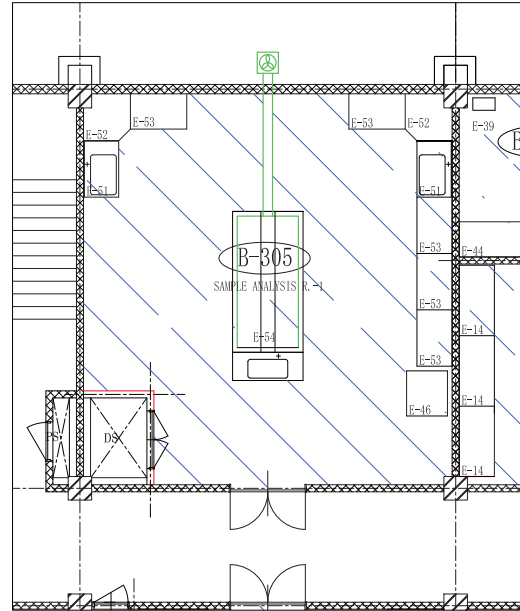


Figure 2-28 Equipment layout plan: 3rd floor -1

PROJECT: THE PROJECT FOR ENHANCING LABORATORY CAPACITIES OF THE RETAQ CENTER FOR ENSURING SAFETY OF AGRO-FISHERY FOODS		
DRAWING TITLE: EQUIPMENT LAYOUT 3F-1	SCALE: 1/100	DRAWING No. K-09
	DATE: 2017/11/20	



ROOM No.	ROOM NAME	Eq. No.	EQUIPMENT NAME	Nos	SIZE	WEIGHT	ELEC	SUP. WAT	DRAIN	GAS
B-305	SAMPLE ANALYSIS ROOM	E-46	Dispenser, handystop(spectram)	3						
		E-46	Atomic absorption spectrometer (AAS)	1	960*870*720h	195kg				○
		E-47	UV-VIS	1	on the desk 450*490*270h	15kg	○			
		E-48	次音							
		E-49	ductively coupled plasma mass spectrometer (ICP-MS)	1	on the desk 1100*650*600h	70kg	○			○
		E-50	IC-ion chromatography	1	on the desk 560*230*500h	30kg	○			
		E-51	Stainless steel sink	2	1200*750*800h	48kg		○	○	
		E-52	Side experiment table (corner)	2	900*900*800h	40kg				
		E-53	Side experiment table	5	1200*750*800h	80kg				
		E-54	Center experiment table	1	with sink, shelves 3600*1500*600h	388kg	○	○	○	

Figure 2-29 Equipment layout plan: 3rd floor -2

PROJECT: THE PROJECT FOR ENHANCING LABORATORY CAPACITIES OF THE RETAQ CENTER FOR ENSURING SAFETY OF AGRO-FISHERY FOODS		
DRAWING TITLE: EQUIPMENT LAYOUT 3F-2	SCALE: 1/100 DATE: 2017/11/20	DRAWING No. K-10

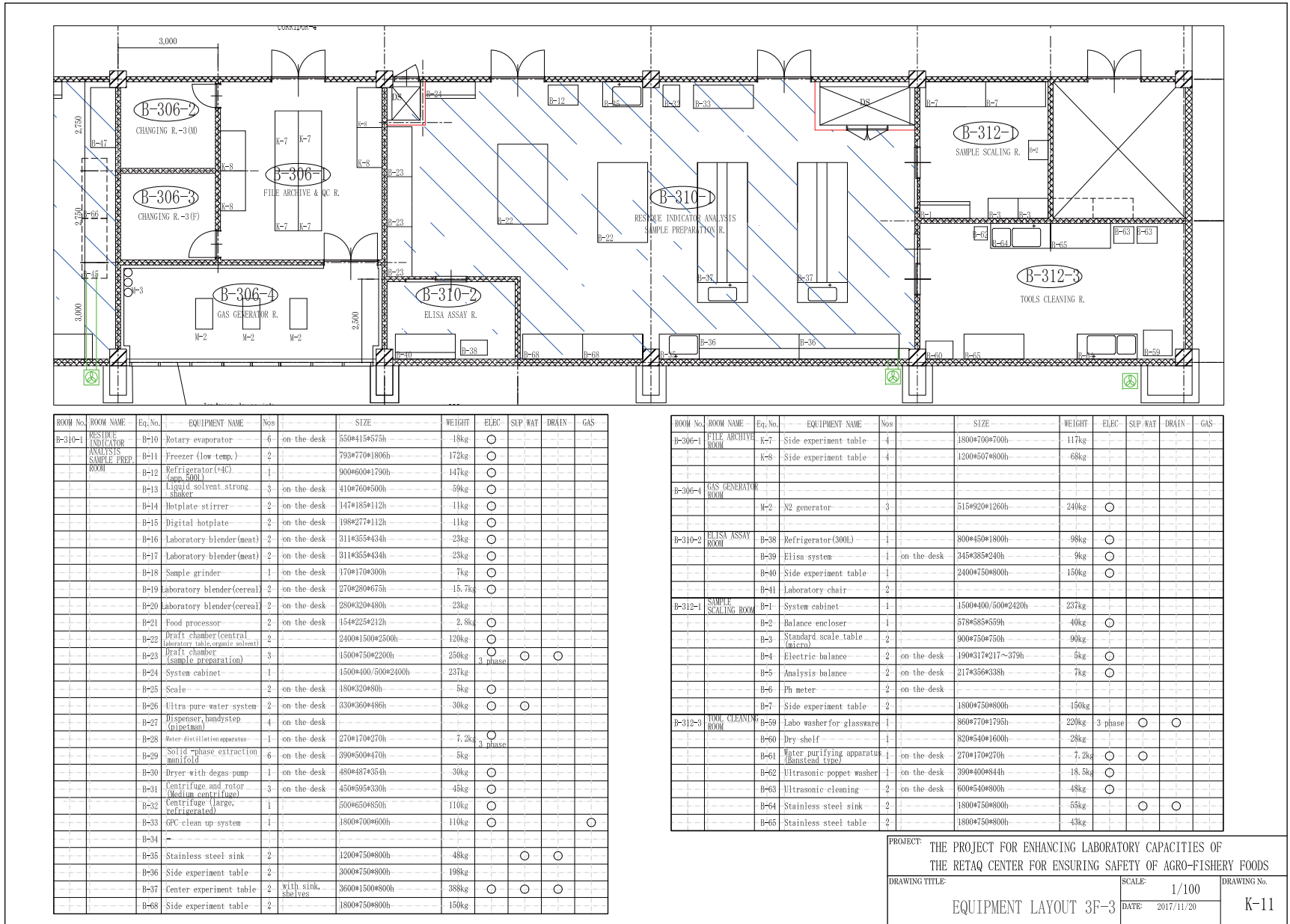
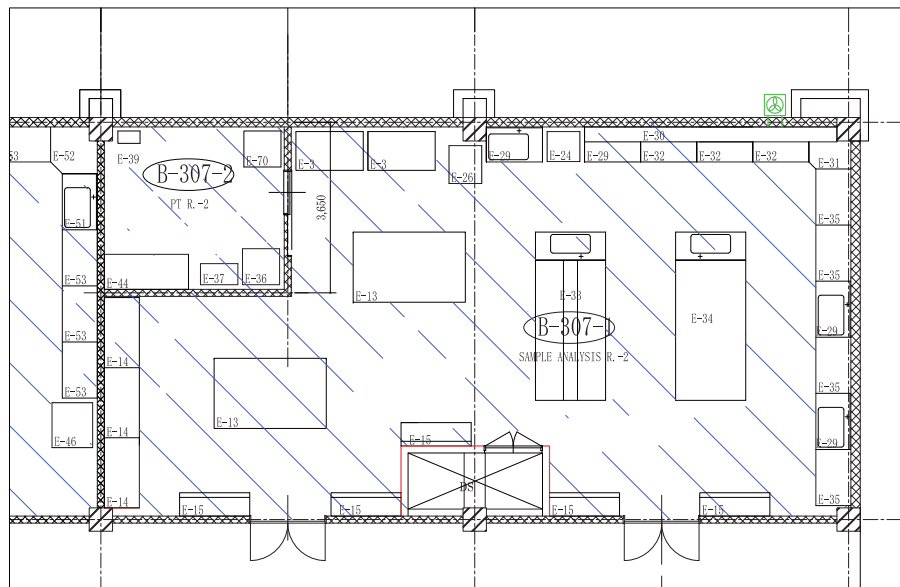


Figure 2-30 Equipment layout plan: 3rd floor -3



ROOM No.	ROOM NAME	Eq. No.	EQUIPMENT NAME	Nos	SIZE	WEIGHT	ELEC	SUP. WAT	DRAIN	GAS
B-307-2	PT ROOM-2	E-36	Freezer (low temperature)	1	793*770*1806h	172kg	○			
		E-37	Refrigerator (300L)	1	800*450*1800h	98kg	○			
		E-38	Mixer	3	280*320*480h	23kg	3 phase			
		E-39	Lymphatization/freeze-drying	1	263*475*810h	36kg	○			
		E-40	Dispenser, handystep (pipetman)	1	on the desk					
		E-41	Seamer (bottol)	1	on the desk		○			
		E-42	Seamer (can)	1	on the desk		○			
		E-43	Chairs	2						
		E-44	Side experiment table	1	1800*750*800h	183kg				
		E-70	Autoclave	1	不明		○			
		E-71	Ball mill (sample homogenize)	1	on the desk					

ROOM No.	ROOM NAME	Eq. No.	EQUIPMENT NAME	Nos	SIZE	WEIGHT	ELEC	SUP. WAT	DRAIN	GAS
B-307-1	SAMPLE ANALYSIS ROOM-2	E-1	Rotary evaporator	1	on the desk	550*415*6575h	18kg	○		
		E-2	Close vessel microwave digestion system	1	540*570*660h	90kg	○			
		E-3	Refrigerator (reagent)	2	1440*800*1950h	287kg	○			
		E-4	Liquid solvent strong shaker	2	on the desk	180*280*600h	12kg			
		E-5	Vortex	4	on the desk	450*175*337h	20kg	○		
		E-6	Homogenizer	2	on the desk	180*180*600h	12kg			
		E-7	Hotplate stirrer	2	on the desk	606*432*122h	14kg	○		
		E-8	Digital hotplate	2	on the desk	287*411*101h	6.1kg	○		
		E-9	Ultrasonic homogenizer	3	on the desk	180*375*270h+250*320*600h	9.5+1.5kg	○		
		E-10	Laboratory blender, edible meat	6	on the desk	170*210*530h	5.6kg	○		
		E-11	Heat block	4	on the desk	210*318*130h	4kg			
		E-12	Concentrator (rapid)	2	on the desk	538*305*305h	18.4kg	○		
		E-13	Boat chamber (organic solvent)	2	on the desk	2400*1500*1500h	120kg	○		
		E-14	Boat chamber (sample preparation)	3	1500*750*2200h	250kg	○	○	○	
		E-15	System cabinet	5	1500*400/500*2400h	237kg				
		E-16	Electric balance	3	on the desk			○		
		E-17	Electric cooker	2	on the desk			○		
		E-18	Ultra pure water system	2	on the desk	330*360*486h	70kg	○	○	
		E-19	Ultrasonic cleaning	2	on the desk	240*208*245h	44kg	○		
		E-20	Dispenser, handystep (pipetman)	3	on the desk			○		
		E-21	Water distillation apparatus	1	on the desk	270*170*270h	7.2kg		○	3 phase
		E-22	Solid-phase extraction manifold	2	on the desk	370*500*470h	2kg			
		E-23	Dryer with degas pump	1	on the desk	480*487*354h	30kg	○		
		E-24	Hot air oven sterilizer (large)	1	700*640*877h	59kg	○			
		E-25	Centrifuge and rotor (Medium)	3	on the desk	320*370*235h	9kg	○		
		E-26	Centrifuge (large size 2) (refrigerate)	1	700*810*915h	290kg	○			
		E-27	Centrifuge and rotor (Degas medium-centrifuge)	1	368*348*425h+460*510*475	29+46kg	○			
		E-28	pH meter	2	on the desk					
		E-29	Stainless sink	3	1800*750*800h	48kg			○	○
		E-30	Exhaust air gallery box	1	3000*160*255h	***kg				
		E-31	Side experiment table (corner)	1	900*900*800h	40kg				
		E-32	Side experiment table	4	1200*750*800h	71kg				
		E-33	Center experiment table	1	with sink, shelves	3600*1500*800h	388kg	○	○	○
		E-34	Center experiment table	1	with sink,	3600*1500*800h	368kg	○	○	○
		E-35	Stainless table	4	1200*750*800h	42kg				

Figure 2-31 Equipment layout plan: 3rd floor -4

PROJECT: THE PROJECT FOR ENHANCING LABORATORY CAPACITIES OF THE RETAQ CENTER FOR ENSURING SAFETY OF AGRO-FISHERY FOODS		
DRAWING TITLE: EQUIPMENT LAYOUT 3F-4	SCALE: 1/100	DRAWING No. K-12
	DATE: 2017/11/20	

## **2-2-4 Implementation Plan**

### **2-2-4-1 Implementation Policy**

#### (1) Organization for Project Implementation

The Project will be implemented in accordance with the Grant Aid System of the Government of Japan after execution of the Exchange of Notes (E/N) and Grant agreement between the Socialist Republic of Viet Nam and the Government of Japan following the decision by a Cabinet meeting of the Government of Japan. The responsible agency on the Vietnamese side for implementation of the Project is the Ministry of Agriculture and Rural Development (MARD), and MARD will establish “Project Management Units (PMU)” as the implementing agency for the project after the E/N. The Contractual signing on the Vietnamese side is made by PMU, which will enter into the Consultant Agreement, the Construction/Equipment Agreement and implementation of the works for the Project to be borne by the Vietnamese side.

#### (2) Consultant

After execution of the Exchange of Notes, PMU will enter into the Consultant Agreement for detailed design and project supervision with a Japanese consultant corporation, which will be validated after authorization by the Government of Japan. For smooth implementation of the Project, it is important to enter into the Consultant Agreement promptly after execution of the Exchange of Notes. It will be necessary for the Consultant to prepare the tender documentation (detailed design drawings and specifications) based on the Report of the Preliminary Study through discussions with NAFIQAD after conclusion of the Consultant Agreement and acquire the confirmation by the Vietnamese side on the contents of the tender documentation in accordance with the above-mentioned procedure of approval. The tender formalities and work supervision activities will be made in accordance with the contents of the tender documentation.

#### (3) Methods of ordering construction works/equipment procurement

The Project will consist of the construction works to construct facilities and the equipment procurement works including procurement, installation and commissioning of medical equipment and materials. The prime contractor for each work will be limited to a Japanese national or corporation having a given qualification and will be selected by a general competitive tender with pre-qualification.

PMU will enter into the respective contracts with the contractors for construction works and equipment procurement, which will be authorized by the Government of Japan. After that, the contractors for construction works and equipment procurement will be able to start the respective works and perform the respective works in accordance with each contract.



(4) Use of local consultant

For the work superintendence, local construction engineers will be employed in addition to the Japanese resident superintendents because the works employ the local engineering methods. In the Project, local equipment engineers will also be employed because the facilities have a higher work ratio for electrical and mechanical equipment than common buildings.

(5) Use of local construction engineers and dispatch of Japanese technical experts

There are several major construction companies in Hanoi City, which have had experience in construction works in which Japanese companies have been involved. They are aware of the construction methods that Japanese construction companies use, but do not have sufficient numbers of engineers who have practical knowledge and skills. Therefore, the technical guidance by prime contractors (such as Japanese general contractors) will be required. For this purpose, it is necessary for the prime contractors to employ local engineers working under the leadership of Japanese engineers and to check on work schedules, quality and safety control and the guidance of the local engineers on those items in a detailed manner.

Since the Project includes a very advanced testing (research) laboratory, the construction work will require a high level of quality control. Therefore, it is indispensable that Japanese technical experts with high experience in this field to take charge of the technical guidance and construction management.

Especially for the special facilities, it is planned to dispatch technical experts from Japan.

In the project, the construction plan is prepared subject to the demarcation that the Vietnamese side conducts the construction of building and general facilities and the Japanese side conducts the procurement of equipment and the construction of special facilities to support laboratory equipment. For securing smooth and appropriate quality of the works to be done by the Japanese side, the detailed demarcation of works between Japan and the Vietnamese sides are to be determined, and the works done by the Vietnamese side (finished work, placement of facilities, etc.) are to be confirmed. As for construction schedule, the works of the Japanese side will be launched after the completion of works of the Vietnamese side. Since the works of the Vietnamese side will be conducted by several numbers of contractors and need to be coordinated, it is necessary for the Japanese side including consultant to establish a system for monitoring of the progress of works of the Vietnamese side so as to launch the works immediately.

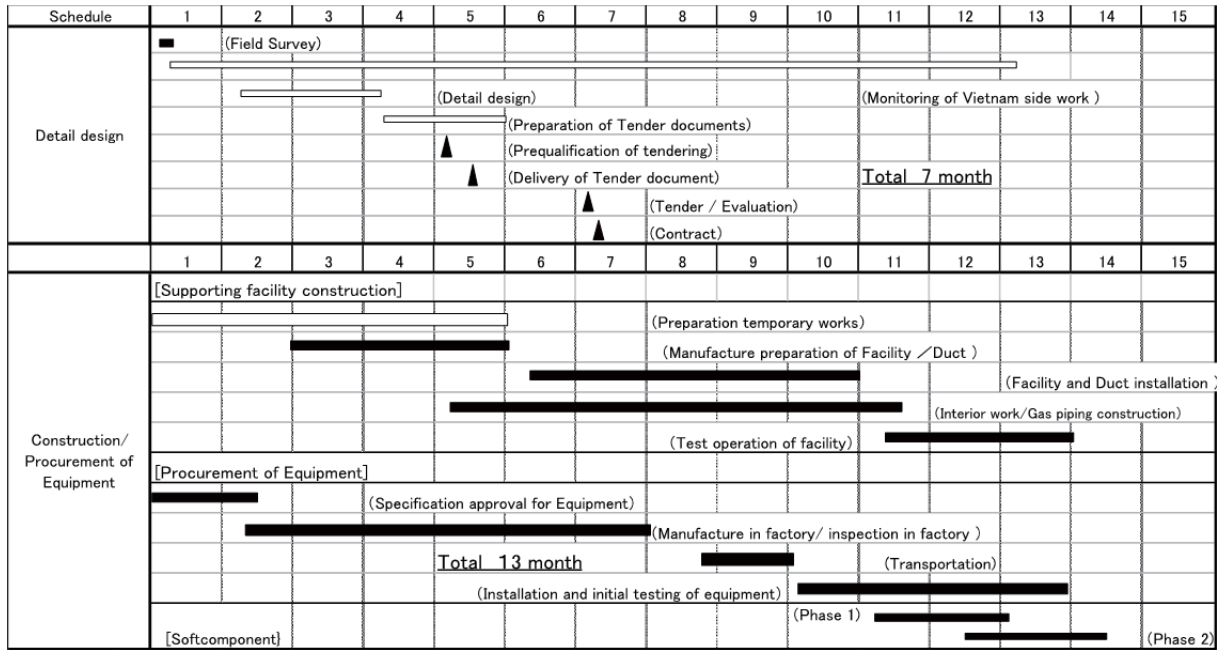


Figure 2-32 Outline of Construction Schedule

The works of the Japanese side are scheduled to launch after completion of the works of Reference Test Building (main structural work), which will be conducted by separate contracts. At that time, however, the infrastructure and exterior work are still under construction, so that it is necessary to obtain yards for stocking materials for facilities work to be done by the Japanese side and temporary office. The following measures will be taken considering the matters to be confirmed based on the progress of works.

- 1) To ensure coordination and matching with the works of the Japanese side at the stage of works of the Vietnamese side, the Consultant will confirm the shop drawings and finished work.
- 2) After selection, the Japanese contractor, with a Japanese supervisor (consultant), will participate in the construction progress meetings organized by the Vietnamese side, to confirm concretely the progress of construction, delivery methods, etc.
- 3) In the case of Viet Nam works and Japan works have to be overlapped, the coordination between those works will be made for smooth implementation, by holding a joint meeting organized by PMU/RETAQ center.

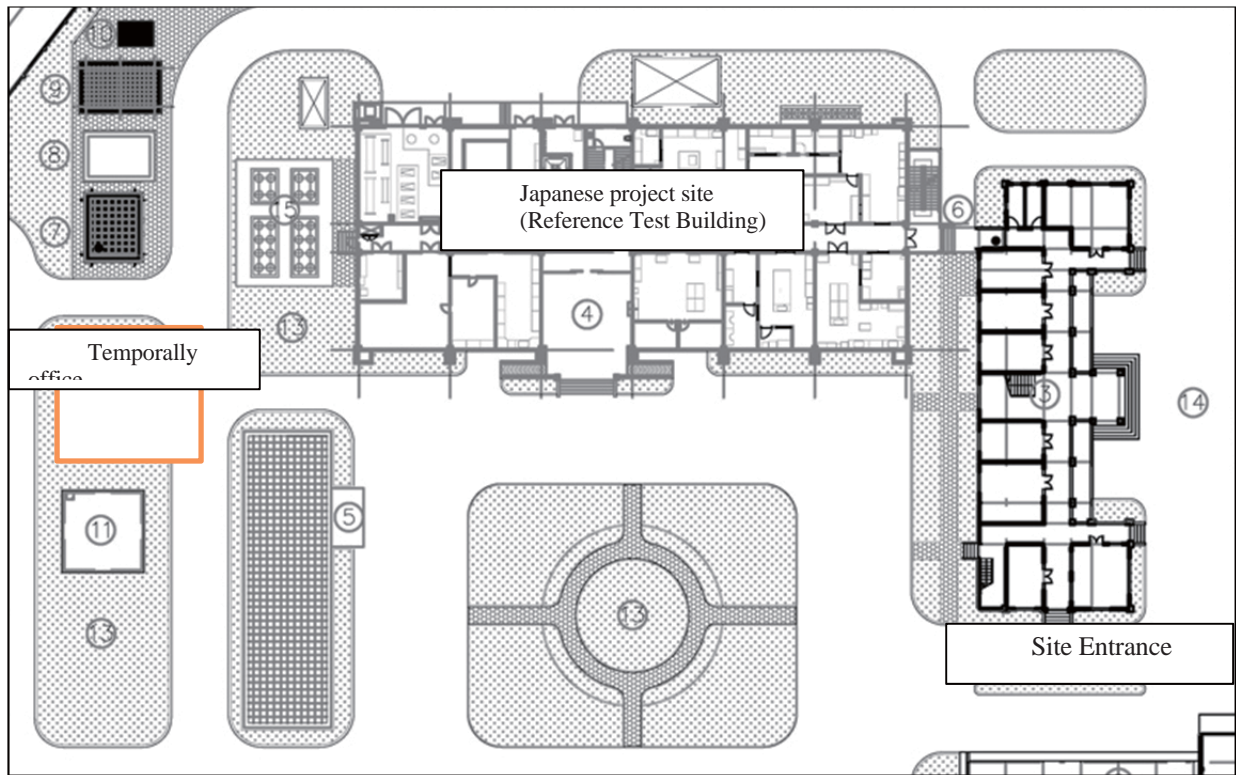


Figure 2-33 Temporary Work Plan

Although there is no concrete layout plan since Vietnamese constructors are not selected, the yards for construction materials and temporary office are secured at the commencement of the works of the Japanese side.

As for work procedure, some analytical equipment (LC/GC/MSMS/TOFMS) which requires longer period for installation are highly required to be installed and completed prior to the other equipment so as to make overall schedule more efficient and shorter. Those equipment are properly adjusted with facilities which include gas piping, water piping and stable electrical lines which will necessitate from initial testing phase.

## 2-2-4-2 Implementation Conditions

### (1) Temporary building plan

The temporary offices for the Consultants, construction contractors and subcontractors, materials storage yards and working plants and storehouses will be constructed in the open space adjacent to the project site through discussions with NAFIQAD.

The main construction materials will be procured from Hanoi City and its suburbs. Concrete will be purchased from ready-mixed concrete plants in Hanoi City and its suburbs.

In order to prevent NAFIQAD-related persons and third parties from unauthorized access to the work areas, it is also necessary to keep guards at the entrances and exits of High Tech Center. Further, to avoid work-related vehicles disturbing the traffic in the premises and neighboring areas, traffic safety personnel will be deployed to prevent possible accidents at necessary points on the front road and other roads in the premises.

### (2) Facility Procurement

The majority of important equipment and materials can be procured in the site area, Hanoi City and its environment. At present, many products with various standards and quality levels from Europe, and ASEAN are distributed throughout Viet Nam. The required equipment and materials will be procured locally to the maximum possible extent in order to facilitate maintenance and repairs after completion of the planned facilities. In this case, the quality and quantity of procured equipment and materials will be fully examined to ensure that the work schedules will not be affected by procurement troubles.

The equipment and materials to be imported from Japan and any third countries will be transported by sea to Haiphong port in Viet Nam, and on land by truck from the port to the construction site in Hanoi City.

For some of the equipment and materials, a packing method that is durable enough against the impacts from shocks, humidity and high temperatures will be adopted.

Table 2-47 Basic concept on procurement of construction materials

Type of Work	Facilities, Materials	Concept of Procurement
Interior Work of Building	Floor: Continuous PVC sheeting, Wall: Calcium silicate board	Capable to procure locally with experiences.
Fitting Work of Building	Steel door, Aluminum fittings	High reliability is required to keep a certain tightness, but capable to procure locally with experiences (Japanese manufacturer is available)
General materials of air conditioning	Piping materials, Galvanized steel for duct, SUS plate, etc.	Assumed to procure materials made in ASEAN countries with a certain quality.

### (3) Construction Method

The Project is for the construction works to build the Reference Test Building and related facilities, which has been designed and constructed by the Vietnamese side. These buildings are very high-level laboratory testing buildings. Dry wall construction method using LGS stud partition walls will be used.

#### 2-2-4-3 Scope of Works

In order to implement the Project, the building works are divided into two parts. One is covered by the Japanese side under the Grant Aid Scheme. And the other is covered by the Vietnamese side, namely NAFIQD and MARD of Vietnamese Government.

The scope of works for the Vietnamese side is listed below. It should be noted that obligation of the recipient country is not limited to those mentioned herewith but included items mentioned below.

#### (1) Skeleton and machine bed

##### 1F: Energy machine room and surroundings

Inside machine bed: Boiler (2), chilling/hot water pumps (6), control panels (2), headers and etc.,

Outside machine bed: Chillers (3) and heat-pump (1), boiler service tank (1).  
North side of the Reference Test Building

Outside machine bed: Package air conditioner condensing unit (4), sample storage condensing unit (1), air compressor unit (1).

2F: Floor opening: Duct and pipe

3F: Floor opening: Duct and pipe

4F: Machine bed: AHU, scrubber, floor duct and chilling/hot water pipe

Floor opening: Chilling/hot water pipe.

Exhaust port on the flat roof: Exhaust air duct to scrubber (3).

#### (2) Installation of Insert for slab bottom surface and wall

1F: Ceiling: Restricted area, energy machine room, sample storage and middle corridor (692m<sup>2</sup>).

2F: Ceiling: Restricted area and middle corridor (389m<sup>2</sup>).

3F: Ceiling: Regulation area and middle corridor (680m<sup>2</sup>).

4F: Ceiling: AHU and ducting area (400m<sup>2</sup>).

Floor opening wall: Pipe shaft and duct (air supply and exhaust).

(3) Wall opening and reinforcement for ventilation hole

1F: Ventilation louver panel for energy machine room, ventilator machine and reinforcement of ventilation hole for air exhausting.

2F: Reinforcement of ventilation hole for air exhausting

3F: Reinforcement of ventilation hole for air exhausting

4F: Installation of supply ventilation hole for AHU

Wall reinforcement of small penetration hole: Gas pipeline and instrumentation line

(4) Power supply

Main power distribution board: Installation of circuit for energy machine room

Electricity supply to terminal board: Designated location of each floors

Floor branch line: Installation of electricity supply terminal in Restricted and Regulation area

Illumination branch line: Installation of electricity supply terminal in Regulation area and middle corridor.

(5) Water supply

Installation of water supply: Installation of water supply tap for experimental table and others (valve end).

(6) Drainage

Floor drainage: Installation of floor drainage port for experimental table and others (tape curing).

(7) Others

Installation of boiler fuel underground tank (2kl):

The Japanese side install 500liter service tank and oil pump from underground tank.

(8) Equipment delivery and installation area

In addition of facility installation area, Equipment installation and delivery floor area accumulate, 1F (692m<sup>2</sup>), 2F (626m<sup>2</sup>), 3F (778m<sup>2</sup>) and 4F (400m<sup>2</sup>), total area estimated 2,496m<sup>2</sup>.

#### 2-2-4-4 Construction Supervision

The Japanese consultant company will enter into the Consultant Agreement with NAFIQAD to undertake the detailed design (including preparation of the tender documentation) and the tender and construction supervision activities for the Project. Construction supervision will secure the due performance of the terms and conditions of the work contracts including determination of whether any work under the Project is carried out in accordance with the design documentation. The consultants will supervise the works to secure the specified quality and control the work schedules in making guidance, advice and coordination during the construction period of each work. The construction supervision will consist of the following activities:

(1) Cooperation in Tender and Contract Award

The consultant will prepare the tender documentation necessary to determine the contractor for each construction or equipment work and render tender services including tender announcement, receipt of tender applications, examination of qualification, holding of a pre-bid meeting, distribution of bidding documents, receipt of bids and evaluation of bids. In addition, the consultant will give advice and cooperation to conclude the contracts for construction and equipment works between the successful contractors and NAFIQAD.

(2) Guidance, Advice and Coordination to Work Contractors

The consultant will examine the construction processes, construction schedule, building materials procurement plan, equipment procurement/installation plan, etc. and give guidance, advice and coordination to the successful contractors.

(3) Inspection and Confirmation of Construction and Manufacturing Drawings

The consultant will examine the construction or manufacturing drawings and documents submitted by the successful contractor and give any necessary instructions and issue the confirmation of the work.

(4) Verification and Confirmation of Building materials and Equipment

To the extent it is required, the consultant will attend the factory inspection of the building materials or equipment at the respective factories of the manufacturers and the work acceptance tests to confirm the quality and performance of the materials and equipment to be produced as specified.

(5) Progress Report of Works

The consultant will supervise the conditions of the manufacturing processes and the construction sites and produce progress reports on the work to related agencies of both governments from time to time.

(6) Installation work

The individual equipment that installation and operation verification are unnecessary, the consultant will confirm its delivery to the predetermined position in the testing building, to confirm with an equipment delivery letter.

(7) Test Run and Completion Inspection

The consultant will attend the test run and completion inspection for buildings, electrical and mechanical systems and laboratory requirement to ensure that performance compliance is achieved satisfactorily as specified in the contract documents and submit the completion reports to NAFIQAD.

(8) Facility construction Supervision System

The consultant will deploy a full-time a resident architect to execute the above activities. Although the facility under the Project is relatively small-scale, the coordination between the Vietnamese works and the Works under the Project is extensively required to achieve the performance of the high-level testing laboratory. In addition, the consultant will dispatch engineers of specific fields to the work sites according to the progress of the works, and give necessary consultation, inspection, guidance and coordination.

The consultant will also provide engineers in charge of the Project in Japan to carry out technical coordination and communication with the work site. The consultant will also make reports to the Government of Japan and the related agencies on necessary matters on the progress status, the payment procedures, the completion and handover of the Project.

The construction supervision diagram under the Project is shown in Figure 2-34 below.

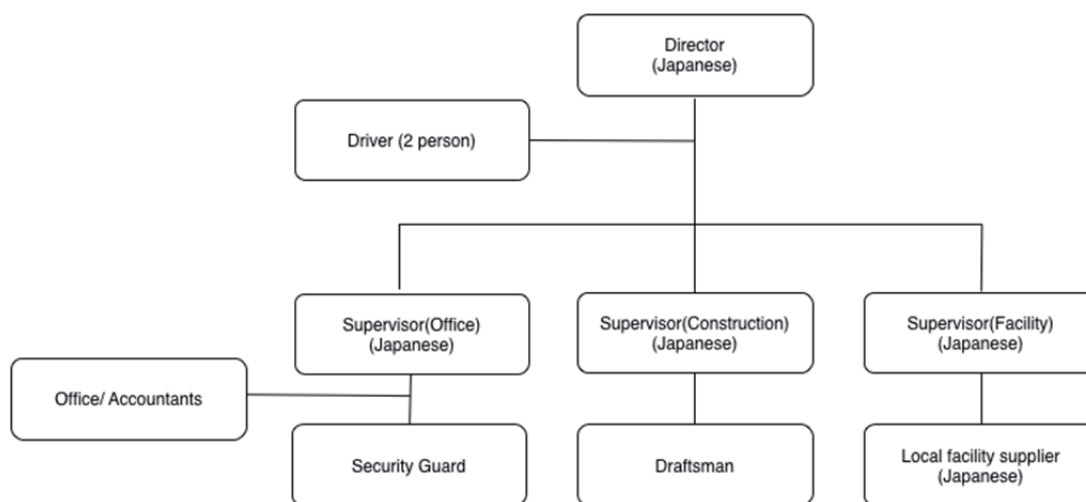


Figure 2-34 Construction supervision

- \* During construction works by the Vietnamese side (from November 2017 to April 2019 : 18 months), guidance will be provided to works by Japanese consultants, in addition to checking of shop drawings, as necessary.
- \* Prior to commencement of works of the Japanese side, the status of works of the Vietnamese side will be confirmed that there is no lack in their works. After confirmation, the discussion will be made with a Japanese contractor on work procedure.
- \* A resident supervisor will be dispatched to the site for 8.5 months from confirmation of works of the Vietnamese side before launch of works of the Japanese side to completion of works of the Japanese side. A resident supervisor will precede the works having a support from air conditioning supervisor at site and corresponding closely with person in charge of equipment installation stationed in Japan.



#### **2-2-4-5 Quality Control Plan**

(1) Coordination with Works by the Vietnamese side

The alteration works for the test building will be implemented by the Vietnamese side in accordance with requirements arising from the works under the Grant Aid. Timely and in-depth discussions between both parties will be required to secure the integrity between the two works.

As soon as commencement of the Works under the Project begins, the contractor will inspect the status of the alteration works and confirm its completion relative to the alteration design documents prepared by the architect of NAFIQAD.

(2) Restricted area and Regulation area of Reference Test Building

1) Restricted area

- Air flow test for Biosafety cabinet (air flow velocity at from opening for 0.25-0.5m/s)
- Air-tightness and differential pressure test
- Air conditioner Dynamic Variable Air Volume Response test
- Exhaust gas treatment test

2) Regulated area

Requirement for install test for Biosafety cabinet(Airflow Velocity at front opening 0.25~0.5m/s), Hood Monitor Test, Air conditioner Dynamic Variable Air Volume Response test

- Exhaust gas treatment test

3) Exhaust air and Drainage/Sewage

Treatments for exhaust air and drainage/sewage shall be specified and confirm to the specific regulations.

#### **2-2-4-6 Procurement Plan**

(1) Procurement of Building Equipment and Materials

As the objective of the Project is to build an inspection (testing) institute, long-lasting and durable products will be procured in order to achieve the required performance of the facilities in consideration of reduced maintenance, inspection and cleaning. With this in mind, the following procurement policies will be adopted:

1) Local procurement

In consideration of convenience for maintenance and repairs after completion of the facility, equipment and materials to be used will be procured locally to the maximum possible extent after checking availability in terms of their quality and quantities. The equipment and materials that are already imported and available in the local markets in Viet Nam, which can be distributed anytime in the markets with no need for import procedures, will be deemed to be local products and positively adopted for the Project.

## 2) Import procurement

Any necessary equipment and materials that are difficult to obtain locally, or do not meet the quality requirements, or the supply is unstable in the required quantities will be procured from Japan or a third country. In this case, the contractors shall coordinate with NAFIQAD/PMU for import and customs clearance in order to smoothly implement the tax exemption measure and other procedures.

Should any products equivalent or similar to the locally procured products can be procured from Japan or any other country, consideration will be given to import such similar products, if “prices plus the costs of packing and transportation” are lower than “prices for local procurement”

Table 2-48 Procurement plan for construction material

ITEM	Place of Procurement			Remark
	Viet Nam	Japan	Others	
PVC Sheet	○			Economic efficiency and facileness of the maintenance
Light Gauge Steel material	○			Ditto
Gypsum board	○			Ditto
Color calcium silicate board	○			Ditto
General paint	○			Ditto
Precision switch	○			Ditto
Electric counters	○			Ditto
Wiring materials	○			Ditto
Illumination, lightning	○			Ditto
Air conditioner for PAC	○			Ditto
Air-cooling chiller	○			Ditto
Air Handling Unit	○			Ditto
Cool and Hot water pump	○			Ditto
Cool and hot water valve	○			Ditto
Exhaust fan	○			Ditto
HEPA Filter	○			Ditto
VAV, CAV	○			Ditto
Boiler	○			Ditto
Scrubber	○			Ditto
Valves	○			Ditto

## 3) Transportation plan

Equipment and materials to be imported from Japan or a third country will be transported by sea to Haiphong port in Viet Nam and by land from the port to the construction site in Hanoi City. For some of the equipment and materials, packing methods securing freedom from impact such as shocks, humidity and high temperatures will be adopted.

#### 4) Procurement plan

The major items of building equipment and materials to be procured will be classified and listed in terms of local procurement, procurement from the third country and from Japan in Table 2-48. The main equipment and materials for electrical and mechanical equipment will be procured from Japan or a third country

### (2) Equipment Procurement

#### 1) Procurement Plan

It is important to secure appropriate maintenance and operation of the equipment to be procured for the Project in order to obtain accurate and stable test results required for testing and researches using the equipment. Engineers having professional knowledge will be requiring making regular maintenance and checking the replacement of parts. For this purpose, it is important to procure products from manufacturers that have such engineer's resident in Viet Nam.

Table 2-49 Procurement Plan for Main Equipment

Equipment	Local	Japan	Third Countries	Remark
GPC clean up, ELISA system, LC/TOF/MS, LC/MS/MS, HPLC/DAD, HPLC/FLD, GC/NPD(FTD), GC/FPD, GC/ECD, GC/MS/MS, atomic absorption spectrophotometer(AAS), UV-VIS, ICP-MS, Ion chromatograph, Nitrogen analysis apparatus, microscope, Distilled water apparatus, Ultra water purifier, Automatic petri dish filling machine, Automatic liquid media filling machine, Solid phase extractor(SPE), White board, Screen for projector, Projector, Table for lecture, Chair for lecture , Ultra water purifier, RT-PCR(BAX)	○*	○		To encourage competitive tendering, etc.
Centrifuge, Voltex mixer, Homogenizer, Stomacher (for bacteria), Small shaker (for culture), Mixer, Stirrer for extraction of organic solvent, Food processor, Ultra sonic homogenizer, Voltex mixer, Water bath, Heat block, Water bath, Hot plate, Muffle furnace, Ultra low temp. Freezer, Freezer, Low-temp. water bath, Refrigerator, Water purifier, Electronic balance, Semi-micro analytical balance, Balance, Ultra sonic washer, pH meter, measuring tape, Humidity meter, Light meter, Choline meter, TSD meter, pH meter, EC meter, sieve, Hand saw, Drill, Soil sampler, Water sampler, Dissection kit, Freeze dryer, Drying oven, Filtration/sterilization apparatus, Platinum needle electric sterilizer, High-pressure steam sterilizer, UV light, Hot air sterilizer, drying oven, Electronic range, Hot plate stirrer, Rotary evaporator, Micro pipettes, Heat resistant plastic container, Sample bottle, Washing basin, Seamer (can), Nitrogen gas generator, Air compressor, Solvent collecting apparatus, CO2 jar, Colony counter, Drying wagon, Pulvelizer, Thermal cyclor, Submarine type electrophoresis, Molecular imaging system, Evaporator, Electric heater, Soxlet extractor, Automatic titrator, Ice maker, Temp and humidity controlled animal rearing cage, Table for microscope, Balance table, Balance confining cover, Laboratory washer, UV stocker for slippers, UV locker, Chemical cabinet, Cabinet, Clean bench, Draft chamber, Glove box, Laboratory table, Work table, Laboratory chair , Gamma spectrometer, Water purifier, Vacuum dryer, High pressure microwave, Automatic petri dish filling apparatus, Seamer (bottle), Exhaust gallery, Waste liquid neutrizer, arm exhaust duct (portable), Temp and humidity controlled animal rearing cage		○		Considering the Performance of the equipment, etc.
Pick-up truck	○			

\*Local purchase of third country product is categorize in local.

#### 2) Transportation Plan

The transportation route for the equipment and materials procured through the import from Japan and any third country will be the same sea route to Haiphong Port of

Viet Nam as for the building materials and equipment, and the inland route from that port to each site will be vehicle transportation. For the equipment and materials that may be subject to functional deterioration due to impacts or ambient humidity and temperature, packing methods that are not affected by such impacts or ambient conditions will be adopted. The period of transportation is estimated to take 1 months for export application formalities including customs clearance and inland transportation.

### 3) Installation of equipment

There are several equipment that will be fixed at its place of installation and related to the installation work. Accordance with difficulty level of installation work, the equipment is to categorize to four different categories as shown in Table 2-50.

Table 2-50 Categories of testing equipment

#	Category	Equipment (description)	Number of Item	Qty.
1	Category 1 High level analysis apparatus	LC/MS/MS, LC/TOF/MS, HPLC, GC/MS/MS, GC, RT-PCR(BAX), AAS, ICPMS, etc.	14	15
2	Category 2 Equipment which needs an engineer for assembling of apparatus	ELISA, RT PCR, Nitrogen analysis apparatus, Ion chromatograph, Distilled water apparatus, Laboratory washer, Rotary evaporator, Soxhlet extractor, Ice maker, Projector, etc.	61	147
3	Category 3 Equipment which needs an engineer for assembling, installation and connecting to facilities	Draft chamber, Clean bench, Pass box, Laboratory table, Side table, etc.	62	241
4	Category 4 General equipment	Equipment other than the above-listed	72	292

For most of equipment as shown in Table 2-47, the electrical connection work will be necessary to carried out. In this case, an installation and adjustment by engineers (expert) will be required for various models of equipment and will take a relatively long time for installation. The installation work and adjustment work for those equipment and systems will be carried out by the engineers dispatched from the manufacturers or local agents during the period of which the facility construction works is being completed. The installation costs of such equipment and systems are included in the equipment procurement plan.

Table 2-51 shows duration of dispatched engineers are necessary for installation, adjustment, initial testing and initial training by category.

Table 2-51 Man-day requires for installation and initial operational guidance by Maker

	Installation (day/man)		Setting/Pre-testing (day/man)		Initial operation (day/man)		Training (day/man)	
	Expert	Worker	Expert	Worker	Expert	Worker	Expert	Worker
Category 1	0	8 days 2 persons	10	10	18	18	0	0
Category 2	0	17 days 2 persons	20	20	13	13	0	0
Category 3	0	24 days 4 persons	27	27 days 4 persons	22	22	0	0
Category 4	0	19 days 2 persons	15	15	9	9	0	0
Total	-	184	72	99	62	62	-	-

#### 2-2-4-7 Installation and Initial Operation

Installation work for laboratory equipment to RETAQ center is basically directed with responsible of the supplier. Category 3 including laboratory table, clean bench, draft chamber and etc. are planned to installed advance to other equipment will be installed. Installation procedure will total of 184 man/day of local workers. The setting and pre-testing will be directed by specialist who will be dispatched from equipment makers. This specialist will direct local workers for those activities for setting/pre-testing and initial operation process of installation work.

Since, all of test equipment are basically selected from specifications equivalent to those of the equipment and materials which are using at test laboratory of NAFIQAD branches. All the grade of equipment will basically apply to the laboratory equipment, which will be easily to operated and maintained with the existing technical level of the staff member. It is also designed to employ the equivalent grade of equipment that have been transfer by technical assistance (SCISAF). The Initial operation will be supplied by procurement plan for all equipment, however, advance training is not.

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

The Vietnamese side requested training as the soft component of its personnel for the upgrading of technical capacity in the operation and maintenance/management of equipment and supporting facilities provided in the project. (refer to Attachment 5)

#### 1. Activities of the soft component

Activity of the soft components are divided into following three stages

Table 2-52 Activity of the Soft components

Stage	Activity	Duration	Starting time
Phase 1	Improvement of maintenance/ management skill of supporting facility	1.1 months	3.0 month before handing over the equipment
Phase 2	Improvement of technical operation on supporting facility	1.7 months	2.0 month before handing over the equipment

Outcome 1 “Establish daily maintenance/management plan of supporting facilities and waste neutralization apparatus”

(Activities)

- 1-1: Understanding of the operation principal and structure of supporting facilities and the liquid waste neutralizer system
- 1-2: Confirmation of initial condition of supporting facility
- 1-3: Understanding each function and structural component of supporting facilities and the liquid waste neutralizer system
- 1-4 : Understanding contents and methods of routine maintenance work of facilities
- 1-5: Formulation of a maintenance checklist and operation rules

Outcome 2 “Establish mid to long-term management plan for renewal of the supporting facilities and waste neutralization apparatus”

(Activities)

- 2-1: Preparation of log book for the inspection, operation, and parts replacement record for supporting facilities
- 2-2: Estimation of maintenance costs based on parts replacement record
- 2-3: Budget planning for supporting facility
- 2-4: Creating of the Operational plan

Outcome 3 “Improvement of operational capabilities of supporting facilities and the waste neutralization apparatus”

(Activities)

- 3-1: Maintenance practice of individual air conditioning and central air conditioning system
- 3-2: OJT for exchange filters for exhaust (HEPA) and air handling unit (AHU)
- 3-3: OJT for maintenance on supporting facilities (air-cooled chiller, boiler, of heat

source equipment)

3-4: Safety management of air conditioning equipment

3-5: OJT on the waste neutralization equipment

3-6: Preparation of the operating rules

## **2. Implementation Resources**

As this project is to provide the highly sophisticated system, the inputs of the Japanese side will include a trainer at the level of the engineer in ventilation system and trainer for laboratory waste treatment equipment having knowledge of the design contents of this project. As the inputs of the Vietnamese side, the maintenance/management personnel are allocated as direct counterparts in the training selected by NAFIQAD

### **• Resources**

#### **The Japanese side**

Two consultants who have experience on supporting facilities (ventilation facility and central air conditioning system, AHU) and laboratory waste neutralization apparatus will be dispatched. One of these consultants will have experience of training on supporting facility. The other consultants will offer guidance on laboratory waste management. They will prepare the teaching materials in Japan.

#### **The Vietnamese side**

During the implementation of the soft component, following counterparts will be dispatched to collaborate with the Japanese experts.

Two persons in charge from NAFIQAD

Two persons for facility maintenance personnel (technical staff)

## **3. Outputs**

- 1) Completion report
- 2) Maintenance plan (maintenance and inspection logbook, working record table, replacement parts manual)
- 3) Medium-and long-term maintenance plan (operation plan, maintenance schedule, parts replacement record)
- 4) Operation manuals (operation regulation, operation guidance)

#### 2-2-4-9 Implementation Schedule

The project implementation schedule after execution of the Exchange of Notes is shown in Figure 2-32. The project will consist of three types of work: detailed design work by the consultants, the tender-related work, and the contractors' works and the consultants' construction supervision work.

##### (1) Detailed Design Work

The consultant agreement for the Project will be entered into between NAFIQAD and a Japanese consultant company, and will be authorized by the Government of Japan. After that, the consultants will prepare the tender documentation (detailed design and bidding documents) in accordance with the Report on the Basic Design Study through consultations with NAFIQAD and submit the documentation to NAFIQAD for its approval MARAD. The period of preparation of this tender documentation is scheduled for 4 months.

##### (2) Tender-related Work

The period required for the tender-related work is estimated to be 3 months

##### (3) Contractors' Works and Consultants' Construction Supervision Work

After the work contracts (for building/equipment procurement) are awarded, the contractors will start the respective works. Simultaneously, the consultants will start their construction supervision works.

For these works, a work period of 13.5 months is estimated as shown in Figure 2-26.

##### (4) Implementation schedule of Vietnamese work

In the process of RETAQ construction to be implemented by the Vietnamese side, it is required to control both construction work of RETAQ center and implementation process of establishment of the Project steering committee in compliance with Decree No.38. The contents of whole process based on this are shown as follows. (refer to Figure 2-26)

##### Construction work schedule (in progress)

1.	Detail design (by consultant)	Nov. 2013~ early Mar. 2014
2.	Creation of EIA report	Done
3.	Negotiation of land lot usage	Done
4.	Permission of firefighting Department	Done
5.	Verification of detail design contents by third party	Done
6.	Permission of detail design by NAFIQAD	Done
7.	Submission of NAFIQAD tender plan to MARD	Done
8.	Selection of contractor (creation of tender documents, public notice, tender)	Done Sep. 2017



- |     |   |                      |
|-----|---|----------------------|
| 9.  | a) Selection of construction supervisor, Subscription procedures of construction insurance  | Done Sep. 2017       |
| 10. | b) Handling over from NAFIQAD to contractor   | Oct. 2017            |
| 11. | Groundbreaking construction (separate into construction work and infrastructure)<br>Testing building construction work<br>Construction work of infrastructure (electricity, water supply, outdoor facilities)<br>Design work of incidental facilities (transform, elevator, fire-extinguishing facility)<br>Tender work as above<br>(Preparation of tender documents, tender, signing contract)<br>Construction work as above<br>The time period when The Japanese side will start installation after completion of construction of testing building or incidental facilities | Nov. 2017-April 2019 |

#### Establishment of Project Management unit (PMU) by MARD

- |    |   |   |
|----|---|---|
| 1. | Preparation of creating the Project Report (Refer to “Preparatory Report”)                                  | Sep. ~ End Dec. 2017                              |
| 2. | Internal evaluation by ICD  | Early ~ End Jan. 2018                             |
| 3. | Evaluation by Verification Board (dept. under MARD)   | one month after submission to MARD                |
|    | Exchange of Notes and Grant Agreement   | At the latest by Apr.2018                         |
| 4. | Approval of the Project Report(MARD)  | two weeks after signing E/N                       |
| 5. | Establishment of the Project Steering Committee   | one months after approval of the Project document |
| 6. | Establishment of the Project Management Unit (PMU)  | one months after approval of the Project document |
|    | Creation of Project administration rules and approval by MARD   | one months after approval of the Project document |
| 7. | Signing consultant contract (3 months after signing EN)   | Three months after signing E/N                    |
| 8. | Application of budget plan for the next fiscal year (Yearly accounting closing date: 15 <sup>th</sup> July) | Mid-Jun ~ Mid-July 2018                           |

## 2-3 Obligations of Recipient Country

The scope of work to be borne by the Vietnamese side will cover the following activities:

### (1) Before the Tender

1. To start the construction of the Reference test Building  
Construction of the Reference Test Building  
Installation of facility to the Reference Test Building
2. To give due environmental and social consideration in the implementation of the Project
3. To secure the following land necessary for the implementation of the Project
4. Project sites
  - 1) Temporary stock yard for construction near the Project area
  - 2) To clear, level and reclaim the project site
5. Demolition of unnecessary existing building
  - 1) Removal of unnecessary existing trees
  - 2) leveling and reclaiming the site for the building
  - 3) to hire supervising consultant for Reference Test building
6. To open bank account (B/A)
7. To issue A/P to a bank in Japan (the Agent Bank) for the payment to the consultant

### (2) During the Project Implementation

1. To issue A/P to a bank in Japan (the Agent Bank) for the payment to the Supplier(s)
2. To bear the following commissions to a bank in Japan for the banking services based upon the B/A
  - 1) Advising commission of A/P
  - 2) Payment commission for A/P
3. To ensure prompt uploading and customs clearance at ports of disembarkation in recipient country and to assist the Suppliers with internal transportation therein.
4. To accord Japanese nationals and/or physical persons of third countries whose services may be required in connection with the supply of the products and the services such facilities as may be necessary for their entry into the country of the recipient and stay therein for the performance of their work.
5. To ensure that customs duties, internal taxes and other fiscal levies which may be imposed in the countries of the Recipient with respect to the purchase of the products and/or the services
6. 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
  - 1) Expense for the RETAQ Project activity
  - 2) Temporary storage yard for Equipment and Facility

- 3) Securement of constriction area
- Construct temporary access road for the construction work.  
To construct the following facilities:
  - 1) The Reference test building
  - 2) The gates and fences in and around the site
  - 3) The access road to the site
  - 4) The road inside of the site
- To provide facilities for distributing electricity, water supply and drainage, and another incidental facilities necessary for the implementation of the Project outside the site
  - 1) Electricity
    - a. The distribution power 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 potable water distribution main to the site
    - b. The water supply system within the site
  - 3) Drainage  
Central Drainage for the Reference test building
  - 4) Air-conditioning and ventilation  
Air-conditioning and ventilation facilities other than those to be borne by the Grant Aid
  - 5) Furniture and Equipment  
General furniture

(3) After the Project

1. To ensure that facilities and the products be maintained and used properly and effectively for the implementation of the Project
2. To bear all the expenses, other than those covered by the Grant, necessary for the implementation of the Project
3. Prepare necessary conditions for use properly and effectively the facilities constructed and equipment provided under the Grant Aid:
  - 1) Employ adequate number of trained personnel
  - 2) Purchase required chemicals, solvents and materials to ensure proper operations of the RETAQ center (at least in the first year)
  - 3) Purchase required tools, glass wares, other consumable materials for testing laboratory (other than equipment provided under the project)
  - 4) Calibration, adjustment of measuring instruments.
  - 5) Cover other necessary expenses to ensure the operation of the RETAQ Center (including electricity, water, oil, waste treatment, etc.)
4. To Submit Project Monitoring Report to JICA, to quarterly basis.
5. Allocation of maintenance cost
6. Operation and maintenance organization and staff
7. Routine check/periodical maintenance

## 2-4 Project Operation Plan

### 2-4-1 Organization

The assignment tasks to be developed by RETAQ center are shown in Figure 2-35. Plans are developed step-by-step with preparation process, facilities construction to technical cooperation (training) conducted by JICA by middle of 2016. After operation of RETAQ center by the Vietnamese side, method training and technical development for testing are conducted as shown in the timeline chart.

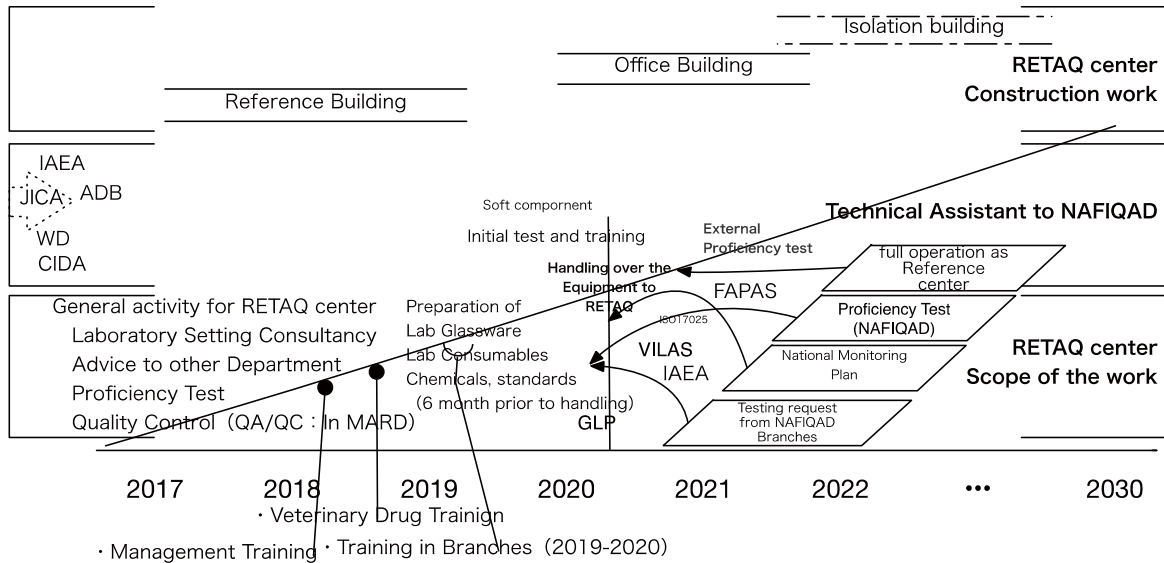


Figure 2-35 Implementation plan of RETAQ center

### 2-4-2 Personnel plan

The personnel employment plan for RETAQ center was still under deliberation at the time of the field survey as shown in the table 2-53. In the basis, personnel staffs of RETAQ center in 2015 are estimated to increase up to 51 persons (approved by MARD). In July 2013, twelve staffs had been employed; and they are being technically trained by the SCIESAF project.

Table 2-53 Personnel allocation plan

Division	In 2017	By 2020	Position of work
I. Management Division	7	13	Director, Vice Director, Head of Testing Reference Div., Head of Public Relations Dept., Head of Administration Div., Head of Accounting Div., Deputy Head of Testing Div., Deputy Head of Public Relations Div., Deputy Head of Administration Div.
II. Laboratory Division	8	33	
Testing Reference Division	2	17	Technical personnel, Testing personnel (Physicochemical testing, biological testing, monitoring)
Public relations Division	2	8	Food Safety and Hygiene Management engineer, Public Relations personnel
Administration Division	4	8	Reception, Accounting, Personnel, Documents storage, Testing Certification
III Supporting Division		5	Driver, Guard, Cleaner
Total	15	51	

(NAFIQAD: RETAQ center Project document)

NAFIQAD had prepared plan to increase laboratory staff to 17 for the testing and reference divisions before the opening of RETAQ center in 2020.

In 2017, total of 15 staffs are employed in RETAQ office including 7 staffs as Management division and 8 staffs for the testing division. RETAQ staffs will be recruited to 51 staffs by the opening of RETAQ center in 2020, as shown in Table 2-50. In the management plan of the RETAQ center, the test division will be starting with 33 staffs.

In addition to the staff to be recruited as permanent employee, 10 additional temporary staffs will be hired for testing division as shown in Table 2-54.

Table 2-54 Recruitment plan for Laboratory staffs

Division	Permanent Employees					Temporary employees					Division Total
	Total Employee	Employment year				Total Employee	Employment year				
		2017	2018	2019	2020		2017	2018	2019	2020	
<b>1. Laboratory</b>											
<b>1-1. Chemical analysis division</b>											
Head of chemical analysis division	1	1			1			1		2	
Residue Indicator	3	1		1	2			1	1	5	
Wet & Ash	1			1	1				1	2	
Radiation	1			1						1	
Bio Assay	2	1			1				1	3	
<b>1.2. Microbiological analysis division</b>											
Head of microbiological analysis division	1	1								1	
Microbiology	2	1		1	2			1	1	4	
Molecular biology	1	1			1				1	2	
GMO	1			1	1				1	2	
<b>2. Non-Laboratory</b>											
<b>2-1. Sample &amp; monitoring</b>											
Sample & monitoring	4	3		1	1				1	5	
Yearly Total	17	9	0	4	4	10	0	0	3	7	27

Table 2-55 Technical staff training Plan

Analysis Target	Main Equipment	Number of personnel's	Educational level	Years of experience	Training abroad		Internal training	
					Place	Training site	Place	Training site
Pesticide	GC/MS/MS	2	Bachelor or higher	Over 3 years	Japan	Yokohama Quarantine Station	Can Tho/HCMC	Branch 4 & 6
Animal drug, Toxin	LC/MS/MS /TOF/MS	2	Bachelor or higher	Over 3 years	Japan	Same above	Same above	Same above
Heavy metals	ICP/MS	2	Bachelor or higher	Over 3 years	Japan	Same above	Same above	Same above
Microorganism	RT-PCR	2	Bachelor or higher	Over 3 years	Japan	Same above	Same above	Same above
Fish disease	RT-PCR	1	Bachelor or higher	Over 1 year	Japan		Same above	Same above
Marine-derived poisons	Bio-assay HPLC	2	Bachelor or higher	Over 1 year	Spain		Same above	Same above

Source: NAFIQAD

<Training program of laboratory work>

Training programs for the laboratory work for technical staffs for RETAQ center are planned by the NAFIQAD from before opening of the RETAQ center. In the plan, NAFIQAD branch and relevant research facilities in local agencies in MARD are planned to use for the training of new employee. In addition to those internal training program, with some high-level skill analysis will be trained with support from international donors program such as EU and UNIDO.

NAFIQAD is preparing training schedule to improve some technical skills for some analytical parameters such as marine toxin, fish disease, which have not been implemented in the branches. The necessary budgets for those training will be prepared from a budget of Viet Nam government (training program budget), a budget of NAFIQAD (reserve fund) and funds from international donors. Yearly training schedules are shown in Table 2-56.

Table 2-56 Training Schedule

	Topic of training	Analysis techic	No.staff	2014				2015				2016				2017				2018				2019				2020			
				I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV
1	Residue indicator,	LCMSMS, HPLC	2	■				■																							
	Pesticide, Animal Drugs, Aflatoxin	GCMSMS, GC/NPD/FTD/ECD	2				■				■				■																
2	Heavy metal	ICP/MS, AAS	2																												
3	Radio assay	Gamma spectrometer																													
6	Marine Toxin	Bio Assay	1																												
7	Food bacteology ,GMO	Food bacteology	2																												
8		PCR, ELISA	2																												
9	Molecular biology	Molecular biology	1																												
10	Sampling		3	■																											

- (■) Training by SCIESAF
- (■) Training by other donors which NAFIQAD send their staff annually
- (■) Equipment Initial training and OJT

Source : NAFIQAD

Table 2-57 Estimated number of Testing staffs for RETAQ center

Division	Contents of test	Engineer			Support staff		Total	RETAQ center Plan			
		Specialty	Major Equipment	Number of staffs	Scope of the work	Support staff	Number	Engineer	Support staff	Total	
Microbiology	Microbiology	General Microbiology Clinical Microbiology Food Microbiology Biochemistry	Microscope	4 (1)	Preparation Medium preparation Inoculation Cleaning	5	11	3(1)	2	5	
	Molecular biology	Molecular Biology Structural Genomics	RT-PCR Thermal cycler	2	same as above			1	2	3	
	GMO	Agriculture Chemistry				1	0	1			
Chemical analysis	Residue indication and Animal drugs	Chemistry Organic Chemistry Analytical Chemistry	GCMSMS LCMSMS GC HPLC	5 (1)	Preparation preparatio (Extraction Digestion) Concentration Washing	5	10	4(1)	2	6	
	Inorganic chemistry	Inorganic Chemistry Food Chemistry Environmental Chemistry	AAS ICP/MS Ion Chromatograph Nitrogen analysis UV					2	2	4	
	Radiology	Radiology	Gamma spectrometer	1	Preparation	1	2	1	0	1	
	Marine Toxin	Biology Toxicology	Bio Assay ELISA	1	Characterization, iso Animal grow	1	2	1	1	2	
	Sampling	Sampling and monitoring	Biology	Sampling technology	3(1)	Supplemental	3	6	4(1)	1	5
							Total	31			
										Total	27

\*Parenthesis show number of management staff

A personnel allocation plan based on the activities of RETAQ center estimated by the survey team is shown in Table 2-57 for the testing staffs. To engage all the activity for laboratory work (testing laboratory work, sampling and monitoring, and R & D), the team has estimated require staffs would be approximately 31. Current plan to start RETAQ center is 27 laboratory staffs has been planned by NAFIQAD for initial stage of RETAQ center, which is 4 staffs difference with estimation. It is clear that main laboratory work will be focus to the testing work and monitoring. Some activities of R&D will not be planned at initial stage RETAQ center.

The annual employment plan submitted by NAFIQAD during the study is described in Table 2-53. In this plan, ten temporary testing engineers will be employed in 2018.

Recruitment plan of testing engineer is described in Table 2-58 to 2-61 which are prepared by NAFIQAD.

Table 2-58 General requirements for position in chemical division

Obligations to perform works		B (Engineer)	C (Assistance engineer)
1	To create and revise SOP of testing technology regarding chemical testing.	<input type="radio"/>	<input type="radio"/>
2	To control testing room based on ISO1725 and to improve testing organization.	<input type="radio"/>	
3	To control quality of Agro-Forestry-Fisheries and to analyze chemical substance for testing technology service.	<input type="radio"/>	<input type="radio"/>
4	To do R&D about food analysis technology of chemical field and to give consulting from a scientific and technical point of view as requested.	<input type="radio"/>	<input type="radio"/>
5	To implement Proficiency test program that chemical substance is indicator	<input type="radio"/>	
6	To manage consumables, spare parts of testing room. To do works under instructions from the boss.	<input type="radio"/>	<input type="radio"/>
Ability required for works			
1	To have knowledge about food quality control, safety rules of Agro-Forestry-Fisheries and salt under the ministry-level and department-level rules of the country.	<input type="radio"/>	<input type="radio"/>
2	To understand chemical testing and its analysis methods. To have knowledge about analysis equipment and facilities.	<input type="radio"/>	
3	To understand the international and national standard of Agro-Forestry-Fisheries, and to able to organize the testing team applied the new testing methods by his/her self.	<input type="radio"/>	<input type="radio"/>
4	To able to arrange testing work effectively. To have the specialized knowledge about the specialized equipment and facilities of microbiology testing.	<input type="radio"/>	<input type="radio"/>
5	To able to plan and implement works alone effectively. Having experience in business trip is required to this position.	<input type="radio"/>	
	Experience in this field		
	Educational background	Bachelor	High school graduate
	Specialized program	Program specialized in Chemistry	2-3 years Graduate from Program specialized in Chemistry
	Language proficiency (English) Computer skill	B (University) <input type="radio"/>	A (High school) <input type="radio"/>

Table 2-59 Personnel requirement for Chemical division

Scientific Field	Recruitment (no.)	Field of Specialty	Required Degree	Skill of experience	Preference of when recruiting
Head of chemical division	1	Overall Chemical testing	Master Degree	Over 5-year experience in Chemical testing room	
Organic chemistry	2	GC/MS/MS	Bachelor Degree	3 years or more experience in Laboratory	Finishing program of GCMSMS training
		LC/MS/MS	Bachelor Degree	3 years or more experience in Laboratory	Finishing program of LCMSMS training
Inorganic Chemistry	2	ICP/MS, AAS, IC	Bachelor Degree	3 years or more experience in Laboratory	Finishing program of ICPMS training
Bioassay	1		Bachelor Degree	3 years or more experience in Laboratory	Experience on Bioassay methods



Table 2-60 General requirements for position in microbiology division

Obligations to perform works		B (Engineer)	C (Assistance engineer)
1	To create and revise SOP of testing technology regarding Bacterial testing.	○	○
2	To control testing room based on ISO1725 and to improve testing organization.	○	
3	To control quality of Agro-Forestry-Fisheries and to analyze Bacterial testing service.	○	○
4	R&D on food analysis technology of field of microbiology and to give consulting from a scientific and technical point of view as requested.	○	○
5	To implement Proficiency test program that microbiological indicator	○	
6	To manage consumables, spare parts of testing room. To do works under instructions from the boss.	○	○
Ability required for works			
1	To have knowledge about food quality control, safety rules of Agro-Forestry-Fisheries and salt under the ministry-level and department-level rules of the country.	○	○
2	To understand chemical testing operation and its analysis methods. To have knowledge about analysis equipment and facilities.	○	
3	To understand the international and national standard of Agro-Forestry-Fisheries, and to able to organize the testing team applied the new testing methods by his/her self.	○	○
4	To able to arrange testing operation effectively. To have the specialized knowledge about the specialized equipment and facilities of microbiology testing.	○	○
5	To able to plan and implement works alone effectively. Having experience in business trip is required to this position.	○	
Experience in this field			
Educational background		Bachelor	High school graduate
Specialized program		Program specialized in microbiology	2-3 years Graduate from Program specialized in microbiology
Language proficiency (English)		B (University)	A (High school)
Computer skill		○	○

Table 2-61 Personnel requirement for Microbiology Division

Scientific Field	Recruitment (no.)	Field of Specialty	Required Degree	Skill of experience	Preference of when recruiting	Scientific Field
Microbiology	Head of microbiology division	1	Overall microbiology testing	Master Degree	Over 5-year experience in microbiology testing room	
	General microbiology	2		Bachelor	Over 1-year experience in testing room	To be attending a microbiology training course
	Microbiology	2	Pathology	Bachelor	Over 3-year experience in testing room	Have Master degree in microbiology
			GMO	Finished master program	Over 1-year experience in testing room	To be attending GMO training course, to have Master degree
Sampling		4		Bachelor		Have practical experience in sampling

The following table describes the employment years of RETAQ center and work contents for each employee (17 persons) after recruiting.

Table 2-62 shows yearly (2018-2020) assignment plan for seventeen permanent staffs employed for RETAQ center. Those staffs are responsible for study and training for their division activities of RETAQ center until the end 2016.

Table 2-62 Assignment plan for Research Staff

Status	year	2018	2019	2020
Head of chemical analysis division	Scope of the Work	Administrative and laboratory management control (chemical division), chemical for chemistry , analytic chemistry, laboratory operation, management		
	2017	Administrative work in RETAQ office. Verification of testing activity in Branches		
	2018	Preparation of planning of approach of the laboratory management, operation and training. Preparation of equipment plan, Operation plan, staff training and development plan for the RETAQ center		
	2019	Prepare Quality control plan, Proficiency test plan. Education of staff in chemical division, prepare laboratory maintenance plan		
	2020	Start operation in RETAQ center. Prepare SOP, GLP document. Prepare accreditation of ISO, access to external Proficiency Test		
Residue Indicator1	Scope of the Work	Organic chemistry, mass spectrogram operation (LC-MS), operation of HPLC. Research and development of newly substance		
	2017	Administrative work in RETAQ office. Verification of testing activity using Mass spectrogram system in Branches		
	2018	Support of preparation of Equipment plan, Management plan, Personal development plan.		
	2019	Operation training at Branches on Mass spectrogram (LC-MS), HPLC, Maintenance of LC equipment.		
	2020	Start operation in RETAQ center of Mass spectrogram (LC/MSMS) and HPLC, R&D of newly substance, preparation of SOP		
Residue Indicator2	Scope of the Work	Organic chemistry, mass spectrogram operation (GC-MS) , operation of GC. Research and development of newly substance		
	2019	Operation training at NAFIQAD Branches on Mass spectrogram (GC-MS) , GC, Maintenance of GC equipment.		
	2020	Start operation in RETAQ center of Mass spectrogram (GC/MSMS) and, R&D of newly substance, preparation of SOP		
Residue Indicator3	Scope of the Work	ELISA assay, Bio assay, A test using the physical and chemical appliance, an evaluation, organic synthesis, a spectrum or absorptiometry.		
	2020	Start operation in RETAQ center, operation of ELISA, UV, VIS, analytical chemistry		
Wet & Ash	Scope of the Work	Inorganic chemistry, General chemistry, Environmental chemistry, training on IMP/MS, and analytical instrumental, maintenance management related equipment		
	2019	Prepare Equipment Plan for inorganic chemistry division of the RETAQ center, Prepare the operation plan, a personnel development plan		
	2020	Operation training at Branches on ICPMS, Prepare Maintenance plan for ICP		
Radiation	Scope of the Work	Radiochemistry, method of the examination of radioactive, training in Branch of the instrumental analysis, Maintenance management, Equipment Plan		
	2019	Operation of the radio-assay equipment, Training in Branch, Preparation of the Maintenance management plan		
	2020	Operation and testing using radiodetector, Preparation of SOP, GLP, Proficiency test, VILAS		
Bio Assay	Scope of the Work	Toxicology, Bioassay method, General chemistry general, Maintenance management of equipment		
	2017	Administrative work in RETAQ office. Verification of testing activity using Mass spectrogram system in Branches		
	2018	Support of preparation of Equipment plan, Management plan, Personal development plan.		
	2019	Operation training at Branches Bio assay		
	2020	Operation and testing using Bioassay method, Preparation of SOP, GLP, Proficiency test, VILAS		
Head of Microbiological analysis division	Scope of the Work	Administrative work, laboratory management control (microbiology division), General microbiology General, food microbiology, laboratory operation, management		
	2017	Administrative work for RETAQ center at initial stage. Verify testing activity in NAFIQAD Branch		
	2018	Prepare laboratory management, operation and training for RETAQ center. Prepare Equipment Plan, Operation plan, personal development plan for the RETAQ center		
	2019	Prepare QC plan, Proficiency test plan. Education of staff of microbiology division. Prepare laboratory maintenance plan for the equipment.		
	2020	Start operation in RETAQ center. Prepare SOP, GLP document. Prepare documents for ISO accreditation , access to external Proficiency Test		
Microbiology1	Scope of the Work	Laboratory management control (microbiology division), Food microbiology, Preparation of Equipment Plan, laboratory operation, management		
	2019	Training at NAFIQAD Branch for Microbiology testing, Support on preparation of Equipment plan, Management plan, Personal development plan.		
	2020	Conduct Microbiological test, prepare laboratory management, GLP document , VILAS certification, External Proficiency Test		
Microbiology2	Scope of the Work	Pathogen microorganism test, Food chemistry, Equipment operation, laboratory management		
	2019	Training at NAFIQAD Branch for Microbiology testing, Support on preparation of Equipment plan		
	2020	Microorganism test, sample processing, laboratory management		
Molecular biology	Scope of the Work	Molecular biology, Genetics, microbiology		
	2017	Administrative work for RETAQ center , Verify testing activity of molecular biology in NAFIQAD Branch		
	2018	Prepare laboratory management, operation and training for RETAQ center. Prepare Equipment Plan, Operation plan, personal development plan.		
	2019	Conduct training in the NAFIQAD branch, Prepare Equipment Plan and operation plan		
	2020	Start operation in RETAQ center. Prepare SOP, GLP document. Prepare documents for ISO accreditation , access to external Proficiency Test		
Genetically modified Organism(GMO)	Scope of the Work	Molecular biology, genetics, pathogen microbiology		
	2019	Training in NAFIQAD branch, Prepare Equipment Plan , an operation plan, and making assists a personnel development plan		
	2020	Start operation in RETAQ center. Conduct GMO study plan, Prepare VILAS( ISO) accreditation		
Head of Sampling & Monitoring	Scope of the Work	Laboratory management control (sampling and monitoring division ),Preparation of sampling plan, Vehicle operation and management plan		
	2017	Administrative work for RETAQ office . Verification of testing activity in Branches		
	2018	Prepare management, operation and training for RETAQ center. Prepare Equipment Plan, Operation plan, personal development plan.		
	2019	Prepare Quality Control plan for staff of sampling division, Prepare laboratory maintenance plan for the equipment		
	2020	Conduct sampling and monitoring plan, prepare, GLP document, VILAS certification		
Sampling & Monitoring 1	Scope of the Work	Food sampling method, Environment sampling method		
	2017	Administrative work in RETAQ office . Verification of testing, sampling and monitoring activity in NAFIQAD Branches		
	2018	Sampling and Monitoring work in NAFIQAD Branch		
	2019	Sampling and monitoring work in NAFIQAD Branch		
	2020	Start operation in RETAQ center.		
Sampling & Monitoring 2	Scope of the Work	Food sampling method, Environment sampling method		
	2017	Sampling and monitoring in NAFIQAD Branches		
	2018	Sampling and Monitoring work in NAFIQAD Branch		
	2019	Sampling and monitoring work in NAFIQAD Branch		
	2020	Start operation in RETAQ center.		
Sampling & Monitoring 3	Scope of the Work	Food sampling method, Environment sampling method		
	2016	Start operation in RETAQ center.		

### 2-4-3 Maintenance/Administration Plan

#### 1) Facilities for Reference Test Building

##### 1. Water Supply, Water Quality, Spatial Gas

Urban water supply is planned to connect to RETAQ center. However, pressure instabilities of water supply in Viet Nam, it is decided to install water-receiving tank by the project and pump up the water as necessary. A separate treatment system is required for high purity water used for laboratory.

##### 2. Waste

Solid and liquid wastes from laboratory in the Reference Test Building are consigned to the private company. General wastewater is treated by the wastewater treatment facility (5t/day); anaerobic treatment and penetrating treatment system installed by the Vietnamese side.

##### 3. Maintenance of air conditioning system and water system.

Maintenance work of Reference Test Building's facilities and equipment is undertaken by the maintenance staff under the control of RETAQ center. The maintenance group consists of one electrical engineer is assigned to the Engineering Section to take care of the practical maintenance of the facilities and equipment. The request for the technical training of those maintenance personnel for enhancement of their technical level of operation and maintenance of the equipment under the Project was requested from the Vietnamese side. The request was examined and decided by the Japanese side to furnish the technical training using soft-component scheme by Japan Grant Aid

##### 4. Legal regulations

It has been confirmed with Construction Management Department of MARD and Detail Design contractor that there were no legal regulations for maintenance for the Reference Test Building.

##### 5. Capacity of electric facilities, voltage fluctuation

The Vietnamese side connects 1,250K-voltage transformer to RETAQ center. However, voltage fluctuation and power cut have been confirmed. It is unavoidable due to variation of electrical demand.

##### 6. Layout plan for testing room in Reference Test Building.

Drawing and layout design to allocated analysis equipment and experiment tables for each testing room were prepared to confirm with the Vietnamese side.

## 2) Equipment

The operation and maintenance of the existing equipment and materials of NAFIQAD Branch is undertaken by the administration staff, which administers the register of materials and equipment, and controls the procurement of replacement parts, reagents and consumables. In principle, the reagents and consumables used in the laboratories of each department are purchased every 4 to 6 months.

The maintenance of the existing equipment of NAFIQAD Branch is basically maintained by the individual engineer and operator in each section, but for the high-level equipment's such as GC/MS, LC/MS/MS, LC/TOF/MS, AAS, ICP/MS used in branch needs special technique are it is difficult to maintain. For those machines, NAFIQAD is having maintenance agreement with products maker, local agent, respective suppliers,

One responsible engineer is to be employed by the RETAQ center, as the maintenance staffs, who have knowledge to conduct appropriate maintenance work for the facility before starting of the procurement stage of the Project.

Required level of an equipment operation at initial stage in 2020 (at opening of RETAQ center) is the practical use of equipment with routine testing work for main component activities. Hence, it is requested the basic training of the main equipment must be completed by the time of equipment delivery.

The equipment installed by the Grant Aid project is design to similar equipment used in NAFIQAD, Branch. Generally, there are differences in manufactures, models, detailed specifications, usability, and maintenance methods between procured equipment by the Grant Aid and current equipment. In addition to this, a computer-controlled system is commonly used for operation of high-level testing equipment for a chemical analysis, and it will require certain period (two to three month) to get familiar with software interface.

The initial operation training and an operation instruction are conducted to a user by contractor during construction. However, this operation training is focused on initial operation and not instruction skill of practical testing that RETAQ center will implement. Thus, operation level of equipment will be established few months after opening of RETAQ center.

## 2-5 Project Cost Estimation

### 2-5-1 Initial Cost Estimation

#### (1) Cost to be borne by the Vietnamese side

Cost to be borne by the Vietnamese side is as follow.

Table 2-63 Contents and cost to be borne by the Vietnamese side

	Contents	(VND)	Remark
I	Facility Installation		
	Construction work *	52,731,032,250	
	Facilities	9,115,747,105	
	Site acquisition	3,698,684,908	
	Project administration	1,218,666,152	
	Consulting service for construction work	3,742,783,155	
	Others	3,282,386,317	
	Contingency	5,423,023,112	
	Total:	79,212,322,999	

\* Allocated budget for REAQ project is 79,212,323,000 VND (in accordance with Decision No.3515/QD-BNN-XD, August 8, 2016), in order to smooth implementation of the ODA project, the Vietnamese side commit to allocate at least 59,467,317,887 VND for completion of the reference testing building of RETAQ project

#### (2) Conditions of estimation

- ① Estimation timing: August 2017
- ② Exchange rate: 1 USD = 112.83 Yen  
1 VND = 0.004846 Yen
- ③ Construction period:  
Detail design and construction period are described in the implementation process.
- ④ Others: This plan is implemented under Grant Aid Scheme of Japan's Government.

### 2-5-2 Operation and Maintenance Costs

#### (1) Administration/Maintenance costs

In the RETAQ center, the cost necessary for management of Testing building are required and roughly estimated as follow.

Table 2-64 Approximate estimation result of sustainable management

(unit: million Dong)

Items	First fiscal year	From the next fiscal year	Notes
① Electricity charge	3,280.44	3,280.44	
② Water supply charge	10.06	10.06	
③ Gas charge	0.00	0.00	
④ Diesel fuel cost	192.00	192.00	
⑤ Replacement cost of consumables like filter or scrubber	0.00	12.00	(Scrubber, draft etc.)
⑥ Maintenance cost of facilities	0.00	275.09	
⑦ Waste collecting service (Test waste)	233.40	233.40	
Subtotal	3,716.44	3,716.44	
⑧⑨⑩ Cost related to equipment	2,260.48	4,003.53	⑧cost of consumables, reagent ⑨cost of spare parts ⑩cost of equipment maintenance contract
Total	5,976.92	7,572.53	
Reserve fund (10%)	597.69	757.25	
Total	6,574.61	8,329.78	

## 1) Estimation of electric consumption

Under the regulations of Hanoi Electric Power Corporation, system of electricity charge to be applied in the building to be built under the Project is as follows.

Basic charges: not necessary

Metered per charges: 4,068 VND/kw h (tax included)

In the total of 1,250 kW of transformer capacity is to be installed in RETAQ center by the Vietnamese side, average electric power used for the building by the Project are estimated to 420kW, almost equivalent to 33% of contracted capacity. Air-conditioning facilities for testing building are assumed to be limited to operate during the daytime, which staffs are on operation.

Electric consumption is calculated as follows:

Metered charge:

$4,068 \text{ VND/kWh} \times 420 \text{ kW} \times 8 \text{ h} \times 20 \text{ days} \times 12 \text{ months} = 3,280,435,200 \text{ VND/year.}$

Thus, the annual electricity charge will be 3,280,435,200 VND / year.

## 2) Estimation of water consumption

Under regulations of Hanoi Water Supply Corporation, system of water charge to be applied in the building to be built under the Project is as follow.

Basic charge: unnecessary

Metered charge: 10,500 VND/m<sup>3</sup> (tax included)

For the quantity of water supply to be used in the building to be built under the Project, if calculating from number of planned personnel, it is 5m<sup>3</sup>/day (50 personnel x 30 liter/person), and it is assumed to be sufficient for testing works.

Calculation formula is as follow.

Metered charge:

10,500 VND/m<sup>3</sup> x 5 m<sup>3</sup>/day x 20 days x 12months= 12,600,000 VND/year

Thus, the annual water supply charge will be 12,600,000 VND/year.

### 3) Gas charge

In the RETAQ center, the general gas will not be used.

### 4) Estimation of Diesel oil /fuel consumption

Diesel oil is used as fuel for emergency generator. The fuel of own-brand emergency generator is 42 liter/h (fuel consumption of 300 kVA), and consumption time per month estimated with due consideration to trial operation time as well as power cut frequency of twice-three times per month is 20 hours. Unit price of diesel oil is 20,000 VND/liter.

Annual fuel consumption quantity: 42 liter/h x 20 h x 12 months = 9,600 liter /year

Annual fuel cost: 20,000 VND/m x 9,600 liter = 19,200,000 VND/year

Thus, annual fuel charge will be 192,000,000 VND/year

### 5) Cost of replacing parts (filters)

Air conditioning equipment and outdoor-air processing unit are installed for intake to testing room of RETAQ center. Pre-filter as well as HEPA filter are installed in the air conditioning equipment. The dry-type (active carbon) and wet-type (neutralized) scrubbers are also installed for outlet air from draft chamber which used for chemical analysis.

The replacement filters are frequency require as follows scheduling, however temporally recycling and cleaning is one option for ecological use of the pre-filters instead of replacing every year.

Replacement frequency (per 1 piece):

BS cabinet	Intake filter	Once/year (120,000 Yen)
	Outlet filter	Once/year (72,000 Yen)
Clean bench	Intake filter	Once/year (120,000 Yen)
Draft chamber	Vinyl lock filter	Once/year (23,800 Yen)
Scrubber (dry-type)	Filler/filter	1 type/year (3,500,000 Yen x 8 pieces)
	Consumables of fan	1 type/year (100,000 Yen)
Scrubber (wet-type)	Filler/filter	1 type/year (400,000 Yen)
	Consumables of fan	1 type/year (100,000 Yen)

These consumables are requested to replace after 2 years.

BS cabinet                    3 pieces    x (120,000 Yen + 72,000 Yen) = 192,000 Yen

Clean bench                12 pieces   x (120,000 Yen) = 1,440,000 Yen

Draft chamber              13 pieces   x (23,800 Yen) = 309,400 Yen

Scrubber (dry-type)        2 pieces    x (3,600,000 Yen + 100,000 Yen) = 7,400,000 Yen

Scrubber (wet-type)       2 pieces    x (400,000 Yen + 100,000 Yen) = 1,000,000 Yen

Thus, the annual filter replacement cost will be 10,341,400 Yen/year (nearly 2,248,130,000 VND).

However, as they are newly installed facilities, replacement is unnecessary in the first fiscal year, and it becomes necessary from the second year after completing facility construction.

#### 6) Building maintenance cost

The interior finish materials will be chosen for the interior facilities that the Japanese side implements so that maintenance and management will be simply implemented. Lengthy PVC sheet is used for the floor, and calcium silicate board is used for the wall. In such a situation, the maintenance cost to be spent for repair and spare parts procurement of interior, air conditioning equipment, electricity supply equipment, aeration and evacuation system of the building is estimated at 100,000 VND/m<sup>2</sup>/year, equivalent to 1/3-1/4 of Japan.

Maintenance cost to be spent for repair of facility is also estimated about 1% of that facility cost. Therefore, annual maintenance cost of the building will be

$100,000 \text{ VND/m}^2/\text{year} \times 2,000 \text{ m}^2 = 200,000,000 \text{ VND/year}$ ,

annual maintenance cost of facility will be that

facility cost x 1% = 350,000 Yen;

(Necessary from the second fiscal year)

#### 7) Laboratory waste collecting service costs

For treatment cost of testing sewage generated in testing of RETAQ center, it is presumed that exhaust quantity of organic solution will be 50l/month and incombustible waste to be exhausted from microbiology testing will be 40kg/month; and cost for each is calculated in reference to sewage treatment cost of Branch 4.

Waste from microbiology testing: fixed amount 17,000,000 VND/month x 12 months = 204,000,000 VND/year

Sewage of organic solvent: 33,000 VND/month x 50L x 12 months = 19,800,000 VND/year

Sewage of plastic products or glass products: 20,000 VND/kg x 40 x 12 months = 9,600,000 VND/year

Therefore, annual cost of 2,33,400,000 VND will be necessary from the first fiscal year.



8) Cost of consumables and reagents (first fiscal year): 2,260,485,395 +VND/year

From second year, testing sample is estimated to increase by 20 %. Cost of consumables, reagents from the next fiscal year will be calculated from following:

$$\text{first fiscal year} \times 20\% + 856,764,315 = 3,569,346,789 \text{ VND/year}$$

[Consumable items require from the first year]

No.	Equipment Name	Contents	QTY			Consumables (amount)		
1	LC/MS/MS	(Argon gas)	2	type x	@	125,000	=	250,000
2	HPLC	(Acetonitrile)	2	type x	@	500,000	=	1,000,000
3	GC	(Helium gas)	3	type x	@	312,500	=	937,500
4	GC/MS/MS	(Helium gas)	1	type x	@	375,000	=	375,000
5	atomic absorption photometer (AAS)	(Acetylene)	1	type x	@	625,000	=	625,000
6	ICP-MS	(Argon gas)	1	type x	@	625,000	=	625,000
7	ion chromatograph	(Solvent)	1	type x	@	120,000	=	120,000
8	Nitrogen analysis apparatus	(ceiling)	2	pieces x	@	160,160	=	320,320
9	Nitrogen analysis apparatus	(grass wall)	1	pieces x	@	30,000	=	30,000
10	Gamma ray analysis	(case)	2	type x	@	15,000	=	30,000
11	Water treatment system	(Ion resin, sterilization lamp)	5	type x	@	70,000	=	350,000
12	Pure water treatment system	RO coat, lamp, resin	4	type x	@	424,00	=	1,696,000
13	Laboratory washer	(detergent, ion-exchange resin)	2	type x	@	40,000	=	80,000
14	pH meter	(Electrode)	2	pieces x	@	30,000	=	60,000
15	Clean bench	(Fluorescent, UV lamp)	4	pieces x	@	40,000	=	160,000
16	Clean bench (BS)	(Lamp, filter)	4	pieces x	@	200,000	=	800,000
17	Draft chamber	(Same kind of filter)	11	pieces x	@	200,000	=	2,200,000
18	Soxhlet extractor	(Reagent)	2	type x	@	200,000	=	400,000
19	Pass box	(UV lamp)	10	pieces x	@	18,00	=	180,00
20	Lyphophilizator	(glass fixture, oil)	2	type x	@	50,000	=	100,000
21	Seamer (bottle)	(glass fixture)	1	piece x	@	6,000	=	6,000
22	Seamer (can)	(glass fixture)	1	pieces x	@	30,000	=	30,000
23	nitrogen production apparatus	(kind of filter)	3	pieces x	@	10,000	=	30,000
24	Pickup vehicle	(fuel, insurance)	1	pieces x	@	120,000	=	120,000
Subtotal						10,524,820 Yen		
								2,260,485,395 VND

Spare parts

1	RT-PCR	(reagent, well)	2	year x	@	20,000	=	40,000
2	UV-VIS	(cell, lamp)	1	year x	@	62,500	=	62,500

[Items to be necessary from the second year]

Yearly maintenance service by manufacture

1	GPC clean up	(2-3 times/year)	1	type x	@	125,000	=	125,000
2	LC/MS/MS, LC/TOF/MS	(2-3 times/year)	2	type x	@	1,250,000	=	2,500,000
3	H+PC	(2-3 times/year)	2	type x	@	625,000	=	1,250,000
4	GC	(2-3 times/year)	3	type x	@	625,000	=	1,875,000
5	GC/MS/MS	(2-3 times/year)	1	type x	@	1,250,000	=	1,250,000
7	atomic absorption photometer (AAS)	(2-3 times/year)	1	type x	@	500,000	=	500,000
9	ICP-MS	(2-3 times/year)	1	type x	@	375,000	=	375,000
10	ion chromatograph	(2-3 times/year)	1	type x	@	625,000	=	625,000

Subtotal 8,568,500 Yen

1, 840, 313, 574VND

(2) Financial situation

Vietnamese side agree to prepare following budget for initial operation of RETAQ center in addition to construction budget of Reference testing building.

	Contents	(VND)	Remark
II	Counterpart fund (Enhancing laboratory capacities of the RETAQ center project)	26,599,000,000	
	Chemicals, material for chemical testing department (first year operation)	14,871,000,000	
	Chemicals, material for biological testing department (first year operation)	6,693,000,000	
	Laboratory Tools	1,049,000,000	
	Equipment Calibration cost	996,000,000	
	Project administration	1,948,000,000	
	Banking arrangement	322,000,000	
	Others (storehouse building, security)	720,000,000	
	Total:	53,198,000,000	

Source: NAFIQAD

Annual budget for operation and sustainable management of the RETAQ center is 5 billion Dong/year in year of 2013 (approximately 25 million Yen, including salary of 12 personnel). As the number of staffs are planned to increase up to 51 staff at the start of RETAQ center in 2020, the required budget will gently increase every year and its expenses would presume to be 105 million Yen. In the case of Can Tho Branch (Branch 6), where 100 staffs has been employed, the annual operation and sustainable management cost is estimated to 40 billion dong (200 million Yen).

The budget necessary for training of the laboratory staffs are subsidize from the training budget of Viet Nam Governments, utilization of reserve fund of the NAFIQAD, and the fund of other donors (ADB, UNDP, etc.). Part of the inspection revenue obtained at the NAFIQAD branch are collected to NAFIQAD headquarters, and those budget is saved to use as maintenance budget for NAFIQAD Laboratory. At the start of the RETAQ center in 2020, this budget is used to obtain testing consumables for activity of laboratory works are require. the Vietnamese side must prepare testing chemicals, standard chemicals, solvent, and special gases, accordingly.

The operating revenue and expenditure plan made by NAFIQAD is as follow. As revenue including parts earned from testing fee in fiscal 2022 is estimated to 90 million Yen, which is possible to say this budget scale is properly planned. Meanwhile, as the new testing items will be added; and facilities of central air conditioning system will be highly enhanced in RETAQ center in comparison with the existing branches, the additional sustainable management cost becomes necessary. However, as testing cost (expense of chemical, water, electric) based on data obtained from Branch 6 is estimated to 50%, the remaining amount (35%, exclude 15% tax) can be allocated to this sustainable management cost.

Table 2-65 Operating revenue and expenditure plan of RETAQ center

(Unit: million Dong)

	Contents	Fiscal 2020	Fiscal 2021	Fiscal 2022
I	Total budget of Government's revenue and expenditure	8,396	13,666	17,995
	Budget granted by Government	3,000	4,500	6,000
II	Income earned from testing fee	5,396	9,166	11,995
	Total expenditure	8,396	13,666	17,995
	Exchanged to Yen	(Approximately 42 million Yen)	(Approximately 68 million Yen)	(Approximately 90 million Yen)

Source: NAFIQAD

Notes:

- Total expenditure includes the expenses of procurement of facilities for center's activities, facilities renewal and expansion.
- Total budget of Government's revenue and expenditure is got from the income earned from testing fee or budget granted by Government.

### 3. Project Evaluation

#### 3-1 Preconditions

The preconditions for the implementation of the Project require the Vietnamese side to carry out the following key processes:

1. To obtain Environmental Permits, etc.  
To provide prior notices and presentation to the stakeholders who are under influence of the project.
2. To initiate EIA or EPA procedures  
To obtain Environmental Permits from DEC  
To obtain any permit required for construction work and material or equipment procurement
3. To secure land for construction, etc.  
To secure land for the Project Site  
To demolish and remove the existing buildings and any obstacle  
To secure land for a temporary yard, local offices, etc.  
To prohibit unauthorized access to the site
4. To establish measures to facilitate a progress of the Project  
To execute the Banking Arrangement (B/A) and issue A/P  
To grant entry visa and residence permits to Japanese personnel engaged to this Project.  
To ensure security during their stay  
To ensure tax-exemption and custom clearance required for any construction work or material or equipment procurement  
To ensure Japanese or Japanese legal entities exempted from any tax or levy in Viet Nam in connection with the construction work /or any material /or equipment procurement for the Project
5. Construction work allocated to the Viet Nam  
To place water piping, electric wires and telephone cables to the Project site  
To procure office equipment, devices and furniture  
To prepare fences and gates for the RETAQ center.

### **3-2 Necessary Inputs by Recipient Country**

The items that need to be undertaken by the Vietnamese side in order to ensure the actualization and maintenance of the Project are as follows:

1. Operation and maintenance  
To secure the human resources as well as operation and maintenance costs required for the Project and to perform appropriate and effective operation and maintenance of the facilities and equipment
2. To follow up with effects of the Project  
To conduct regular and continuous measurement for the effects of this Project in order to understand the precise results for the continuous progress of the Project
3. Implement and continue the training geared to utilizing the outputs of the soft component.
4. Employees (laboratory staff and maintenance personnel) who have received training will operate and maintain the procured equipment on a continuous basis.
5. Secure the necessary budget for operation and maintenance.

### **3-3 Important Assumptions**

The followings are the important assumptions to realize and maintain the effectiveness by the Project.

1. The external conditions that need to be in place in order to ensure the actualization and maintenance of the Project effects are as follows.
2. There will be no changes in SPS measures related to inspection system and import and export of food policies plans in Viet Nam.

### **3-4 Project Evaluations**

#### **3-4-1 Relevance**

The Project is deemed to be valid for implementation under the Government of Japan's Grant Aid scheme from the following reasons

- (1) Viet Nam has been making efforts to implement the Agreement on Sanitary Phytosanitary (SPS) Measures since joining in WTO. In November 2008, Viet Nam Prime Minister signed the decision on the 'National Action Plan' on the promotion of the implementing requirements of SPS agreement for promoting WTO obligations. The decision refers to providing safe agricultural products to domestic and foreign market, through promoting food hygiene and controlling pest and infectious disease from other countries by function of RETAQ center.

- (2) The project is consistent with Japan’s policy to support for improving the system of food safety, enhancement of quarantine system of Agriculture-Forestry and Fishery products such as protecting the variety of plans and improving the technical capacity, while considering the environmental changes and effect to agriculture after joining in WTO, as noted in the Assistance Plan to Viet Nam in July in 2009.
- (3) Japan and Viet Nam have signed the Economic Partnership Agreement (EPA) in December in 2008, where Japan announced to its support to “SPS Project of Viet Nam” for improving capacity to implement SPS Policy.

### 3-4-2 Effectiveness

The following effects are expected through the implementation of this Project:

#### (1) Quantitative effects

Quantitative index	Basal index 2020 (Before operation)	Target index 2013 3 years after operation
Foods safety		
Proficiency test	0	600
Reference test	0	200
Risk Analysis	0	150
Number of the sampled from National monitoring program		1,750
Residue analysis	0	500
Bivalve shells	0	750
Post harvesting program	0	500
Number of the samples for residual test and examination from import/export food product		
Physiochemical and Microbiological division	0	5,000
Examination of sample from private company	0	300
	Total	9,750

#### (2) Qualitative Effects

Project implementation will impart the following qualitative effects.

- 1) Improvement of inspection capacity in RETAQ center will improve the reliability of food safety control for imported and exported foods.
- 2) Expansion of sampling and monitoring capacity in the northern region by RETAQ center can improve hazard analysis with quick and fast response.
- 3) Improvement of the reference testing activity in RETAQ center can enhance accuracy and sensitivity of result obtained in official food testing laboratories.

- 4) Implementing of soft components can secure proper techniques for laboratory waste control and systematic operation, which can improve labour safety and supervision techniques.
- 5) Including of facility operators to the soft component can enhance sustainable operation of facilities (central air conditioning, exhaust system, neutralization apparatus) to be maintained.
- 6) Securement of proper facility can assure health safety of staffs in RETAQ center.
- 7) Proper and accurate information relating to food safety can be provide from RETAQ center to universities institutes and related food stakeholder